Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Circuit High	B2B02	This DTC will detect when the blower motor feedback hardwire circuit signal is too out of range high. This includes some non-OBD failures in the blower system, open, and short to 12 V. Blower Motor Speed Return Circuit High Diagnostic will consume the Climate Control Front Blower Fan Speed Feedback Wire Duty Cycle High Fault Status from the OBD Smart Device "BCM" and increment the failure counter when a fail occurs. X of Y will determine fault maturation and when to set the DTC.	Duty Cycle	Climate Control Front Blower Fan Speed Feedback Out of Range High Fault Status = "FAIL"	No active DTC's:	High Speed CAN enabled U0140 Loss of Comm BCM FA Not Set B2B38 Message Counter Incorrect FA not Set	8 failures out of 10 samples 1 sample per second	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Circuit Low	B2B03	This DTC will detect when the blower motor feedback hardwire circuit signal is out of range low. This includes some internal blower failures and short to ground conditions. Blower Motor Speed Return Circuit Low Diagnostic will consume the Climate Control Front Blower Fan Speed Feedback Wire Duty Cycle Low Fault Status from OBD Smart Device "BCM" and increment the failure counter when a fail occurs. X of Y will determine fault maturation and when to set the DTC.	Duty Cycle	Climate Control Front Blower Fan Speed Feedback Out of Range Low Fault Status = "FAIL"	No active DTC's:	High Speed CAN enabled U0140 Loss of Comm BCM FA Not Set B2B38 Message Counter Incorrect FA not Set	8 failures out of 10 samples 1 sample per second	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Feedback Circuit Out of Range High	B2B0B	This DTC will detect when the blower motor feedback sensor is reporting a value above the maximum allowed. Blower Motor Speed Feedback Circuit Out of Range High Diagnostic will consume the Climate Control Front Blower Fan Speed Feedback Frequency from the OBD Smart Device "BCM" and increment the failure counter when a fail occurs. X of Y will determine fault maturation and when to set the DTC.	DC frequency	> 200 Hertz	No active DTC's:	High Speed CAN enabled U0140 Loss of Comm BCM FA Not Set B2B38 Message Counter Incorrect FA not Set B2B02 FA Not Set B2B03 FA Not Set	8 failures out of 10 samples 1 Sec / Sample	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Feedback Circuit Out of Range Low	B2B0C	This DTC will detect when the blower motor feedback sensor is reporting a value less then the minimum allowed. Blower Motor Speed Feedback Circuit Out of Range Low Diagnostic will consume the Climate Control Front Blower Fan Speed Feedback Frequency from the OBD Smart Device "BCM" and increment the failure counter when a fail occurs. X of Y will determine fault maturation and when to set the DTC.	DC frequency	< 45 Hertz	No active DTC's:	High Speed CAN enabled U0140 Loss of Comm BCM FA Not Set B2B38 Message Counter Incorrect FA not Set B2B02 FA Not Set B2B03 FA Not Set	8 failures out of 10 samples 1 Sec / Sample	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Ignition Switch Run/ Start Position Circuit Low	B2B0D	This DTC monitors for a CGM Ignition Switch Run/Start Position Circuit Low error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Ignition Switch Run/Start Position Circuit Low DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Ignition Switch Run/ Start Position Circuit High	B2B0E	This DTC monitors for a CGM Ignition Switch Run/Start Position Circuit High error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Ignition Switch Run/Start Position Circuit High DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Control Module Memory Failure	B2B12	This DTC monitors for a CGM Control Module Memory Failure error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Control Module Memory Failure DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Control Module Internal Performance Failure	B2B13	This DTC monitors for a CGM Control Module Internal Performance Failure error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Control Module Internal Performance Failure DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Blower Fan Feedback Message Counter Incorrect	B2B38	This DTC monitors for an error in communication with the Front Blower Fan Feedback Message.	Communication of the Alive Rolling Count or Protection Value of the Front Blower Fan Feedback Message over CAN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Steering Wheel Angle Sensor Signal Message Counter Incorrect	C1211	This DTC monitors for an error in the Steering Wheel Angle Sensor Signal Message Counter	Communication of the Alive Rolling Count or Protection Value from the Steering Wheel Angle Sensor over CAN bus is incorrect for out of total samples	 >= 15.00 counts >= 16.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type C, No SVS "Safety Emissions Neutral Diagnostic"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit Low	C124F	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	≤ -3.8500 g ≥ -3.8500 g (≤ 0.5 Ω impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit High	C1250	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	≥ 3.8500 g ≤ 3.8500 g (≤ 0.5 Ω impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Performance	C1251	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a signal value that is stuck in a valid range by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal) update raw lateral acceleration signal fail, 50 millisecond update rate	≥ 0.5300 g ≤ 3.8500 g	battery voltage run crank voltage diagnostic monitor enable update raw lateral acceleration signal stablity time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw lateral acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean ≥ 15.0 KPH = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit Low	C1252	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	≤ -3.8500 g ≥ -3.8500 g (≤ 0.5 Ω impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time ≥ 15.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit High	C1253	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	≥ 3.8500 g ≤ 3.8500 g (≤ 0.5 Ω impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Performance	C1254	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal rationalized against the TOSS vehicle speed acceleration. The diagnostic monitor can be designed to detect an invalid longitudinal acceleration signal based on the TOSS vehicle speed windows and TOSS vehicle speed acceleration, 4 windows can be enabled. The delta between the TOSS vehicle speed acceleration and longitudinal acceleration signal is taken within each window to verify the delta is small, no failure indicated, or the delta is large indicating the longitudinal acceleration signal is in error. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 1 fail time, 50 millisecond update rate	≥ 0.5300 g	battery voltage run crank voltage diagnostic monitor enable region 1 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 1 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≥ 80.0 Nm ≥ 0.1500 g ≥ 15.0 KPH ≤ 200.0 KPH	raw longitudinal acceleration signal stability time ≥ 10.0 seconds raw longitudinal acceleration signal fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate region 1 fail time ≥ 75.0 seconds out of region 1 sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	< 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 2 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 2 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal)	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds raw longitudinal acceleration signal fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate region 2 fail time ≥ 75.0 seconds out of region 2 sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					update region 2 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	 ≤ 0.70 % ≥ 80.0 Nm ≥ 0.1500 g ≥ 0.0 KPH ≤ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 3 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds raw longitudinal acceleration signal fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate region 3 fail time ≥ 75.0 seconds out of region 3 sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 3 sample time: brake pedal position engine torque ABS(TOSS vehicle speed acceleration) TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≥ 80.0 Nm ≤ 0.1000 g ≥ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal fail time, 50 millisecond update rate update raw longitudinal acceleration signal region 4 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds raw longitudinal acceleration signal fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 4 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≤ 80.0 Nm ≤ 0.1500 g ≥ 0.0 KPH ≤ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 4 fail time ≥ 75.0 seconds out of region 4 sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric Park Brake Availability Status Message Counter Incorrect	C1280	This DTC monitors for an error in communication with the Electric Park Brake Availability Status Signals.	Communication of the Alive Rolling Count or Protection Value of the Electric Park Brake Availability Status Signals over CAN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Electric Park Brake Application Status Message Counter Incorrect	C1281	This DTC monitors for an error in communication with the Electric Park Brake Application Status Signals.	Communication of the Alive Rolling Count or Protection Value of the Electric Park Brake Application Status Signals over CAN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position	4 cam sensor pulses less than or greater than nominal position in one cam revolution.	-8.1 Crank Degrees 10.1 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning No Active DTCs: Time since last execution of diagnostic	 CrankSensor_FA P0340, P0341 < 0.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Outside Air Temperature (OAT) Sensor Circuit Performance (OAT wired to ECM)	P0071	Detects an Outside Air Temperature (OAT) sensor that is stuck in range. There are two components to the test: an engine off component, and an engine running component. If the engine has been off for a long enough period of time, and the coolant temperature and Intake Air Temperature (IAT) values are similar, then the air temperature values in the engine compartment of the vehicle are considered to have equalized. In this case, the engine off component of the diagnostic can be enabled. If the IAT and the OAT values are similar, then the OAT Performance Diagnostic passes. If the IAT and OAT values are not similar, the diagnostic will continue to monitor the IAT and the OAT as the vehicle starts to move. For applications that have ability to move without engaging the internal combustion	**Engine Off:** If IAT >= OAT: IAT - OAT	> 15.0 deg C	Time between current ignition cycle and the last time the engine was running	>= 28,800.0 seconds	Executed every 100 msec until a pass or fail decision is made	Type A, 1 Trips
			If IAT < OAT: OAT - IAT	> 15.0 deg C	Engine is not running			
					Vehicle Speed	>= 15.5 MPH		
			If either of the following conditions are met, this diagnostic will pass:		Coolant Temperature - IAT	< 15.0 deg C		
					IAT - Coolant Temperature	< 15.0 deg C		
			If IAT >= OAT: IAT - OAT	<= 15.0 deg C	OAT-to-IAT engine off equilibrium counter	>= 300.0 counts		
			If IAT < OAT: OAT - IAT	<= 15.0 deg C	The "OAT-to-IAT engine off equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is off. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Off**			
					No Active DTCs:	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngineModeNotRunTimer Error		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		engine, the engine off test will continue. If the vehicle has been moving quickly enough for a long enough period of time, the IAT and OAT values should have reached an equilibrium. This period of time is defined by the "OAT-to-IAT engine off equilibrium counter". The "OAT-to-IAT engine off equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is off. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. While the "OAT-to-IAT engine off equilibrium counter" is counting, IAT and OAT are monitored for similarity. If they are similar, the OAT Performance Diagnostic passes. If the counter reaches an equilibrium and the IAT and OAT values are not similar, the OAT Performance Diagnostic will fail.	<u>**Engine Running:**</u> If IAT >= OAT: IAT - OAT If IAT < OAT: OAT - IAT If either of the following conditions are met, this diagnostic will pass: If IAT >= OAT: IAT - OAT If IAT < OAT: OAT - IAT	> 15.0 deg C > 15.0 deg C <= 15.0 deg C <= 15.0 deg C	Time between current ignition cycle and the last time the engine was running Engine is running Vehicle Speed Engine air flow OAT-to-IAT engine running equilibrium counter The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed and engine air flow when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table **P0071: OAT Performance Drive Equilibrium Engine Running** No Active DTCs:	>= 28,800.0 seconds >= 15.5 MPH >= 10.0 grams/second >= 300.0 counts VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngineModeNotRunTimer Error	Executed every 100 msec until a pass or fail decision is made	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		If the engine off component of the diagnostic was enabled, but did not make a pass or fail decision, the engine running component will begin executing when the internal combustion engine starts to run. If the vehicle has been moving quickly enough for a long enough period of time, the IAT and OAT values should have reached an equilibrium. This period of time is defined by the "OAT-to-IAT engine running equilibrium counter". The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. While the "OAT-to-IAT engine running equilibrium counter" is counting, IAT and OAT are monitored for						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		similarity. If they are similar, the OAT Performance Diagnostic passes. If the counter reaches an equilibrium and the IAT and OAT values are not similar, the OAT Performance Diagnostic will fail.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Outside Air Temperature (OAT) Sensor Circuit Low	P0072	Detects a continuous short to ground in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too low. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw OAT Input	<= 46 Ohms (~150 deg C)	Continuous		40 failures out of 50 samples 1 sample every 100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Outside Air Temperature (OAT) Sensor Circuit High	P0073	Detects a continuous open circuit in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too high. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw OAT Input	>= 427,757 Ohms (~-60 deg C)	Continuous		40 failures out of 50 samples 1 sample every 100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Outside Air Temperature (OAT) Sensor Intermittent In-Range	P0074	Detects a noisy or erratic signal in the Outside Air Temperature (OAT) circuit by monitoring the OAT sensor and failing the diagnostic when the OAT signal has a noisier output than is expected. When the value of the OAT signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of OAT readings. The result of this summation is called a “string length”. Since the OAT signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic OAT signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current OAT reading - OAT reading from 100 milliseconds previous)	> 100 deg C 10 consecutive OAT readings		Continuous	4 failures out of 5 samples Each sample takes 1.0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure (FRP) Too Low	P0087	Determine if rail pressure is below an absolute value.	Rail pressure	< 0 to 15 MPa (see table **P0087 Minimum rail pressure**)	Run crank voltage Engine running, cranking excluded, for a time No IFT running (refer to FUL_IFT_St) No engine shut down request LowFuelConditionDiagnostic Fuel pressure estimated at high pressure pump inlet is valid Fuel pressure estimated at high pressure pump inlet No DTC active:	≥ 11.0 V >= 30.00 s = FALSE >= 400.00 kPa FuelPumpRlyCktFA P0091 P2294 P2296	113 failures out of 162 samples 6.25 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator 1 Performance	P0089	Determine when rail pressure is above maximum threshold when pressure is governed by Fuel Metering Unit valve.	Rail pressure	> 68 to 268 MPa (see table **P0089 Maximum rail pressure with MU**)	Run crank voltage Rail pressure is governed by Fuel Metering Unit (refer to *RailPresCntrl*)	≥ 11.0 V	41 failures out of 82 samples OR 41 continuous failures out of 82 samples 6.25 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid 1 Control Circuit	P0090	This DTC detects an Open Circuit on the Fuel Metering Unit valve	Current low across High and Low Side drivers during ON state indicates an open circuit.	Impedence between High Side and Low Side pins of the Fuel Metering Unit valve ≥ 200 kΩ	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7 failures out of 10 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid 1 Control Circuit Low Voltage	P0091	This DTC detects a short circuit to ground of the Low Side driver circuit of the Fuel Metering Unit valve	Voltage low across Low Side driver during OFF state indicates short-to-ground.	Impedence between Low Side pin of the Fuel Metering Unit valve and the controller ground ≤ 0.5 Ω.	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7 failures out of 10 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid 1 Control Circuit High Voltage	P0092	This DTC detects a short circuit to power of the Low Side driver circuit of the Fuel Metering Unit valve	Voltage high across Low Side driver during ON state indicates short to power.	Impedence between Low Side pin of the Fuel Metering Unit valve and the controller power ≤ 0.5 Ω.	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7 failures out of 10 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 2 Circuit Performance (applications with IAT, IAT2 and IAT3)	P0096	Detects an Intake Air Temperature 2 (IAT2) sensor value that is stuck in range by comparing the IAT2 sensor value against the IAT and IAT3 sensor values and failing the diagnostic if the IAT2 value is more different than the IAT and IAT3 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT and IAT3 values are similar, and the IAT2 value is not similar to the IAT and IAT3 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT2 value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**Good Correlation Between IAT and IAT3** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	> 25 deg C <= 25 deg C > 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			Not Good Correlation, IAT in Middle Power Up IAT is between Power Up IAT2 and Power Up IAT3 AND ABS(Power Up IAT2 - Power Up IAT3) AND ABS(Power Up IAT - Power Up IAT2) > ABS(Power Up IAT - Power Up IAT3)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		ignition cycle if the enable conditions are met.	**Not Good Correlation, IAT3 in Middle** Power Up IAT3 is between Power Up IAT and Power Up IAT2 AND ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT3 - Power Up IAT2) > ABS(Power Up IAT3 - Power Up IAT)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 Low (applications with LIN MAF)	P0097	Detects an erroneously low value being reported over the LIN serial connection from the Intake Air Temperature 2 (IAT2) sensor. The diagnostic monitors the IAT2 sensor output temperature and fails the diagnostic when the IAT2 temperature is too low. The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT 2 Temperature	< -60 degrees C	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 High (applications with LIN MAF)	P0098	Detects an erroneously high value being reported over the LIN serial connection from the Intake Air Temperature 2 (IAT2) sensor. The diagnostic monitors the IAT2 sensor output temperature and fails the diagnostic when the IAT2 temperature is too high. The IAT2 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT 2 Temperature	> 150 degrees C	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 2 Intermittent In-Range	P0099	Detects a noisy or erratic signal in the Intake Air Temperature 2 (IAT2) circuit by monitoring the IAT2 sensor and failing the diagnostic when the IAT2 signal has a noisier output than is expected. When the value of the IAT2 signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT2 readings. The result of this summation is called a “string length”. Since the IAT2 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT2 signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT 2 reading - IAT 2 reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT 2 readings	Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit Low Voltage (Diesel L6 ATM)	P00B3	Circuit Continuity This DTC detects a short to ground in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resitance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit High Voltage (Diesel L6 ATM)	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temperature Sensor Circuit Intermittent/ Erratic (Diesel L6 ATM)	P00B5	Circuit Erratic This DTC detects large step changes in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	EECR_RCT_Erratic_TFT KO EECR_RCT_CktHiLo_FA	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Multiple Pressure Sensor Correlation Performance (3 intake air pressure sensor configuration)	P00C7	This monitor is used to identify if BARO, MAP and TCIAP pressure values are irrational when compared to each other. The plausibility monitor compares the BARO, MAP and TCIAP pressures in two different conditions: - at idle (part of the test enabled when the engine is running) - between key off and when the engine starts running (part of the test enabled when the engine is not running). If the engine has been off for a sufficient amount of time, the pressure values in the induction system will have equalized. The BARO, MAP and TCIAP sensors values are checked to see if they are within the normal expected atmospheric pressure range. If they are, then BARO, MAP and TCIAP are compared to see if their values are similar. If the three sensors are not in agreement the monitor is not able to pinpoint the sensor(s)	Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between BARO sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor	> **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] > **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] > **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa]	Correlation diagnostic enabled by calibration Engine is running Run Crankrelay supply voltage in range Engine speed Requested fuel Throttle measured position Engine Coolant Temperature No faults are present	== 1.00 > 11.00 [V] < 950.00 [rpm] < 40.00 [mm^3] > 90.00 [%] > 70.00 [°C] CrankSensor_FA ==FALSE FUL_GenericInjSysFA ==FALSE TPS_PstnSnsrFA ==FALSE MAP_SensorCircuitFA ==FALSE AAP2_SnsrCktFA ==FALSE AAP_AAP5_SnsrCktFA ==FALSE AAP_AAP2_SnsrStabFA ==FALSE AAP_AAP5_SnsrStabFA ==FALSE ECT_Sensor_FA	480.00 fail counters over 600.00 sample counters sampling time is 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		that is/are not working correctly and therefore indicates that there is a fault that impacts the three sensors.				==FALSE MAF_MAF_SnsrFA ==FALSE		
			Difference (absolute value) in measured pressure between MAP sensor and BARO sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and BARO sensor OR Difference (absolute value) in measured pressure between MAP sensor and BARO sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and BARO sensor OR Difference (absolute value) in measured pressure between MAP sensor and BARO sensor	> 10.0 [kPa] <= 10.0 [kPa] <= 10.0 [kPa] <= 10.0 [kPa] > 10.0 [kPa] <= 10.0 [kPa] <= 10.0 [kPa]	Time between current ignition cycle and the last time the engine was running Engine is not rotating Manifold Pressure Manifold Pressure Baro Pressure Baro Pressure TCIAP Pressure TCIAP Pressure No Active DTCs: No Pending DTCs:	> 5.0 [s] >= 50.0 [kPa] <= 115.0 [kPa] >= 50.0 [kPa] <= 115.0 [kPa] >= 50.0 [kPa] <= 115.0 [kPa] EngineModeNotRunTimerError MAP_SensorFA AAP_SnsrFA AAP2_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP	4 fail counters over 5 sample counters sampling time is 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and BARO sensor OR Difference (absolute value) in measured pressure between MAP sensor and BARO sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and BARO sensor	<= 10.0 [kPa] > 10.0 [kPa] > 10.0 [kPa] > 10.0 [kPa]				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid Supply Voltage Control Circuit Low	P00C9	This DTC detects a short circuit to ground of the high side driver circuit of the Fuel Metering Unit valve	Voltage high across High Side driver of the Fuel Metering Unit valve during ON state indicates short toground	Impedence between High Side pin of the and the controller ground ≤ 0.5 Ω	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7.00 failures out of 10.00 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid Supply Voltage Control Circuit High	P00CA	This DTC detects a short circuit to high voltage of high side driver circuit of the Fuel Metering Unit valve	Voltage low across High Side driver of the Fuel Metering Unit valve during OFF state indicates short to power	Impedence between High Side pin of the Fuel Metering Unit valve and the controller power ≤ 0.5 Ω	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7.00 failures out of 10.00 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 3 Circuit Performance	P00E9	Detects an Intake Air Temperature 3 (IAT3) sensor value that is stuck in range by comparing the IAT3 sensor value against the IAT and IAT2 sensor values and failing the diagnostic if the IAT3 value is more different than the IAT and IAT2 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT and IAT2 values are similar, and the IAT3 value is not similar to the IAT and IAT2 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT3 value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per ignition cycle if the	**Good Correlation Between IAT and IAT2** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	<= 25 deg C > 25 deg C > 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF (Engine Coolant Temp - Outside Ambient Temp) No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds <= 13.0 deg C PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			Not Good Correlation, IAT in Middle Power Up IAT is between Power Up IAT2 and Power Up IAT3 AND ABS(Power Up IAT2 - Power Up IAT3) AND ABS(Power Up IAT - Power Up IAT3) > ABS(Power Up IAT - Power Up IAT2)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		enable conditions are met.				EngineModeNotRunTimer Error		
			Not Good Correlation, IAT2 in Middle Power Up IAT2 is between Power Up IAT and Power Up IAT3 AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3) > ABS(Power Up IAT2 - Power Up IAT)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 3 Low	P00EA	Detects a continuous short to ground in the Intake Air Temperature 3 (IAT3) signal circuit by monitoring the IAT3 sensor output resistance and failing the diagnostic when the IAT3 resistance is too low. The IAT3 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw IAT 3 Input	< 49.14 Ohms (~150 deg C)	None		40 failures out of 50 samples 1 sample every 100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 3 High	P00EB	Detects a continuous open circuit in the Intake Air Temperature 3 (IAT3) signal circuit by monitoring the IAT3 sensor output resistance and failing the diagnostic when the IAT3 resistance is too high. The IAT3 sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw IAT 3 Input	> 169,523 Ohms (~-60 deg C)	None		40 failures out of 50 samples 1 sample every 100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 3 Intermittent In-Range	P00EC	Detects a noisy or erratic signal in the Intake Air Temperature 3 (IAT3) circuit by monitoring the IAT3 sensor and failing the diagnostic when the IAT3 signal has a noisier output than is expected. When the value of the IAT3 signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT3 readings. The result of this summation is called a “string length”. Since the IAT3 signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT3 signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT 3 reading - IAT 3 reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT 3 readings	Continuous		4 failures out of 5 samples Each sample takes 1.0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit Low (applications with LIN MAF)	P00F4	Detects an eroneously low value being reported over the LIN serial connection from the humidity sensor. The diagnostic monitors the humidity sensor relative humidity output and fails the diagnostic when the humidity percentage is too low. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity percentage value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	Relative Humidity	<= -6.25 %	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit High (applications with LIN MAF)	P00F5	Detects an eroneously high value being reported over the LIN serial connection from the humidity sensor. The diagnostic monitors the humidity sensor relative humidity output and fails the diagnostic when the humidity percentage is too high. The humidity sensor converts the capacitance across the sensor to a relative humidity. The relative humidity percentage value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	Relative Humidity	>= 106.25 %	Powertrain Relay Voltage for a time LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit Intermittent	P00F6	Detects a noisy or erratic signal in the humidity circuit by monitoring the humidity sensor and failing the diagnostic when the humidity signal has a noisier output than is expected. When the value of relative humidity in % is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of humidity readings. The result of this summation is called a “string length”. Since the humidity signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic humidity signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current Humidity reading - Humidity reading from 100 milliseconds previous)	> 80 % 10 consecutive Humidity readings	Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	>= 11.0 Volts >= 0.9 seconds PowertrainRelayFault	4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure (MAP) Sensor Performance (3 intake air pressure sensor configuration)	P0106	This monitor is used to identify MAP sensor internal faults (measurement with an offset or a drift). The plausibility monitor compares the BARO, MAP and TCIAP pressures in two different conditions: - at idle (part of the test enabled when the engine is running) - between key off and when the engine starts running (part of the test enabled when the engine is not running). If the MAP sensor value is within the normal expected atmospheric range, then MAP, TCIAP and BARO are compared to see if their values are similar. If the TCIAP and BARO sensor values are similar, but the MAP value is not similar, then a MAP performance diagnostic will fail. If MAP sensor is not in agreement with the other two the monitor is able to pinpoint MAP as the faulty sensor.	Difference (absolute value) in measured pressure between MAP sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between MAP sensor and BARO sensor AND Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor	> **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] > **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] <= **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa]	Correlation diagnostic enabled by calibration Engine is running Run Crankrelay supply voltage in range Engine speed Requested fuel Throttle measured position Engine Coolant Temperature No faults are present	== 1.00 > 11.00 [V] < 950.00 [rpm] < 40.00 [mm^3] > 90.00 [%] > 70.00 [°C] CrankSensor_FA ==FALSE FUL_GenericInjSysFA ==FALSE TPS_PstnSnsrFA ==FALSE MAP_SensorCircuitFA ==FALSE AAP2_SnsrCktFA ==FALSE AAP_AAP5_SnsrCktFA ==FALSE AAP_AAP2_SnsrStabFA ==FALSE AAP_AAP5_SnsrStabFA ==FALSE ECT_Sensor_FA	480.00 fail counters over 600.00 sample counters sampling time is 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						==FALSE MAF_MAF_SnsrFA ==FALSE		
			MAP sensor OR MAP sensor OR Difference (absolute value) in measured pressure between MAP sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between MAP sensor and BARO sensor AND Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor	< 50.0 [kPa] > 115.0 [kPa] > 10.0 [kPa] > 10.0 [kPa] <= 10.0 [kPa]	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 5.0 [s] EngineModeNotRunTimerError MAP_SensorCircuitFA AAP_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 fail counters over 5 sample counters sampling time is 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit Low (with pull-up)	P0107	Detects a continuous short to ground in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too low. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	< 3.0 % of 5 Volt Range (This is equal to 7.5 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit High (with pull-up)	P0108	Detects a continuous short to power or open circuit in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too high. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	> 90.0 % of 5 Volt Range (This is equal to 390.0 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Performance (applications with IAT, IAT2 and IAT3)	P0111	Detects an Intake Air Temperature (IAT) sensor value that is stuck in range by comparing the IAT sensor value against the IAT2 and IAT3 sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and IAT3 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled. The diagnostic will fail if the IAT2 and IAT3 values are similar, and the IAT value is not similar to the IAT2 and IAT3 values. The diagnostic will also fail if none of the three sensor values are similar to each other, and the IAT value is furthest from the sensor value that is in the middle of the three sensor values. This diagnostic is executed once per	**Good Correlation Between IAT2 and IAT3** ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT3)	> 25 deg C > 25 deg C <= 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			Not Good Correlation, IAT2 in Middle Power Up IAT2 is between Power Up IAT and Power Up IAT3 AND ABS(Power Up IAT - Power Up IAT3) AND ABS(Power Up IAT2 - Power Up IAT) > ABS(Power Up IAT2 - Power Up IAT3)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		ignition cycle if the enable conditions are met.	**Not Good Correlation, IAT3 in Middle** Power Up IAT3 is between Power Up IAT and Power Up IAT2 AND ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up IAT3 - Power Up IAT) > ABS(Power Up IAT3 - Power Up IAT2)	> 25 deg C	Time between current ignition cycle and the last time the engine was running Powertrain Relay Voltage for a time If application has a LIN MAF: LIN Communications established with MAF No Active DTCs:	> 28,800 seconds >= 11.0 Volts >= 0.9 seconds PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimerError	Executes once at the beginning of each ignition cycle if enable conditions are met	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Low (applications with LIN MAF)	P0112	Detects an erroneously low value being reported over the LIN serial connection from the Intake Air Temperature (IAT) sensor. The diagnostic monitors the IAT sensor output temperature and fails the diagnostic when the IAT temperature is too low. The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT Temperature	< -60 degrees C	LIN Communications established with MAF		40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit High (applications with LIN MAF)	P0113	Detects an erroneously high value being reported over the LIN serial connection from the Intake Air Temperature (IAT) sensor. The diagnostic monitors the IAT sensor output temperature and fails the diagnostic when the IAT temperature is too high. The IAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. The temperature value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	IAT Temperature	> 150 degrees C	LIN Communications established with MAF		40 failures out of 50 samples 1 sample every 100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic signal in the Intake Air Temperature (IAT) circuit by monitoring the IAT sensor and failing the diagnostic when the IAT signal has a noisier output than is expected. When the value of the IAT signal in °C is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of IAT readings. The result of this summation is called a “string length”. Since the IAT signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic IAT signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 80.00 deg C 10 consecutive IAT readings	If application has a LIN MAF: LIN Communications established with MAF		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit Low (Diesel L6 ATM)	P0117	Circuit Continuity This DTC detects a short to ground in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit High (Diesel L6 ATM)	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent (Diesel L6 ATM)	P0119	Circuit Erratic This DTC detects large step changes in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	ECT_Sensor_Ckt_FA EECR_EngineOut_Erratic _TFTKO	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Erratic This DTC detects large step changes in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7:		No Active DTC's	ECT_Sensor_Ckt_FA EECR_EngineOut_Erratic _TFTKO	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngCoolant TempSnsr5 The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 6: 1) Sensor time constant	 3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C 4.0 seconds -60.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	250.0 °C 3.4 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the ECT (EngineCoolant temperature) does not achieve the required target temperature after an allowed energy accumulation by the engine. This can be caused by an ECT sensor biased low or a cooling system that is not warming up correctly because of a stuck open thermostat or other fault.	Energy is accumulated after the first conbustion event using Range 1, 2 or 3: If the maxium energy is greater than as shown in the supporting tables prior to the Engine outlet coolant achieving the target a fault will be indicated. **Range 1 (Primary):** Ambient air temperature is between 10.0 and 52.0 °C Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 43.1 °C. The target temperatur for this range will not drop below 56.9 °C **Range 2 (Secondary):** Ambient air temperature is between -9.0 and 10.0 °C Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 45.0 °C. The target temperatur for this range will not drop below 45.0 °	**P0128 Maximum Acculated Energy - Primary** **P0128 Maximum Acculated Energy - Secondary**	No DTCs Engine soak time Engine run time Engine Outlet Coolant Temperature - Range 1: - Range 2: - Range 3: Devices in main cooling circuit are not in in device control If Engine RPM is continuously greater than for this time period Distance traveled	THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA THMR_SWP_FlowStuckOn_FA THMR_SWP_NoFlow_FA OAT_PtEstFiltFA VehicleSpeedSensor_FA EngineTorqueEstInaccurate MAF_SensorFA ETHR_CoolantEnergyModel ETHR_RemedialActionLevel1 ETHR_RemedialActionLevel2 ETHR_RemedialActionLevel3 EECR_EngineOutlet_FA > 1,800.0 seconds 10.0 - 1,800.0 seconds ≤ 37.5 °C ≤ 35.6 °C ≤ 35.6 °C 9,999 rpm 5.0 seconds ≥ 0.2 km	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			C **Range 3 (Tertiary):** Ambient air temperature is between -20.0 and -9.0 °C Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 45.0 °C. The target temperatur for this range will not drop below 45.0 ° C	**P0128 Maximum Acculated Energy - Tertiary** This diagnostic models the net energy into and out of the cooling system during the warm-up process. The ten energy terms are: heat from combustion (with AFM correction), heat from after-run, heat loss to transmission oil, heat loss to enviroment, heat loss to cabin, heat loss to DFCO, heat loss to engine oil, heat loss to exhaust, and eat loss to autostop.				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor Circuit Range/ Performance	P017B	This DTC detects if the EMT(Engine Metal Temperature) does not achieve the required target temperature after an allowed energy accumulation by the engine. This can be caused by an EMT sensor biased low or a cooling system that is not warming up correctly because of a stuck open thermostat.	Energy is accumulated after the first conbustion event using Range 1, 2 or 3: If the maxium energy is greater than as shown in the supporting tables prior to the Engine outlet coolant achieving the target a fault will be indicated. **Range 1 (Primary):** Ambient air temperature is between 10.0 and 52.0 °C Cylinder Head Metal reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 43.1 °C. The target temperature for this range will not drop below 56.9 °C **Range 2 (Secondary):** Ambient air temperature is between -9.0 and 10.0 °C Cylinder Head Metal reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 45.0 °C. The target temperature for this range will not drop below 45.0 °C	**P017B Maximum Accumulated Energy - Primary** **P017B Maximum Accumulated Energy - Secondary**	No DTCs Engine soak time Engine run time Cylinder Head Metal Temperature - Range 1: - Range 2: - Range 3: Devices in main cooling circuit are not in in device control If Engine RPM is continuously greater than for this time period Distance traveled	THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA THMR_SWP_FlowStuckOn_FA THMR_SWP_NoFlow_FA OAT_PtEstFiltFA VehicleSpeedSensor_FA EngineTorqueEstInaccurate MAF_SensorFA ETHR_CoolantEnergyModel ETHR_RemedialActionLevel1 ETHR_RemedialActionLevel2 ETHR_RemedialActionLevel3 EECR_CylHeadMetal_FA > 1,800.0 seconds 10.0 - 1,800.0 seconds ≤ 37.5 °C ≤ 35.6 °C ≤ 35.6 °C 9,999 rpm 5.0 seconds ≥ 0.2 km	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Range 3 (Tertiary): Ambient air temperature is between -20.0 and -9.0 °C Cylinder Head Metal reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 45.0 °C. The target temperature for this range will not drop below 45.0 ° C	**P017B Maximum Accumulated Energy - Tertiary** This diagnostic models the net energy into and out of the cooling system during the warm-up process. The ten energy terms are: heat from combustion (with AFM correction), heat from after-run, heat loss to transmission oil, heat loss to enviroment, heat loss to cabin, heat loss to DFCO, heat loss to engine oil, heat loss to exhaust, and heat loss to autostop.				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor Circuit Low (Diesel L6 ATM)	P017C	Circuit Continuity This DTC detects a short to ground in the Cylinder Head Temperature signal circuit or the Cylinder Head Temperature sensor. This is accomplished by monitoring the resitance of the circuit. If the resistance goes out of our expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngMetalHeadTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor Circuit High (Diesel L6 ATM)	P017D	Circuit Continuity This DTC detects a short to ground in the Cylinder Head Temperature signal circuit or the Cylinder Head Temperature sensor. This is accomplished by monitoring the resitance of the circuit. If the resistance goes out of our expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: CeEECR_e_EngMetalHeadTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolantTempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor “A” Circuit Intermittent/ Erratic (Diesel L6 ATM)	P017E	Circuit Erratic This DTC detects large step changes in the cylinder head temperature sensor signal circuit or the cylinder head temperature sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.						Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Fuel Temperature Sensor A Performance	P0181	Determine when fuel temperature sensor is not plausible, due to offset or drift.	IF the fuel fired heater is not used
			{
			The difference in absolute value between temperature measured by the fuel filter sensor and the reference sensor is:
			}
			
			ELSE
			
			(see **P0181 Fuel Temperature Sensor Reference**)
				
				> 30.00 °C
				
				> 25.00 °C
					Run crank voltage
					
					FTZM Run crank voltage
					
					Time from engine running
					
					No error for Engine Not Running timer
					
					At least one valid value received from serial communication
					
					No electrical fault on the fuel filter temperature sensor
					
					No fault on the selected reference sensor
					
					Engine soak time
					
					No error for Engine Not Running timer
					
					(Engine coolant temperature
					
					OR
					
					ECT_OBD_GlobalCoolTmpEnbl
					(refer to "*OBD Coolant Enable Criteria*" section))
					
					Status of the fuel fired heater is recognized
						> 6.0 V
						
						≥ 8.0 V
						
						< 3.00 s
						
						FTS_FTS_CktFA
						
						FTS_PlausRefSnsrFlt
						
						> 28,800 s
						
						> -40 °C
							10.00 failures out of 20.00 samples
							
							100 ms/sample
								Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Sensor Bus Relay commanded on No fault on the sensor bus relay No fault in the serial communication	 SBR_RlyFA P1103		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Temperature Sensor A Circuit Low	P0182	Determine when a short circuit to ground affects fuel temperature sensor.	Fuel temperature sensor output resistance	< 50 Ω	Run crank voltage Run crank voltage Engine not cranking FTZM Run crank voltage Sensor Bus relay Commanded on No DTC active At least one valid value received from serial communication	> 6.0 V ≥ 11.0 V ≥ 8.00 SBR_RlyFA P1103	10 failures out of 20 samples 100 ms/samples	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Temperature Sensor A Circuit High	P0183	Determine when a short circuit to ground affects fuel temperature sensor.	Fuel temperature sensor output resistance	> 95,000 Ω	Run crank voltage Run crank voltage Engine not cranking FTZM Run crank voltage Sensor Bus relay Commanded on No DTC active At least one valid value received from serial communication	> 6.0 V ≥ 11.0 V FTZM Run crank voltage ≥ 8.00 SBR_RlyFA P1103	10 failures out of 20 samples 100 ms/samples	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Temperature Sensor A Circuit Intermittent	P0184	Determine when fuel temperature sensor changes quicker than expected, likely due to an intermittent fault.	Fuel temperature	> (1 - α) * 156 °C + (Last good sample * α) with α = e^[- (amount of consecutive bad samples * 0.01)]	Run crank voltage Run crank voltage FTZM Run crank voltage Sensor Bus relay Commanded on No DTC active At least one valid value received from serial communication	> 6.0 V ≥ 11.0 V ≥ 8.00 FTS_FTS_CktFA SBR_RlyFA P1103	10 failures out of 15 samples 100 ms/samples	Type B, 2 Trips
			Fuel temperature	< (1 - α) * -56 °C + (Last good sample * α) with α = e^[- (amount of consecutive bad samples * 0.01)]	Run crank voltage Run crank voltage FTZM Run crank voltage Sensor Bus relay Commanded on No DTC active At least one valid value received from serial communication	> 6.0 V ≥ 11.0 V ≥ 8.00 FTS_FTS_CktFA SBR_RlyFA P1103	10 failures out of 15 samples 100 ms/samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Range/ Performance	P018B	This DTC detects a fuel pressure sensor response stuck within the normal operating range using an intrusive test (as follows) a] Intrusive Test Trigger: 1] Fuel Pump Duty Cycle Clamped Time (min or max duty cycle) >= 5 sec Or 2] Fuel Pres Err Variance <= calibration value KeFDBR_cmp_FPSS_ MinPres Variance ; Otherwise, Report status as Pass b] Intrusive test freq limit: 60 sec between intrusive tests that pass, c] Intrusive test Fuel Flow limit: Fuel Flow Actual < Max allowed Fuel Flow rate	Sensed fuel pressure change [absolute value, during intrusive test]	<= 30 kPa	a) Diagnostic enabled [FDBR_b_FPSS_DiagEnb ld] b) Timer Engine Running [FDBR_t_EngModeRunC oarse] c1) Fuel Flow Rate Valid c2) FDB_FuelPresSnsrCktFA c3) Reference Voltage Fault Status [DTC P0641] c4) FAB_FuelPmpCktFA c5) Fuel Control Enable Fault Active [DTC P12A6] c6) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255] c7) Fuel Pump Speed Fault Active [DTC P129F] c8) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_Info1_U codeCmFA DTC P165C] c9) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_ UcodeCmFA DTC]	a) == TRUE b) >= 5.00 seconds c1) == TRUE c2) <> TRUE c3) <> TRUE c4] <> TRUE c5) <> TRUE c6) <> TRUE c7) <> TRUE c8) <> TRUE c9] <> TRUE	1 sample / 12.5 millisec Intrusive Test Duration: Fuel Flow - related (5 to 12 sec)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					c10) Fuel Pump Duty Cycle Fault Active	c10) <> TRUE		
					c11) Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	c11) == CeFDBR_e_WiredTo_FTZM		
					c12) Sensor Bus Relay On	c12) == TRUE		
					d) Emissions Fuel Level Low [Message $3FB]	d) <> TRUE		
					e) Fuel Control Enable	e) == TRUE		
					f) Fuel Pump Control State	f) == Normal Control OR == Fuel Pres Sensor Stuck Control		
					g) Instantaneous Fuel Flow [FCBR_dm_InstFuelFlow]	g) >= 0.05 gm/sec		
					h) Diagnostic System Disabled [DRER_b_DiagSysDsb]	h) <> TRUE		
					j1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr DTC]	j1) <> TRUE		
					j2) CAN Sensor Bus message $0C3_Available	j2) == TRUE		
					j3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and	j3) <> TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC]			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Low	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low Values are analyzed as percent of sensor reference voltage [[Abs [5.0V - SensorVoltsActual] / 5.0V] *100%]	Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	< 4.00 % or [0 kPa gauge]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo ECM d2) IF NOT, then see Case2	64.00 failures / 80.00 samples 1 sample/12.5 ms	Type B, 2 Trips
			Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	< 4.00 % or [0 kPa gauge]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d1) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig] d2) Sensor Bus Relay On d3) CAN Sensor Bus message $0C3_Available d4) Fuel Pres Sensor Ref	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo FTZM d2) == TRUE d3) == TRUE d4) <> TRUE	64.00 failures / 80.00 samples 1 sample/12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC]	d2) IF calibration CeFDBR_e_WiredTo_FTZM <> WiredTo FTZM, then see Case1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit High	P018D	This DTC detects if the fuel pressure sensor circuit is shorted High Values are analyzed as percent of sensor reference voltage [[Abs [5.0V - SensorVoltsActual] / 5.0V] *100%]	Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	> 96.00 % or [743 kPa ga]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo ECM d2) IF NOT, then see Case2	64.00 failures / 80.00 samples 1 sample/12.5 ms	Type B, 2 Trips
			Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	> 96.00 % or [743 kPa ga]	a) Diagnostic enabled [FDBR_b_FPSnsrCktLoDiagEnbl] b) Run_Crank Active [PMDR_b_RunCrankActive c) Diagnostic System Disabled [DRER_b_DiagSysDsbl] d1) Pressure Sensor Configuration [FDBR_e_FuelPresSnsrConfig] d2) Sensor Bus Relay On d3) CAN Sensor Bus message $0C3_Available d4) Fuel Pres Sensor Ref	a) == TRUE b) == TRUE c) <> TRUE d1) IF calibration CeFDBR_e_WiredTo_FTZM == WiredTo FTZM d2) == TRUE d3) == TRUE d4) <> TRUE	64.00 failures / 80.00 samples 1 sample/12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC]	d2) IF calibration CeFDBR_e_WiredTo_FTZM <> WiredTo FTZM, then see Case1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure (FRP) Sensor A Performance	P0191	Determine when fuel rail pressure sensor is not plausible, due to offset or drift.	Rail pressure sensor output (as percentage of supply voltage) OR Rail pressure sensor output (as percentage of supply voltage)	> 12.0 % < 8.0 %	Engine off time No error for Engine Not Running timer No engine movement detected since begin of driving cycle (Engine coolant temperature OR ECT_OBD_GlobalCoolTmpEnbl (refer to "*OBD Coolant Enable Criteria*" section)) Run crank voltage Run crank voltage An initilization time delay of 12.00 consecutive samples has been passed No active DTC:	≥ 480 s ≥ -40 °C = TRUE > 6.0 V ≥ 11.0 V ECT_Sensor_FA FHP_RPS_CktFA	18 failures out of 36 samples 6.25 ms/sample	Type A, 1 Trips
			Absolute difference between rail pressure #1 (first trace) and rail pressure #2 (second trace)	> 25.0 MPa	**Rail Pressure Sensor Configuration** Starter motor is not engaged OR Starter motor has been engaged for a time	= CeFHPG_e_RPS_DoubleTrack ≥ 15 s	21 failures out of 24 samples 6.25 ms/sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR Run crank voltage No active DTC: The diagnostic feedback protocol is in the state outputting the redundant pressure information	 > 8.4 V FHP_RPS_CktFA FHP_RPS2_CktFA P0194		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure (FRP) Sensor A Circuit Low Voltage	P0192	Determine when a short circuit to ground affects fuel rail pressure sensor.	Fuel rail pressure sensor output (as percentage of supply voltage)	< 4.0 %	(Starter motor is not engaged OR Starter motor has been engaged for a time OR Run crank voltage An initilization time delay of 12.00 consecutive samples has been passed	 ≥ 15 s > 8.4 V)	16 failures out of 32 samples OR 16 continuous failures out of 32 samples 6.25 ms/samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure (FRP) Sensor A Circuit High Voltage	P0193	Determine when a short circuit to voltage affects fuel rail pressure sensor.	Fuel rail pressure sensor output (as percentage of supply voltage)	> 96.0 %	(Starter motor is not engaged OR Starter motor has been engaged for a time OR Run crank voltage An initilization time delay of 12.00 consecutive samples has been passed	≥ 15 s > 8.4 V)	16 failures out of 32 samples OR 16 continuous failures out of 32 samples 6.25 ms/samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature (EOT) Circuit Low	P0197	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	< 25 ohms	Diagnostic Status	Enabled	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature (EOT) Circuit High	P0198	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	> 450,000 ohms	Diagnostic Status Engine Run Time OR ECT	Enabled > 20.0 seconds >= -20 Deg C	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature Sensor (EOT) Circuit Intermittent	P0199	Determines if an intermittent fault exists on the engine oil temperature sensor circuit. This diagnostic compares each temperature sample to the previous sample and measures cumulative error over a sample period.	**Continuous Test** <u>Pass/Fail Condition:</u> Temperature signal string length, cumulative sum of absolute value of (Oil Temperature - Previous Oil Temperature)	String Length >= 10.00 °C	None	Enabled	4 failures out of 5 samples, sampled every 2 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature Sensor B Circuit Low	P01BB	Controller specific output driver circuit diagnoses the Engine Oil Temperature Sensor B low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor B Circuit Resistance	< 25 ohms	Diagnostic Status	Enabled	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature Sensor B Circuit High	P01BC	Controller specific output driver circuit diagnoses the Engine Oil Temperature Sensor B low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor B Circuit Resistance	> 450,000 ohms	Diagnostic Status Engine Run Time OR ECT	Enabled > 20.0 seconds >= -20 Deg C	4 failures out of 5 samples Sampled every 1 second	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature Sensor B Circuit Intermittent	P01BD	Determines if an intermittent fault exists on the engine oil temperature sensor B circuit. This diagnostic compares each temperature sample to the previous sample and measures cumulative error over a sample period.	**Continuous Test** <u>Pass/Fail Condition:</u> Temperature signal string length, cumulative sum of absolute value of (Oil Temperature - Previous Oil Temperature)	String Length >= 10.00 °C	None	Enabled AND EngOilTempFA = FALSE	4 failures out of 5 samples, sampled every 2 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 3 Circuit Low (Diesel L6 ATM)	P01E5	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr3 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 3 Circuit High (Diesel L6 ATM)	P01E6	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: CeEECR_e_EngCoolantTempSnsr3 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 3 Circuit Intermittent/ Erratic (Diesel L6 ATM)	P01E7	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	EECR_TS3_Erratic_TFTKO EECR_TS3_CktHiLo_FA	5 seconds out of a 6 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Temperature Dropped Below Diagnostic Monitoring Temperature (Diesel L6 ATM)	P01F0	This DTC detects an unexplained cooling system cool down below the OBD monitoring threshold during normal operating conditions. This check is run throughout the key cycle.	Engine outlet coolant temperature drops below for an unexpected reason	55.0 °C	No Active DTC's Engine Runtime Distance traveled this key cycle Ambient air pressure Ambient air temperature ********** Engine coolant temperature At least once during the key cycle ********** Heat to coolant DFCO time Thermostat duty cycle RPM Active Fuel Management is not in	ECT_Sensor_Ckt_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA EngineTorqueEstInaccurate ECT_Sensor_Perf_FA THMR_SWP_NoFlow_FA THMR_SWP_FlowStuckOn_FA ≥ 30.0 seconds ≥ 1.2 km ≥ 55.0 kPa ≥ -9.0 °C ≥ 56.9 °C ≥ **P01F0 - Heat To Coolant Min 2D** ≤ 15.0 seconds ≤ 101.0 % ≤ 8,192 Half Cylinder Mode	110 seconds out of a 130 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger/ Supercharger "A" Overboost Condition	P0234	This monitor detects failures in the charging air system such to not fulfill the request of boost pressure in the intake manifold. It works only in steady state closed loop pressure control zone. The DTC checks a permanent negative control deviation of the boost pressure indicating an overboost condition. This monitor is used to detect any malfunction in the boost pressure system causing the vehicle's emissions to exceed the limits. The aim of the overboost pressure monitor is to detect obstructions in the exhaust pipe. The boost pressure is usually controlled by the VGT vanes. The intake manifold pressure is also affected by the throttle valve and the HP EGR valve position changes. The aim of this procedure is to identify a limitation of the VGT vanes (equal to an obstruction) that leads to exceed the emission limits.	Boost pressure tracking error(difference between the desired boost pressure and the measured pressure at intake manifold by MAP sensor) lower than a threshold. If throttle control is active: The setpoint used for closed loop control is the conversion of the desired upstream throttle boost pressure (target) in desired intake boost pressure. The conversion of the setpoint is done calculating the pressure drop over the throttle valve that is strictly dependent on the valve position. If throttle control is NOT active: The setpoint used for closed loop control is the intake manifold pressure: in this situation the diagnostic monitors the boost pressure closed loop control tracking error.	If throttle control is active (Refer to "Other AICR DSL flags" Free Form): **P0234: Negative boost deviation threshold (throttle control active)** [kPa] x **P0234, P2263: Overboost barometric correction** If throttle control is NOT active (Refer to "Other AICR DSL flags" Free Form): **P0234: Negative boost deviation threshold (throttle control not active)** [kPa] x **P0234, P2263: Overboost barometric correction**	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Difficult launch NOT detected Boost Pressure Control Closed Loop active No active transition from a combustion mode to another one Outside Air Temperature in range Desired Boost Pressure steady state: BstDes-BstDes_Old	**P0234, P0299: Boost pressure control deviation enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "LDT_DifficultLaunchActive" Free Form Refer to "Boost Control in Closed Loop" Free Form ==TRUE > -20.00 [°C] AND < 55.00 [°C] > -7 [kPa/s] AND < 6 [kPa/s]	50 fail counters over 70 sample counters sampling time is 25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine speed in range	> 2,500.00 [rpm] AND < 4,000.00 [rpm]		
					Desired intake Boost pressure in range	> **P0234: Minimum boost pressure for overboost monitor enabling** [kPa] AND **P0234: Maximum boost pressure for overboost <monitor enabling** [kPa]		
					(Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	> 70 [°C] ==TRUE < 130 [°C]		
					Ambient Air Pressure in range	> 70 [kPa] AND < 110 [kPa]		
					Throttle Valve position	>= 85.00 [%] if throttle control is active (Refer to "Other AICR DSL flags" Free Form) >= 75.00 [%] if throttle control is NOT active (Refer to "Other AICR DSL flags" Free Form)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs All enabling conditions last for a time	AIC_BstSysDiagDenomDsbl ==FALSE > **P0234: Overboost monitor delay timer** [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger/ Supercharger "A" Underboost Condition	P0299	This monitor detects failures in the charging air system such to not fulfill the request of boost pressure in the intake manifold. It works only in steady state closed loop pressure control zone. The DTC checks a permanent positive control deviation of the boost pressure indicating an underboost condition. This monitor is used to detect any malfunction in the boost pressure system causing the vehicle's emissions to exceed the limits. The aim of the underboost pressure monitor is to detect leakages in the pipe after the compressor or in the intake/exhaust manifold. The boost pressure is usually controlled by the VGT vanes. The intake manifold pressure is also affected by the throttle valve and the HP EGR valve position changes. The aim of this procedure is to identify a limitation of the VGT vanes (equal to a leakage) that leads to exceed the emission	Boost pressure tracking error(difference between the desired boost pressure and the measured pressure at intake manifold by MAP sensor) higher than a threshold. If throttle control is active: The setpoint used for closed loop control is the conversion of the desired upstream throttle boost pressure (target) in desired intake boost pressure. The conversion of the setpoint is done calculating the pressure drop over the throttle valve that is strictly dependent on the valve position. If throttle control is NOT active: The setpoint used for closed loop control is the intake manifold pressure: in this situation the diagnostic monitors the boost pressure closed loop control tracking error.	If throttle control is active (Refer to "Other AICR DSL flags" Free Form): >(**P0299: Positive boost deviation threshold (throttle control active)** [kPa] x **P0299, P2263: Underboost barometric correction**) If throttle control is NOT active (Refer to "Other AICR DSL flags" Free Form): >(**P0299: Positive boost deviation threshold (throttle control not active)** [kPa] x **P0299, P2263: Underboost barometric correction**)	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Difficult launch NOT detected Boost Pressure Control Closed Loop active No active transition from a combustion mode to another one Outside Air Temperature in range Desired Boost Pressure steady state: BstDes-BstDes_Old	**P0234, P0299: Boost pressure control deviation enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "LDT_DifficultLaunchActive" Free Form Refer to "Boost Control in Closed Loop" Free Form ==TRUE > -20.00 [°C] AND < 55.00 [°C] > -7 [kPa/s] AND < 6 [kPa/s]	200.00 fail counters over 250.00 sample counters sampling time is 25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		limits.			Engine speed in range	> 1,300.00 [rpm] AND < 2,050.00 [rpm]		
					Desired intake Boost pressure in range	> **P0299: Minimum boost pressure for underboost monitor enabling** [kPa] AND **P0299: Maximum boost pressure for underboost monitor enabling** [kPa]		
					(Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	> 70 [°C] ==TRUE < 130 [°C]		
					Ambient Air Pressure in range	> 70 [kPa] AND < 110 [kPa]		
					Throttle Valve position	>= 85.00 [%] if throttle control is active (Refer to "Other AICR DSL flags" Free Form) >= 75.00 [%] if throttle control is NOT active (Refer to "Other AICR DSL flags" Free Form)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs All enabling conditions last for a time	AIC_BstSysDiagDenomDsbl ==FALSE > **P0299: Underboost monitor delay timer** [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected	P0300 P0301 P0302 P0303 P0304 P0305 P0306	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity. The rate of misfire over an interval is compared to both emissions and catalyst damaging thresholds. The pattern of crankshaft acceleration after the misfire is checked to differentiate between real misfire and other sources of crank shaft noise. Emissions Neutral Default Action: If consumed Emissions Neutral Default DTCs from other subsystems are set: Ignore Rough Road, Traction, Stability, and Antilock brake signals. If default action not activated, Misfire Monitor could complete less frequently or inaccurately. Default Action Latched for duration of Trip Default Action: If Misfire P030x sets on some hybrid applications, the isolation damper	Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load The equation used to calculate deceleration value is tailored to specific vehicle operating conditions. The selection of the equation used is based on the 1st single cylinder continuous misfire threshold tables encountered that are not max of range. If all tables are max of range at a given speed/load, that speed load region is an ***Undetectable region*** see Algorithm Description Document for additional details. SINGLE CYLINDER CONTINUOUS MISFIRE((Medres_Decel Medres_Jerk OR (Medres_Decel Medres_Jerk OR (Lores_Decel Lores_Jerk OR (Lores_Decel Lores_Jerk OR RevBalanceTime)	 - see details of thresholds on Supporting Tables Tab > **RufSCD_Decel** AND > **RufSCD_Jerk)** > **SCD_Decel** AND > **SCD_Jerk)** > **RufCyl_Decel** AND > **RufCyl_Jerk)** > **CylModeDecel** AND > **CylModeJerk)** >**RevMode_Decel**	Engine Run Time Engine Coolant Temp Or If ECT at startup Then System Voltage + Throttle delta - Throttle delta Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.)	> 2 crankshaft revolution "ECT" If OBD Max Coolant Achieved = FALSE -9 ºC < ECT Or if OBD Max Coolant Achieved = TRUE -9 ºC < ECT < 127 ºC < -9 ºC If OBD Max Coolant Achieved = FALSE 21 ºC < ECT If OBD Max Coolant Achieved = TRUE 21 ºC < ECT < 127 ºC 9.00 < volts < 32.00 < 100.00 % per 25 ms < 100.00 % per 25 ms Not Enabled	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests Failure reported for (4) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter. OR when Early Termination Reporting = Enabled and engine rev > 1,000 revs and < 3,200 revs at end of trip	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		between engine and transmission can go into extreme resonance. Default action is to move rpm out of the resonance zone. If default action not activated, significant hardware damage could occur rendering vehicle inoperable.	********** **This Feature only used on Diesel engines** Combustion Modes that force selection of Idle Tables ********** Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables: RANDOM MISFIRE Use random misfire thresholds If no misfire for (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk)	********** **This Feature only used on Diesel engines** **CombustModeIdleTbl** in Supporting Tables ********** > 3 Engine Cycles > **RufSCD_Decel** * **Random_SCD_Decel** >**RufSCD_Jerk** * **Random_SCD_Jerk** > **SCD_Decel** * **Random_SCD_Decel** > **SCD_Jerk** * **Random_SCD_Jerk** > **RufCyl_Decel** * **RandomCylModDecel** > **RufCyl_Jerk** * **RandomCylModJerk**			any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP. Continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Lores_Decel AND Lores_Jerk)	> **CylModeDecel * RandomCylModDecel** > **CylModeJerk * RandomCylModJerk**				
			OR RevBalanceTime	> **RevMode_Decel * RandomRevModDecl**				
			PAIRED CYLINDER MISFIRE If a cylinder & it's pair are above PAIR thresholds (Medres_Decel AND Medres_Jerk)	> **RufSCD_Decel * Pair_SCD_Decel** > **RufSCD_Jerk * Pair_SCD_Jerk**				
			OR (Medres_Decel AND Medres_Jerk)	> **SCD_Decel * Pair_SCD_Decel** > **SCD_Jerk * Pair_SCD_Jerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **RufCyl_Decel * PairCylModeDecel** > **RufCyl_Jerk * PairCylModeJerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **CylModeDecel * PairCylModeDecel** > **CylModeJerk * PairCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)	> **CylModeDecel * PairCylModeDecel**				
			AND Above TRUE for))	> 35 engine cycles out of 100 engine cycles				
			BANK MISFIRE Cylinders above Bank Thresholds	>= 2 cylinders				
			(Medres_Decel	> **RufSCD_Decel * Bank_SCD_Decel**				
			AND Medres_Jerk)	> **RufSCD_Jerk * Bank_SCD_Jerk**				
			OR (Medres_Decel	> **SCD_Decel * Bank_SCD_Decel**				
			AND Medres_Jerk)	> **SCD_Jerk * Bank_SCD_Jerk**				
			OR (Lores_Decel	> **RufCyl_Decel * BankCylModeDecel**				
			AND Lores_Jerk)	> **RufCyl_Jerk * BankCylModeJerk**				
			OR (Lores_Decel	> **CylModeDecel * BankCylModeDecel**				
			AND Lores_Jerk)	> **CylModeJerk * BankCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CONSECUTIVE CYLINDER MISFIRE 1st cylinder uses single cyl continuous misfire thresholds; 2nd Cylinder uses: (Medres_Decel AND Medres_Jerk)	> **RufSCD_Decel** * **ConsecSCD_Decel** > **RufSCD_Jerk** * **ConsecSCD_Jerk**				
			OR (Medres_Decel AND Medres_Jerk)	> **SCD_Decel** * **ConsecSCD_Decel** > **SCD_Jerk** * **ConsecSCD_Jerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **RufCyl_Decel** * **ConsecCylModDecel** > **RufCyl_Jerk** * **ConsecCylModeJerk**				
			OR (Lores_Decel AND Lores_Jerk)	> **CylModeDecel** * **ConsecCylModDecel** > **CylModeJerk** * **ConsecCylModeJerk**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CYLINDER DEACTIVATION MODE (Active Fuel Managment)					
			AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel	> **CylModeDecel * ClyAfterAFM_Decel**				
			AND CylAfterDeacCyl_Jerk)	> **CylModeJerk * CylAfterAFM_Jerk**				
			OR (CylBeforeDeacCylDecel	> **CylModeDecel * CylBeforeAFM_Decel**				
			AND CylBeforeDeacCyl_Jerk)	> **CylModeJerk * ClyBeforeAFM_Jerk**				
			AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for	> 3 Engine Cycles				
			(CylAfterDeacCyl_Decel	> **CylModeDecel * ClyAfterAFM_Decel * RandomAFM_Decl**				
			AND CylAfterDeacCyl_Jerk)	> **CylModeJerk * CylAfterAFM_Jerk * RandomAFM_Jerk**				
			(CylBeforeDeacCylDecel	> **CylModeDecel * CylBeforeAFM_Decel * RandomAFM_Decl**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND CylBeforeDeacCyl_Jerk)	> **CylModeJerk * ClyBeforeAFM_Jerk * RandomAFM_Jerk**				
			OR IF option Crank based IMEP estimate is Enabled and CrankBased_IMEP is	Not Enabled < **Misfire_IMEP_Thresh_vs_BinID** (Note: Thresholds uses following tables to pick threshold vs BinID. See supporting tables for more information on how BinID works to select appropriate calibration threshold) **Misfire_IMEP_BinID_vs_RPM_Load Misfire_IMEP_BinID_RPM_Axis Misfire_IMEP_BinID_Load_Axis** - see details on Supporting Tables Tab				
			Misfire Percent Emission Failure Threshold	≥ 3.75 % P0300				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Misfire Percent Catalyst Damage	> **Catalyst_Damage_Misfire_Percentage** in Supporting Tables whenever secondary conditions are met.	(at low speed/loads, one cylinder may not cause cat damage)			
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load	Engine Speed Engine Load Misfire counts	> 8,192 rpm AND > 200 % load AND < 180 counts on one cylinder		
					Engine Speed	550 < rpm < ((Engine Over Speed Limit) - 400) OR 8,191) Engine speed limit is a function of inputs like Gear and temperature see **EngineOverSpeedLimit** in supporting tables	4 cycle delay	
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus		
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	0 cycle delay	
					Undetectable engine speed and engine load region	***Undetectable region*** from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 8,192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	< **ZeroTorqueEngLoad** or <**ZeroTorqueAFM** if AFM is active in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	≤ 100.0 % (≤ 100.0 % in AFM) > 318 mph (> 318 mph AFM)	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					NEGATIVE TORQ AFM If deactivated cylinders appear to make power, torque is negative: DeactivatedCyl_Decel AND DeactivatedCyl_Jerk AND # of Deact Cyls Inverted	<**DeacCylInversionDecel** <**DeacCylInversionJerk** > 4 cylinder	0 cycle delay	
					If EGR Intrusive test	is Active	0 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 97.00 %	7 cycle delay	
					After Fuel resumes on Automatic shift containing Fuel Cut		2 Cylinder delay	
					Delay if PTO engaged	Not Enabled	4 cycle delay	
					Delay if error in indices of buffered data is detected and delay is enabled	Delay Enabled	3 cycle delay	
					Delay if IMEP calculation	initializing on startup or running resets (expires before rpm enablement)	4 cycle delay	
					***************************** **This Feature only used on Diesel engines**	*****************************	******************	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Combustion Mode	= **InfrequentRegen** value in Supporting Tables	4 cycle delay	
					Driver cranks before Wait to Start lamp extinguishes	IF TRUE	**WaitToStart** cycle delay	
					Brake Torque **********	> 199.99 % Max Torque **********	4 cycle delay **********	
					DRIVELINE RING FILTER After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.			
					Filter Driveline ring:	> "**Ring Filter**" # of engine cycles after misfire in Supporting Tables		
					Stop filter early:	> "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab		
					ABNORMAL ENGINE SPEED OSCILLATION: (checks each "misfire" candidate in 100 engine Cycle test to see if it looks like some disturbance like rough road (abnormal).)			
					Used Off Idle, and while not shifting,			
					TPS	> 200 %		
					Engine Speed	> 1,000 rpm		
					Veh Speed	> 3 mph		
					Auto Transmission	not shifting		
					indivdual candidate			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					deemed abnormal if number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation) Consecutive decels while in SCD Mode Cyl Mode Rev Mode At the end of 100 engine cycle test, the ratio of abnormal/candidate is checked to confirm if real misfire is present within the 100 engine cycles. abnormal candidates/ total candidates MISFIRE CRANKSHAFT PATTERN RECOGNITION checks each "misfire" candidate in 100 engine Cycle test to see if overall crankshaft pattern looks like real misfire (recognized), or some disturbance like rough road (unrecognized). At the end of 100 engine cycle test, the ratio of unrecog/recognized is	> **Abnormal SCD Mode** > **Abnormal Cyl Mode** > **Abnormal Rev Mode** in Supporting Tables > 0.50 ratio	discard 100 engine cycle test	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					checked to confirm if real misfire is present within the 100 engine cycles. Typically used for checking a single misfire per engine cycle but can support some other patterns on some packages			
					Pattern Recog Enabled:	Enabled		
					Pattern Recog Enabled during Cylinder Deac	Not Enabled		
					Pattern Recog Enabled consecutive cyl pattrn	Enabled		
					Engine Speed	675 < rpm < 6,800		
					Veh Speed	> 0.0 mph		
					The 1st check for "recognized" is the 1st fired cylinder after the misfire candidate should both accelerate and jerk an amount based acceleration and jerk of Single Cylinder Misfire thresholds in effect at that speed and load.			
					(CylAfter_Accel AND	> Misfire_ decel * **1st_FireAftrMisfr_Acel**		
					CylAfter_Jerk)	> Misfire_Jerk * **1st_FireAftrMisfr_Jerk**		
						Or if AFM mode is active: > Misfire_ decel * **1stFireAftrMisAcelAFM** > Misfire_Jerk *		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						1stFireAfterMisJerkAFM		
					Addtionally, the crankhaft is checked again a small calibratible number of cylinders later to see if the distrubance is still large like rough road, or has calmed down like real misfire. The size of disturbance is compared to a multiplier times the ddt_jerk value used to detect misfire at that speed and load. If there is repetitive misfire on consecutive engine cycles, the expected snap is adjusted due to the higher expected disturbance.			
					Num of Cylinders after misfire to start check of crankshaft snap	2 Cylinders		
					"misfire" recognized if: Crankshaft snap after: isolated "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire**		
					repetative "misfire"	< Misfire_Jerk * **SnapDecayAfterMisfire** * **RepetSnapDecayAdjst** in Supporting Tables		
					At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Ratio of Unrecog/Recog		discard 100	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						> 0.60	engine cycle test	
					**********			
					NON-CRANKSHAFT BASED ROUGH ROAD:	**********	**********	
					Rough Road Source	Disabled		
					**********	CeRRDR_e_None		
					IF Rough Road Source = WheelSpeedInECM	**********	**********	
					(Wheel speed noise OR ABS = OR Traction = OR Vehicle Stability) =	> **WSSRoughRoadThres** active active active	discard 100 engine cycle test	
					AND No Emission Neutral Default Action DTCs	ABS Failed Vehicle Dynamics Control System Status Driven Wheel Rotation Status Non Driven Wheel Rotation Status		
					**********			
					IF Rough Road Source = "FromABS"	**********	**********	
					(RoughRoad = OR ABS = OR Traction = OR Vehicle Stability) =	detected active active active	discard 100 engine cycle test	
					AND No Emission Neutral Default Action DTCs	ABS Failed Vehicle Dynamics Control System Status		
					**********			
					IF Rough Road Source = "TOSS"	********** >**TOSSRoughRoadThres**	********** discard 100	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					TOSS dispersion AND No Active DTCs ********** Default Action Isolator Resonance Default Action Option ********** If Isolator Resonance Option Enabled AND Misfire P030x TFTKO	in supporting tables Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only) ********** ********** Not Enabled ********** Set engine speed limits: 0 < Eng RPM < 9,000	engine cycle test 4 cycle delay ********** **********	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position System Variation Not Learned	P0315	This DTC determines if the crankshaft sensor learn values that are stored in memory are valid. The angle between each tooth of the reluctor wheel is learned, and the sum of all angles together should sum to 360° (one revolution of the reluctor wheel). Default values, or corrupted values will not sum to 360°.	The Crankshaft target wheel should be 360 degrees around in circumferance. Loss or controller non-volitile memory or an error in memory will cause the values of individual teeth learn to be defaulted or incorrect. Set the DTC if the Differance between the sum of the reluctor wheel's teeth and 360 degrees is greater than:	> 0.001 degrees	OBD Manufacturer Enable Counter	MEC = 0	0.50 seconds Frequency Continuous100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			No crankshaft pulses received	>= 0.1 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	 P0340 P0341	2 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	>= 2.0 grams/second > 450 RPM P0335	Continuous every 250 msec	Type A, 1 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 1 > 65,535	Engine is Running OR Starter is engaged No DTC Active:	P0340 P0341	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Determines if a fault exists with the cam position bank 1 sensor A signal	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	= FALSE > 2.0 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged		Continuous every 100 msec	
			No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 > 6	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	CrankSensor_FA	Continuous every MEDRES event	Type A, 1 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position Sensor - Crankshaft Start Position Incorrect	P034A	Monitors the position of the crankshaft during a hybrid auto-start to verify that the sensor has reported the crankshaft position properly.	Crankshaft position is in error by a number of crankshaft wheel teeth	> 1 crankshaft teeth	Engine has started rotating during a hybrid auto-start Crankshaft position is being verified No Active DTCs:	CrankSensor_FA	2 failures out of 3 samples a sample occurs each time the engine is started	Type B, 2 Trips
			Crankshaft position is in error by at least one crankshaft wheel tooth		Engine has started rotating during a hybrid auto-start Crankshaft position is being verified No Active DTCs:	CrankSensor_FA	4 failures out of 5 samples a sample occurs each time the engine is started	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position Sensor - Crankshaft Direction Incorrect	P034B	The Crankshaft Direction Incorrect test monitors the number of crankshaft reversals reported by a bi-directional crank sensor.	Number of crankshaft sensor reversals within a period of time	>= 3 <= 10.0 seconds	Engine Speed Engine Speed Engine Air Flow Engine Movement Detected No Active DTCs:	> 400 RPM < 2,000 RPM >= 2.0 grams/second CrankSensor_FA	Continuous Every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation (EGR) Flow insufficient	P0401	This monitor detects failures in the air system such to not fulfill the request of mass air flow through the intake circuit. This monitor is used to detect any malfunction in the air system that leads to lower HP EGR rate causing the vehicle's emissions to exceed the OBD limits. The aim of the HP EGR flow monitor is to detect HP EGR obstructions (insufficient HP EGR flow). The HP EGR flow depends on several variables like the HP EGR valve position, intake manifold pressure, exhaust pressure, HP EGR cooler (if present) outlet temperature. The aim of this procedure is to identify a limitation of the HP EGR (equal to an obstruction) that leads to exceed the OBD limits. In particular environmental conditions where the provided HP EGR flow amount is not enough to have a robust monitoring, the HP EGR flow intrusive test can be enabled. When	Air mass tracking error: difference between the fresh air requested (set point) and the fresh air measured by MAF sensor.	< (SeaBaro Constant x **P0401: Insufficient HP EGR flow barometric table B (sea level)** [mg]) + (MidBaro Constant x **P0401: Insufficient HP EGR flow barometric table B (mid level)** [mg]) + (LoBaro Constant x **P0401: Insufficient HP EGR flow barometric table B (low level)** [mg]) + (SeaBaro Constant x	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Desired EGR rate Engine speed is steady state: |RPM-RPM_old| in range, with hysteresis for a minimum number of samples Fuel request is steady state: |FUEL-FUEL_old| in range, with hysteresis for a minimum number of samples An air control transition	**P0401, P131F: EGR flow monitor enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0 [%] TRUE if <= 13 [rpm], FALSE if > 16.00 [rpm] > 20 [counts] TRUE if <= 0.20 [mm^3], FALSE if > 0.50 [mm^3] > 25 [counts] Refer to "Air Control	400.00 fail counters over 500.00 sample counters sampling time is 25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		the intrusive test is enabled, a dedicated flow setpoint value is provided to air control.		**P0401: Insufficient HP EGR flow barometric table A (sea level)** [mg] x **P0401: Insufficient HP EGR flow barometric correction (sea level)**) + (MidBaro Constant x **P0401: Insufficient HP EGR flow barometric table A (mid level)** [mg] x **P0401: Insufficient HP EGR flow barometric correction (mid level)**) + (LoBaro Constant x **P0401: Insufficient HP EGR flow barometric table A (low level)** [mg] x	has ended OR Such condition is disabled by calibration No active transition from a combustion mode to another one Throttle measured position Outside Air Temperature Ambient Pressure Engine Coolant Temperature OR OBD Coolant Enable Criteria Desired HP EGR flow Desired fuel quantity	Transition"Free Form OR 1.00 ==TRUE ==TRUE > 85.00 [%] > -20.00 [°C] > 69.60 [kPa] > 70.00 [°C] ==TRUE > **P0401: Minimum desired HP EGR flow** [mg] > **P0401: Insufficient HP EGR flow Min fuel enabling condition** [mm^3] AND <		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P0401: Insufficient HP EGR flow barometric correction (low level))	Outside air temperature in range Desired LP EGR split LP EGR valve measured position No faults on proper temperature sensor All enabling conditions last for a time	**P0401: Insufficient HP EGR flow Max fuel enabling condition** [mm^3] Condition must be TRUE. Refer to "P0401, P131F, P049B: Outside air temperature" Free Form == 0% < 1.00 [%] AIC_EGR_FlowDiagAirTempFA ==FALSE >= 0.70 [s]		
			Air mass tracking error: difference between the fresh air requested (set point) and the fresh air measured by MAF sensor.	< (SeaBaro Constant x **P0401: Insufficient HP EGR flow barometric table B (sea level)** [mg]) + (MidBaro Constant	Calibration on diagnostic enabling Difficult launch NOT detected Engine Running Cranking ignition in range	**P0401, P131F: EGR intrusive test enabling** ==TRUE Refer to "LDT_DifficultLaunchActive" Free Form ==TRUE Battery voltage > 11.00 [V]	400.00 fail counters over 500.00 sample counters sampling time is 25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				x **P0401: Insufficient HP EGR flow barometric table B (mid level)** [mg]) + (LoBaro Constant x **P0401: Insufficient HP EGR flow barometric table B (low level)** [mg]) + (SeaBaro Constant x **P0401: Insufficient HP EGR flow barometric table A (sea level)** [mg] x **P0401: Insufficient HP EGR flow barometric correction (sea level)**) + (MidBaro Constant x	PT Relay voltage in range Air Control is Active (air control in closed loop) Desired EGR rate Engine speed is steady state: |RPM-RPM_old| in range, with hysteresis for a minimum number of samples Fuel request is steady state: |FUEL-FUEL_old| in range, with hysteresis for a minimum number of samples An air control transition has ended OR Such condition is disabled by calibration No active transition from a combustion mode to another one	Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0 [%] TRUE if <= 13 [rpm], FALSE if > 16.00 [rpm] > 20 [counts] TRUE if <= 0.20 [mm^3], FALSE if > 0.50 [mm^3] > 25 [counts] Refer to "Air Control Transition"Free Form OR 1.00 ==TRUE ==TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P0401: Insufficient HP EGR flow barometric table A (mid level) [mg] x **P0401: Insufficient HP EGR flow barometric correction (mid level)**) + (LoBaro Constant x **P0401: Insufficient HP EGR flow barometric table A (low level)** [mg] x **P0401: Insufficient HP EGR flow barometric correction (low level)**)	Throttle measured position Outside Air Temperature Ambient Pressure Engine Coolant Temperature OR OBD Coolant Enable Criteria Outside air temperature in range No faults on proper temperature sensor No faults on crank sensor or on fuel injection system Time since last HP EGR flow insufficient monitoring (standard test or intrusive test) test completion	> 85.00 [%] > -20.00 [°C] > 69.60 [kPa] > 70.00 [°C] ==TRUE Condition must be FALSE. Refer to "P0401, P131F, P049B: Outside air temperature" Free Form AIC_EGR_FlowDiagAirTempFA ==FALSE CrankSensor_FA ==FALSE FUL_GenericInjSysFA ==FALSE > 0.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Desired fuel quantity	> **P0401: Insufficient HP EGR intrusive test Min fuel enabling condition** [mm^3] AND < **P0401: Insufficient HP EGR intrusive test Max fuel enabling condition** [mm^3]		
					All enabling conditions above last for a time	> 0.00 [s]		
					Desired LP EGR split	== 0%		
					LP EGR valve measured position	< 1.00 [%]		
					All enabling conditions (included the above timer) last for a time	>= 0.70 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Warm Up Catalyst Efficiency Below Threshold Bank 1 (OBD2, Cold start based monitor)	P0421	Cold start based monitor: the Catalyst (CC DOC) monitor only runs at cold start when dedicated conditions to detect this situation are satisfied. The diagnostic takes advantage of the HydroCarbon stored in the cold phase (the proper combination of combustion mode and injection pattern is requested in order to accumulate the proper amount of HC for performing a robust monitoring) and evaluates the energy produced by Catalyst during the following oxidation process (once that light-off temperature is fulfilled). The so calculated released energy is compared to the energy provided at CC DOC inlet in order to rescale the efficiency index value. Some corrections to minimize the results dispersion are finally applied. EWMA Filtering functionality (including Fast Initial Response (FIR), Rapid Response (RR) and EWMA	Catalyst Efficiency Index < Threshold If - Catalyst EWMA filter enabling calibration = TRUE AND - Catalyst conversion inefficiency previously detected (Catalyst Fault Active = TRUE) Then: Catalyst Efficiency Index < Repass Threshold	Efficiency Index < **CatCrtdEffThrsh** [Curve] If EWMA Enbl Cal = 1.00 [Boolean] AND Catalyst FA = CAT_CatSysEffLoB1_FA Then: Efficiency Index < **CatCrtdEffRepEWMA** [Curve]	**Catalyst monitor is enabled if:** - Catalyst monitor enabling calibrations = TRUE AND Number of DPF regeneration events successfully completed after vehicle exits from assembly plant (DOC de-greened); AND - No active DTCs: Catalyst up temperature sensor not in fault (Fault Flag = FALSE) AND Catalyst down temperature sensor not in fault (Fault Flag = FALSE) AND Catalyst up exhaust flow estimation not in fault (Fault Flag = FALSE) AND Injection system not in fault (Fault Flag = FALSE) AND Ambient temperature information not in fault (Fault Active = FALSE) AND Vehicle speed information not in fault (Fault Active =	**Catalyst monitor is enabled if:** Cat Monitor Enbl Cal = 1.00 [Boolean] AND ColdStartMonitorSelected = 1.00 [Boolean] AND DPF Rgn Cmpt >= 1.00 AND No active DTCs [Boolean]: Cat Up Temp Snsr Flt = NOT (EGT_SnsrCatUpFlt) AND Cat Dwn Temp Snsr Flt = NOT (EGT_SnsrCatDwnFlt) AND Cat Up Exh Flow Flt = NOT (EXF_TotExhCatUpFlt) AND Injection System Flt = NOT (FUL_GenericInjSysFlt) AND Amb Temp FA = NOT (OAT_PtEstFiltFA) AND Veh Speed FA = NOT (VehicleSpeedSensor_FA	Task Time = 100 [ms] If - Catalyst EWMA filter enabling cailibration = FALSE (EWMA Enbl Cal = 1.00 [Boolean]) Then: 2 trips (with malfunction) to set DTC (Type B) If - Catalyst EWMA filter enabling cailibration = TRUE (EWMA Enbl Cal = 1.00 [Boolean]) AND - EWMA status = EWMA Standard Then: 1 trip (with malfunction) to set DTC (Type A) If - Catalyst EWMA filter enabling cailibration = TRUE (EWMA Enbl Cal = 1.00 [Boolean])	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Standard) is supported by the Catalyst (CC DOC) monitor.			FALSE) AND Catalyst down hydrocarbon estimation not in fault (Fault Flag = FALSE) AND Soaking time information not in fault (Fault Active = FALSE) AND Engine coolant temperature information not in fault (Fault Flag = FALSE) AND IF water desorption model compensation is enabled THEN specific humidity model not in fault AND - Ambient conditions always satisfied while engine running: Ambient pressure higher than calibration AND Ambient temperature higher than calibration AND - Cold start conditions	) AND Cat Dwn HC Flt = NOT (CAT_HC_CatDwnFlt) AND Eng Mode Not Run Timer = NOT (EngineModeNotRunTimer_FA) AND Eng Cool Temp Flt = NOT (ECT_Sensor_FA & ECT_Sensor_TFTKO) AND IF water desorption model compensation enabled (1.00 [Boolean]) THEN WetExhSpcfcHumNotVld = NOT (EXM_WetExhSpcfcHumNotVld) AND Ambient conditions always satisfied while engine running [Boolean]: Amb Press > 74.36 [KPa] AND Amb Temp > 253.00 [K] AND Cold start conditions	AND - EWMA status = Fast Initial Response (FIR) Then: - 1 trip (with malfunction) to set DTC (Type A) and return to EWMA status = EWMA Standard - 2.00 [Counter] elapsed trips (with no mulfunction) to report pass and return to EWMA status = EWMA Standard If - Catalyst EWMA filter enabling cailibration = TRUE (EWMA Enbl Cal = 1.00 [Boolean]) AND - EWMA status = Rapid Response (RR) Then: - 1 trip (with malfunction) to set DTC (Type A) and return to EWMA status = EWMA Standard - 1 trip (with no mulfunction) to report pass	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					detected at key on: Engine coolant temperature lower or equal than calibration AND Catalyst down exhaust temperature (by sensor) lower or equal than calibration AND Soaking time higher or equal than calibration AND Catalyst stored HydroCarbon quantity lower or equal than calibration AND Late after injection quantity lower or equal to the difference between the quantity disabling the after injection request in case of long idle and the minimum quantity aborting the monitor AND - Catalyst monitor not yet performed successfully in current driving cycle (Catalyst monitor shall run only once per driving cycle): Catalyst down estimated temperature (by 1dk thermal model) lower than calibration AND monitor not completed in freezing state	detected at key on [Boolean]: Eng Cool Temp <= 55.00 [°C] AND Cat Dwn Temp Snsr <= 55.00 [°C] AND Soak Time >= 0.00 [s] AND Cat Stored HC <= 0.70 [g] AND Late after injection quantity lower or equal to the difference between 30,000.00 and 4,500.00 AND Catalyst monitor not yet performed successfully in current driving cycle (Catalyst monitor shall run only once per driving cycle) [Boolean]: Cat Dwn Temp (by 1dk thermal model) < 265.00 [°C] AND when Cat Dwn Temp (by 1dk thermal model) =	- 2.00 [Counter] elapsed trips (with no mulfunction) to report pass and return to EWMA status = EWMA Standard	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						265.00 [°C] catalyst monitor integration is not frozen		
					AND - If enabled by cal, HC accumulation strategy never disabled	AND if HC accumulation strategy enable cal == TRUE (cal value = 1.00 [Boolean]) then AIC_CoolByp_DsblLateAft == FALSE		
					Catalyst monitor integration is enabled if: - Catalyst up exhaust temperature (read by sensor) higher than calibration If Catalyst up exhaust temperature (read by sensor) lower than calibration, integration is reset	**Catalyst monitor integration is enabled if:** Cat Up Temp Snsr > 190.00 [°C] If Cat Up Temp Snsr < 145.00 [°C] integration is reset		
					- Catalyst down exhaust temperature (read by sensor) higher than calibration If catalyst down exhaust temperature (read by sensor) lower than calibration, integration is reset	Cat down Temp Snsr > 135.00 [°C] Cat down Temp Snsr < 125.00 [°C] integration is reset		
					Catalsyt monitor integration is frozen if: - Catalyst up exhaust flow lower than calibration If Catalyst up exhaust flow higher than calibration	**Catalsyt monitor integration is frozen if:** Cat Up Exh Flow < 36.00 [g/s] If Cat Up Exh Flow > 40.00 [g/s] integration is		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					integration is re-enabled;	re-enabled;		
					- Current combustion mode is not suitable for monitor	NOT(**ColdMontrCombModeEnbl** in the position of the current combustion mode) = TRUE		
					- engine is not running	engine not running		
					Diagnostic test evaluation is triggered if: - Catalyst down estimated temperature (by 1dk thermal model) higher or equal than calibration.	**Diagnostic test evaluation is triggered if:** Cat Dwn Temp (by 1dk thermal model) >= 265.00 [°C].		
					Diagnostic test evaluation is aborted if: - the ratio between time spent in a not suitable combustion mode and the whole monitoring time exceeds a threshold	**Diagnostic test evaluation is aborted if:** - combustion mode ratio > 0.08		
					- the ratio between time spent in low flow condition and the whole monitoring time exceeds a threshold	- flow ratio > 0.70		
					- the combination of the two ratios above exceeds a threshold	- combined ratio > 2.00		
					- the ratio between time spent in a not suitable combustion mode and the time frame once enabling conditions are met but the monitor is not running exceeds a threshold	- combustion mode preparation ratio > 0.13		
					- the integration time (monitoring time) is lower	- integration time < 30.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					than a threshold - the integration time (monitoring time) is higher than a threshold - Injected HC quantity in cold start phase lower than a threshold	- integration time > 100.00 [s] - Injected HC < 4,500.00 [mg]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Performance (For use on vehicles with a single fuel tank)	P0461	This DTC will detect a primary fuel tank level sensor stuck in-range.	a) Sensed fuel volume change is b) while engine fuel consumption is	a) < 3 liters b) ≥ 27.81 liters	1. Diagnostic Enabled 2. Engine Operational State	1. == True 2. == Running	250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit Low Voltage (For use on vehicles with a fuel float)	P0462	This DTC will detect a primary fuel tank sensor out-of-range low.	Fuel level Sender % of 5V range	< 10 % or 88.48 liters	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	100 failures out of 125 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit High Voltage (For use on vehicles with a fuel float)	P0463	This DTC will detect a primary fuel tank level sensor out-of-range high.	Fuel level Sender % of 5V range	> 60 % or 7.50 liters	a) Diagnostic enabled status b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	a) == True b) == True c) == True d) <> True	100 failures out of 125 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan Speed Low [LIN Bus Electric PWM Fans Only - Internal or External controller]	P0494	Measured actual fan speed is monitored against a calibrated lower acceptable limit for the cooling fan RPM under normal operating conditions. The diagnostic is set when the threshold is crossed. This diagnostic ensures that the fan is not under cooling. Only after first fan activation, the fan will be held commanded on for enough time to ensure this monitor has an opportunity to mature a decision.	Measured Fan Speed	<= Speed Low Limit [Supporting Table] **P0494_LIN_Threshold**	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In-Range e] LIN Bus based Fan Operation Enabled f] LIN Bus Lost Communication Fault Active g] LIN Bus Continuous Operation Fault Active h] Fan Commanded On	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <> True d] > 11.00 volts e] == TRUE f] <> True g] <> True h] == TRUE	16.00 failures / 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Flow Insufficient	P049B	This monitor detects failures in the air system such to not fulfill the request of mass air flow through the intake circuit. This monitor is used to detect any malfunction in the air system that leads to lower LP EGR rate causing the vehicle's emissions to exceed the OBD limits. The aim of the LP EGR flow monitor is to detect LP EGR obstructions (insufficient LP EGR flow). The LP EGR flow depends on several variables like the LP EGR valve position, intake manifold pressure, exhaust pressure, LP EGR differential pressure, LP EGR cooler outlet temperature. The aim of this procedure is to identify a limitation of the LP EGR (equal to an obstruction) that leads to exceed the OBD limits.	Air mass tracking error: difference between the fresh air requested (set point) and the fresh air measured by MAF sensor.	< (SeaBaro Constant x **P049B: Insufficient LP EGR flow barometric table B (sea level)** [mg]) + (MidBaro Constant x **P049B: Insufficient LP EGR flow barometric table B (mid level)** [mg]) + (LoBaro Constant x **P049B: Insufficient LP EGR flow barometric table B (low level)** [mg]) + (SeaBaro Constant x	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Desired EGR rate Engine speed is steady state: |RPM-RPM_old| in range, with hysteresis for a minimum number of samples Fuel request is steady state: |FUEL-FUEL_old| in range, with hysteresis for a minimum number of samples	**P049B: Insufficient LP EGR flow monitor enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0 [%] TRUE if <= 3.00 [rpm], FALSE if > 10.00 [rpm] > 25.00 [counts] TRUE if <= 0.20 [mm^3], FALSE if > 0.60 [mm^3] > 22.00 [counts]	300.00 fail counters over 375.00 sample counters sampling time is 25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P049B: Insufficient LP EGR flow barometric table A (sea level) [mg] x **P049B: Insufficient LP EGR flow barometric correction (sea level)**) + (MidBaro Constant x **P049B: Insufficient LP EGR flow barometric table A (mid level)** [mg] x **P049B: Insufficient LP EGR flow barometric correction (mid level)**) + (LoBaro Constant x **P049B: Insufficient LP EGR flow barometric table A (low level)** [mg] x	An air control transition has ended OR Such condition is disabled by calibration No active transition from a combustion mode to another one Outside Air Temperature Ambient Pressure Engine Coolant Temperature OR OBD Coolant Enable Criteria Desired LP EGR flow Desired fuel quantity	Refer to "Air Control Transition"Free Form OR 0.00 ==TRUE ==TRUE > -20.00 [°C] > 69.60 [kPa] > 60.00 [°C] ==TRUE > **P049B: Minimum desired LP EGR flow** [mg] > **P049B: Insufficient LP EGR flow Min fuel enabling condition** [mm^3] AND **P049B: Insufficient LP EGR flow Max fuel enabling condition**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P049B: Insufficient LP EGR flow barometric correction (low level))		[mm^3]		
					Outside air temperature in range	Condition must be TRUE. Refer to "P0401, P131F, P049B: Outside air temperature" Free Form		
					Desired LP EGR split	== 100%		
					HP EGR valve measured position	< 2.00 [%]		
					No faults on proper temperature sensor	AIC_LPE_FlowDiagAirTempFA ==FALSE		
					All enabling conditions last for a time	>= 1.10 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation System Disconnecte d	P04DB	The Crankcase Ventilation System Disconnected Diagnostic monitors the performance of the Positive Crankcase Ventilation (PCV) System. After the enable conditions are met, this monitor will will evaluate the signal of the Crankcase Ventilation Pressure sensor. This sensor is mounted in the PCV hose between the crankcase and the engine induction system. During normal operation, the sensor will see a pressure drop that varies in conjunction with the engine air flow. Additionally, the sensor will see pressure pulses as the cylinders go up and down in the crankcase. This monitor evaluates both the signal offset based on the pressure drop, and the signal noise based on the pressure pulses. The product of the	ScaledSignal * ScaledNoise Where ScaledSignal = Where ScaledNoise = The Crankcase Ventilation Pressure Sensor is sampled every 3.125 msec to calculate ScaledSignal and ScaledNoise.	< 0.75 kPa * kPa Average Crankcase Ventilation Pressure Signal value calculated over the sample period and normalized as a function of engine air flow based on table **P04DB: Crankcase Pressure Signal Normalization for Air Flow** 0.50 kPa is subtracted from the normalized value. The absolute value of the result is taken to get the final ScaledSignal. Average Crankcase Ventilation Pressure Signal delta calculated over the sample period and normalized as a function of engine speed based on table **P04DB: Crankcase Pressure Noise Normalization for Engine Speed**	Diagnostic is Enabled Outside Air Temperature Engine Coolant Temperature Barometric Pressure <u>Stability conditions:</u> Engine Air Flow Engine Air Flow Engine Vacuum Engine Vacuum Engine Speed Engine Speed Maximum Engine Air Flow - Minimum Engine Air Flow over the sample period Time that stability conditions must be met prior to sampling data Stability conditions must continue to be met as the data sample is collected over a period A data sample may accumulate data from multiple sample windows. <u>DTCs Active:</u> <u>DTCs Pending:</u>	 >= -20.0 Degrees C >= 70.0 Degrees C >= 68.0 kPa >= 120.0 Grams/Second <= 250.0 Grams/Second >= -220.0 kPa <= -100.0 kPa >= 1,000 RPM <= 4,500 RPM <= 75.0 Grams/Second = 2.3 Seconds = 5.0 Seconds MAF_SensorFA MAP_SensorFA OAT_PtEstFiltFA AmbPresDfltdStatus ECT_Sensor_FA PCV_Sensor_FA PCV_Sensor_Circuit_FA	The DTC will fail immediately if the malfunction criteria are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		signal offset and signal noise is compared to a calibration threshold during certain engine operating conditions. If this product is above a failure threshold, the system is operating as expected, and the monitor passes. If the product is below the failure threshold, the system is disconnected, and the monitor fails.	ScaledSignal and ScaledNoise values are accumulated over a period of 5.0 Seconds.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation Hose Connection Sensor Circuit Low	P04E2	Detects a continuous open or short to ground in the Crankcase Ventilation Pressure signal circuit by monitoring the Crankcase Ventilation Pressure sensor output voltage and failing the diagnostic when the Crankcase Ventilation Pressure voltage is too low. The Crankcase Ventilation Pressure sensor is a pressure transducer which outputs a voltage proportional to the gauge pressure between the crankcase ventilation hose and the atmosphere.	Crankcase Ventilation Pressure Voltage	<= 4.3 % of 5 Volt Range (This is equal to -5.71 kPa)	Diagnostic is Enabled		960 failures out of 1,200 samples 1 sample every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation Hose Connection Sensor Circuit High	P04E3	Detects a continuous short to power in the Crankcase Ventilation Pressure signal circuit by monitoring the Crankcase Ventilation Pressure sensor output voltage and failing the diagnostic when the Crankcase Ventilation Pressure voltage is too high. The Crankcase Ventilation Pressure sensor is a pressure transducer which outputs a voltage proportional to the gauge pressure between the crankcase ventilation hose and the atmosphere.	Crankcase Ventilation Pressure Voltage	>= 95.5 % of 5 Volt Range (This is equal to 5.69 kPa)	Diagnostic is Enabled		960 failures out of 1,200 samples 1 sample every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation Hose Connection Sensor Range/ Performance	P04FB	Detects a performance failure in the Crankcase Ventilation Pressure sensor, such as when the sensor value is stuck in range. If the engine has been off for a sufficient amount of time, the pressure in the crankcase ventilation system will equalize to atmospheric pressure. The Crankcase Ventilation Pressure sensor value is checked to see if it is within the normal expected range around the expected value of 0 kPa. If it is not, the Crankcase Ventilation Pressure performance diagnostic will fail. The Crankcase Ventilation Pressure sensor is a pressure transducer which outputs a voltage proportional to the gauge pressure between the crankcase ventilation hose and the atmosphere.	Crankcase Ventilation Pressure OR Crankcase Ventilation Pressure	>= 0.63 kPa <= -0.63 kPa	Diagnostic is Enabled Engine is not rotating Time since engine has stopped rotating Engine Coolant Temperature <u>DTCs Active:</u>	 >= 10.0 seconds >= 70.0 deg C PCV_Sensor_Circuit_FA ECT_Sensor_FA EngineModeNotRunTimer Error	128 failures out of 160 samples 1 sample every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Performance - Continuously Variable Displacement Oil Pump	P0521	Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range. The engine oil pressure is compared against thresholds when engine is running and when engine is off.The engine oil pressure rationality diagnostic has two parts: engine running test and engine off test. The engine running test compares the measured oil pressure to threshold. If the measured oil pressure is out of the thresholds, then the error counter increments. The engine off test compares the measured oil pressure against thresholds after the engine has stopped rotating. If the measured oil pressure is out of the thresholds, then the error counter increments.	**Two Stage Oil Pump EOP Sensor Test with Engine Running, High Pressure State** <u>To Fail when previously passing with the engine running:</u> Filtered Engine Oil Pressure below threshold OR Filtered Engine Oil Pressure above threshold <u>To pass when previously failing:</u> Filtered Engine Oil Pressure above low threshold plus an offset OR Filtered Engine Oil Pressure below high threshold minus an offset	Filtered Oil Pressure < (**P0521_CVDOP_MinOilPresFail** kPa) OR Filtered Oil Pressure > (**P0521_CVDOP_MaxOilPressure** kPa) Filtered Oil Pressure > (**P0521_CVDOP_MinOilPresFail** + 10.0 kPa) OR Filtered Oil Pressure < (**P0521_CVDOP_MaxOilPressure** - 10.0 kPa)	Variable Displacement Oil Pump is Present = TRUE Engine Running Diagnostic Status Engine Off Rationality Test Diagnostic Reporting Status Oil Pressure Sensor In Use Engine Running Ambient Air Pressure Oil Aeration (= TRUE if engine speed > 10,000 RPM for longer than **TimeForOilAeration** seconds) Filtered Engine Speed within range Sensed Oil Temperature within range Engine Speed stable No active DTC's	Enabled Enabled Test not report a fail state Yes ≥ 10.0 seconds ≥ 70.0 kPa FALSE 1,000 RPM ≤ Filtered Engine Speed ≤ 4,500 RPM 40.0 deg C ≤ Sensed Oil Temperature ≤ 120.0 deg C (RPM - Previous RPM) < 35 Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCktFA AmbientAirDefault EngOilTempFA	≥ 40 errors out of 50 samples. Performed every 100 msec ≥ 10 passes out of 50 samples. Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						CrankSensor_FA		
			Two Stage Oil Pump EOP Sensor Test with Engine Off If enabled: <u>To Fail when previously passing with the engine off:</u> Difference between oil pressure and Barometric pressure is Greater than a threshold	(Oil Pressure - Barometric Pressure) ≥ KeLUBD_p_OP_EngOffDiffMax kPa	Two Stage Oil Pump is Present = TRUE Engine Off Rationality Test Diagnostic Status Engine Running Rationality Test Diagnostic Status Modelled Oil Temperature No Engine Movement No active DTC's	Enabled Enabled Test not report a fail state ≥ 60.0 deg C > 10.0 seconds EngineModeNotRunTimer_FA EngOilTempFA EngOilPressureSensorCktFA CrankSensor_FA	≥ 20 errors out of 40 samples. Run once per trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	< 6.00 percent Deadband: < 5 percent or > 95 percent	Engine Speed Enable Engine Speed Disable Oil Pressure Sensor In Use Diagnostic Status	> 400 rpm < 350 rpm Yes Enabled	1,280 failures out of 1,600 samples Performed every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	> 95.00 percent Deadband: < 5 percent or > 95 percent	Oil Pressure Sensor In Use Diagnostic Status	Yes Enabled	1,280 failures out of 1,600 samples Performed every 3.125 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit Low Voltage	P0532	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too low	(AC High Side Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	< 3 percent	AC HSP Sensor Present Diagnostic Status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit High Voltage	P0533	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too high	(AC High Side Pressure Sensor Circuit Voltage) ÷ 5 Volts) *100	> 95 percent	AC HSP Sensor Present Diagnostic Status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an invalid range. "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in an invalid range, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control analog circuit voltage must be "between ranges" for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "between ranges" when the ratio is measured in the following ranges: 0.28 -0.31, 0.415-0.445, 0.585 - 0.615 0.78 - 0.81, 1.005 - 1.035	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control On Switch Circuit	P0565	Detects a failure of the cruise on/off switch in a continously applied state "Emissions Neutral Default Action - When the BCM tells the ECM that the cruise control analog input voltage is in the Momentary Cruise On/Off range for too long, the code is set and cruise control is disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." Only applicable for vehicles with a momentary on/off cruise switch architecture.	Cruise Control On switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 20.00 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Resume range for too long, the code is set and cruise control is disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Resume switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Set range for too long, the code is set and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Set switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Cancel Switch Circuit	P056C	Detects a failure of the cruise cancel switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage is in the Cancel range for too long, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	Cruise Control Cancel switch remains applied for greater than a calibratable period of time.	fail continously in the applied state for greater than 20.00 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Input Circuit	P0575	Determines if cruise switch state received from the BCM is valid. "Emissions Neutral Default Action : When the ECM determines that a serial communication fault from the BCM has occurred with frame $1E1, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	If x of y rolling count / protection value faults occur, disable cruise for duration of fault	Message <> 2's complement of message Message rollling count<>previous message rolling count value plus one	Diagnostic is enabled. Cruise Control Switch Serial Data Error Diagnostic Enable Serial communication to BCM Power Mode Engine Running	1.00 No loss of communication = RUN = TRUE	9 failures out of / 17 samples Performed on every received message 9 rolling count failures out of / 17 samples Performed on every received messagw	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Range/ Performance	P057B	This diagnostic monitors the Brake Pedal Position Sensor for a stuck in range failure	.Brake pedal position sensor movement diagnostic cal is enabled 1.00	True	Diagnostic is enabled. Brake Pedal Position Sensor Circuit Range / Performance Diagnostic Enable	1.00 ignition voltage > 10.00		MIL: Type A, 1 Trips
			Calculated EWMA value must be greater than calibratable theshold after calibratable number of tests have completed to report a "test passed" for P057B	EWMA value looked up in supporting table **P057B KtBRKI_K_FastTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is > 0.80	calculated brake pedal position delta sample counter > 50.00 for fast test OR calculated brake pedal position delta sample counter > 1,000.00 for slow test	calculated brake pedal position delta > 3.25 OR (for slow test) shift lever has been in park once this key cycle vehicle speed >= 8.00 accelerator pedal position < 5.00	total number of EWMA tests > 20.00	
			Calculated EWMA Value must be less than calibratable threshold after calibratable number of tests have completed to report a "test failed" for P057B. This test runs once per key cycle	EWMA value looked up in supporting table **P057B KtBRKI_K_CmpltTestPointWeight** P057B as a function of calculated brake pedal position delta EWMA value is less thatn 0.40	no DTC's active (P057C, P057D)	shift lever has been in park once this key cycle vehicle speed >= 8.00 accelerator pedal position < 5.00	total number of EWMA tests > 2.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Low	P057C	detects short to ground for brake pedal position sensor	If x of y samples are observed below failure threshold, default brake pedal position to zero percent.	5.00	Diagnostic is enabled. Brake Pedal Position Sensore Low Voltage Diagnostic Enable	1.00	20 / 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit High	P057D	detects open circuit for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	95.00	Diagnostic is enabled. Brake Pedal Position Sensore High Voltage Diagnostic Enable	1.00	20.00 / 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Intermittent/ Erratic	P057E	detects noisy / erratic ouput for brake pedal position sensor	If x of y samples are observed above failure threshold, default brake pedal position to zero percent and set DTC	25.00	Diagnostic is enabled. Brake Pedal Position Sensor Circuit Intermittent / Erratic Diagnostic Enable	1.00	5.00 / 20.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-function Circuit Low Voltage	P0580	detects short to ground failure for cruise multi-function switch circuit "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch circuit voltage is too low for too long, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." Only applicable for vehicles with a momentary on/off cruise switch architecture.	Cruise Control analog circuit voltage must be in an "Open Short To Ground" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considerred to be "open short to ground when the ratio is measured in the following rangs: 0 - 0.185	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-function Circuit High Voltage	P0581	detects short to power failure for cruise multi-function switch circuit "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch circuit voltage is too high for too long, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." Only applicable for vehicles with a momentary on/off cruise switch architecture.	Cruise Control analog circuit voltage must be in "Short To Power" range for greater than a calibratable period of time.	The cruise control analog voltage A/D count ratio is considered to be "short to power" when the ratio is measured in the following range: 1.005 - 1.035	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Performance	P058A	This DTC monitors for a battery module internal fault	Battery Module signals an internal fault via LIN bus VeVITR_e_IBS_InternalFault	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Monitoring Performance	P058B	This DTC monitors for a battery module current fault	Battery Module signals an internal fault via LIN bus VeVITR_e_BatCurrRatDiag	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Monitoring Performance	P058C	This DTC monitors for a battery module temperature fault	Difference between Battery Module raw temperature values	> 10.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Temperature Data Available over LIN bus Internal Temperature Circuit Low Fault Active (P16DE) Internal Temperature	Enabled Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = Zero = True = False	8 failed samples within 10 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Circuit High Fault Active (P16DF) Battery Module Temperature Too High Fault Active (P058E) Battery Module Temperature Too Low Fault Active (P058F)	= False = False = False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Voltage Monitoring Performance	P058D	This DTC monitors for a battery module voltage fault	Difference between 12V System Reference Voltage and IBS 12V Battery Voltage values	> 5.00 Volts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit IBS Voltage and Current Data Available over LIN bus Battery Monitor Module Circuit Low Voltage Fault Active (P16D4) Battery Monitor Module Circuit High Voltage Fault Active (P16D5)	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True = True = False = False	32 failed samples within 40 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Too High	P058E	This DTC monitors for a battery module temperature too high fault	Battery Module raw temperature 2 value	> 120.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	Enabled Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Too Low	P058F	This DTC monitors for a battery module temperature too low fault	Battery Module raw temperature 2 value	< -43.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	Enabled Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = Zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Active Grill Air Shutter A Performance /Stuck OFF	P059F	A 2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condtion] when X failures occur in Y samples after an electronic command latency delay. A Part 1 failure result then enables Part 2 which makes a fixed number of repeat attempts to reach the commanded postion [ReTry to clear obstruction]. The DTC is set when the calibrated fault threshold count of repeat attempts is reached without achieving the original commanded shutter position.	Smart Shutter Actuator 1 Position Response AND Shutter 1 Diagnostic Delay Threshold count	<> Smart Shutter Actuator 1 Commanded Position percent AND Counter > 99.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter1 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1.00 failures out of 1.00 samples 1 sample / 100 milliseconds	Type B, 2 Trips
			Shutter 1 Performance Test count	= 5.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter1 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Active Grill Air Shutter B Performance /Stuck OFF	P05AE	A 2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condtion] when X failures occur in Y samples after an electronic command latency delay. A Part 1 failure result then enables Part 2 which makes a fixed number of repeat attempts to reach the commanded postion [ReTry to clear obstruction]. The DTC is set when the calibrated fault threshold count of repeat attempts is reached without achieving the original commanded shutter position.	Smart Shutter Actuator 2 Position Response AND Shutter 2 Diagnostic Delay Threshold count	<> Smart Shutter Actuator 2 Commanded Position percent AND Counter > 99.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter2 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1.00 failures out of 1.00 samples 1 sample / 100 milliseconds	Type B, 2 Trips
			Shutter 2 Performance Test count	= 5.00 counts	a. Ignition Run_Crank Active, b. Ignition Run_Crank AND Ignition Accessory AND ECU Awake, c. Command Shutter2 Enable	a. = TRUE, b. = FALSE AND = FALSE AND = TRUE, c. = 1.00	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code.	The Primary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5.00 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type A, 1 Trips
			The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations.	254 failures detected via Error Correcting Code			Diagnostic runs continuously via the flash hardware.	
			The Primary Processor's calculated checksum does not match the stored checksum value for a selected subset of the calibrations.	2 consecutive failures detected or 5 total failures detected.			Diagnostic runs continuously. Will report a detected fault within 200 ms.	
				In all cases, the failure count is cleared when controller shuts down				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM Long Term Memory Reset	P0603	This DTC detects an invalid NVM which includes a Static NVM, Perserved NVM, ECC ROM in NVM Flash Region, and Perserved NVM during shut down.	Static NVM region error detected during initialization				Diagnostic runs at controller power up.	Type A, 1 Trips
			Perserved NVM region error detected during initialization				Diagnostic runs at controller power up.	
			Perserved NVM region error detected during shut down.				Diagnostic runs at controller power down.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.47144 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	65,534 counts			Diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for both the primary and secondary processsors.	Time new seed not received exceeded			always running	0.450 seconds	Type A, 1 Trips
			MAIN processor receives seed in wrong order			always running	3 / 18 counts intermittent. 50 ms/count in the ECM main processor	
			2 fails in a row in the MAIN processor's ALU check			Test is Enabled: 1 (If 0, this test is disabled)	25 ms	
			2 fails in a row in the MAIN processor's configuration register masks versus known good data			Test is Enabled: 1 (If 0, this test is disabled)	12.5 to 25 ms	
			Checks number of stack over/under flow since last powerup reset >=	3.00		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		Test is Enabled: 1 (If 0, this test is disabled)	5 / 10 counts or 0.150 seconds continuous; 50 ms/count in the ECM main processor	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization.	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Counter >=					
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	
			MAIN processor DMA transfer from Flash to RAM has 1 failure			Test is Enabled: 0 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAM	
			Safety critical software is not executed in proper order.	>= 1 incorrect sequence.		Test is Enabled: 1 (If 0, this test is disabled)	Fail Table, f(Loop Time). See supporting tables: **P0606_PSW Sequence Fail f (Loop Time)** / Sample Table, f (Loop Time)See supporting tables: **P0606_PSW Sequence Sample f(Loop Time)** counts 50 ms/count in the ECM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			MAIN processor determines a seed has not changed within a specified time period within the 50ms task.	Previous seed value equals current seed value.		Test is Enabled: 1 (If 0, this test is disabled)	Table, f(Loop Time). See supporting tables: **P0606_Last Seed Timeout f (Loop Time)**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal ECM Processor Integrity Performance	P0607	Indicates that the ECM has detected an internal processor integrity performance.	Performs the failure diagnostic for the offline and online BIST results.			Test is enabled: 0 . (If 0, this test is disabled)	5 counts background task/ count in the ECM main processor	Type A, 1 Trips
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: 1 . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: 1 . (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ANDR ADC Fault	P060B	Indicates that the ECM has detected an ANDR ADC Fault.	Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	Type A, 1 Trips
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation percent >	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation	6.00 %	Run/Crank Voltage >	7.00 V	2 / 14 counts or	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			percent >				1.75 seconds continuous; 250 ms/count in the ECM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Control Circuit Open (12VSS)	P0615	Controller specific output driver circuit diagnoses the Starter relay (12VSS) low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	>= 200 KOhms impedance between signal and controller ground.	Starter control diag enable Engine speed Run Crank voltage	Enabled >= 0.00 RPM >= 11.00 volts	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Control Circuit Low Voltage (12VSS)	P0616	Controller specific output driver circuit diagnoses the Starter relay (12VSS) low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 0.5 Ohms impedance between signal and controller ground	Starter control diag enable Engine speed Run Crank voltage	Enabled >= 0.00 RPM >= 6.41 volts	8 failures out of 10 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Control Circuit High Voltage (12VSS)	P0617	Controller specific output driver circuit diagnoses the Starter relay low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 0.5 Ohms impedance between signal and controller power	Starter control diag enable Engine speed Run Crank voltage	Enabled >= 0.00 RPM >= 6.41 volts	40 failures out of 50 samples 50 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Internal Control Module EEPROM Error	P062F	This DTC detects a NVM long term performance. There are two types of diagnostics that run during controller power up. One for HWIO reports that writing to NVM (at shutdown) will not succeed, and the other HWIO reports the assembly calibration integrity check has failed.	HWIO reports that writing to NVM (at shutdown) will not succeed				Diagnostic runs at controller power up.	Type B, 2 Trips
			HWIO reports the assembly calibration integrity check has failed				Diagnostic runs at controller power up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1 by monitoring the reference percent Vref1 and failing the diagnostic when the percent Vref1 is too low or too high or if the delta between the filtered percent Vref1 and non-filtered percent Vref1 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref1 < or ECM percent Vref1 >> or the difference between ECM filtered percent Vref1 and percent Vref1 >	4.875 % Vref1 5.125 % Vref1 0.0495 % Vref1	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open	P0650	Detects an inoperative malfunction indicator lamp control low side driver circuit. This diagnostic reports the DTC when an open circuit is detected.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P263A may also set (MIL Control Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2 by monitoring the reference percent Vref2 and failing the diagnostic when the percent Vref2 is too low or too high or if the delta between the filtered percent Vref2 and non-filtered percent Vref2 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref2 < or ECM percent Vref2 >>br>or the difference between ECM filtered percent Vref2 and percent Vref2 >	4.875 % Vref2 5.125 % Vref2 0.0495 % Vref2	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or too high or if the delta between the filtered percent Vref3 and non-filtered percent Vref3 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref3 < or ECM percent Vref3 >> or the difference between ECM filtered percent Vref3 and percent Vref3 >	4.875 % Vref3 5.125 % Vref3 0.0495 % Vref3	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4 by monitoring the reference percent Vref4 and failing the diagnostic when the percent Vref4 is too low or too high or if the delta between the filtered percent Vref4 and non-filtered percent Vref4 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref4 < or ECM percent Vref4 >> or the difference between ECM filtered percent Vref4 and percent Vref4 >	4.875 % Vref4 5.125 % Vref4 0.0495 % Vref4	Diagnostic enabled AND [(Run/Crank voltage for Time period AND Starter engaged) OR (Run/Crank voltage AND Starter engaged)]	= 1 > 6.41 Volts = 0.02 Seconds = FALSE > 8.41 Volts = TRUE	19 / 39 counts; or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure Control Circuit/Open	P06DA	Controller specific output driver circuit diagnoses the oil pump low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	Open Circuit ≥ 200 k Ω impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips Note: In certain controllers P06DB may also set (Engine Oil Pressure Control Circuit Short To Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure Control Circuit Low	P06DB	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DA may also set (Engine Oil Pressure Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure Control Circuit High	P06DC	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	Short to Power ≤ 0.5 Ω impedance between output and controller power	Powertrain Relay Voltage Run/Crank Active Cranking State	≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Oil Pump Control Circuit Performance - Continuously Variable Displacement Oil Pump	P06DD	Diagnoses the performance of the oil pump controls. The test determines if the oil pump is capable of meeting the pressure demand.	Absolute Oil Pressure Error = ABS [Desired Oil Pressure - Measured Oil Pressure] A first-order lag filter is applied to the error value, every 100ms: Filtered Pressure Error = Previous Error + 0.00250 *(New Error - Previous Error) <u>Fail from passing state:</u> Filtered Oil Pressure Error is greater than a threshold AND the cycler algorithm is unable to clear the fault. <u>Pass from failing state:</u>	Filtered Pressure Error ≥ 40.00 kPa AND Cycler Algorithm has cycled the pump solenoid for 1.80 seconds AND Filtered Pressure Error ≥ **P06DD_CVDOP_MaxPressErr** after the cycler is complete	<u>Common Criteria:</u> Closed Loop Pump Control Active Engine Running Powertrain Relay Voltage Desired Oil Pressure in Range Oil Temperature in Range Engine Speed in Range	≥ 11.00 **P06DD_CVDOP_MinDesPres** ≤ Desired Oil Pressure ≤ **P06DD_CVDOP_MaxDesPress** 40.00 °C ≤ Oil Temp ≤ 120.00 °C 1,000 RPM <= Engine Speed <= 4,500	Performed every 100ms.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Filtered Oil Pressure Error is less than a threshold	Filtered Pressure Error < **P06DD_CVDOP_Max PressErr**				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Control Module (TCM) Requested MIL Illumination	P0700	Monitors the TCM MIL request message to determine when the TCM has detected a MIL illuminating fault.	Transmission Control Module Emissions-Related DTC set and module is requesting MIL	Transmission Control Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBCM is valid	Serial Communication 2's complement message - ($1C7/$1C9 for engine torque, $1CA/$1C6 for axle torque)	Message <> 2's complement of message	Active Communication with EBCM Power Mode Engine Running Status of traction in GMLAN message ($4E9)	Received serial data = Run = True = Traction Present	>= 6 failures out of 10 Performed on every received message	Type C, No SVS Emissions Neutral Diagnostic - Type C
			OR Serial Communication message ($1C7/$1C9 for engine torque, $1CA/ $1C6 for axle torque) rolling count index value	Message rolling count value <> previous message rolling count value plus one	Run/Crank Active Ignition Voltage	> 0.50 seconds > 6.41 volts	6 rolling count failures out of 10 samples Performed on every received message	
			OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples. Performed every 200 ms	
			Torque request greater than torque request diagnostic maximum threshold	> 251 Nm for engine torque based traction torque system, OR > 4,000 Nm for axle torque based traction torque system			>= 4 out of 10 samples Performed on every received message	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Reset Signal Message Counter Incorrect	P1000	This DTC monitors for an error in communication with the Fuel Pump Driver Control Module Reset Signal	Communication of the Alive Rolling Count or Protection Value from the FPDCM over CAN bus is incorrect for out of total samples	 >= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Reset Error	P1005	This DTC monitors for a reset error in the Fuel Pump Driver Control Module	If the received value for the time since the last FPDCM reset has reset and the newly received value or previous value is for out of total samples	<= 0.50 seconds >= 2.00 counts >= 400.00 counts	DTC is enabled Sensor bus relay Battery voltage P1000 U18A2	Enabled On > 11.00 Volts Not active Not active	Diagnostic runs in 50 ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Control Circuit Shorted	P1006	This monitor checks whether the Engine Coolant Flow Control Valve DC motor wires are shorted to one another.	Current flowing through the DC motor driver higher than a threshold (error information provided by HWIO)	> 9 [A]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled Error indication provided by HWIO	== 1.00 > 11.00 [V] == False == True != Indeterminate	80.00 fails out of 100.00 samples Sampling rate: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Temperature (Fuel Tank Zone Module) Too High Signal Message Counter Incorrect	P1009	This DTC monitors for an error in communication with the Fuel Pump Driver Control Module (FTZM) Temperature Too High Signal Message	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Driver Control Module over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 100ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Erratic	P100C	This DTC monitors for an erratic Temperature signal via LIN bus from the Battery Monitor Module	Communication of the Temperature signal from the Battery Monitor Module has become erratic or is incorrect for out of total samples	>= 4 counts >= 5 counts	The diagnostic is enabled All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	Enabled >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Internal Temperature Circuit Erratic	P100D	This DTC monitors for an erratic Temperature Circuit signal via LIN bus from the Battery Monitor Module	Communication of the Temperature Circuit signal from the Battery Monitor Module has become erratic or is incorrect for out of total samples	>= 4 counts >= 5 counts	The diagnostic is enabled All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	Enabled >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Motor Driver Temperature Too High	P100F	This monitor checks whether the temperature of the Engine Coolant Flow Control Valve DC motor driver is too high.	DC motor driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled Error indication provided by HWIO	== 1.00 > 11.00 [V] == False == True != Indeterminate	80.00 fails out of 100.00 samples Sampling rate: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Position Sensor Exceeded Minimum Learning Limit	P1010	This monitor checks whether the Engine Coolant Flow Control Valve positions at the mechanical end stops are out of range.	SENT position raw value at the fully open mechanical stop lower than a threshold OR SENT position raw value at the fully open mechanical stop higher than a threshold	< 4.00 [%5V] > 9.20 [%5V]	Test enabled Run/crank active Engine moving Engine coolant temperature OR OBD Coolant Temp enabled Engine coolant temperature OR OBD Max Coolant Temp achieved Engine coolant temperature fault active Actuator fault SENT position sensor fault Valve perfomance test failed this key on End of Trip event occurred	== 1.00 == False == False > -50.00 [°C] == True < 150.00 [°C] == False ECT_Sensor_FA == False PECR_Actr_Flt == False PECR_PstnSnsr_Flt == False PECR_Obstruction_TFTKO == False == True	Within 60.00 [s] after engine shutdown	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Phase U-V-W Circuit Open	P1029	This DTC detects if any of the 3phase fuel pump control circuits is Open [system configuration "Brushless"] The diagnostic can detect open circuit faults when the fuel pump is not rotating. In the "stopped" state, small currents are injected into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. This process is completed in less than 1 millisecond. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are	Phased-pair circuit voltage	3V <= V [back-EMF] <= 6V	a) Sensed fuel pump speed b) Device configuration FCBR_e_ChassisFuelPresSysType c) Diagnostic Enabled - KeFABR_b_OpenCktDiagEnbl d) CAN Sensor Bus message $3EC_Avail e) Sensor Bus Relay On f) Sensor Bus B Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr]	a) == 0 RPM b) CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys c) == TRUE d) == TRUE e) == TRUE f) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Phase U-V-W Circuit Low	P102A	This DTC detects if the fuel pump control circuit is shorted to low [Short to Ground] The diagnostic detects short-to-ground faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair high-side drive is monitored, or 2) in the "stopped" state, small currents are injected into each motor phase circuit pair	Phased-pair circuit voltage Difference	Vdelta > 0.145 V	a) Device configuration FCBR_e_ChassisFuelPresSysType b) Diagnostic KeFABR_b_GshtCktDiagEnbl c) CAN Sensor Bus message $3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr]	a) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys b) == TRUE c) == TRUE d) == TRUE e) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.	Phased-pair circuit voltage	V [back-EMF] >= 6 V	a) Sensed fuel pump speed b) Device configuration FCBR_e_ChassisFuelPresSysType c) Diagnostic KeFABR_b_GshtCktDiagEnbl d) CAN Sensor Bus message $3EC_Avail e) Sensor Bus Relay On f) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr]	a) == 0 RPM b) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys c) == TRUE d) == TRUE e) == TRUE f) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Phase U-V-W Circuit High	P102B	This DTC detects if the fuel pump control circuit is shorted to high voltage [Short to Battery] The diagnostic detects short-to-battery faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair low-side current shunt is monitored, or 2) in the "stopped" state, small currents are injected	Phased-pair circuit voltage Difference	Vdelta > 0.4 V	a) Device configuration FCBR_e_ChassisFuelPresSysType b) Diagnostic KeFABR_b_PshtCktDiagEnbl c) CAN Sensor Bus message $3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr]	a) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys b) == TRUE c) == TRUE d) == TRUE e) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.	Phased-pair circuit voltage	V[backEMF] > 6 V	a) Sensed fuel pump speed b) Device configuration FCBR_e_ChassisFuelPresSysType b) Diagnostic KeFABR_b_PshtCktDiagEnbl c) CAN Sensor Bus message $3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr]	a) == 0 RPM b) == CeFCBR_e_DSL_ECM_FTZM_BLDC_Sys b) == TRUE c) == TRUE d) == TRUE e) <> TRUE	40.00 failures / 80.00 samples 1 sample / 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Pump "A" Control Signal Message Counter Incorrect	P103E	Coolant Pump LIN Frame Alive Rolling Count has not incremented correctly						Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Injection Valve Supply Voltage Circuit Low Bank 1 Unit 1	P1048	This diagnosis verifies if a DEF dosing valve high side short to ground occurred	HWIO interface DEFMV_ENABLE_GROUND_SHORT = Fault	VeHWIO_e_DEFMV_Enbl_Gsht == CeSCRR_e_Fault	Test enabled by calibration Key on (OR engine running) Engine is not cranking Battery voltage HWIO interface DEFMV_ENABLE_GROUND_SHORT different from INDETERMINATE	1.00 > 11.00 [V]	30.00 failures out of 60.00 samples Time basis = 100ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Injection Valve Supply Voltage Circuit High Bank 1 Unit 1	P1049	This diagnosis verifies if a DEF dosing valve high side short to power occurred	HWIO interface DEFMV_ENABLE_POWER_SHORT = Fault	VeHWIO_e_DEFMV_Enbl_Psht == CeSCRR_e_Fault	Test enabled by calibration Key on (OR engine running) Engine is not cranking Battery voltage HWIO interface DEFMV_ENABLE_POWER_SHORT different from INDETERMINATE	1.00 > 11.00 [V]	30.00 failures out of 60.00 samples Time basis = 100ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Position Sensor Circuit Low	P1096	Circuit Continuity This DTC detects a short to ground in the position sensor signal circuit. This is accomplished by monitoring the reported position. If the position goes out of the expected range the DTC is set.	Engine Coolant Bypass Valve C Positions Sensor SENT digital read value	< 50	SENT communitation is not in error Run Crank Ignition in Range Engine not cranking Engine Diag System	VECR_MRV_LoC_FP = True = True = Enabled	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Position Sensor Circuit High	P1097	Circuit Continuity This DTC detects a short to power in the position sensor signal circuit. This is accomplished by monitoring the reported position. If the position goes out of the expected range the DTC is set.	Engine Coolant Bypass Valve C Positions Sensor SENT digital read value	> 4,050	SENT communitation is not in error Run Crank Ignition in Range Engine not cranking Engine Diag System	VECR_MRV_LoC_FP = True = True = Enabled	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Position Sensor Stop Performance	P1098	Performance Check This DTC checks for an invalid endstop learn. The valve is moved against each endstop. If the learned position is out of range a DTC will be set.	If any of the following conditions are met a failure will be recorded: Condition 1 (closed): Learned bypass valve position or and the learn has completed Condition 2 (open): Learned bypass valve position or and the learn has completed	> 0.00 degrees < -10.00 degrees > 319.00 degrees < 309.00 degrees	No DTCs Engine Diag System Bypass Valve Learn Engine Outlet Coolant OR OBD Coolant Enable Criteria Engine Outlet Coolant AND Engine Hot Light	VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR_MRV_PstnPerf_FA = Enabled = Successful or Inprogress ≥ -40.0 ºC = TRUE ≤ 9,999.0 ºC = Inactive	Within 60.0 seconds after engine shutdown.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Supply Circuit Low	P109F	Circuit Continuity Controller specific output driver circuit detects a short to ground in the supply circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Supply voltage	≤ 6V	Run Crank Ignition in Range Engine not cranking Engine Diag System Driver under voltage status is not	= True = True = Enabled = Indeterminate	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Motor Current High	P10A0	Controller specific output driver circuit detects an overcurrent condition in the load circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Current measurement outside of controller specific acceptable range when H-Bridge is energized	8.1A ≤ X ≤ 12.8A	Run Crank Ignition in Range Engine not cranking Engine Diag System Driver over current status is not	= True = True = Enabled = Indeterminate	2 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Control Circuit Shorted	P10A1	Controller specific output driver circuit detects a short to ground in the load circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Current measurement outside of controller specific acceptable range when H-Bridge is energized	9.8A ≤ X ≤ 15.8A	Run Crank Ignition in Range Engine not cranking Engine Diag System Driver control circuit load short status is not	= True = True = Enabled = Indeterminate	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Actuator Driver Temperature Too High	P10A2	Controller specific temperature threshold. If temperature becomes too high this DTC will set.	Temperature measurement outside of controller specific acceptable range.	≥ 105ºC	Run Crank Ignition in Range Engine not cranking Engine Diag System Driver overtemperature status is not	= True = True = Enabled = Indeterminate	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Injector Temperature - Exhaust Gas Temperature Not Plausible	P10D1	This monitor measures the temperature of DEF injector coil and compares to reference temperature after long soak.	Difference between coil temperature and reference temperature greater than calibratable value.	> 55.00	Test enabled by calibration (TRUE->Enable False -> Disable)	1.00	Single decision criteria. Function Task: 25ms	Type B, 2 Trips
					DEF Injector Fault State (No fault on injector)	== FALSE		
					Powertrain relay in range	== TRUE		
					Long Engine off soak period has elapsed (sec)	>= 28,800.00		
					Service Test	== FALSE		
					Run/Crank is Active	== TRUE		
					Engine in Cranking Phase	== FALSE		
					Powertrain Relay in-Range	== TRUE		
					Diag System Disable	== FALSE		
					Coil Temp Rationality Diag Inhibited	== FALSE		
					Coil Temperature Estimation Available	== TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator C Solenoid Supply Voltage Control Circuit Low	P10E6	This DTC detects a short circuit to ground of the high side driver circuit of the Fuel Metering Unit valve 2	Voltage high across High Side driver of the Fuel Metering Unit valve 2 during ON state indicates short toground	Impedence between High Side pin of the Fuel Metering Unit valve 2 and the controller ground ≤ 0.5 Ω	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7.00 failures out of 10.00 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator C Solenoid Supply Voltage Control Circuit High	P10E7	This DTC detects a short circuit to high voltage of high side driver circuit of the Fuel Metering Unit valve 2	Voltage low across High Side driver of the Fuel Metering Unit valve 2 during OFF state indicates short to power	Impedence between High Side pin of the Fuel Metering Unit valve 2 and the controller power ≤ 0.5 Ω	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7.00 failures out of 10.00 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator A Control Circuit Shorted	P10E8	This DTC detect a short circuit between the high and low side pins of the Fuel Metering Unit valve.	Current high across High and Low Side drivers during ON state indicates a shorted load.	Current achieves the 2 A threshold in 2 us	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 == FALSE == TRUE	7.00 failures out of 10.00 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator C Control Circuit Shorted	P10EA	This DTC detect a short circuit between the high and low side pins of the Fuel Metering Unit valve 2.	Current high across High and Low Side drivers during ON state indicates a shorted load.	Current achieves the 2 A threshold in 2 us	Powertrain relay voltage Engine cranking Run crank active	≥ 11.00 V == FALSE == TRUE	7.00 failures out of 10.00 samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 2 Signal Message Counter Incorrect	P1100	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Fuel Level Sensor 2 Signal Message Counter	Communication of the Fuel Level Sensor 2 Signal Message Counter from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Water in Fuel Signal Message Counter Incorrect	P1103	This DTC monitors for an error in communication with the Water in Fuel Signal	Communication of the Alive Rolling Count or Protection Value from the FTZM over CAN bus is incorrect for out of total samples	 >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor Not Plausible (Diesel L6 ATM)	P111E	This DTC detects either a biased high or low ECT (Engine Coolant temperature) sensor. This is done by comparing the ECT sensor output to two other temperature sensor outputs after a soak condition.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds, and aux heater effects		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn sr -	OAT_PtEstFiltFA PSAR_PropSysInactveCr s_FA = FALSE EECR_EngineOutlet_Ckt FA EECR_CylHeadCoolant_ CktFA EECR_BlockCoolant_Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_C ktFA EECR_HeaterCoreOutlet _CktFA EECR_RadiatorOutlet_Ck tFA EECR_BypassInlet_CktF A EECR_CylHeadMetal1_C ktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_F A	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			can be looked up by finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors ================== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Comparison sensor 1: CeEECR_e_BiasChkEng MetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtr CrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRad OutClntSnsr Fuel Operated heater:	22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	Ambient Air Temperature ========== Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different	≥ -20.0 ºC = CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkHtrCrInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOutsideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B:	12.67 ºC 7.50 ºC 12.67 ºC 7.50 ºC 9.60 ºC 9.60 ºC	types of aux heater detection for this application: 2x2 signature Absolute Drop IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between	Enabled Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrEngMetalSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 5.0 ºC 5.0 ºC > 16.0 ºC CeAEHR_e_BlkHtrBlockClntSnsr > 87.00 L/min 0.1 - 17.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			A failure will be reported if any of the following conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	>A ºC >A ºC >B ºC >B ºC	AND Engine runtime is A block heater is detected if a drop is **IAT Drop Criteria:** A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is	< 77.0 seconds > 1.8 ºC ≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Derivative count will increment if derivative is If counts are a block heater is detected ==========	< -0.10 ºC/sec ≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temperature Sensor Not Plausible (Diesel L6 ATM)	P112F	This DTC detects either a biased high or low RCT (Radiator Coolant Temperature) sensor. This is done by comparing the RCT sensor output to two other temperature sensor outputs after a soak condition.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadiatorCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds,		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS	OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_RadiatorOutlet_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant_CktFA EECR_EngineInlet_CktFA EECR_EngineOutlet_CktFA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet_CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			and aux heater effects can be looked up by finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Inlet:**	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	nsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors ========== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkEng MetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtr CrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRad OutClntSnsr Fuel Operated heater:	22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	========== Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application:	= CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkHtrCrlnClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOutsideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B:	12.67 ºC 7.50 ºC 12.67 ºC 7.50 ºC 9.60 ºC 9.60 ºC	2x2 signature Absolute Drop IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between AND Engine runtime is A block heater is detected	Enabled Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrEngMetalSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 5.0 ºC 5.0 ºC > 16.0 ºC CeAEHR_e_BlkHtrBlockClntSnsr > 87.00 L/min 0.1 - 17.0 seconds < 77.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			A failure will be reported if any of the following conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A ºC >A ºC >B ºC >B ºC	if a drop is **IAT Drop Criteria:** A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is Derivative count will increment if derivative is	> 1.8 ºC ≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds < -0.10 ºC/sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If counts are a block heater is detected ==========	≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module 5V Reference 2 Circuit	P1177	This DTC monitors for an error in the Fuel Pump Driver Control Module 5V Reference 2 Circuit	Raw Fuel Pump Driver Control Module 5V Reference 2 is or Raw Fuel Pump Driver Control Module 5V Reference 2 is or Absolute difference of the filtered Fuel Pump Driver Control Module 5V Reference 2 and Raw Fuel Pump Driver Control Module 5V Reference 2 is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent < 87.75 Percent > 0.90 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage U0076 PT Sensor Bus Relay Communication with the Fuel Tank Zone Module is not lost	Enabled >= 11.00 Volts Is not active Commanded on (if present)	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	P1178	This DTC monitors for an error in the Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is or Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is or Absolute difference of the filtered Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit and Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is For a non-continuous failure of out of For a continuous failure of	> 92.25 Percent < 87.75 Percent > 0.90 Percent 40.00 counts 80.00 counts 0.20 seconds	Diagnostic is enabled Run/Crank Ignition Voltage U0076 PT Sensor Bus Relay Communication with the Fuel Tank Zone Module is not lost	Enabled >= 11.00 Volts Is not active Commanded on (if present)	Executes in 50.0ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve D Control Signal Message Counter Incorrect	P117A	This DTC monitors for an error in communication with the Engine Coolant Bypass Valve D Control Signals	Communication of the Alive Rolling Count or Protection Value of the Engine Coolant Bypass Valve D Control Signal Message over LIN bus is incorrect for out of total samples	 >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor Not Plausible (Diesel L6 ATM)	P117F	This DTC detects either a biased high or low Cylinder Head Temperature sensor. This is done by comparing the RCT sensor to two other temperature sensors after a soak condition.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngMetalHeadTemp Snsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds,		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn sr - BiasChk_EGR_DwnStmS nsr	OAT_PtEstFiltFA PSAR_PropSysInactveCr s_FA = FALSE EECR_CylHeadMetal1_C ktFA EECR_CylHeadCoolant_ CktFA EECR_BlockCoolant_Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_C ktFA EECR_HeaterCoreOutlet _CktFA EECR_RadiatorOutlet_Ck tFA EECR_BypassInlet_CktF A EECR_CylHeadMetal1_C ktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_F A	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			and aux heater effects can be looked up by finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlo ckClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEng MetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterN oEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEng MetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asHigh Threshold A: Threshold B: **Engine Inlet:**	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	- BiasChk_EGR_LowPrsSn sr - BiasChkFuelSnsr Comparison sensors ================== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature =================	EGRTempSensorDNSS_F A LPE_TempSnsrFA HRTR_b_FuelSensor_FA _Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkEng MetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtr CrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRad OutClntSnsr Fuel Operated heater:	22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application:	= CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterN		2x2 signature			
			oEffect		Absolute Drop			
			Block Heater:		IAT Drop	Enabled		
			CeEECR_e_AuxHeaterBi		Temperature Derivative	Enabled		
			asHigh			Disabled		
			Threshold A:	12.67 ºC	**2x2 Signature Criteria:**	Disabled		
			Threshold B:	7.50 ºC				
					The warm sensors			
			Heater Outlet:		Sensor 1:			
			CeEECR_e_PhysSnsr5					
			Comparison sensor 1:		Sensor 2:	CeAEHR_e_BlkHtrCylHd		
			CeEECR_e_BiasChkHtr			ClntSnsr		
			CrInClntSnsr		The cool sensors	CeAEHR_e_BlkHtrEngM		
			Comparison sensor 2:		Sensor 1:	etalSnsr		
			CeEECR_e_BiasChkEng					
			InClntSnsr		Sensor 2:	CeAEHR_e_BlkHtrRadO		
			Fuel Operated heater:			utClntSnsr		
			CeEECR_e_AuxHeaterN			CeAEHR_e_BlkHtrOutsid		
			oEffect		A block heater will be	eAirSnsr		
			Block Heater:		detected if the warm			
			CeEECR_e_AuxHeaterBi		sensors are within			
			asBoth		AND			
			Threshold A:	12.67 ºC	The cool sensors are	5.0 ºC		
			Threshold B:	7.50 ºC	within			
					AND			
			Radiator Outlet:		The delta between the	5.0 ºC		
			CeEECR_e_PhysSnsr3		two groups (warm/cold)			
			Comparison sensor 1:			> 16.0 ºC		
			CeEECR_e_BiasChkEng		**Absolute Drop Criteria:**			
			InClntSnsr					
			Comparison sensor 2:		The			
			CeEECR_e_BiasChkOut		is monitored for a drop.			
			sideAirSnsr			CeAEHR_e_BlkHtrBlock		
			Fuel Operated heater:		The drop will be	ClntSnsr		
			CeEECR_e_AuxHeaterN		monitored for once			
			oEffect		coolant flow is			
			Block Heater:		AND			
			CeEECR_e_AuxHeaterN		Flow time is between	> 87.00 L/min		
			oEffect		AND			
			Threshold A:	9.60 ºC	Engine runtime is	0.1 - 17.0 seconds		
			Threshold B:	9.60 ºC				
					A block heater is detected	< 77.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			A failure will be reported if any of the following conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A ºC >A ºC >B ºC >B ºC	if a drop is **IAT Drop Criteria:** A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is Derivative count will increment if derivative is If counts are	 > 1.8 ºC ≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds < -0.10 ºC/sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					a block heater is detected ==========	≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Block Coolant Valve Position Sensor Circuit Low Voltage	P118A	This diagnostic continuously detects if the Block Rotary Valve Position Feedback signal is too low and out of the expected operating range, defined by any position below the lower mechanical end-stop. If the enable criteria are met and the raw position feedback is below the out of range low position fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met. This diagnostic will suspend when a matured fault is detected while the valve is performing the integrity check and will re-enable when the valve performs the integrity check again at the end of the next drive cycle.	Coolant Valve Position Feedback	< -7.00 °	If Integrity Check Fault Active is FALSE, then the following must be satisfied [12V System Voltage VECR_BRV_PstnFdbk_Av , VECR_BRV_PstnFdbk_Fol PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On] If Integrity Check Fault Active is TRUE, then the following must be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_Av , VECR_BRV_PstnFdbk_Fol PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690	 >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = True >= 2.50 seconds >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Powertrain Relay Commanded On Coolant Valve Commanded Position]	= True <= -15.00 °		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Block Coolant Valve Position Sensor Circuit High Voltage	P11C9	This diagnostic continuously detects if the Block Rotary Valve Position Feedback signal is too high and out of the expected operating range, defined by any position above the upper mechanical endstop. If the enable criteria are met and the raw position feedback is greater than the out of range high fail threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met. This diagnostic will suspend when a matured fault is detected while the valve is performing the integrity check and will re-enable when the valve performs the integrity check again at the end of the next drive cycle.	Coolant Valve Position Feedback	> 117.00 °	If Integrity Check Fault Active is FALSE, then the following shall be satisfied [12V System Voltage VECR_BRV_PstnFdbk_Av , VECR_BRV_PstnFdbk_Fol PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On] If Integrity Check Fault Active is TRUE, then the following must be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_Av , VECR_BRV_PstnFdbk_Fol PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690	 >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = True >= 2.50 seconds >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Powertrain Relay Commanded On Coolant Valve Commanded Position]	= True >= 125.00 °		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Command Signal Message Counter Incorrect	P11FF	This DTC monitors for an error in communication with the Fuel Pump Command Signals	Communication of the Alive Rolling Count or Protection Value from the Fuel Control System over CAN bus is incorrect for out of total samples	>= 15 counts >= 16 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Signal Message Counter Incorrect	P1200	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Fuel Level Sensor 1 Signal Message Counter	Communication of the Fuel Level Sensor 1 Signal Message Counter from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Over Temperature	P1255	To detect if an internal fuel pump driver over-temperature condition exists under normal operating conditions. The FTZM ERFS control may adjust the PWM slew rate or frequency as a self-protection method, but may not reduce pump rotational speed or impact pumping performance in any way due to an over-temperature condition.	Fuel Pump Driver Temperature	T > 160 degC	a) Diagnostic enabled [KeFABR_b_OvertempDiagEnbl] b) Sensor Bus Relay On c) CAN Sensor Bus message $3EC_Available d) Sensor Bus Message $3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_ARC_ChkErr]	a) == TRUE b) == TRUE c) == TRUE d) <> TRUE	5.00 failures / 10.00 samples 1 sample / 100 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure (FRP) Sensor B Circuit Low Voltage	P127C	Determine when a short circuit to ground affects fuel rail pressure (secondary) sensor.	Fuel rail pressure sensor output (as percentage of supply voltage)	< 4.0 %	**Rail Pressure Sensor Configuration** Starter motor is not engaged OR Starter motor has been engaged for a time OR Run crank voltage An initilization time delay of 12.00 consecutive samples has been passed Diagnostic feedback protocol is not in the *check low state*	= CeFHPG_e_RPS_Double Track ≥ 15 s > 8.4 V	16 failures out of 32 samples OR 16 continuous failures out of 32 samples 6.25 ms/samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure (FRP) Sensor B Circuit High Voltage	P127D	Determine when a short circuit to voltage affects fuel rail pressure (secondary) sensor.	Fuel rail pressure sensor output (as percentage of supply voltage)	> 96.0 %	**Rail Pressure Sensor Configuration** Starter motor is not engaged OR Starter motor has been engaged for a time OR Run crank voltage An initilization time delay of 12.00 consecutive samples has been passed Diagnostic feedback protocol is not in the *check high* state	= CeFHPG_e_RPS_Double Track ≥ 15 s > 8.4 V	16 failures out of 32 samples OR 16 continuous failures out of 32 samples 6.25 ms/samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Fuel Pump Speed Signal Incorrect	P129F	FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless pump speed is inferred using rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 millisecs. Diagnostic software [FABR ring] calculates the error between the commanded, arbitrated fuel pump speed [FCBR ring] and the FTZM sensed fuel pump speed. The error is filtered and evaluated against calibratable threshold limits to determine pass/fail status. Any failure that exists on the fuel pump output circuit (3 phases) will be manifested in a Fuel Pump Speed	Sensed Filtered Fuel Pump Speed Error	> Speed Error Low Threshold [Supporting Table] **P129F Threshold Low** OR < Speed Error High Threshold [Supporting Table] **P129F Threshold High**	a) Diagnostic Enabled FABR Speed Rationality Diagnostic b) CAN Sensor Bus message $0CB_Available c) FABR Fuel Control Enable Fault Active d) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr] e) FABR Fuel Pump Ckt FA f) FABR Driver OverTemp FA g) Run_Crank input Voltage h) Sensor Bus Relay On j) CAN Sensor Bus message $0CB Data Fault [CFMR_b_FTZM_Info8_ARC_ChkErr] k) CAN Sensor Bus message $0CB Comm Fault [CFMR_b_FTZM_Info8_UcodeCmFA] l) Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA] m) Timer - FABR Rising Edge Diagnostic Delay n) Timer - FABR Falling Edge Diagn Delay	a) == TRUE b) == TRUE c) <> TRUE d) <> TRUE e) <> TRUE f) <> TRUE g) > 9.00 volts h) == TRUE j) <> TRUE k) <> TRUE l) <> TRUE m) > 2.30 seconds n) > 0.90 seconds	1 sample / 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Rationality Diagnostic fault. Reported fuel pump speed data will only be consumed in this same diagnostic.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Enable Circuit Performance	P12A6	The purpose of the Fuel Pump Driver Control Module Enable Circuit Performance diagnostic is to detect if the state of the fuel control enable circuit is valid. This is done by comparing the fuel control enable circuit state [high or low] sensed by the Fuel Tank Zone Module device to the commanded state of the fuel control enable signal from the ECM [in serial data]. When the sensed state does not match the commanded state, the fail counter increments.	Sensed Fuel Control Enable circuit state [Fuel Tank Zone Module device]	<> Fuel Control Enable Active command [serial data]	a) Diagnostic enabled [KeFABR_b_FuelCntrlEnblDiagEnbl] b) Sensor Bus message $0CC Fuel Pump Command Message Signal Counter Incorrect [CFMR_b_FTZM_Info2_ARC_ChkErr] c) CAN Sensor Bus message $0CC_Available d) Sensor Bus Relay On e) Timer [FABR_t_RunCrankActive]	a) == TRUE b) <> TRUE c) == TRUE d) == TRUE e) >= 0.51 seconds	40.00 failures / 80.00 samples 1 sample / 12.5 millisec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Control Module (Fuel Tank Zone Module) Control Signal Message Counter Incorrect	P12A8	This DTC monitors for an error in communication with the Fuel Pump Control Module (FTZM) Control Signal Message	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Run/ Start Voltage Signal Message Counter Incorrect	P130F	This DTC monitors for an error in the Ignition Run/Start Voltage Signal Message Counter	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Control At Limit - Pressure Too High (OBDII market only)	P131D	This monitor is used to detect any malfunction in the exhaust throttle valve performance that leads to too high pressure upstream the throttle valve itself. The diagnostic monitors, at the same time, the control saturation and the tracking error when exhaust back pressure controller is in closed loop to detect a fault. The aim of the exhaust back pressure feedback control monitor is to detect ETV/LP EGR valves obstructions that lead to the ETV component control saturation and to excessive exhaust back pressure upstream ETV itself.	Exhaust back pressure control is in saturation AND Exhaust back pressure tracking error: difference between the ETV upstream pressure requested (set point) and the estimated ETV upstream pressure	==TRUE < (**P131D: Closed Loop Exhaust pressure too high threshold** [mg] x **P131D: Closed Loop Exhaust pressure too high correction**)	Exhaust pressure diagnostic when ETV upstream pressure controller is in closed loop enabled by calibration Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Engine speed is steady state: |RPM-RPM_old| in range, with hysteresis for a minimum number of samples Fuel request is steady state: |FUEL-FUEL_old| in range, with hysteresis for a minimum number of samples Desired ETV upstream	1.00 ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form TRUE if <= 10.00 [rpm], FALSE if > 20.00 [rpm] > 25.00 [counts] TRUE if <= 0.50 [mm^3], FALSE if > 1.10 [mm^3] > 25.00 [counts] < 140.00 [kPa]	360.00 fail counters over 450.00 sample counters sampling time is 25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressure Desired fuel quantity	 >**P131D: Closed Loop Exhaust pressure too high Min fuel enabling condition** [mm^3] AND <**P131D: Closed Loop Exhaust pressure too high Max fuel enabling condition** [mm^3]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Control At Limit - Pressure Too Low (OBDII market only)	P131E	This monitor is used to detect any malfunction in the exhaust throttle valve performance that leads to too low pressure upstream the throttle valve itself. The diagnostic monitors, at the same time, the control saturation and the tracking error when exhaust back pressure controller is in closed loop to detect a fault. The aim of the exhaust back pressure feedback control monitor is to detect ETV/LP EGR valves leakages that lead to the ETV component control saturation and to insufficient exhaust back pressure upstream ETV itself.	Exhaust back pressure control is in saturation AND Exhaust back pressure tracking error: difference between the ETV upstream pressure requested (set point) and the estimated ETV upstream pressure	==TRUE > (**P131E: Closed Loop Exhaust pressure too low threshold** [mg] x **P131E: Closed Loop Exhaust pressure too low correction**)	Exhaust pressure diagnostic when ETV upstream pressure controller is in closed loop enabled by calibration Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Engine speed is steady state: |RPM-RPM_old| in range, with hysteresis for a minimum number of samples Fuel request is steady state: |FUEL-FUEL_old| in range, with hysteresis for a minimum number of samples Desired ETV upstream	1.00 ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form TRUE if <= 10.00 [rpm], FALSE if > 20.00 [rpm] > 25.00 [counts] TRUE if <= 0.50 [mm^3], FALSE if > 1.10 [mm^3] > 25.00 [counts] > 70.00 [kPa]	360.00 fail counters over 450.00 sample counters sampling time is 25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressure Desired fuel quantity	 >**P131E: Closed Loop Exhaust pressure too low Min fuel enabling condition** [mm^3] AND <**P131E: Closed Loop Exhaust pressure too low Max fuel enabling condition** [mm^3]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Status Signals Message Counter Incorrect	P135C	This DTC monitors for an error in communication with the Cooling Fan 1 Status Signals	Communication of the Alive Rolling Count or Protection Value of the Cooling Fan 1 Status Signals Message over LIN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Status Signals Message Counter Incorrect	P135D	This DTC monitors for an error in communication with the Cooling Fan 2 Status Signals	Communication of the Alive Rolling Count or Protection Value of the Cooling Fan 2 Status Signals Message over LIN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 3 Status Signals Message Counter Incorrect	P135E	This DTC monitors for an error in communication with the Cooling Fan 3 Status Signals	Communication of the Alive Rolling Count or Protection Value of the Cooling Fan 3 Status Signals Message over LIN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure High Control Circuit Low	P13B1	Controller specific output driver circuit diagnoses the oil pump high-sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	Short to Ground Circuit ≤ 0.5 Ω impedance between output and controller ground	Powertrain Relay Voltage Run/Crank Active Cranking State	≥ 11.00 = True = False	>= 40 errors out of 50 samples. Performed every 100 msec	Type A, 1 Trips Note: In certain controllers P06DA may also set (Oil Pump Control Circuit Open)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HP EGR Slow Response - Increasing Flow (OBDII market only)	P140B	This monitor (in increasing flow direction) detects failures in the air system such to not fulfilll the request of HP EGR flow in the intake manifold during transient conditions. It works only in closed loop EGR control zone. This monitor is used to detect any malfunction in the HP EGR system that leads to slow down the air control causing the vehicle's emissions to exceed OBDII limits. The aim of the HP EGR flow slow response monitor is to detect small obstructions in the exhaust pipe. This monitor could also detect slow responding HP EGR valve, or skewed MAF sensor. Slow responding throttle and VGT vanes could also affect the HP EGR flow response time.	Error difference (absolute value) between the desired HP EGR rate and the actual HP EGR rate during transient air control conditions. The error is averaged over a calibrate-able cumulative transient time.	> **P140B: Increasing HP EGR slow response threshold** [%]	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Air control active condition lasts for a time Desired EGR rate No active transition from a combustion mode to another one (Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	**P140B, P140C: HP EGR slow response enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0.05 [s] > 0 [%] ==TRUE > 20.00 [°C] ==TRUE < 129.00 [°C]	Test is evaluated after the enabling conditions are satisfied for a number of samples >= 200.00 sampling time is 25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Throttle measured position	> 85.00 [%]		
					Outside air temperature	> -20.00 [°C]		
					Ambient air pressure	> 69.60 [kPa]		
					LP EGR valve total mass error (absolute value, | desired LP EGR mass - estimated LP EGR mass|)	< 100.00 [mg]		
					Desired fuel quantity in range	> **P140B: Increasing HP EGR slow response Min fuel enabling condition** [mm^3] AND < **P140B: Increasing HP EGR slow response Max fuel enabling condition** [mm^3]		
					Exhaust manifold pressure in range	> 70.00 [kPa] AND < 350.00 [kPa]		
					Desired HP EGR flow gradient (Req-ReqOld) lower than a threshold	< 1.50 [mg/s]		
					Desired HP EGR flow gradient (Req-ReqOld)	TRUE if > 1.30 [mg].		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					greater than a threshold, with hysteresis	FALSE if < 0.80 [mg]		
					Hysteresis lasts for a limited number of samples	<= 45.00 [count]		
					HP EGR valve total mass error (desired HP EGR mass - estimated HP EGR mass) in range, with hysteresis	TRUE if > 40.00 [mg], FALSE if < 15.00 [mg]		
					Desired HP EGR rate	> 7.00 [%]		
					HP EGR valve position OR it is above that threshold for a time	<= 55.00 [%] >= 0.02 [s]		
					Exhaust manifold pressure is valid	EXM_ExhMnfdPresNotVld ==FALSE		
					Nominal HP EGR valve total flow is valid	EGR_VlvTotFlowNomNotVld ==FALSE		
					Nominal LP EGR valve total flow is valid	LPE_VlvTotFlowNomNotVld ==FALSE		
					All enabling conditions last for a time	>= 0.05 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HP EGR Slow Response - Decreasing Flow (OBDII market only)	P140C	This monitor (in decreasing flow direction) detects failures in the air system such to not fulfilll the request of HP EGR flow in the intake manifold during transient conditions. It works only in closed loop EGR control zone. This monitor is used to detect any malfunction in the HP EGR system that leads to slow down the air control causing the vehicle's emissions to exceed OBDII limits. The aim of the HP EGR flow slow response monitor is to detect small leakages in the pipe after the compressor or in the intake/exhaust manifold. This monitor could also detect slow responding HP EGR valve, or skewed MAF sensor. Slow responding throttle and VGT vanes could also affect the HP EGR flow response time.	Error difference (absolute value) between the desired HP EGR rate and the actual HP EGR rate during transient air control conditions. The error is averaged over a calibrate-able cumulative transient time.	> **P140C: Decreasing HP EGR slow response threshold** [%]	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Air control active condition lasts for a time Desired EGR rate No active transition from a combustion mode to another one (Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	**P140B, P140C: HP EGR slow response enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0.05 [s] > 0 [%] ==TRUE > 20.00 [°C] ==TRUE < 129.00 [°C]	Test is evaluated after the enabling conditions are satisfied for a number of samples >= 100.00 sampling time is 25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Throttle measured position	> 85.00 [%]		
					Outside air temperature	> -20.00 [°C]		
					Ambient air pressure	> 69.60 [kPa]		
					LP EGR valve total mass error (absolute value, | desired LP EGR mass - estimated LP EGR mass|)	< 100.00 [mg]		
					Desired fuel quantity in range	> **P140C: Decreasing HP EGR slow response Min fuel enabling condition** [mm^3] AND < **P140C: Decreasing HP EGR slow response Max fuel enabling condition** [mm^3]		
					Exhaust manifold pressure in range	> 70.00 [kPa] AND < 350.00 [kPa]		
					Desired HP EGR flow gradient (Req-ReqOld) greater than a threshold	> -1.45 [mg/s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Desired HP EGR flow gradient (Req-ReqOld) lower than a threshold, with hysteresis	TRUE if < -1.30 [mg], FALSE if > -0.70 [mg]		
					Hysteresis lasts for a limited number of samples	<= 45.00 [count]		
					HP EGR valve total mass error (desired HP EGR mass - estimated HP EGR mass) in range, with hysteresis	TRUE if < -35.00 [mg], FALSE if > -15.00 [mg]		
					Desired HP EGR rate	< 55.00 [%]		
					Exhaust manifold pressure is valid	EXM_ExhMnfdPresNotVld ==FALSE		
					Nominal HP EGR valve total flow is valid	EGR_VlvTotFlowNomNotVld ==FALSE		
					Nominal LP EGR valve total flow is valid	LPE_VlvTotFlowNomNotVld ==FALSE		
					All enabling conditions last for a time	> 0.02 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor A Reference Feedback Range/ Performance [For use on vehicles with FTZM]	P1434	This DTC will detect a fault in Primary fuel tank level sensor 5V reference by comparing DEC ECU commanded signal period and pulse width values against measured period and pulse width reported by the smart device	Reference Voltage 0 Period Error Maximum [Measured Ref V Period - Commanded Ref V Period]	> 25.00 millisec	a] CAN serial data available [$2D7] b] Calibration - Reference Voltage Command Source c] Timer - Reference Voltage Pulse Width Available Synchronization d] Timer - Reference Voltage Period Available Delay e] Diagnostic System Disabled f] FTZM Serial Data Info4 Rolling Counter Check Error g] Reference Voltage Performance 0 Diagnostic Enabled	a] == True b] == ECM c] > 1.25 sec d] > 0.75 sec e] <> True f] <> True g] == TRUE	250 ms / sample	Type B, 2 Trips
			Reference Voltage 0 Pulse Width Error Maximum [Measured Ref V PW - Commanded Ref V PW]	> 1.50 millisec	a] CAN serial data available [$2D7] b] Calibration - Reference Voltage Command Source c] Timer - Reference Voltage Pulse Width Available Synchronization d] Timer - Reference Voltage Period Available Delay e] Diagnostic System Disabled	a] == True b] == ECM c] > 1.25 sec d] > 0.75 sec e] <> True	250 ms / sample 16 Failures / 20 Samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					f] FTZM Serial Data Info4 Rolling Counter Check Error g] Reference Voltage Performance 0 Diagnostic Enabled	f] <> True g] == TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control System Diagnostic Signals Message Counter Incorrect	P143A	This DTC monitors for an error in communication with the Reductant Control System Diagnostic Signals	Communication of the Alive Rolling Count or Protection Value of the Diesel Exhaust Fluid Controller Diagnostic Information 1 over CAN bus is incorrect for out of total samples Or Communication of the Alive Rolling Count or Protection Value of the Diesel Exhaust Fluid Diagnostic Controller Information 2 over CAN bus is incorrect for out of total samples Or Communication of the Alive Rolling Count or Protection Value of the Diesel Exhaust Fluid Controller Diagnostic Information 3 over CAN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control System Information Signals Message Counter Incorrect	P143B	This DTC monitors for an error in communication with the Reductant Control System Information Signals	Communication of the Alive Rolling Count or Protection Value of the Diesel Exhaust Fluid Controller Reductant Sensor Data over CAN bus is incorrect for out of total samples Or Communication of the Alive Rolling Count or Protection Value of the Diesel Exhaust Fluid Controller Information 1 over CAN bus is incorrect for out of total samples Or Communication of the Alive Rolling Count or Protection Value of the Diesel Exhaust Fluid Controller Information 2 over CAN bus is incorrect for out of total samples	 >= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 2 Not Plausible (Diesel L6 ATM)	P149A	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds, and aux heater effects can be looked up by		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn sr -	OAT_PtEstFiltFA PSAR_PropSysInactveCr s_FA = FALSE EECR_TS2_CktFA EECR_CylHeadCoolant_ CktFA EECR_BlockCoolant_Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_C ktFA EECR_HeaterCoreOutlet _CktFA EECR_RadiatorOutlet_Ck tFA EECR_BypassInlet_CktF A EECR_CylHeadMetal1_C ktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_F A	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			finding the location		BiasChk_EGR_DwnStmS	EGRTempSensorDNSS_F		
			associated with the		nsr	A		
			physical (Temperature)		-			
			sensor number.		BiasChk_EGR_LowPrsSn			
					sr	LPE_TempSnsrFA		
			Engine Outlet:		- BiasChkFuelSnsr	HRTR_b_FuelSensor_FA		
			CeEECR_e_PhysSnsr2			_Bndl		
			Comparison sensor 1:					
			CeEECR_e_BiasChkBlo		Comparison sensors	= Availible		
			ckClntSnsr					
			Comparison sensor 2:		==================			
			CeEECR_e_BiasChkEng		The following thresholds			
			MetalSnsr		are based on the sensor			
			Fuel Operated heater:		under diagnosis			
			CeEECR_e_AuxHeaterN					
			oEffect		**Engine Outlet:**			
			Block Heater:		Propulsion Off Soak Time	≥ 21,600 seconds		
			CeEECR_e_AuxHeaterN		Ambient Air Temperature	≥ -20.0 ºC		
			oEffect					
			Threshold A:	12.25 ºC	**Engine Block:**			
			Threshold B:	6.75 ºC	Propulsion Off Soak Time	≥ 21,600 seconds		
					Ambient Air Temperature	≥ -20.0 ºC		
			Engine Block:					
			CeEECR_e_PhysSnsr7		**Engine Inlet:**			
			Comparison sensor 1:		Propulsion Off Soak Time	≥ 21,600 seconds		
			CeEECR_e_BiasChkEng		Ambient Air Temperature	≥ -20.0 ºC		
			OutClntSnsr					
			Comparison sensor 2:		**Head Metal:**			
			CeEECR_e_BiasChkEng		Propulsion Off Soak Time	≥ 21,600 seconds		
			MetalSnsr		Ambient Air Temperature	≥ -20.0 ºC		
			Fuel Operated heater:					
			CeEECR_e_AuxHeaterN		**Heater Inlet:**			
			oEffect		Propulsion Off Soak Time	≥ 21,600 seconds		
			Block Heater:		Ambient Air Temperature	≥ -20.0 ºC		
			CeEECR_e_AuxHeaterBi					
			asHigh		**Heater Outlet:**			
			Threshold A:	20.60 ºC	Propulsion Off Soak Time	≥ 21,600 seconds		
			Threshold B:	6.60 ºC	Ambient Air Temperature	≥ -20.0 ºC		
			Engine Inlet:		**Radiator Outlet:**			
			CeEECR_e_PhysSnsr1		Propulsion Off Soak Time	≥ 21,600 seconds		
			Comparison sensor 1:		Ambient Air Temperature	≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_BiasChkEng MetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtr CrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRad OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect	22.50 ºC 7.25 ºC	========== Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this	= CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkHtrCrInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOutsideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: A failure will be reported if any of the following	 12.67 ºC 7.50 ºC 12.67 ºC 7.50 ºC 9.60 ºC 9.60 ºC	application: 2x2 signature Absolute Drop IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between AND Engine runtime is	 Enabled Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrEngMetalSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 5.0 ºC 5.0 ºC > 16.0 ºC CeAEHR_e_BlkHtrBlockClntSnsr > 87.00 L/min 0.1 - 17.0 seconds < 77.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A ºC >A ºC >B ºC >B ºC	A block heater is detected if a drop is **IAT Drop Criteria:** A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is Derivative count will increment if derivative is	> 1.8 ºC ≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds < -0.10 ºC/sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If counts are a block heater is detected ==========	≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 3 Not Plausible (Diesel L6 ATM)	P149B	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr3 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds, and aux heater effects can be looked up by		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn sr -	OAT_PtEstFiltFA PSAR_PropSysInactveCr s_FA = FALSE EECR_TS3_CktFA EECR_CylHeadCoolant_ CktFA EECR_BlockCoolant_Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_C ktFA EECR_HeaterCoreOutlet _CktFA EECR_RadiatorOutlet_Ck tFA EECR_BypassInlet_CktF A EECR_CylHeadMetal1_C ktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_F A	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1 Comparison sensor 1:	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors ================== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_BiasChkEng MetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtr CrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRad OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect	22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	========== Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application:	= CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkHtrCrInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOutsideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: A failure will be reported if any of the following	12.67 ºC 7.50 ºC 12.67 ºC 7.50 ºC 9.60 ºC 9.60 ºC	2x2 signature Absolute Drop IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between AND Engine runtime is A block heater is detected if a drop is	Enabled Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrEngMetalSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 5.0 ºC 5.0 ºC > 16.0 ºC CeAEHR_e_BlkHtrBlockClntSnsr > 87.00 L/min 0.1 - 17.0 seconds < 77.0 seconds > 1.8 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			conditions are met. Evaluated in order:		**IAT Drop Criteria:**			
			1) This sensor is above both comparison sensors	>A ºC	A block heater will be detected if:			
					IAT has a drop of	≥ 5.0 ºC		
					during a drive defined by:			
			2) This sensor is below both comparison sensors	>A ºC	Drive time	≥ 400.0 seconds		
					Vehicle speed	≥ 24.0 kph		
			3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew	>B ºC	Addtional drive time is provided when vehicle speed drops below above threshold as follows	0.5 times the seconds with vehicle speed below the threshold above		
			4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	>B ºC	This detection method will abort if the engine is off	> 180.0 seconds		
					OR			
					Engine runtime	> 1,800 seconds		
					Temperature Derivative Criteria:			
					Derivative will be monitored using	CeAEHR_e_BlkHtrBlock ClntSnsr		
					Derivative will be monitored once coolant flow is	> -1.00 L/min		
					AND			
					Flow time is between	5.0 - 15.0 seconds		
					AND			
					Engine runtime is	< 75.0 seconds		
					Derivative count will increment if derivative is	< -0.10 ºC/sec		
					If counts are a block heater is detected	≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					==========			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 4 Not Plausible (Diesel L6 ATM)	P149C	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds, and aux heater effects can be looked up by		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn sr - BiasChk_EGR_DwnStmS	OAT_PtEstFiltFA PSAR_PropSysInactveCr s_FA = FALSE EECR_TS4_CktFA EECR_CylHeadCoolant_ CktFA EECR_BlockCoolant_Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_C ktFA EECR_HeaterCoreOutlet _CktFA EECR_RadiatorOutlet_Ck tFA EECR_BypassInlet_CktF A EECR_CylHeadMetal1_C ktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_F A	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1 Comparison sensor 1:	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	nsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors ========== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature ==========	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_BiasChkEng MetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEng OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEng OutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtr CrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRad OutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect	22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application:	= CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock ClntSnsr CeAEHR_e_BlkHtrRadO utClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkHtrCrInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOutsideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: A failure will be reported if any of the following	12.67 ºC 7.50 ºC 12.67 ºC 7.50 ºC 9.60 ºC 9.60 ºC	2x2 signature Absolute Drop IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between AND Engine runtime is A block heater is detected if a drop is	Enabled Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrEngMetalSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 5.0 ºC 5.0 ºC > 16.0 ºC CeAEHR_e_BlkHtrBlockClntSnsr > 87.00 L/min 0.1 - 17.0 seconds < 77.0 seconds > 1.8 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	 >A ºC >A ºC >B ºC >B ºC	**IAT Drop Criteria:** A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria**: Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is Derivative count will increment if derivative is If counts are a block heater is detected	 ≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds < -0.10 ºC/sec ≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					==========			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 5 Not Plausible (Diesel L6 ATM)	P149D	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The comparison sensors, temperature thresholds, and aux heater effects		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn sr - BiasChk_EGR_DwnStmS nsr -	OAT_PtEstFiltFA PSAR_PropSysInactveCr s_FA = FALSE EECR_TS5_CktFA EECR_CylHeadCoolant_ CktFA EECR_BlockCoolant_Ckt FA EECR_EngineInlet_CktFA EECR_EngineOutlet_Ckt FA EECR_HeaterCoreInlet_C ktFA EECR_HeaterCoreOutlet _CktFA EECR_RadiatorOutlet_Ck tFA EECR_BypassInlet_CktF A EECR_CylHeadMetal1_C ktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_F A	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			can be looked up by finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr Comparison sensors ========== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature ========== Comparison sensor 1 & 2	EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Comparison sensor 1: CeEECR_e_BiasChkEngMetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlockClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B: **Heater Inlet:** CeEECR_e_PhysSnsr4 Comparison sensor 1: CeEECR_e_BiasChkHtrCrOutClnSnsr Comparison sensor 2: CeEECR_e_BiasChkRadOutClntSnsr Fuel Operated heater:	22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application: 2x2 signature Absolute Drop	= CeEECR_e_BiasChkNoSelection Same set as listed above and EngineModeNotRunTimerError EngineModeNotRunTimer_FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlockClntSnsr CeAEHR_e_BlkHtrRadOutClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Heater Outlet:** CeEECR_e_PhysSnsr5 Comparison sensor 1: CeEECR_e_BiasChkHtrCrlnClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B: **Radiator Outlet:** CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOutsideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B:	12.67 ºC 7.50 ºC 12.67 ºC 7.50 ºC 9.60 ºC 9.60 ºC	IAT Drop Temperature Derivative **2x2 Signature Criteria:** The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2: A block heater will be detected if the warm sensors are within AND The cool sensors are within AND The delta between the two groups (warm/cold) **Absolute Drop Criteria:** The is monitored for a drop. The drop will be monitored for once coolant flow is AND Flow time is between AND Engine runtime is A block heater is detected if a drop is	Enabled Enabled Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrEngMetalSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 5.0 ºC 5.0 ºC > 16.0 ºC CeAEHR_e_BlkHtrBlockClntSnsr > 87.00 L/min 0.1 - 17.0 seconds < 77.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			A failure will be reported if any of the following conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew	>A ºC >A ºC >B ºC >B ºC	**IAT Drop Criteria:** A block heater will be detected if: IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is Derivative count will increment if derivative is If counts are a block heater is detected	> 1.8 ºC ≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlockClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds < -0.10 ºC/sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					==========	≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
LP EGR Slow Response - Increasing Flow (OBDII market only)	P14A5	This monitor (in increasing flow direction) detects failures in the air system such to not fulfilll the request of LP EGR flow in the intake manifold during transient conditions. It works only in closed loop EGR control zone. This monitor is used to detect any malfunction in the LP EGR system that leads to slow down the air control causing the vehicle's emissions to exceed OBDII limits. The aim of the LP EGR flow slow response monitor is to detect small obstructions in the exhaust pipe. This monitor could also detect slow responding LP EGR valve, or skewed MAF sensor.	Error difference (absolute value) between the desired LP EGR rate and the actual LP EGR rate during transient air control conditions. The error is averaged over a calibrate-able cumulative transient time.	> **P14A5: Increasing LP EGR slow response threshold** [%]	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Air control active condition lasts for a time Desired EGR rate No active transition from a combustion mode to another one (Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	**P14A5, P14A6: LP EGR slow response enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0.02 [s] > 0 [%] ==TRUE > 60.00 [°C] ==TRUE < 129.00 [°C]	Test is evaluated after the enabling conditions are satisfied for a number of samples >= 200.00 sampling time is 25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Exhaust Throttle measured position	> 60.00 [%]		
					Outside air temperature	> -20.00 [°C]		
					Ambient air pressure	> 69.60 [kPa]		
					HP EGR valve total mass error (absolute value, | desired HP EGR mass - estimated HP EGR mass|)	< 200.00 [mg]		
					Desired fuel quantity in range	> **P14A5: Increasing LP EGR slow response Min fuel enabling condition** [mm^3] AND < **P14A5: Increasing LP EGR slow response Max fuel enabling condition** [mm^3]		
					LP EGR differential pressure in range	> 0.60 [kPa] AND < 2.30 [kPa]		
					Desired LP EGR flow gradient (Req-ReqOld) lower than a threshold	< 4.50 [mg/s]		
					Desired LP EGR flow gradient (Req-ReqOld)	TRUE if		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					greater than a threshold, with hysteresis	> 3.40 [mg], FALSE if < 0.00 [mg]		
					Hysteresis lasts for a limited number of samples	<= 13.00 [count]		
					LP EGR valve total mass error (desired LP EGR mass - estimated LP EGR mass) in range, with hysteresis	TRUE if > 55.00 [mg], FALSE if < 19.00 [mg]		
					Desired LP EGR rate	> 4.00 [%]		
					LP EGR valve position OR	<= 15.00 [%]		
					it is above that threshold for a time	>= 0.02 [s]		
					No fault on Exhaust throttle valve position sensor	LEV_PstnSnsrFA ==FALSE		
					HP EGR valve total flow is valid	EGR_VlvTotFlowNotValid ==FALSE		
					Nominal LP EGR valve total flow is valid	LPE_VlvTotFlowNomNotVld ==FALSE		
					All enabling conditions last for a time	>= 0.02 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
LP EGR Slow Response - Decreasing Flow (OBDII market only)	P14A6	This monitor (in decreasing flow direction) detects failures in the air system such to not fulfilll the request of LP EGR flow in the intake manifold during transient conditions. It works only in closed loop EGR control zone. This monitor is used to detect any malfunction in the LP EGR system that leads to slow down the air control causing the vehicle's emissions to exceed OBDII limits. The aim of the LP EGR flow slow response monitor is to detect small leakages in the pipe after the compressor or in the intake/exhaust manifold. This monitor could also detect slow responding LP EGR valve, or skewed MAF sensor.	Error difference (absolute value) between the desired LP EGR rate and the actual LP EGR rate during transient air control conditions. The error is averaged over a calibrate-able cumulative transient time.	> **P14A6: Decreasing LP EGR slow response threshold** [%]	Calibration on diagnostic enabling Engine Running Cranking ignition in range PT Relay voltage in range Air Control is Active (air control in closed loop) Air control active condition lasts for a time Desired EGR rate No active transition from a combustion mode to another one (Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	**P14A5, P14A6: LP EGR slow response enabling** ==TRUE ==TRUE Battery voltage > 11.00 [V] Powertrain relay voltage > 11.00 [V] Refer to "Air Control Active" Free Form > 0.02 [s] > 0 [%] ==TRUE > 60.00 [°C] ==TRUE < 129.00 [°C]	Test is evaluated after the enabling conditions are satisfied for a number of samples >= 200.00 sampling time is 25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Exhaust Throttle measured position	> 60.00 [%]		
					Outside air temperature	> -20.00 [°C]		
					Ambient air pressure	> 69.60 [kPa]		
					HP EGR valve total mass error (absolute value, | desired HP EGR mass - estimated HP EGR mass|)	< 200.00 [mg]		
					Desired fuel quantity in range	> **P14A6: Decreasing LP EGR slow response Min fuel enabling condition** [mm^3] AND < **P14A6: Decreasing LP EGR slow response Max fuel enabling condition** [mm^3]		
					LP EGR differential pressure in range	> 0.50 [kPa] AND < 2.80 [kPa]		
					Desired LP EGR flow gradient (Req-ReqOld) greater than a threshold	> -5.00 [mg/s]		
					Desired LP EGR flow gradient (Req-ReqOld)	TRUE if		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					lower than a threshold, with hysteresis	< -2.50 [mg], FALSE if > 0.50 [mg]		
					Hysteresis lasts for a limited number of samples	<= 8.00 [count]		
					LP EGR valve total mass error (desired LP EGR mass - estimated LP EGR mass) in range, with hysteresis	TRUE if < -60.00 [mg], FALSE if > -20.00 [mg]		
					Desired LP EGR rate	< 8.00 [%]		
					No fault on Exhaust throttle valve position sensor	LEV_PstnSnsrFA ==FALSE		
					HP EGR valve total flow is valid	EGR_VlvTotFlowNotValid ==FALSE		
					Nominal LP EGR valve total flow is valid	LPE_VlvTotFlowNomNotVld ==FALSE		
					All enabling conditions last for a time	>= 0.02 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor A Signal Message Counter Incorrect	P14B6	This DTC monitors for an error in communication with the Mass Air Flow Sensor A	Communication of the Alive Rolling Count Press_2B_C03 from the Mass Air Flow Sensor A over LIN bus is incorrect for out of total samples Or Communication of the Alive Rolling Count TmpHum_2A_C03 from the Mass Air Flow Sensor A over LIN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor B Not Plausible	P14C0	This DTC detects either a biased high or low temperature sensor. This is done by comparing this sensor with two other temperature sensors.	This sensor is compared to two other sensors for this diagnostic to function. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngMetalHeadTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The comparison sensors, temperature thresholds, and aux heater effects		No Active DTC's Propulsion system Inactive timer error Sensor under diagnosis is not faulted Used comparison sensors are not currently faulted: - BiasChkCylHdClntSnsr - BiasChkBlockClntSnsr - BiasChkEngInClntSnsr - BiasChkEngOutClntSnsr - BiasChkHtrCrInClntSnsr - BiasChkHtrCrOutClnSnsr - BiasChkRadOutClntSnsr - BiasChkBypInClntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSn	OAT_PtEstFiltFA PSAR_PropSysInactveCrs_FA = FALSE EECR_CylHeadMetalB_CktFA EECR_CylHeadCoolant_CktFA EECR_BlockCoolant_CktFA EECR_EngineInlet_CktFA EECR_EngineOutlet_CktFA EECR_HeaterCoreInlet_CktFA EECR_HeaterCoreOutlet_CktFA EECR_RadiatorOutlet_CktFA EECR_BypassInlet_CktFA EECR_CylHeadMetal1_CktFA IAT_SensorFA HumTempSnsrFA MnfdTempSensorFA OAT_AmbientSensorFA EngOilTempFA EGRTempSensorUPSS_FA EGRTempSensorDNSS_FA	1 failure to set DTC 1 sec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			can be looked up by finding the location associated with the physical (Temperature) sensor number. **Engine Outlet:** CeEECR_e_PhysSnsr2 Comparison sensor 1: CeEECR_e_BiasChkBlockClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterNoEffect Threshold A: Threshold B: **Engine Block:** CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkEngMetalSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B: **Engine Inlet:** CeEECR_e_PhysSnsr1	12.25 ºC 6.75 ºC 20.60 ºC 6.60 ºC	sr - BiasChkFuelSnsr Comparison sensors ================== The following thresholds are based on the sensor under diagnosis **Engine Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Engine Block:** Propulsion Off Soak Time Ambient Air Temperature **Engine Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Head Metal A/B:** Propulsion Off Soak Time Ambient Air Temperature **Heater Inlet:** Propulsion Off Soak Time Ambient Air Temperature **Heater Outlet:** Propulsion Off Soak Time Ambient Air Temperature **Radiator Outlet:** Propulsion Off Soak Time Ambient Air Temperature =================	LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl = Availible ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC ≥ 21,600 seconds ≥ -20.0 ºC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Comparison sensor 1: CeEECR_e_BiasChkEngMetalSnsr Comparison sensor 2: CeEECR_e_BiasChkEngOutClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B: **Cylinder Head Metal A:** CeEECR_e_PhysSnsr8 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlockClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B: **Cylinder Head Metal B:** CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkEngOutClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlockClntSnsr Fuel Operated heater:	 22.50 ºC 7.25 ºC 12.50 ºC 6.75 ºC	Comparison sensor 1 & 2 are not ========== Aux Heat Detection Aux heat detection can only be enabled the following are met: No Active DTCs At power-up a warm sensor and cool sensor are compared Warm sensor Cool sensor If the warm sensor is compared to the cool sensor Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application: 2x2 signature Absolute Drop	= CeEECR_e_BiasChkNoSelection Same set as listed above and EngineModeNotRunTimerError EngineModeNotRunTimer_FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlockClntSnsr CeAEHR_e_BlkHtrRadOutClntSnsr > 7.40 ºC > 21,600 seconds > 21,600 seconds > -20.00 ºC Enabled Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterN		IAT Drop	Disabled		
			oEffect		Temperature Derivative	Disabled		
			Block Heater:					
			CeEECR_e_AuxHeaterBi		**2x2 Signature Criteria:**			
			asLow	12.50 ºC	The warm sensors			
			Threshold A:	6.75 ºC	Sensor 1:	CeAEHR_e_BlkHtrCylHd		
			Threshold B:			ClntSnsr		
					Sensor 2:	CeAEHR_e_BlkHtrEngM		
			Heater Inlet:			etalSnsr		
			CeEECR_e_PhysSnsr4		The cool sensors			
			Comparison sensor 1:		Sensor 1:	CeAEHR_e_BlkHtrRadO		
			CeEECR_e_BiasChkHtr			utClntSnsr		
			CrOutClnSnsr		Sensor 2:	CeAEHR_e_BlkHtrOutsid		
			Comparison sensor 2:			eAirSnsr		
			CeEECR_e_BiasChkRad		A block heater will be			
			OutClntSnsr		detected if the warm			
			Fuel Operated heater:		sensors are within	5.0 ºC		
			CeEECR_e_AuxHeaterN		AND			
			oEffect		The cool sensors are			
			Block Heater:		within	5.0 ºC		
			CeEECR_e_AuxHeaterBi		AND			
			asHigh	12.67 ºC	The delta between the			
			Threshold A:	7.50 ºC	two groups (warm/cold)	> 16.0 ºC		
			Threshold B:					
					Absolute Drop Criteria:			
			Heater Outlet:		The	CeAEHR_e_BlkHtrBlock		
			CeEECR_e_PhysSnsr5		is monitored for a drop.	ClntSnsr		
			Comparison sensor 1:					
			CeEECR_e_BiasChkHtr		The drop will be			
			CrInClntSnsr		monitored for once			
			Comparison sensor 2:		coolant flow is	> 87.00 L/min		
			CeEECR_e_BiasChkEng		AND			
			InClntSnsr		Flow time is between	0.1 - 17.0 seconds		
			Fuel Operated heater:		AND			
			CeEECR_e_AuxHeaterN		Engine runtime is	< 77.0 seconds		
			oEffect					
			Block Heater:		A block heater is detected			
			CeEECR_e_AuxHeaterBi		if a drop is	> 1.8 ºC		
			asBoth	12.67 ºC				
			Threshold A:	7.50 ºC	**IAT Drop Criteria:**			
			Threshold B:		A block heater will be			
					detected if:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Radiator Outlet: CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEng InClntSnsr Comparison sensor 2: CeEECR_e_BiasChkOut sideAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterN oEffect Threshold A: Threshold B: A failure will be reported if any of the following conditions are met. Evaluated in order: 1) This sensor is above both comparison sensors 2) This sensor is below both comparison sensors 3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew 4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this	9.60 ºC 9.60 ºC >A ºC >A ºC >B ºC >B ºC	IAT has a drop of during a drive defined by: Drive time Vehicle speed Addtional drive time is provided when vehicle speed drops below above threshold as follows This detection method will abort if the engine is off OR Engine runtime **Temperature Derivative Criteria:** Derivative will be monitored using Derivative will be monitored once coolant flow is AND Flow time is between AND Engine runtime is Derivative count will increment if derivative is If counts are a block heater is detected ==========	≥ 5.0 ºC ≥ 400.0 seconds ≥ 24.0 kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr > -1.00 L/min 5.0 - 15.0 seconds < 75.0 seconds < -0.10 ºC/sec ≥ 4 counts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			skew					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Engine Speed Request Circuit	P150C	This DTC monitors for an error in communication with the Transmission Engine Speed Request signal in $19D	Communication of the Alive Rolling Count or Protection Value in the Transmission Engine Speed signal over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 25ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Communication Error with Active Grill Air Shutter Module “A”	P151E	This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module A	Communication of the Alive Rolling Count from the Shutter Module A over LIN bus is incorrect or the Shutter Module A signals has an internal error for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Communication Error with Active Grill Air Shutter Module “B”	P151F	This DTC monitors for an internal error or error in communication with the Active Grill Air Shutter Module B	Communication of the Alive Rolling Count from the Shutter Module B over LIN bus is incorrect or the Shutter Module B signals has an internal error for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Adaptive Cruise Control Signal Circuit	P1553	Detects rolling count or protection value errors in Adaptive Cruise Control Axle Torque Command serial data signal "Emissions Neutral Default Action : When the ECM determines that a serial communication fault has occurred with the EOCM or the ACC module in data frame $2CB, the code is set and the Adaptive Control Cruise will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." Only applicable for applications with ACC feature.	If x of y rolling count / protection value faults occur, disable adaptive cruise control for duration of fault		Diagnostic is enabled. Adaptive Cruise Control Command Serial Data Error Diagnostic Enable	1.00	9 / 17 counts	Type C, No SVS, "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Switch State Undertermined	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch “Data Invalid” (latched on/off switch architectures) or “Indeterminate” (momentary on/off switch architectures) is detected for too long, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails."	cruise switch state is received as "undetermined" for greater than a calibratable time	fail continuously for greater than 3.0 seconds	Diagnostic is enabled.		fail continuously for greater than 3.0 seconds	Type C, No SVS, "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume/ Acceleration Signal 2 Circuit	P155C	Detects a failure of the cruise resume 2 switch in a continously applied state "Emissions Neutral Default Action : When the BCM tells the ECM that the secondary cruise control switch circuit voltage is stuck in Increase High state for too long, ECM sets the code and cruise control will be disabled and disengaged for the remainder of the key cycle regardless of current pass/fail condition once it fails." Only applicable for applications with the secondary cruise switch circuit.	Cruise Control Resume 2 switch remains applied for greater than a calibratable period of time.	fail continuously in the applied state for greater than 89.000 seconds	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	MIL: Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Signal Message Counter Incorrect	P155E	This DTC monitors for an error in communication with the DC/DC Converter Actuator Voltage Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Ignition Switch Run/ Start Position Signal Message Counter Incorrect	P156D	This DTC monitors for an error in communication with the DC/DC Converter Run/ Crank Terminal Status Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Signal Message Counter Incorrect	P156E	This DTC monitors for an error in communication with the DC/DC Converter Crank Control Terminal Signal	Communication of the Alive Rolling Count or Protection Value from the DC/DC Converter over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Calibration Incorrect	P158A	Type of cruise in Body Control Module does not match that in the Engine Control Module for 2.5 seconds "Emissions Neutral Default Action : This diagnostic compares the BCM and the ECM configuration calibrations of whether No Cruise, Conventional Cruise Control, or ACC is available on the vehicle. If the calibration for the cruise system type in the ECM does not match the value in $4E9 signal Vehicle Speed Control System Type, a P158A DTC is set and cruise control is disabled."	Type of cruise system in GMLAN $4E9 does not match with that in the Engine Control Module for a fix time.	2.5 seconds	Diagnostic is enabled. DID $40 from BCM says cruise system is present (ECM recieves programmble information from Body Control Module) OR ECM will not receive Programmable information for Cruise from Body Control Module	True	fail continuously for greater than 2.5 seconds.	Type C, No SVS "Emissions Neutral Diagnostics – Special Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Analog Mode Switch Circuit Low	P159F	This DTC will detect an analog driver mode switch input that is too low out of range.	For button type Normal_Button Analog Mode Switch low voltage threshold % of 5V range For button type Enhanced_Button Analog Mode Switch low voltage threshold % of 5V range For button type Mulitple_Button Analog Mode Switch low voltage threshold % of 5V range	< 29.00 % < 24.30 % < 21.20 %	Vehicle mode analog switch button type	= CeDMDG_e_Seven_Buttons	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Analog Mode Switch Circuit High	P15A0	This DTC will detect an analog driver mode switch input that is too high out of range.	For button type Normal_Button Analog Mode Switch high voltage threshold % of 5V range For button type Enhanced_Button Analog Mode Switch high voltage threshold % of 5V range For button type Mulitple_Button Analog Mode Switch high voltage threshold % of 5V range	 >= 88.80 % >= 94.10 % >= 95.30 %	Vehicle mode analog switch button type	= CeDMDG_e_Seven_Buttons	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Analog Mode Switch Performance	P15A1	This DTC will detect an analog driver mode switch input that is in an indeterminate range.	For button type Normal_Button Analog Mode Switch indeterminate region % of 5V range For button type Enhanced_Button Analog Mode Switch indeterminate regions % of 5V range For button type Mulitple_Button Analog Mode Switch indeterminate regions % of 5V range	66.80 % ≤ % of 5 volts < 72.80 % 63.50 % ≤ % of 5 volts < 65.50 % 83.50 % ≤ % of 5 volts < 85.50 % 52.90 % ≤ % of 5 volts < 54.10 % 74.10 % ≤ % of 5 volts < 75.30 % 87.50 % ≤ % of 5 volts < 88.60 %	Vehicle mode analog switch button type	= CeDMDG_e_Seven_Buttons	200 failures out of 250 samples 25 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auto Start Stop Select Switch Signal Circuit For start stop conventional hybrid applications	P15A3	BCM to ECM Rolling Count check for CAN frame $1E1. -- Only utilize when calibration variable KeINFG_e_HybridType equals CeINFR_e_StartStopConv.	Rolling count value received from BCM does not match expected value	= TRUE	Engine Speed Engine Speed Engine speed between min/max for Vehicle Speed for Hybrid type	≥ 200 RPM ≤ 7,500 RPM ≥ 5.0 seconds ≤ 318.14 MPH ≥ 5.0 seconds =CeINFR_e_StartStopConv	> 3 error counts for > 10.0 seconds 100 ms / sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Object Detection Control Module Torque Request Signal Message Counter Incorrect	P15F6	Detects rolling count or protection value errors in Collision Preparation System Axle Torque Command serial data signal "Emissions Neutral Default Action : When the ECM determines that a serial communication fault has occurred with the EOCM in frame $2CD, the code is set and the Collision Preparation System is disabled." Only applicable for applications with Full Speed Range Adaptive Cruise Control and Collision Preparation System feature.	If x of y rolling count / protection value faults occur, disable collision preparation system for duration of fault		Diagnostic is enabled. Front Object Detection Module Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Automatic Braking Engine Torque Request Signal Message Incorrect	P15F8	Detects rolling count or protection value errors Rear Virtual Bumper Axle Torque Command serial data signal "Emissions Neutral Default Action : When the ECM determines that a serial communication fault has occurred with the EOCM in frame $2F9, the code is set and the auto braking feature is disabled for the remainder of the key cycle." Only applicable for applications with Full Speed Range Adaptive Cruise Control and Collision Preparation System feature.	If x of y rolling count / protection value faults occur, disable rear virtual bumper or collision preparation system for duration of fault		Diagnostic is enabled. Automatic Braking Engine Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No SVS , "Emissions Neutral Diagnostics – special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Wheel Speed Sensor Sequence Number Incorrect	P15FD	This DTC monitors wheel speed signals for an incorrect sequence	Communication of the wheel speed sequence numbers from the ABS / Brake Control Module is incorrect. A complete set of sequence numbers has not been received for and this state is continuous for out of a total sample time of	 > 10.00 seconds > 4.00 seconds > 5.00 seconds	Sequence Number Error DTC is enabled Power Mode Run/Crank Ignition Voltage Driven and non-driven wheel rotational status is currently being received and not failsoft.	= 1 (1 indicates enabled) = Run or Crank >= 11.00 Volts	Diagnostic executes in 25ms loop	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Sensor Signal Message Counter Incorrect	P15FF	This DTC monitors for an internal error or error in communication with the Battery Monitor Signal	Communication of the Alive Rolling Count from the Battery Monitor Module in frame 1E over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for out of total samples Or Communication of the Alive Rolling Count from the Battery Monitor Module in frame 15 over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for out of total samples Or Communication of the Alive Rolling Count from the Battery Monitor Module in frame 16 over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for out of total samples Or Communication of the Alive Rolling Count from	>= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Fastest periodic communication rate to Battery Monitor Module on LIN bus executes at 250ms.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			the Battery Monitor Module in frame 17 over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count from the Battery Monitor Module in frame 18 over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count from the Battery Monitor Module in frame 19 over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count from the Battery Monitor Module in frame 1D over LIN bus is incorrect or the					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Battery Monitor Module signals it has an internal error for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count from the Battery Monitor Module in frame 1A over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count from the Battery Monitor Module in frame 1B over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for	>= 8.00 counts				
			out of total samples	>= 10.00 counts				
			Or					
			Communication of the Alive Rolling Count from the Battery Monitor Module in frame 1C over LIN bus is incorrect or the Battery Monitor Module signals it has an internal error for	>= 8.00 counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			out of total samples	>= 10.00 counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Pressure Regulator 1 Control Performance	P163A	This diagnostic checks for internal failures of the Fuel Metering Unit valve driver.	Fuel Metering Unit valve Driver Status OR Fuel Metering Unit valve Driver Status	== *Failed* == *Not Initialized* for at least 10.00 consecutive samples	Powertrain relay voltage Engine cranking Run crank active	≥ 11.0 V == FALSE == TRUE	32.00 failures out of 64.00 samples 12.5 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Pressure Regulator 2 Control Performance	P163B	Determine when commanded current for Rail Pressure Regulator valve is out of expected current range.	Current flowing through pressure regulator valve OR Current flowing through pressure regulator valve	> 2.30 A < 0.05 A	Powertrain relay voltage Rail pressure is governed by Pressure Regulator (refer to *RailPresCntrl*) No active DTC since key is on:	≥ 11.0 V FHP_PR_DrvrCloseTFTKO FHP_PR_DrvrOpenTFTKO	81.00 failures out of 162.00 samples 6.25 ms/sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Reference Voltage Status Message Counter Incorrect	P165C	This DTC monitors for an error in communication with the Sensor Reference Voltage Status Signals	Communication of the Alive Rolling Count or Protection Value from the Fuel Control System over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage And Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Voltage Signal Message Counter Incorrect	P167F	This DTC monitors for an error in the FTZM Battery Voltage Signal Message Counter	Communication of the Alive Rolling Count or Protection Value from the Fuel Pump Control Module (FTZM) over CAN bus is incorrect for out of total samples	>= 8 counts >= 10 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage Sensor Bus Relay	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts = On (if present)	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Voltage Correlation	P1682	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage and the Powertrain Relay Ignition Voltage. The diagnostic monitors the difference in voltage between Run/Crank Voltage and the Powertrain Relay Ignition Voltage and fails the diagnostic when the voltage difference is too high. This diagnostic only runs when the powertrain is commanded on and the Run/Crank Voltage is greater than a threshold based on IAT or the powertrain ignition voltage is high enough the Run/Crank voltage is high enough.	|Run/Crank – PT Relay Ignition| >	3.00 Volts		Powertrain Relay commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage > 5.50 Volts) AND Run/Crank voltage > 5.50 Volts	240 / 480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Voltage Correlation #3	P16BC	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage #2	|Run/Crank – PT Relay Ignition| >	3.00 Volts		Powertrain commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage > 5.50 Volts) AND Run/Crank voltage > 5.50 Volts	240 / 480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Circuit Low Voltage	P16D4	This DTC monitors for a battery module low voltage circuit fault	Battery Module signals a low voltage circuit fault via LIN bus VeVITR_U_12VBattVolt	< 3.00 Volts for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Circuit High Voltage	P16D5	This DTC monitors for a battery module high voltage circuit fault	Battery Module signals a high voltage circuit fault via LIN bus VeVITR_U_12VBattVolt	> 26.00 Volts for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Low	P16D6	This DTC monitors for a battery module current low fault	Battery Module signals a current low fault via LIN bus VeVITR_I_12VBattCurrRaw	< -1400 Amps for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current High	P16DD	This DTC monitors for a battery module current high fault	Battery Module signals a current high fault via LIN bus VeVITR_I_12VBattCurrRaw	> +1400 Amps for 200 fail counts out of 250 sample counts	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Internal Temperature Circuit Low	P16DE	This DTC monitors for a battery module internal temperature circuit low fault	Battery Module raw temperature 1 value	> 120.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	Enabled Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 or zero = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Internal Temperature Circuit High	P16DF	This DTC monitors for a battery module internal temperature circuit high fault	Battery Module raw temperature 1 value	< -43.00 Celsius	The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit For Historical Mode IBS Down Counter (over LIN bus) For Continuous Mode IBS Down Counter (over LIN bus) IBS Measure Temperature Data Available over LIN bus	Enabled Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True Between 1 and 24 = zero = True	4 failed samples within 5 total samples Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Random Access Memory (RAM) Error	P16E1	This DTC monitors for a battery module RAM memory fault	Battery Module signals a RAM memory fault via LIN bus VeVITR_e_IBS_IntRAM_ Fault	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Read Only Memory (ROM) Error	P16E2	This DTC monitors for a battery module ROM memory fault	Battery Module signals a ROM memory fault via LIN bus VeVITR_e_IBS_IntROM_ Fault	= CeVITR_e_DiagFailed	The diagnostic is enabled System Diagnostics Disabled Power Mode 12V System Reference Voltage LIN Bus Off or Battery Module Communication Faults Active Outside Air Temperature Outside Air Temperature Validity Bit	Enabled = False Not equal off > 9.00 Volts = False > -20.00 Celsius and < 50.00 Celsius = True	Diagnostic runs in the 250 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Data Incompatible	P16E3	This DTC monitors for a battery module data incompatible fault	Battery Module data received over LIN bus is incompatible. (Measured by any of the following)		The historical mode diagnostic is enabled and / or The continuous mode diagnostic is enabled	Enabled Enabled	Diagnostic runs in the 250 ms loop	Type B, 2 Trips
			Historical Test	Upon IBS wakeup, if any of the below Historical Test conditions are satisfied, the diagnostic fails.	System Diagnostics Disabled Power Mode 12V System Reference Voltage	= False Not equal off > 9.00 Volts		
			Absolute value of IBS battery capacity C20 data (IBS Return Nominal C20 - 95.00 Ah)	> 5.00 Ah	LIN Bus Off or Battery Module Communication Faults Active	= False		
			or		Outside Air Temperature	> -20.00 Celsius and < 50.00 Celsius		
			IBS Returns a battery type that is not equal to	CeBSER_e_IBS_Cfg BatAGM				
			or		Outside Air Temperature Validity Bit	= True		
			Absolute value of (IBS Return Battery Calibration#1 U40@25 C - 12.22 V)	> 0.50 Volts	IBS Configuration Data Available over LIN bus	= True		
			or		Historical Test Only Host Controller MEC Counter	<= 0		
			Absolute value of (IBS Return Battery Calibration#1 U80@25 C - 12.66 V)	> 0.50 Volts				
			Continuous Test	If any of the below conditions are satisfied for 16.00 fail counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				out of 20.00 sample counts, the diagnostic fails.				
			Absolute value of IBS battery capacity C20 data (IBS Return Nominal C20 - 95.00 Ah)	> 5.00 Ah				
			or					
			IBS Returns a battery type that is not equal to	CeBSER_e_IBS_Cfg BatAGM				
			or					
			Absolute value of (IBS Return Battery Calibration#1 U40@25 C - 12.22 V)	> 0.50 Volts				
			or					
			Absolute value of (IBS Return Battery Calibration#1 U80@25 C - 12.66 V)	> 0.50 Volts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance (Diesel)	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable.	Torque Learn offset is out of bounds given by threshold range	High Threshold 0.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	Type A, 1 Trips
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 3,197.00 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 3,197.00 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Rate limited vehicle speed and its dual store do not equal	N/A		Time since first CAN message with vehicle speed >= 0.500 sec	10 / 40 counts; 25.0msec/count	
			Commanded engine torque due to fast actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 459 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded engine torque due to slow actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 459 ms continuous, 0.5 down time multipier	
			TOS to wheel speed conversion factor is out of bounds given by threshold range	High Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo Low Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo	Ignition State	Accessory, run or crank	255 / 6 counts; 25.0msec/count	
			TOS to wheel speed conversion factor is out of bounds given by threshold	N/A	Ignition State	Accessory, run or crank Transfer case range valid	7.00 / 10.00 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			range Transfer case neutral request from four wheel drive logic does not match with operating conditions			and not over-ridden FWD Apps only		
			Driver progression mode and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). **P16F3_Speed Control External Load f(Oil Temp, RPM)** + 83.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Predicted Request	4,096.00	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Without Motor is greater than its redundant calculation plus threshold	Nm			2,048 ms continuous, 0.5 down time multipier	
			Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold	82.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 159 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, down time multipier 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	83.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (event based) calculation not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 159 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing timing (event based) calculation not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 159 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Idle speed control calculated predicted minimum torque request exceeds calculated torque limit	Minimum value (**P16F3_Speed Control External Load f(Oil Temp, RPM)** , **P16F3_Speed Control External Load Max f (Vehicle Speed, RPM)** + **P16F3_Speed Control External Load Offset f(Vehicle Sped, Transmission Oil Temp)**) + 83.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit	Minimum value (**P16F3_Speed Control External Load f(Oil Temp, RPM)** , **P16F3_Speed Control External Load Max f (Vehicle Speed, RPM)** + **P16F3_Speed Control External Load Offset f(Vehicle Sped, Transmission Oil Temp)**) +	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				83.00 Nm				
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	3,197.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	3,197.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Immediate Request is greater than its redundant calculation plus threshold	3,197.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR Commanded Immediate Request is less than its redundant calculation minus threshold					
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	119.89 Nm		Cruise has been engaged for more than 4.00 seconds	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Desired engine torque request greater than redundant calculation plus threshold	82.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	550.50 m/s	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 159 ms continuous, 0.5 down time multipier	
			Speed Control's Preditcted Torque	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Request and its dual store do not match				ms continuous, 0.5 down time multipier	
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 245 ms continuous, 0.5 down time multipier	
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 83.00 Nm Low Threshold - 83.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software or	High Threshold 35.00	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			less than threshold limit	Nm Low Threshold 0.00 Nm			0.5 down time multipier	
			Generator friction torque is out of bounds given by threshold range	High Threshold 83.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			1. Difference of reserve torque value and its redundant calculation exceed threshold OR 2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation	1. 82.00 Nm 2. N/A 3. 82.00 Nm 4. 82.00		1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 83.00 Nm	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			exeed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	Nm	3. & 4.: Ignition State	3. & 4.: Accessory, run or crank		
			Min. Axle Torque Capacity is greater than threshold	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Driver Predicted Request is greater than its redundant calculation plus threshold OR Driver Predicted Request is less than its redundant calculation minus threshold	3,197.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Predicted torque for zero pedal determination is greater than calculated limit.	Table, f(Oil Temp, RPM, Vehicle Speed). See supporting tables: min (**P16F3_Speed Control External Load f(Oil Temp, RPM)** , Sum **old P16F3_Speed Control External Load Max f(Vehicle** (**Speed, RPM)** , **old P16F3_Speed Control External Load Offset f(Vehicle Sped, Transmission Oil Temp)**) + 83.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Rate limited cruise axle torque request and its dual store do not match within a threshold	119.89 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multipier	
			1. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of bounds given by threshold range OR 2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions	1. 3.50 % 2. N/A 3. N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			and its dual store do not equal OR 3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal					
			Commanded axle torque is greater than its redundant calculation by threshold	3,197.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded axle torque is less than its redundant calculation by threshold	4,795.50 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded	40.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			by AC control software				ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (time based) calculation does not equal its redundant calculation	N/A		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Transmission Torque Request cacluations do not equal their dual stores	N/A		Run or Crank = TRUE > 0.50 s	16 / 32 counts; 25.0msec/count	
			Pedal learns and their redundant calculation do not equal		Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Requested fuel mass is greater or equal to its redundant calculation plus threshold	8.44 mg	Engine running No rich combustion mode No cranking phase		Up/down timer 458.94 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No fuel cut off request		multiplier	
			Engine friction torque is greater than its redundant calculation plus threshold OR Engine friction torque is lower than its redundant calculation minus threshold	83.00 Nm 83.00 Nm	Engine running		Up/down timer 475.00 ms continuous, 0.5 down time multiplier	
			High Pressure Pump Torque Load is greater than threshold OR High Pressure Pump Torque Load is lower than threshold	83.00 Nm 0.00 Nm	Engine running		Up/down timer 475.00 ms continuous, 0.5 down time multiplier	
			Pumping Losses is lower than threshold OR Pumping Losses rate of change signal greater than P2D2 threshold	0.00 Nm/task_100ms 5.19 Nm	Engine running		Up/down timer 475.00 ms continuous, 0.5 down time multiplier	
			Start Up Engine Friction Compensation rate of change haher than a threshold AND Start Up Engine Friction Compensation higher than threshold	41.50 Nm/task_12.5 1.00 Nm	Engine running		Up/down timer 101.78 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Limited Immediate Indicated Torque request is greater than its redundant calculation plus threshold	83.00 Nm	Engine running		Up/down timer 458.94 ms continuous, 0.5 down time multiplier	
			Active damping torque reduction greater than threshold OR Active damping torque reduction lower than threshold	83.00 Nm -83.00 Nm	Engine running		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Fuel volume request greater than its redundant calculation plus threshold	9.94 mm3	Engine running No rich combustion mode		Up/down timer 458.94 ms continuous, 0.5 down time multiplier	
			Absolute value of the sum of the Fuel Volumes in the pulse train minus Fuel Volume Request minus Main Correction greater than threshold	9.94 mm3	Engine Running No rich combustion mode Main pulse quantity already compensated with main correction is greater than or equal to zero		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Cumulative Programmed Energizing Time greater then its redundant calculation plus threshold (Note: when an emission test is performed OR CSERS test is performed the threshold is	67.70 us additional value for emission tests: 0.00 us	Engine running		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			incremented by a further value)	additional value fro CSERS test 0.00 us				
			Cumulative Desired Energizing Time greater than its redundant calculation plus threshold (Note: when an emission test is performed OR CSERS test is performed the threshold is incremented by a further value)	67.70 us additional value for emission tests: 0.00 us additional value fro CSERS test 0.00 us	Engine Running		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Difference between Fuel Rail Pressure Event Based Signal and Fuel Rail Pressure Time Based signal higher than threshold OR Difference between Fuel Rail Pressure Event Based Signal and Fuel Rail Pressure Time Based signal lower than threshold	300.00 MPa -40.00 MPa	Engine running Delta Filtered Pressure value lower than AND Delta Filtered Pressure value greater than	865.00 MPa/s -1,638.00 MPa/s	Up/down timer 458.94 ms continuous, 0.5 down time multiplier	
			Absolute difference between Main Correction and its redundant calculation greater than or equal to threshold	9.94 mm3	Engine running No rich combustion mode		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Cylinder Balancing Fuel Quantity Compensation converted in Energizing	**P16F3_CB safety deadband threshold f (Fuel Rail Pressure)**	Engine running		Up/down timer 158.94 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Time greater than its redundant calculation plus threshold OR (only if cylinder balancing detected a fault) Cylinder Balancing Fuel Quantity Compensation converted in Energizing Time greater than threshold	us **P16F3_CB safety deadband threshold f (Fuel Rail Pressure)** us			0.5 down time multiplier	
			Absolute value of the difference between the calculated EIA compensation and its redundant calculation greater than threshold	**P16F3_EIA safety deadband threshold f (Fuel Rail Pressure)** us	Engine cranking or engine running		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Absolute value of the difference between the calculated EIA compensation and its redundant calculation greater than threshold	9.94 mm3	Engine cranking or engine running		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Absolute value of the weighted delta energizing time greater then threshold	**P16F3_SQA safety deadband threshold f (Fuel Rail Pressure)** us	Ignition State	Accessory, run or crank	Up/down timer 458.94 ms continuous, 0.5 down time multiplier	
			Oil Pump Low Pressure Offset Friction greater then zero OR Oil Pump Low Pressure Offset Friction lower then	-20.00 Nm	Engine running		Up/down timer 475.00 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			threshold					
			Absolute value of fuel mass compensated for air temperature greater then threshold	4.22 mg	Engine running No rich combustion mode No cranking phase No fuel cut off request	Accessory, run or crank	Up/down timer 458.94 ms continuous, 0.5 down time multiplier	
			Absolute value of Main correction compensation based on coolant temperature greater then threshold	4.97 mm3	Engine Running No rich combustion mode		Up/down timer 158.94 ms continuous, 0.5 down time multiplier	
			Injector Valve Closing Adjustment energizing time correction greater then threshold OR Injector Valve Closing Adjustment energizing time correction lower then threshold	**P16F3_VCA safety max deadband threshold f(Fuel Rail Pressure)** us **P16F3_VCA safety min deadband threshold f(Fuel Rail Pressure)** us	Engine Cranking or engine running		Up/down timer 458.94 ms continuous, 0.5 down time multiplier	
			Desired Immediate Indicated torque greater then its redundant calculation plus threshold	83.00 Nm	Engine running		Up/down timer 458.94 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Fuel Temperature Energizing Time Compensation greater then its redundant calculation plus threshold	**P16F3_FTD safety deadband threshold f (Fuel Rail Pressure)** us	(Engine running OR engine cranking occurred in current driving cycle) AND FUL_InjLeakTempValid	 = TRUE	Up/down timer 101.78 ms continuous, 0.5 down time multiplier	
			Absolute value of the diffence between current and previous Fuel Injector Backflow Temperature greater then threshold	2,047.94 °C/100ms	Engine cranking or engine running ECT_Sensor_FA AND FTS_FTS_CktFA AND FTS_FTS_PIFA AND XOY_SecurityFlt_CeXOYR_e_FULR_FTD_RateLimFlt AND XOY_SecurityFlt_CeXOYR_e_ETMR_FTD_RedntCalcFlt	 = FALSE = FALSE = FALSE = FALSE = FALSE	Up/down timer 2,047.97 ms continuous, 0.5 down time multiplier	
			Increase of pumping losses due to exhaust brake actuation less then threshold	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475.00 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							down time multiplier	
			Exhaust Brake Torque Capacity less then Threshold	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475.00 ms continuous, 0.5 down time multiplier	
			Delta Engine Fuel Temperature less than zero		Engine Fuel Temperature below threshold Engine cranking or engine running	80.00 ° C	Up/down timer 462.50 ms continuous, 0.5 down time multiplier	
			Combustion Mode Arbitration Winner is higher than the maximum expected combustion mode OR Previous Combustion Mode Arbitration Winner is higher than the maximum expected combustion mode OR Combustion Mode Arbitration Winner is equal to Previous Combustion Mode Arbitration Winner and not equal to Normal combustion Mode		Engine cranking or engine running		Up/down timer 162.50 ms continuous, 0.5 down time multiplier	
			The sum of Low, Middle		Engine cranking or engine		Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			and High Barometric Correction Factors greater than 1		running		462.50 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Acceleration Sensor Signal Message Counter Incorrect	P175F	The diagnostic monitor detects an alive rolling count error or checksum error in the CAN frame containing the lateral acceleration signal value and longitudinal acceleration sensor signal value. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	rolling count value received from EBCM and expected TCM calculated value not equal OR checksum lateral and longitudinal acceleration CAN frame message value error 50 millisecond update rate	= TRUE = TRUE	enable alive rolling count error detection: diagnostic monitor enable lateral and longitudinal acceleration CAN frame message received battery voltage run crank voltage enable checksum error detection: diagnostic monitor enable lateral and longitudinal acceleration CAN frame message received normal CAN battery voltage run crank voltage communication enabled DTCs not fault active	= 1 Boolean = TRUE ≥ 11.0 volts ≥ 11.0 volts = 1 Boolean = TRUE ≥ 11.0 volts ≥ 11.0 volts = TRUE U0073	alive rolling count errors ≥ 54 out of 9 sample counts 50 millisecond update rate checksum error time ≥ 54.00 seconds	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Signal Message Counter Incorrect	P188B	This DTC monitors for an error in communication with the Transmission Range Signal	Communication of the Alive Rolling Count or Protection Value of the Transmission Range Signal over CAN bus is incorrect for out of total samples	>= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is avaialble >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 250ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Axle Torque Secondary Signal Message Counter Incorrect	P1899	This DTC monitors for an error in communication with the Axle Torque Secondary Signal	Communication of the Alive Rolling Count or Protection of the Axle Torque Secondary Signal over CAN bus is incorrect for out of total samples	>= 15.00 counts >= 16.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Four Wheel Drive Range Secondary Signal Message Counter Incorrect	P189A	This DTC monitors for an error in communication with the Secondary Axle Operational Mode Signal	Communication of the Alive Rolling Count or Protection of the Secondary Axle Operational Mode Signal over CAN bus is incorrect for out of total samples	>= 15.00 counts >= 16.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is available >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Park Assistance System Performance	P18CB	Determines if Park assist active bit from EBCM is valid	Speed Error - APA active ($1C6/$1C7) above a vehicle speed threshold OR Initialization Error - APA active ($1C6/$1C7) without an active torque request OR Exit Error - APA transitions to inactive during active torque request above a vehicle speed threshold	> 10.00 APA active boolean transitions from False to True with Torque Intervention = No request APA active boolean transitions from True to False with Torque Intervention <> No request when vehicle speed is > 1.00	Active Communication with EBCM Power Mode Engine Running Status of traction in GMLAN message ($4E9) Run/Crank Active Ignition Voltage	Received serial data = Run = True = Traction Present > 0.50 seconds > 6.41 volts	>= 6 failures out of 10 Performed every 12.5ms >= 6 failures out of 10 Performed every 12.5ms When transition occurs, no number of samples Performed every 12.5ms	Type C, No SVS Emissions Neutral Diagnostic - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Injector Circuit / Open Bank 1 Unit 1	P2047	This diagnosis verifies if a DEF dosing valve open circuit occurred	HWIO interface DEFMV_OPEN = Fault	VeHWIO_e_DEFMV_Open == CeSCRR_e_Fault	Test enabled by calibration Key on (OR engine running) Engine is not cranking Battery voltage HWIO interface DEFMV_OPEN different from INDETERMINATE	1.00 > 11.00 [V]	30.00 failures out of 60.00 samples Time basis = 100ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Injector Circuit Low Bank 1 Unit 1	P2048	This diagnosis verifies if a DEF dosing valve low side short to ground occurred	HWIO interface DEFMV_GROUND_SHORT = Fault	VeHWIO_e_DEFMV_Gsht == CeSCRR_e_Fault	Test enabled by calibration Key on (OR engine running) Engine is not cranking Battery voltage HWIO interface DEFMV_GROUND_SHORT different from INDETERMINATE	1.00 > 11.00 [V]	30.00 failures out of 60.00 samples Time basis = 100ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Injector Circuit High Bank 1 Unit 1	P2049	This diagnosis verifies if a DEF dosing valve low side short to battery occurred	HWIO interface DEFMV_POWER_SHORT = Fault	VeHWIO_e_DEFMV_Psht == CeSCRR_e_Fault	Test enabled by calibration Key on (OR engine running) Engine is not cranking Battery voltage HWIO interface DEFMV_ENABLE_POWER_SHORT different from INDETERMINATE	1.00 > 11.00 [V]	30.00 failures out of 60.00 samples Time basis = 100ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SCR NOx Catalyst Efficiency Below Threshold Bank 1 Catalyst 1 - EWMA Enabled	P20EE	The diagnosis checks if there is a malfunction in the SCR1 (SCRF) NOx conversion system measuring its NOx conversion efficiency. SCR1 NOx conversion efficiency is evaluated by two NOx sensors (upstream & downstream SCR1, also defined as NOx#1 and NOx#2 respectively). Considering that NOx sensors are cross-sensitive (they measure both NOx and NH3), NOx#2 will be affected by NH3 at SCR1 outlet. The monitoring is executed by comparing SCR1 measured NOx conversion efficiency and SCR1 reference efficiency: - Measured NOx conversion efficiency is calculated as η_Eff_SCR1_Msrd = 1 - [∫ NOx_SCR1_Dwn_Msrd / ∫ NOx_SCR1_Up_Msrd]	EWMA filtering is applied to the difference between measured SCR1 NOx conversion efficiency (η_Eff_SCR1_Msrd) and reference one (η_Eff_SCR1_Ref)	Fail threshold is = 0, Repass threshold is = 0	Test enabled by calibration; No active DTCs; Debounce time elapsed after SCR chemical model is healed; Diagnostic system not disabled; Test not yet executed on current key cycle except the case where EWMA filtering is in Rapid Response (RR) or Fast Initial Response (FIR) state; Tests per trip up to calibratable value when EWMA filter is in Fast Initial Response (FIR) state; Total tests executed in Fast Initial Response (FIR) state up to calibratable value;	CalOut = 1 [Boolean]; ≠ NOX_Snsr1_NOx_Flt ≠ NOX_NOx_SnsrSCR_DwnFlt ≠ EGT_TempSCR_UpFlt ≠ EGP_PresSCR_UpFlt ≠ EXF_TotExhSCR_UpFlt ≠ SCR_RDP_Flt ≠ SCR_TipStuckFltSt ≠ SCR_DEFMV_FA ≠ SCR_ChemicalMdlFlt; Debounce = 100 [s]; NotDsbl = True [Boolean]; NotRun = True [Boolean]; FIR test trip < 1 ; FIR tot tests < 2 ;	One failure to set the DTC.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		- Reference efficiency is evaluated as η_Eff_SCR1_Ref = 1 - [∫ NOx_SCR1_Dwn_Ref / ∫ NOx_Up_SCR1_Msrd] NOx_SCR1_Dwn_Ref is calculated as NOx_SCR1_Dwn_Ref = NOx_SCR1_Up_Msrd * (1 - (SCR1_eff_estimated - offset)) SCR1_eff_estimated comes from SCR1 chemical model and it takes into account the estimated amount of NOx and NH3 at SCR1 outlet: SCR1_eff_estimated = 1 - (NOx_SCR1_Dwn_est +NH3_SCR1_Dwn_est) / NOx_SCR1_Up_Msrd			Tests per trip up to calibratable value when EWMA filter is in Rapid Response (RR) state; Total tests executed in Rapid Response (RR) state up to calibratable value; DEF system ready to inject; Urea inside the tank not frozen; Debounce time elapsed after DEF defrost has been completed; Engine torque request higher than calibration; Rate of change of estimated efficiency (from SCR1 catalyst model) less than or equal to a calibratable value; Debounce time elapsed after condition based on rate of change of estimated efficiency is met; Upstream SCR1 NOx sensor measurement reliable; Downstream SCR1 NOx sensor measurement	RR test trip < 1 ; RR tot tests < 4 ; DEF ready = True [Boolean]; DEF tank status = DEF_TankNotFrozen [Enumerative]; Debounce = 0 [s]; Torque >= 50 [Nm]; |Rate of change of estimated efficiency| <= 1 [-] Debounce = 2 [s]; Reliable = True [Boolean]; Reliable = True [Boolean];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This allows being aligned to cross-sensitive NOx sensor #2. The offset (**K_EffOffset**) is calibrated in order to detect a malfunction. Test is performed when NOx integral upstream SCR1 reaches 1,200.00 [mg]. Use this section if EWMA filter is enabled (1.00 == 1 [Boolean]).			reliable; Number of DPF regeneration events successfully completed after vehicle exits from assembly plant (SCR1 catalyst de-greened); SCR service bay test not active; Debounce time elapsed after exiting from SCR service bay test; Outside ambient temperature higher than calibration with hysteresis; Ambient pressure higher than calibration with hysteresis; Urea dosing activation by SCR1 mean temperature condition; Debounce time elapsed after urea dosing activation by SCR1 mean temperature becomes true; Difference between SCR1 upstream and SCR1 downstream temperatures: - higher than first calibration curve	DPF Rgn Compt > 0 [-]; Service Bay Test == ServNotRunning [Enumerative]; Debounce = 0 [s]; OAT > -20 [°C]; -20 [°C] < hysteresis range < -20 [°C] Pressure > 72 [kPa]; 70 [°C] < hysteresis range < 72 [°C] SCR1 mean temperature > 185 [°C]; 180 [°C] < hysteresis range < 185 [°C] Debounce = 100 [s]; SCR1 up/down diff temperature > **T_MinTempGrad** [°C] Temperature <		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(f[SCR1 mean temperature]) AND - lower than second calibration curve (f[SCR1 mean temperature]);	**T_MaxTempGrad** [°C];		
					Debounce time elapsed after condition based on temperature gradient is met;	Debounce = 5 [s];		
					Exhaust mass flow and SCR1 average temperature within calibratable limits defined by 2 size table (f[exhaust mass flow, SCR1 average temperature]), enabled if table output is greater than calibration;	**K_EffExhFlowCond** > 1 [-];		
					Debounce time elapsed after condition based on exhaust mass flow and SCR1 average temperature is met;	Debounce = 5 [s];		
					SCR1 mean temperature time derivative within limits defined by maximum and minimum calibrations and debounce time elapsed based on following logic: - while SCR1 mean temperature time derivative is outside the limits, the system continuously evaluates the debounce time based	-3 < Delta temperature < 3 [°C/sec]; Debounce = **t_DerTempDsblTmr** [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					on calibration curve (f[SCR1 mean temperature time derivative]) and records the maximum value; - instead when SCR1 mean temperature time derivative gets within the limits, countdown starts until debounce time has been reached;			
					Upstream SCR1 NOx flow measurement lower than calibration and debounce time elapsed based on following logic: - while SCR1 NOx flow measurement higher than calibration, the system continuously evaluates the NOx average flow; - instead when SCR1 NOx flow measurement gets lower than calibration, debounce time based on calibration curve (f[NOx average flow, time spent with NOx flow higher than calibration]) is evaluated and countdown starts until debounce time has been elapsed. Limitation on the debouce time is always applied;	NOx up flow < 75 [mg/s]; Debounce = **t_NOxFlowIncDsblTmr** [sec]; Max debounce = 30 [s];		
					Upstream SCR1 NOx flow measurement higher than calibration;	NOx up flow > 2 [mg/s];		
					Upstream SCR1 NOx	NOx up > 125 [ppm];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					sensor measurement higher than calibration;			
					Upstream SCR1 NOx sensor measurement lower than calibration;	NOx up < 1,000 [ppm];		
					Downstream SCR1 NOx sensor measurement higher than calibration;	NOx dwn > -1 [ppm];		
					Upstream SCR1 absolute NOx flow derivative lower than calibration;	Delta NOx up flow < 25 [mg/s^2];		
					NO2/NOx ratio: - higher than first calibratable value AND - lower than second calibratable value;	NO2/NOx > 0 [-] NO2/NOx < 1 [-];		
					Debounce time elapsed after all NOx conditions (except upstream SCR1 NOx flow measurement lower than calibration) become true;	Debounce = 1 [s];		
					Estimated NH3 slip downstream SCR1 lower than a calibration;	Estimated NH3 slip < 75.00 [ppm];		
					Debounce time elapsed after estimated NH3 slip condition is met;	Debounce = 5.00 [s]		
					NH3/NOx ratio upstream SCR1 lower than a calibration;	NH3/NOx ratio SCR1 up < 5.00 [-];		
					Debounce time elapsed	Debounce = 5.00 [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					afetr NH3/NOx ratio condition is met;			
					DPF / DeHC combustion modes not active;	Cmb ≠ DPF_HiO2 | DPF_LoO2 | DPF_EngPrtct_HiO2 | DPF_EngPrtct_LoO2 | DPF_PN | DPF_RichIdle | DeHC_Drive | DeHC_Park [Enumerative];		
					Debounce time elapsed after exiting from DPF / DeHC combustion modes;	Debounce = 60 [s];		
					NH3 storage deviation error of SCR1 (difference between storage estimation and storage set-point): - higher than first calibration curve (f[SCR1 average temperature]) AND - lower than second calibration curve (f[SCR1 average temperature]);	NH3 deviation > **m_NH3_StrgDevErrMinThrsh** [g] NH3 deviation < **m_NH3_StrgDevErrMaxThrsh** [g];		
					NH3 storage of SCR1: - higher than first calibration curve (f[SCR1 average temperature]) AND - lower than second calibration curve (f[SCR1 average temperature]);	NH3 storage > **m_NH3_StrgMinThrsh** [g] NH3 storage < **m_NH3_StrgMaxThrsh** [g];		
					Debounce time elapsed after condition based on NH3 storage deviation error and NH3 estimated	Debounce = 5 [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					storage is met; SCR dosing in NH3 storage control or in intrusive NH3 storage control; Debounce time elapsed after switching to NH3 storage control or intrusive NH3 storage control; Diesel Exhaust Fluid quality measurement (concentration read by DEF quality sensor) higher than calibration with hysteresis (condition active only if DEF quality sensor is available);	 Dos = NH3_StrgCntrl | Intrsv_NH3_StrgCntrl [Enumerative]; Debounce = 10 [s]; DEF concentration > 29 [Pct]; 28 [Pct] < hysteresis range < 29 [Pct] DEFQS present= 1 [Boolean];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detects a continuous or intermittent short low or open in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #1 on the Main processor.	APP1 percent Vref	< 0.4625 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detects a continuous or intermittent short high in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #1 on the Main processor.	APP1 percent Vref >	4.7500 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detects a continuous or intermittent short low or open in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #2 on the Main processor.	APP2 percent Vref <	0.3250 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detects a continuous or intermittent short high in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #2 on the Main processor.	APP2 percent Vref >	2.6000 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19 / 39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detect a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between APP1 and the APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic also monitors the difference in reference voltage between normalized min APP1 and the normalized min APP2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on Main processor	Difference between APP1 displaced and APP2 displaced >	5.000 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123,P2127, P2128) (P06A3, P0697)	19 / 39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min APP1) and (normalized min APP2) >	3.500 % Vref	Run/Crank voltage No APP sensor faults No 5V reference errors or faulst for # 3 & # 4 5V reference circuits	> 6.41 Volts (P2122, P2123,P2127, P2128) (P06A3, P0697)	19 / 39 counts intermittent; or 15 counts continuous, 12.5 ms/count in the main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 2 Circuit Low (Diesel L6 ATM)	P2184	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 2 Circuit High (Diesel L6 ATM)	P2185	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 2 Circuit Intermittent/ Erratic (Diesel L6 ATM)	P2186	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	EECR_TS2_Erratic_TFTKO EECR_TS2_CktHiLo_FA	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Performance (3 intake air pressure sensor configuration)	P2227	This monitor is used to identify BARO sensor internal faults (measurement with an offset or a drift). The plausibility monitor compares the BARO, MAP and TCIAP pressures in two different conditions: - at idle (part of the test enabled when the engine is running) - between key off and when the engine starts running (part of the test enabled when the engine is not running). If the BARO sensor value is within the normal expected atmospheric range, then MAP, TCIAP and BARO are compared to see if their values are similar. If the MAP and TCIAP sensor values are similar, but the BARO value is not similar, then a BARO performance diagnostic will fail. If BARO sensor is not in agreement with the other two the monitor is able to pinpoint BARO as the faulty sensor.	Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between BARO sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor	> **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] > **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] <= **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa]	Correlation diagnostic enabled by calibration Engine is running Run Crankrelay supply voltage in range Engine speed Requested fuel Throttle measured position Engine Coolant Temperature No faults are present	== 1.00 > 11.00 [V] < 950.00 [rpm] < 40.00 [mm^3] > 90.00 [%] > 70.00 [°C] CrankSensor_FA ==FALSE FUL_GenericInjSysFA ==FALSE TPS_PstnSnsrFA ==FALSE MAP_SensorCircuitFA ==FALSE AAP2_SnsrCktFA ==FALSE AAP_AAP5_SnsrCktFA ==FALSE AAP_AAP2_SnsrStabFA ==FALSE AAP_AAP5_SnsrStabFA ==FALSE ECT_Sensor_FA	480.00 fail counters over 600.00 sample counters sampling time is 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						==FALSE MAF_MAF_SnsrFA ==FALSE		
			BARO Pressure OR BARO Pressure OR Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between BARO sensor and MAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor	< 50.0 [kPa] > 115.0 [kPa] > 10.0 [kPa] > 10.0 [kPa] <= 10.0 [kPa]	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 5.0 [s] EngineModeNotRunTimerError MAP_SensorCircuitFA AAP_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP	4 fail counters over 5 sample counters sampling time is 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Low (Diesel, pull-down)	P2228	Detects a continuous short to ground or open circuit in the Barometric Pressure (BARO) signal circuit by monitoring the BARO sensor output voltage and failing the diagnostic when the BARO voltage is too low. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO Voltage	< 10.0 % of 5 Volt Range (This is equal to 40.0 kPa)			240 failures out of 300 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit High (Diesel, pull-down)	P2229	Detects a continuous short to power in the Barometric Pressure (BARO) signal circuit by monitoring the BARO sensor output voltage and failing the diagnostic when the BARO voltage is too high. The BARO sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	BARO Voltage	> 84.0 % of 5 Volt Range (This is equal to 114.0 kPa)			240 failures out of 300 samples 1 sample every 12.5 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Intermittent	P2230	Detects a noisy or erratic signal in the barometric pressure (BARO) circuit by monitoring the BARO sensor and failing the diagnostic when the BARO signal has a noisier output than is expected. When the value of BARO in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO readings. The result of this summation is called a “string length”. Since the BARO signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO reading - BARO reading from 12.5 milliseconds previous)	> 100 kPa 80 consecutive BARO readings			4 failures out of 5 samples Each sample takes 1.0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Water in Fuel Sensor Circuit (Digital/ Passive, Wired to FTZM)	P2264	Monitor verifies that sensor reports 'water in fuel present' as self test within first seconds since it is supplied.	Water In Fuel sensor output	≥ 4.5 V (Water not present)	Powertrain relay voltage Ignition off time Ignition on time Software and Calibration versions match (refer to '*MEMR FNA Matched Flag*' free form) Sensor Bus Relay commanded on FTZM supply voltage No active DTC: No error for Engine Not Running timer	≥ 11.0 V > 60.0 s > 0.10 s and < 2.00 s ≥ 8.0 V P1103 SBR_RlyFA	5 failure out of 9 samples 100 ms/sample	Type C, SVS one trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Water in Fuel Condition (Digital/ Passive, Wired to FTZM)	P2269	Determine fuel filter sensor detect water.	Water in fuel sensor output	≤ 2.0 V (Water present)	Powertrain relay voltage Ignition on time Sensor Bus Relay commanded on FTZM supply voltage No active DTC:	≥ 11.0 V > 15.00 s ≥ 8.0 V P1103 SBR_RlyFA	40 failure out of 80 samples 100 ms/sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Inlet Pressure (TCIAP) Sensor Performance (3 intake air pressure sensor configuration)	P227B	This monitor is used to identify TCIAP sensor internal faults (measurement with an offset or a drift). The plausibility monitor compares the BARO, MAP and TCIAP pressures in two different conditions: - at idle (part of the test enabled when the engine is running) - between key off and when the engine starts running (part of the test enabled when the engine is not running) If the TCIAP sensor value is within the normal expected atmospheric range, then MAP, TCIAP and BARO are compared to see if their values are similar. If the MAP and BARO sensor values are similar, but the TCIAP value is not similar, then a TCIAP performance diagnostic will fail. If TCIAP sensor is not in agreement with the other two the monitor is able to pinpoint TCIAP as the faulty sensor.	Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor AND Difference (absolute value) in measured pressure between BARO sensor and MAP sensor	> **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] > **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa] <= **P0106, P2227, P227B, P00C7: Maximum pressure difference** [kPa]	Correlation diagnostic enabled by calibration Engine is running Run Crank relay supply voltage in range Engine speed Requested fuel Throttle measured position Engine Coolant Temperature No faults are present	== 1.00 > 11.00 [V] < 950.00 [rpm] < 40.00 [mm^3] > 90.00 [%] > 70.00 [°C] CrankSensor_FA ==FALSE FUL_GenericInjSysFA ==FALSE TPS_PstnSnsrFA ==FALSE MAP_SensorCircuitFA ==FALSE AAP2_SnsrCktFA ==FALSE AAP_AAP5_SnsrCktFA ==FALSE AAP_AAP2_SnsrStabFA ==FALSE AAP_AAP5_SnsrStabFA ==FALSE	480.00 fail counters over 600.00 sample counters sampling time is 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						ECT_Sensor_FA ==FALSE MAF_MAF_SnsrFA ==FALSE		
			TCIAP Pressure OR TCIAP Pressure OR Difference (absolute value) in measured pressure between BARO sensor and TCIAP sensor AND Difference (absolute value) in measured pressure between TCIAP sensor and MAP sensor AND Difference (absolute value) in measured pressure between BARO sensor and MAP sensor	< 50.0 [kPa] > 115.0 [kPa] > 10.0 [kPa] > 10.0 [kPa] <= 10.0 [kPa]	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 5.0 [s] EngineModeNotRunTimer Error MAP_SensorCircuitFA AAP_SnsrCktFA AAP2_SnsrCktFA AAP3_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP3_SnsrCktFP	4 fail counters over 5 sample counters sampling time is 12.5ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor Circuit C Low (Diesel, applications with LIN MAF)	P227C	Detects an eroneously low value being reported over the LIN serial connection from the BARO C sensor. The diagnostic monitors the BARO C sensor pressure output and fails the diagnostic when the pressure is too low. The BARO C sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO C pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	BARO C Pressure	< 45.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor Circuit C High (Diesel, applications with LIN MAF)	P227D	Detects an eroneously high value being reported over the LIN serial connection from the BARO C sensor. The diagnostic monitors the BARO C sensor pressure output and fails the diagnostic when the pressure is too high. The BARO C sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure. The BARO C pressure value is transmitted to the ECM by the MAF sensor using the LIN serial communication protocol.	BARO C Pressure	> 115.0 kPa	LIN Communications established with MAF		160 failures out of 200 samples 1 sample every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit Intermittent/ Erratic (applications with LIN MAF)	P227E	Detects a noisy or erratic signal in the barometric pressure (BARO) C circuit by monitoring the BARO C sensor and failing the diagnostic when the BARO C signal has a noisier output than is expected. When the value of BARO C in kilopascals (kPa) is determined, a delta is calculated between the current reading and the previous reading. The absolute value of these deltas is summed over a number of BARO C readings. The result of this summation is called a “string length”. Since the BARO C signal is anticipated to be relatively smooth, a string length of a particular magnitude indicates a noisy or erratic BARO C signal. The diagnostic will fail if the string length is too high.	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO C reading - BARO C reading from 25 milliseconds previous)	> 100 kPa 80 consecutive BARO C readings	None		4 failures out of 5 samples Each sample takes 2.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator 1 - Forced Engine Shutdown	P228A	Determine when rail pressure is lower than desired setpoint and metering unit actuator has achieved its maximum authority.	Rail pressure setpoint - measured rail pressure Commanded fuel flow for metering unit	> 40 MPa ≥ Maximum flow deliverable by high pressure pump (refer to *RailPresCntrl* section)	Run crank voltage Engine running Rail pressure is governed by Fuel Metering Unit (refer to *RailPresCntrl*) No DTC active since key is on:	≥ 11.0 V P000F	160 failures out of 320 samples 12.5 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator 2 - Forced Engine Shutdown	P228B	Determine when rail pressure is lower than desired setpoint and rail pressure regulator has achieved its maximum authority.	Rail pressure setpoint - measured rail pressure Commanded pressure for pressure regulator valve	> 40 MPa ≥ 50 to 285 MPa (see table **P228B Pressure Regulator completely closed command**)	Run crank voltage Engine running Pressure Regulator controlled in closed loop (refer to *RailPresCntrl*)	≥ 11.0 V	160 failures out of 320 samples 12.5 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator 1 Exceeded Control Limits - Pressure Too Low	P228C	Determine when rail pressure is lower than desired setpoint.	Rail pressure setpoint - measured rail pressure	> 16 to 16 MPa (see table **P228C Positive rail pressure deviation (MU)**)	Run crank voltage Engine running Fuel Metering Unit controlled in closed loop (refer to *RailPresCntrl*) Fuel injected quantity (Low fuel level calibrated as enabling condition OR LowFuelConditionDiagnostic (Air ambient pressure calibrated as enabling condition OR Air ambient pressure (Air ambient temperature calibrated as enabling condition OR Air ambient temperature No DTC active since key is on:	≥ 11.0 V > 4.0 mm^3/stroke = 0.00 = FALSE) = 0.00 ≥ 0 kPa) = 0.00 ≥ -40 °C) P000F	320 failures out of 640 samples 12.5 ms/sample	Type B, 2 Trips MIL is illuminated according to 'similar engine conditions' criteria.
			Rail pressure setpoint -		Run crank voltage	≥ 11.0 V	320 failures out	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			measured rail pressure	> 16 to 16 MPa (see table **P229A Positive rail pressure deviation (PR)**)	Engine running Pressure Regulator controlled in closed loop (refer to *RailPresCntrl*) Fuel injected quantity (Low fuel level calibrated as enabling condition OR LowFuelConditionDiagnostic (Air ambient pressure calibrated as enabling condition OR Air ambient pressure (Air ambient temperature calibrated as enabling condition OR Air ambient temperature	 > 2.0 mm^3/stroke = 0.00 = FALSE) = 0.00 ≥ 0 kPa) = 0.00 ≥ -40 °C)	of 640 samples 12.5 ms/sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator 1 Exceeded Control Limits - Pressure Too High	P228D	Determine when rail pressure is greater than desired setpoint.	Rail pressure setpoint - measured rail pressure	< -18 to -18 MPa (see table **P228D Negative rail pressure deviation (MU)**	Run crank voltage Fuel Metering Unit controlled in closed loop (refer to *RailPresCntrl*) Fuel injected quantity Fuel temperature (Low fuel level calibrated as enabling condition OR LowFuelConditionDiagnostic (Air ambient pressure calibrated as enabling condition OR Air ambient pressure (Air ambient temperature calibrated as enabling condition OR Air ambient temperature	≥ 11.0 V > 4.0 mm^3/stroke > -40 °C == 0.00 = FALSE) = 0.00 ≥ 0 kPa) = 0.00 ≥ -40 °C)	320 failures out of 640 samples 12.5 ms/sample	Type B, 2 Trips MIL is illuminated according to 'similar engine conditions' criteria.
			Rail pressure setpoint - measured rail pressure	< -18 MPa	Run crank voltage Pressure Regulator controlled in closed loop (refer to RailPresCntrl)	≥ 11.0 V	320 failures out of 640 samples 12.5 ms/sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fuel injected quantity	> 4.0 mm^3/stroke		
					(Low fuel level calibrated as enabling condition	= 0.00		
					OR			
					LowFuelConditionDiagnostic	= FALSE)		
					(Air ambient pressure calibrated as enabling condition	= 0.00		
					OR			
					Air ambient pressure	≥ 0 kPa)		
					(Air ambient temperature calibrated as enabling condition	= 0.00		
					OR			
					Air ambient temperature	≥ -40 °C)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator 2 Performance	P2293	Determine when rail pressure is above maximum threshold when pressure is governed by Pressure Regulator valve.	Rail pressure	> 68 to 268 MPa (see table **P2293 Maximum rail pressure with PR**)	Run crank voltage Rail pressure is governed by Pressure Regulator (refer to *RailPresCntrl*)	≥ 11.0 V	41 failures out of 82 samples OR 41 continuous failures out of 82 samples 6.25 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid 2 Control Circuit	P2294	Controller specific output driver circuit diagnoses the Rail Pressure Regulator valve low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit: impedance between signal and controller ground	≥ 200 kΩ	Powertrain relay voltage Run crank voltage Engine not cranking Pressure Regulator calibrated as present	≥ 11.0 V > 6.0 V	65 failures out of 130 samples 6.25 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid 2 Control Circuit Low Voltage	P2295	Controller specific output driver circuit diagnoses the Rail Pressure Regulator valve low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground: impedance between signal and controller ground	≤ 0.5 Ω	Powertrain relay voltage Run crank voltage Engine not cranking Pressure Regulator calibrated as present	≥ 11.0 V > 6.0 V	65 failures out of 130 samples 6.25 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator Solenoid 2 Control Circuit High Voltage	P2296	Controller specific output driver circuit diagnoses the Rail Pressure Regulator valve low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power: impedance between signal and controller power	≤ 0.5 Ω	Powertrain relay voltage Run crank voltage Engine not cranking Pressure Regulator calibrated as present	≥ 11.0 V > 6.0 V	65 failures out of 130 samples 6.25 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator C Control Circuit/Open	P233A	This DTC detects an Open Circuit on the Fuel Metering Unit valve 2	Current low across High and Low Side drivers during ON state indicates an open circuit.	Impedence between High Side and Low Side pins of the the Fuel Metering Unit valve 2 ≥ 200 kΩ	Powertrain relay voltage Engine cranking Run crank active	≥ 11.0 V == FALSE == TRUE	failures out of samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator C Control Circuit Low	P233B	This DTC detects a short circuit to ground of the Low Side driver circuit of the Fuel Metering Unit valve 2	Voltage low across Low Side driver during OFF state indicates short-to-ground.	Impedence between Low Side pin of the Fuel Metering Unit valve 2 and the controller ground ≤ 0.5 Ω	Powertrain relay voltage Engine cranking Run crank active	≥ 11.0 V == FALSE == TRUE	failures out of samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Regulator C Control Circuit High	P233C	This DTC detects a short circuit to power of the Low Side driver circuit of the Fuel Metering Unit valve 2	Voltage high across Low Side driver during ON state indicates short to power.	Impedence between Low Side pin of the Fuel Metering Unit valve 2 and the controller power ≤ 0.5 Ω	Powertrain relay voltage Engine cranking Run crank active	≥ 11.0 V == FALSE == TRUE	failures out of samples 100 ms/sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Closed Loop Reductant Injection Control At Limit - Flow Too Low	P249D	This diagnosis checks if the DEF injection system has exceeded the limit of correction authority. The monitoring is executed by comparing the long-term adaptation factor (LTAF) with a calibratable threshold: LTAF > OBD high threshold. The long-term adaptation factor is calculated based on the information given by the NH3 storage correction strategy. This factor represents the measured deviation of the complete SCR system and shall be used to compensate it by making a correction over the DEF injection quantity.	Long-term adaptation factor (LTAF) higher than calibratable threshold	LTAF > 1.74	Test enabled by calibration;	CalOut = 1 [Boolean];	One failure to set the DTC.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	Protect error - Serial Communication message 2's complement not equal ($189/$199)	Message <> two's complement of message	Diagnostic Status	Enabled	>= 16 failures out of 20 samples.	Type B, 2 Trips
					Power Mode	= Run	Performed on every received message	
			OR Rolling count error - Serial Communication message ($189/$199) rolling count index value	Message <> previous message rolling count value + one	Ignition Voltage	> 6.41 volts	>= 6 Rolling count errors out of 10 samples.	
					Engine Running	= True	Performed on every received message	
			OR		Run/Crank Active	> 0.50 Sec		
			Range Error - Serial Communication message - ($189/$199) TCM Requested Torque Increase	> 600 Nm	No Serial communication loss to TCM (U0101)	No loss of communication	>= 6 range errors out of 10 samples.	
							Performed on every received message	
			OR					
			Multi-transition error - Trans torque intervention type request change	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples. Performed every 200 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Hood Switch Performance	P257D	This DTC monitors the hood switch rationality	Hood Switch position is in an invalid position. The hood switch reading is invalid in these voltage percentage ranges: If Hood Switch type is Global A If Hood Switch type is Global B Hood Switch Type: Global A	 43.4% to 45.7% 59.34% to 66.96%	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	Enabled Use Run/Crank as Enable	80 failed samples within 100 total samples Diagnostic runs in the 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Hood Switch Short to Ground / Low Voltage	P257E	This DTC monitors the hood switch for a short to ground or low voltage condition	The hood switch percent voltage reading is lower than the expected bounds of: If Hood Switch type is Global A If Hood Switch type is Global B Hood Switch Type: Global A	< 17.2% < 28.54%	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	Enabled Use Run/Crank as Enable	80 failed samples within 100 total samples Diagnostic runs in the 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Hood Switch Short to Voltage / High Voltage	P257F	This DTC monitors the hood switch for a short to voltage or high voltage condition	The hood switch percent voltage reading is higher than the expected bounds of: If Hood Switch type is Global A If Hood Switch type is Global B Hood Switch Type: Global A	 > 67.8% > 85.2%	The diagnostic is enabled Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable	Enabled Use Run/Crank as Enable	80 failed samples within 100 total samples Diagnostic runs in the 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake System Control Module Requested MIL Illumination	P25A2	Monitors the Brake System Control Module MIL request message to determine when the Brake System Control Module has detected a MIL illuminating fault.	Brake System Control Module Emissions-Related DTC set and module is requesting MIL	Brake System Control Module Emissions-Related DTC set and module is requesting MIL		Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unmetered Fuel - Forced Engine Shutdown	P25BD	Determines if engine overspeed condition is occuring when no fuel is being delivered	Engine Speed exceeds a threshold for a period of time	Fail Condition: Engine Speed > 5,800 RPM		Engine Speed > 1,500 RPM	Fail threshold: Overspeed condition TRUE > 25.0 milliseconds	Type A, 1 Trips
			Engine Speed less than a threshold for a period of time	Pass Condition: Engine Speed < (5,800 - 300) RPM		Engine Speed > 1,500 RPM	Pass threshold: Overspeed condition FALSE > 25.0 milliseconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Pump “A” Control Circuit Stuck On	P261F	The purpose of the diagnostic is to detect and report a failure of the component. This diagnostic checks the commanded off state of the pump to ensure that it is not reporting an actual speed that would represent a commanded on state. If the enable criteria are met when the pump is commanded off, the actual speed is evaluated. If the actual speed is greater than the calibrated fault threshold, the diagnostic reports a FAIL. If the actual speed does not exceed the calibrated fault threshold, the diagnostic reports a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Pump Feedback Speed	>= 1,500.00 RPM	12V System Voltage PECR_AuxCoolPmpSpdActl_FoI PECR_AuxCoolPmpSpdActl_Av Any of the following criteria are met for a) Pump Enable b) Pump Command Speed in Range	> 11.00 V (with hysteresis disable < 10.00 V) = Not Active = Not Active >= 2.00 s True 0.00 RPM to 299.00 RPM	80 seconds out of a 100 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Off Timer Performance	P262B	This DTC determines if the hardware timer does not initialize or count properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe). Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment. Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when module shutdown is initiated or run/crank becomes active.	Count Up Test: Time difference between the current read and the previous read of the timer Range Test: The variation of the HWIO timer and mirror timer is	> 1.50 seconds > 0.25 %.			Count Up Test: 4 failures out of 20 samples 1 sec / sample Continuous while run/crank is not active and until controller shutdown is initiated. Range Test: Once per trip when controller shutdown is initiated or run/ crank becomes active.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump "A" Low Flow / Performance	P2635	This DTC detects degradation in the performance of the electronically regulated fuel system by calculating the difference between the sensed, filtered system [line] pressure versus the ECM-commanded pressure [error calculation]. The calculated error is then compared to calibrated fault threshold tables for a fault decision.	Sensed Filtered Fuel System [line] pressure error	<= Low Threshold [Supporting Table] **P2635 Threshold Low** OR >= High Threshold [Supporting Table] **P2635 Threshold High**	a) Diagnostic enabled [FDBR_b_FSRD] b) Timer Engine Running [FDBR_t_EngModeRunCoarse] c1) Fuel Flow Rate Valid c2) Ambient Air Pressure Value Defaulted c3) FDB_FuelPresSnsrCktFA c4) Reference Voltage Fault Status [DTC P0641] c5) Exhaust AfterTreatment Fuel Injector A Control Circuit Short Low Fault [HCIR_b_GshtFA DTC P20CD] c6) Fuel Pres Sensor Performance Fault Active [DTC P018B] c7) Use Calculated Flow Performance Fault Thresholds [FDBR_b_UseCalcFSRD_FltThrshs] c8) Engine Speed Status Valid c9) FAB_FuelPmpCktFA c10) Fuel Control Enable	a) == TRUE b) >= 40.00 seconds c1) == TRUE c2) <> TRUE c3) <> TRUE c4) <> TRUE c5) <> TRUE c6) <> TRUE c7) <> TRUE c8] == TRUE c9] <> TRUE c10) <> TRUE	1 sample / 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fault Active [DTC P12A6]			
					c11) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255]	c11) <> TRUE		
					c12) Fuel Pump Speed Fault Active [DTC P129F]	c12) <> TRUE		
					c13) CAN Sensor Bus message $0C3 Comm Fault [CFMR_b_FTZM_Info1_UcodeCmFA DTC P165C]	c13) <> TRUE		
					c14) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA DTC]	c14] <> TRUE		
					c15) Sensor Configuration [FDBR_e_FuelPresSnsrConfig]	c15) == CeFDBR_e_WiredTo_FTZM		
					c16) Sensor Bus Relay On	c16) == TRUE		
					d) Emissions Fuel Level Low [Message $3FB]	d) <> TRUE		
					e) Fuel Control Enable	e) == TRUE		
					f) Fuel Pump Control State	f) == NORMAL		
					g) Run_Crank input circuit voltage	g) 11.00 volts <= Run_Crank_V <= 32.00 volts		
					h) High Pres Fuel Pump	h) <> TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Mode Management Enabled			
					j) High Pres Fuel Pump Control Mode	j) <> Disabled Mode AND a8b) <> ZeroFlow Mode		
					k) Instantaneous Fuel Flow [FCBR_dm_InstFuelFlow]	k) 0.05 grams/sec <= InstFuelFlow <= Max Allowed Flow [Supporting Table] **P2635 Max Fuel Flow**		
					m1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B $0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr DTC]	m1) <> TRUE		
					m2) CAN Sensor Bus message $0C3_Available	m2) == TRUE		
					m3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B $0C3] [CFMR_b_FTZM_Info1_ARC_ChkErr DTC]	m3) <> TRUE		
					n) Timer - Diagnostic Enable	n) > 2.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Low	P263A	Detects an inoperative malfunction indicator lamp control circuit. This diagnostic reports the DTC when a short to ground is detected.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between output and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	1 failures out of 1 samples 50 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P0650 may also set (MIL Control Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) High	P263B	Detects an inoperative malfunction indicator lamp control circuit. This diagnostic reports the DTC when a short to power is detected.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between output and controller power	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11.00 volts	4 failures out of 5 samples 50 ms / sample	Type B, No MIL NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Supply Heater Control Circuit/Open	P2687	Controller specific output driver circuit diagnoses the Fuel Supply Heater Control Relay low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit: impedance between signal and controller ground	≥ 200 kΩ	Powertrain relay voltage Run crank voltage Engine not cranking	≥ 11.0 V > 6.0 V	25 failures out of 50 samples 100ms/sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Supply Heater Control Circuit Low	P2688	Controller specific output driver circuit diagnoses the Fuel Supply Heater Control Relay low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground: impedance between signal and controller ground	≤ 0.5 Ω	Powertrain relay voltage Run crank voltage Engine not cranking	≥ 11.0 V > 6.0 V	25 failures out of 50 samples 100ms/sample	Type C, SVS one trip

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Supply Heater Control Circuit High	P2689	Controller specific output driver circuit diagnoses the Fuel Supply Heater Control Relay low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power: impedance between signal and controller power	≤ 0.5 Ω	Powertrain relay voltage Run crank voltage Engine not cranking	≥ 11.0 V > 6.0 V	25 failures out of 50 samples 100ms/sample	Type C, No SVS

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Control Circuit/Open	P26B7	Controller specific output driver circuit detects an open circuit in the load circuit for the Engine Coolant Bypass Valve C when the H-Bridge is energized.	Driver reports an open control cirucit condition	= TRUE	Run Crank Ignition in Range Engine not cranking Engine Diag System Driver control circuit open status is not	= True = True = Enabled = Indeterminate	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Range/ Performance	P26BB	This DTC will detect when the valve cannot achieve the desired position within a calibrated threshold (degrees (angle)) after the Target position has stabilized for a calibratable amount of time or is moving slower than a calibratable rate. A failure of this diagnostic would indicate a slow or stuck part.	Absolute position deviation between target and actual	> 12.0 Degrees	No DTCs Closed Loop position control Soft Closing function Soft Opening function Valve anti-sticking routine Engine Diag System Engine not cranking Run Crank Ignition in Range Engine Outlet Coolant OR OBD Coolant Enable Criteria	VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR_MRV_PstnPerf_FA = Active = Inactive = Inactive = Inactive = Enabled = True = True ≥ -20.0 ºC = TRUE	6 seconds out of a 7 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Block Coolant Valve Stuck Open	P26C0	This diagnostic detects the performance of the Block Rotary Valve, bounded by the two mechanical endstops. It monitors the difference between raw position feedback and position request. If the enable criteria are met and the position difference exceeds the failed threshold and the raw position feedback reports a value that is above the calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met.	Absolute value of the position difference between position request and position feedback AND Coolant Valve Position Feedback	>= 10.00 ° >= 50.00 °	The following shall be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_Av, VECR_BRV_PstnFdbk_FOl, VECR_BRV_CktLo_FP, VECR_BRV_CktHi_FP VECR_BRV_CktLo_FA, VECR_BRV_CktHi_FA PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Coolant Valve Position Command If Use Engine Block Coolant Temperature is TRUE, then the following shall be used [Engine Block Coolant Enable Temperature] Coolant Valve Calibration Run**	>= 0.10 seconds >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ° and 115.00 ° = 1.00 >= -40.00 °C (hystersis disable <= -41.00 °C) Has not been triggered for greater than 37.00 seconds	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Change in Two Consecutive Coolant Valve Position Command] ** Calibration run is a set of pre-defined valve movements for calibrating the position sensor and learning the position of the endstops.	<= 5.00 ° for more than 2.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Block Coolant Valve Stuck Closed	P26C2	This diagnostic detects the performance of the Block Rotary Valve, bounded by the two mechanical endstops. It monitors the difference between raw position feedback and position request. If the enable criteria are met and the position difference exceeds the failed threshold and the raw position feedback reports a value that is below the calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a Fail, and if not it will report a Pass. The diagnostic will continue to report as long as the enablement criteria are met.	Absolute value of the position difference between position request and position feedback AND Coolant Valve Position Feedback	>= 10.00 ° < 50.00 °	The following shall be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_Av VECR_BRV_PstnFdbk_Fol VECR_BRV_CktLo_FP, VECR_BRV_CktHi_FP VECR_BRV_CktLo_FA, VECR_BRV_CktHi_FA PowertrainRelayStateOn_FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Coolant Valve Position Command If Use Engine Block Coolant Temperature is TRUE, then the following shall be used [Engine Block Coolant Enable Temperature] Coolant Valve Calibration Run**	>= 0.10 seconds >= 11.00 V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ° and 115.00 ° = 1.00 >= -40.00 °C (hystersis disable <= -41.00 °C) Has not been triggered for greater than 37.00 seconds		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Change in Two Consecutive Coolant Valve Position Command] ** Calibration run is a set of pre-defined valve movements for calibrating the position sensor and learning the position of the endstops.	<= 5.00 ° for more than 2.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Temperature Coolant Loop Pump Overspeed	P26FA	This DTC indicates a out of range high failure of the pump speed.	Actual pump speed	>= 8,500 rpm	Diagnostic enabled ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** >= 11.0 Volts True **********	8 failures out of 10 samples 1000ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Sensor B Circuit Low	P2802	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a short to ground failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates short to ground failure Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to ground	≤ 0.5 Ω impedance between signal and controller ground	diagnostic monitor enable battery voltage update battery voltage timer PWM % duty cycle when voltage directly proportional OR PWM % duty cycle when voltage inversly proportional circuit sensor type	= 1 Boolean ≥ 0.00 volts ≤ 7.78 % ≥ 7.78 % CeTRGD_e_VoltDirctProp	fail time ≥ 0.50 seconds out of sample time ≥ 1.00 seconds battery voltage timer ≥ 1.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Sensor B Circuit High	P2803	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a power short or open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit or power short failure Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit or power short	≤ 0.5 Ω impedance between signal and controller voltage source OR ≥ 200 K Ω impedance between signal and controller ground	diagnostic monitor enable battery voltage update battery voltage timer PWM % duty cycle when voltage directly proportional OR PWM % duty cycle when voltage inversly proportional circuit sensor type	= 1 Boolean ≥ 0.00 volts ≥ 92.22 % ≤ 92.22 % CeTRGD_e_VoltDirctProp	fail time ≥ 0.50 seconds out of sample time ≥ 1.00 seconds battery voltage timer ≥ 1.00 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 4 Circuit Low (Diesel L6 ATM)	P2AFE	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 4 Circuit High (Diesel L6 ATM)	P2AFF	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: CeEECR_e_EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 5 Circuit Low (Diesel L6 ATM)	P2B2D	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	RCT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 5 Circuit High (Diesel L6 ATM)	P2B2E	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Motor Current High	P2B58	This monitor checks whether the current in the Engine Coolant Flow Control Valve DC motor driver is too high.	Current flowing through the DC motor driver higher than a threshold (error information provided by HWIO)	> 5.5 [A]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled Test failed this key cycle	== 1.00 > 11.00 [V] == False == True PECR_MtrCurrLim_TFTKO == False	80.00 fails out of 100.00 samples Sampling rate: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Control Circuit/Open	P2B59	This monitor checks whether any of the Engine Coolant Flow Control Valve DC motor wires is disconnected.	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled Error indication provided by HWIO	== 1.00 > 11.00 [V] == False == True != Indeterminate	80.00 fails out of 100.00 samples Sampling rate: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Control Circuit High	P2B5B	This monitor checks whether any of the Engine Coolant Flow Control Valve DC motor wires is shorted to power.	Current flowing through the DC motor driver higher than a threshold (error information provided by HWIO)	> 9 [A]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled Error indication provided by HWIO	== 1.00 > 11.00 [V] == False == True != Indeterminate	80.00 fails out of 100.00 samples Sampling rate: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Supply Circuit Low	P2B5C	This monitor checks whether the supply voltage at the Engine Coolant Flow Control Valve DC motor driver is too low.	Supply voltage at the DC motor driver lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled Error indication provided by HWIO	== 1.00 > 11.00 [V] == False == True != Indeterminate	80.00 fails out of 100.00 samples Sampling rate: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Position Sensor Circuit Low	P2B5E	This monitor checks whether the Engine Coolant Flow Control Valve position is below a lower threshold.	SENT position raw value lower than a threshold	< 2.00 [%5V]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled SENT communication fault	== 1.00 > 11.00 [V] == False == True PECR_SENT_LossComm_Flt == False	160.00 fails out of 200.00 samples Sampling rate: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Position Sensor Circuit High	P2B5F	This monitor checks whether the Engine Coolant Flow Control Valve position is above an upper threshold.	SENT position raw value higher than a threshold	> 98.00 [%5V]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled SENT communication fault	== 1.00 > 11.00 [V] == False == True PECR_SENT_LossComm_Flt == False	160.00 fails out of 200.00 samples Sampling rate: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Control Valve Position Sensor Circuit Range/ Performance	P2B60	This monitor checks whether the Engine Coolant Flow Control Valve position is unable to reach the desired position.	Absolute difference between desired position and measured position higher than a threshold	> 12.00 [%]	Test enabled	== 1.00	480.00 fails out of 600.00 samples Sampling rate: 6.25 ms	Type A, 1 Trips
					Diagnostic system enabled	== True		
					Engine cranking	== False		
					Powertrain relay voltage	> 11.00 [V]		
					Desired position rate of change AND	> -30.00		
					Desired position rate of change AND	< 30.00		
					Time since rate of change is in range	> 2.50		
					Closed-loop position contro active	== True		
					Engine coolant temperature OR	> -50.00 [°C]		
					OBD Coolant Temp enabled	== True		
					Engine coolant temperature fault active	ECT_Sensor_FA == False		
					Outside air temperature	> -50.00 [°C]		
					Outside air temperature fault active	OAT_PtEstFiltFA == False		
					Actuator fault	PECR_Actr_Flt == False		
					SENT position sensor fault	PECR_PstnSnsr_Flt == False		
					Valve perfomance test			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					failed this key on	PECR_Obstruction_TFTKO == False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Pump "A" Overspeed	P2B86	The purpose of the performance diagnostic is to detect and report a failure of the component. If the enable criteria are met, the difference between the commanded speed and the component actual speed is calculated. An overspeed condition is when the commanded speed is less than the component actual speed. The speed difference is filtered and when the difference is less than the overspeed calibrated fault threshold, the diagnostic reports a FAIL. If filtered speed difference does not exceed the overspeed calibrated fault threshold, the diagnostic reports a PASS. The diagnostic will continue to report as long as the enablement criteria are met. There are two different failure criteria as the pump feedback speed is dependent on the system voltage.	Any of the following fail criteria is met: Criteria1: Filtered (Pump Command Speed - Pump Feedback Speed) 12V System Voltage Criteria 2: Filtered (Pump Command Speed - Pump Feedback Speed) 12V System Voltage	< **P2B86 Coolant Pump "A" Overspeed Fail Threshold** (RPM) >= 12.50 V < **P2B86 Coolant Pump "A" Overspeed Fail Threshold Low Volatage** (RPM) < 12.50 V (See supporting tables for the above threshold values)	Difference in Pump Command Speed from previous data sample to present data sample Any of the following criteria is met: Criteria 1: Calibration to use fault pending is TRUE PECR_EAP_SpeedOORL_FP PECR_EAP_SpeedOORH_FP Criteria 2: Calibration to use fault pending is FALSE All of the following criteria is met 2a) PECR_EAP_SpeedOORL_FA PECR_EAP_SpeedOORL_TFTKO 2b) PECR_EAP_SpeedOORH_FA PECR_EAP_SpeedOORH_TFTKO All of the following criteria are met for Time Delay:	< 50.00 RPM for >= 1.50 s = 1.00 (1 is TRUE) = Not Active = Not Active = 1.00 (0 is FALSE) = Not Active = Not Active = Not Active = Not Active	80 seconds out of a 100 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(See "Time Delay" definition below)			
					12V System Voltage	> 11.00 V (with hysteresis disable < 10.00 V)		
					PECR_AuxCoolPmpSpdActl_FoI	= Not Active		
					PECR_AuxCoolPmpSpdActl_Av	= Not Active		
					Pump Enable	= True		
					Pump Command Speed in Range	300.00 RPM <= Command Speed <= 9,000.00 RPM		
					Any of the following criteria is met:			
					Criteria 1: Engine inlet coolant temperature check calibration is TRUE	= 0.00 (1 is TRUE)		
					Criteria 2: a) EECR_EngineInlet_FA	= Not Fault Active		
					b) Engine Inlet Coolant Temperature	>= -30.00 °C		
					Where: "Time Delay"	>= 10.00 s		
					If all of the following criteria are met:			
					a) Engine inlet coolant temperature check calibration is FALSE	= 0.00 (0 is FALSE)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					b) Engine Inlet Coolant Temperature Else "Time Delay"	<= -20.00 degC >= 0.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Pump "A" Underspeed	P2B87	Detects when the coolant pump speed is slower than the commanded speed.	Any of the following fail criteria is met: Criteria1: Filtered (Pump Command Speed - Pump Feedback Speed) 12V System Voltage Criteria 2: Filtered (Pump Command Speed - Pump Feedback Speed) 12V System Voltage	< **P2B87 Coolant Pump "A" Underspeed Fail Threshold** (RPM) >= 12.50 V < **P2B87 Coolant Pump "A" Underspeed Fail Threshold Low Voltage** (RPM) < 12.50 V (See supporting tables for the above threshold values)	Difference in Pump Command Speed from previous data sample to present data sample Any of the following criteria is met: Criteria 1: Calibration to use fault pending is TRUE PECR_EAP_SpeedOORL_FP PECR_EAP_SpeedOORH_FP Criteria 2: Calibration to use fault pending is FALSE All of the following criteria is met 2a) PECR_EAP_SpeedOORL_FA PECR_EAP_SpeedOORL_TFTKO 2b) PECR_EAP_SpeedOORH_FA PECR_EAP_SpeedOORH_TFTKO All of the following criteria are met for Time Delay:	< 50.00 RPM for >= 1.50 s = 1.00 (1 is TRUE) = Not Active = Not Active = 1.00 (0 is FALSE) = Not Active = Not Active = Not Active = Not Active	80 seconds out of a 100 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(See "Time Delay" definition below)			
					12V System Voltage	> 11.00 V (with hysteresis disable < 10.00 V)		
					PECR_AuxCoolPmpSpdActl_FoI	= Not Active		
					PECR_AuxCoolPmpSpdActl_Av	= Not Active		
					Pump Enable	= True		
					Pump Command Speed in Range	300.00 RPM <= Command Speed <= 9,000.00 RPM		
					Any of the following criteria is met:			
					Criteria 1: Engine inlet coolant temperature check calibration is TRUE	= 0.00 (1 is TRUE)		
					Criteria 2: a) EECR_EngineInlet_FA	= Not Fault Active		
					b) Engine Inlet Coolant Temperature	>= -30.00 °C		
					Where: "Time Delay"	>= 10.00 s		
					If all of the following criteria are met:			
					a) Engine inlet coolant temperature check calibration is FALSE	= 0.00 (0 is FALSE)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					b) Engine Inlet Coolant Temperature Else "Time Delay"	 <= -20.00 degC >= 0.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Temperature Coolant Loop Pump Underspeed	P2BA0	This DTC indicates a out of range low failure of the pump speed.	Actual pump speed	< -115 rpm	Diagnostic enabled ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** >= 11.0 Volts True **********	8 failures out of 10 samples 1000ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Delivery Performance (EWMA filtered)	P2BAA	This diagnostic checks the DEF hydraulic system for faults that can lead to diminished DEF delivery.	EWMA of Pressure Drop Deviation Pressure Drop Variation is evaluated as: Average of DEF line pressure when no dosing - Average of DEF line pressure when performing test injections - **P2BAA RDP Min Press Drop** EWMA filter coefficients: Standard Fast Initial Response Rapid Response	> 0 kPa 0.08 0.38 0.20	Ambient Air Temperature Barometric Pressure DEF Injector Component Management Ready DEF Injector Cooling Request DPF Regeneration Active DEF Injector Temperature DEF Injector Temperature variation of DEF Injector temperature within a time period Integrated DEF Injected Mass Integrated DEF Injected Mass Integrated Upstream NOx Flow Upstream SCR Exhaust Flow DEF System Hydraulic System Shutoff No DEF Mass Flow less than calibratable mass for calibratable time DEF Tank Status	> -20.00 °C > 70.00 kPa == TRUE == FALSE == FALSE > 200.00 °C < 500.00 °C < 3.00 °C = 100ms * 100.00 > 16,000.00 mg < 10,000,000,000.00 mg >= 0.00 mg > 8.00 g/s == FALSE < 200.00 mg/s >= 100ms * 0.00 = NOT FROZEN	Function Task: 25ms	Type A, 1 Trips , EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No fault for Upstream DEF Injector Temperature			
					No fault for Outside Air Temperature	[OAT_PtEstFiltFA or OAT_OAT_SnsrNonEmissFA]		
					No fault for Upstream SCR Exhaust Flow	EXF_TotExhSCR_UpFlt		
					No fault for Barometric Pressure	AAP_AmbientAirPresDfltd		
					No fault for Upstream NOx Sensor Concentration	== FALSE		
					No fault for Vehicle Speed Sensor	VehicleSpeedSensor_FA		
					Vehicle Speed below calibratable threshold for calibratable time	<= 3.00 km/h >= 100ms * 10.00		
					No DEF Metering Valve Tip Stuck Fault	SCR_TipStuckFltSt		
					Engine Mode	== RUNNING		
					(Fuel injection quantity request OR Idle speed control active)	< 30.0 mm^3		
					(Engine speed OR Idle speed control active)	600 < rpm < 2,500		
					(DEF pressure deviation (actual - desired) when no			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					dosing OR amount of no dosing phase cycles)	<= 50.00 kPa >= 2		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 4 Circuit Intermittent/ Erratic (Diesel L6 ATM)	P2BB4	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr4 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	EECR_TS4_Erratic_TFTKO EECR_TS4_CktHiLo_FA	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor 5 Circuit Intermittent/ Erratic (Diesel L6 ATM)	P2BB5	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	EECR_TS5_Erratic_TFTKO EECR_TS5_CktHiLo_FA	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHe adTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature Sensor A/B Correlation	P2C21	Determines if one of the redundant oil temperature sensors is biased or stuck in range. Three independent tests can be used.1) Cold Start Test Compares EOT to ECT and IAT at powerup after a long soak (Fast and regular tests). 2) Warm Up Test Compares EOT to a target EOT after a large enough accumulated airflow has occurred. 3) Continuous Test Compares Sensor A to Sensor B.	**Fast Cold Start Test** <u>To indicate an fast fail:</u> Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup IAT - Powerup ECT <u>To indicate a fast pass</u>: Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup EOT - Powerup IAT	EOT Temp Diff > **FastFailTempDiff** (See P0196 details on Supporting Tables Tab) AND < 16 degrees C < 16 degrees C AND < 16 degrees C	EOT Diagnostic main Status AND Engine Running Cold Start Specific EOT Test Conditions: Use Cold Start Diagnostic Engine Off Time Engine Off Timer Validity No active DTC's	Enabled = True Enabled > 540 Seconds = True Fault bundles: IgnitionOffTimer_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA	Cold Start Fast Test - one failure out of one sample - test performed once per second	Type B, 2 Trips
			Cold Start Test <u>Pass Condition 1:</u> Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup EOT - minIAT OR <u>Pass Condition 2:</u> Absolute value of Powerup EOT - Powerup ECT	<= 16 Deg C <= 16 Deg C OR > 16 Deg C	All three tests (Cold/ Warm/Continuous) EOT Diagnostic main enable AND Engine Running Cold Start Specific EOT Test Conditions: Use Cold Start Diagnostic Engine Off Time Engine Off Timer Validity	Enabled = True Enabled > 540 Seconds = True	Cold Start Regular Test - one failure out of one sample - test performed once per second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND (IAT minimum observed with Block Heater or (IAT minimum observed and Absolute value of power up IAT - min. observed IAT)) AND Absolute value of Powerup EOT - Powerup IAT AND Absolute value of Powerup EOT - minIAT <u>Fail Condition:</u> Absolute value of Powerup EOT - Powerup ECT AND (IAT minimum observed with Block Heater or (IAT minimum observed and Absolute value of power up IAT - min. observed IAT)) AND (Absolute value of Powerup EOT - Powerup IAT or Absolute value of Powerup EOT - minIAT) AND Absolute value of Powerup ECT - Powerup IAT	AND > -7 Deg C > -10 Deg C <= 5 Deg C AND <= 16 Deg C <= 16 Deg C > 16 Deg C AND > -7 Deg C > -10 Deg C <= 5 Deg C AND > 16 Deg C > 16 Deg C AND <= 16 Deg C	Time above Minimum Vehicle Speed Time less than Vehicle speed resets above timer No active DTC's	> 9 MPH for > 400 seconds < 15.0 for > 20.0 seconds Fault bundles: IgnitionOffTimer_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND Absolute value of Powerup ECT - minIAT	AND <= 16 Deg C				
			Warmup Test <u>Warm Up Fail Condition:</u> EOT <u>Warm Up Test Pass Condition:</u> EOT	 < 70 Deg C => 70 Deg C	EOT Diagnostic main enable Engine Running Warm Up EOT Test Specific Conditions: Use Warm Up EOT Diagnostic Power up ECT Power up ECT Total accumulated engine airflow since engine start DISABLE CONDITIONS (for all three tests)No active DTC's	Enabled = True Disabled > -7 degrees C < 165 degrees C >= **P0196_TotalAccumulatedFlow** (See P0196 details on Supporting Tables Tab) Fault bundles: IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuitFA	Warm up Tests - one failure out of one sample - test performed once per second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Continuous Test <u>Pass Condition:</u> (Measured Oil Temperature A - Measured Oil Temperature B) OR Absolute value of (Measured Oil Temperature A - Measured Oil Temperature B) <u>Fail Condition:</u> (Measured Oil Temperature A - Measured Oil Temperature B) AND Absolute value of (Measured Oil Temperature A - Measured Oil Temperature B)	>= 0 and <= 15.8 OR >= 0 and <= 15.8 > 15.8 AND > 15.8	Redundant Sensor Enable EOT Diagnostic main Enable Engine Running Continuous EOT Test Specific Conditions: Power up ECT and ECT All of three criteria above AND EOT Model Oil Temperature reach Equilibrium OR Use quick transition to equilibrium state and ECT DISABLE CONDITIONS (for all three tests)No active DTC's	Enabled Enabled = True Enabled >= -7 and <= 110 Deg C >= 45 and <= 105 Deg C >= 82 Deg C Disabled and >= ECT from 5 sec previous Fault bundles: IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA IAT_SensorCircuitFA EngOilModeledTempValid	Continuous Test 8 failures out of 10 samples performed once per second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor B Circuit Low	P2C3A	Circuit Continuity This DTC detects a short to ground in the a temperature sensor signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngMetalHeadSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	< X Ohms X is equal to: Temp Sensor 1: 49 Ohms Temp Sensor 2: 48.8 Ohms Temp Sensor 3: 43.2 Ohms Temp Sensor 4: 43.2 Ohms Temp Sensor 5: 43.2 Ohms Temp Sensor 6: 62.3 Ohms Temp Sensor 7: 48.8 Ohms Temp Sensor 8: 62.3 Ohms			5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor B Circuit High	P2C3B	Circuit Continuity This DTC detects a short to high or open in a temperature signal circuit or the temperature sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60ºC) This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngMetalHeadTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4 Temperature Sensor 6: CeEECR_e_EngMetalHe adTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolant TempSnsr5 Temperature Sensor 8:	> X Ohms X is equal to: Temp Sensor 1: 230,546 Ohms Temp Sensor 2: 230,546 Ohms Temp Sensor 3: 338,540 Ohms Temp Sensor 4: 338,540 Ohms Temp Sensor 5: 338,540 Ohms Temp Sensor 6: 380,707 Ohms Temp Sensor 7: 230,546 Ohms Temp Sensor 8: 380,707 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -20.0 °C	5 seconds out of a 6 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_EngMetalHeadTempSnsr					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor B Circuit Intermittent/ Erratic	P2C3C	Circuit Erratic This DTC detects large step changes in a temperature signal circuit or the temperature sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	Temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. This program uses a highly confiurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngMetalHeadTempSnsr2 Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr Temperature Sensor 4: CeEECR_e_EngCoolant TempSnsr3 Temperature Sensor 5: CeEECR_e_EngCoolant TempSnsr4		No Active DTC's	EECR_EMT2_CktHiLo_FA EECR_EMT2_Erratic_TFTKO	5 seconds out of a 6 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: CeEECR_e_EngMetalHeadTempSnsr2 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 8: CeEECR_e_EngMetalHeadTempSnsr The calculated high and low limits for the next reading use the following calibrations: Temperature Sensor 1: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 2: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 3: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 4: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 5: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit	 3.1 seconds -60.0 °C 150.0 °C 2.4 seconds -60.0 °C 150.0 °C 3.6 seconds -60.0 °C 150.0 °C 2.3 seconds -60.0 °C 150.0 °C 2.7 seconds -60.0 °C 150.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Temperature Sensor 6: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 7: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit Temperature Sensor 8: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last temp reading was 90 °C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 °C and the high limit was calibrated to 200 °C the caluculated limits are 101 °C and 73 °C. The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid. **********	 4.0 seconds -60.0 °C 250.0 °C 3.4 seconds -60.0 °C 150.0 °C 4.0 seconds -50.0 °C 250.0 °C				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder Head Temperature Sensor A/B Correlation	P2C3D	This monitor detects a deviation between Cylinder Head Temperature sensor signal 1 and Cylinder Head Temperature sensor signal 2 on a continuous basis. If the deviation exceeds a threshold the DTC is set.	Absolute difference between temperature signal 1 and temperature signal 2 higher than a threshold	> 10.00 [°C]	Test enabled Temperature signal 1 fault active Temperature signal 2 fault active	== 1.00 EECR_HMR_Snsr1_FA == False EECR_HMR_Snsr2_FA == False	50.00 fails out of 60.00 samples Sampling rate: 250 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Temperature Coolant Loop Pump Preformance	P2C48	This DTC indicates a pump flow deviation failure. An expected phase current of the pump is superviced to detect any pump malfunction.	Absolute Pump AC (Phase) current error = (Actual pump speed refer to **PmpPerf: Tabel to estimate the expected pump AC current based on the pump speed.** in Supporting table) - Actual Pump AC current For more than	> 5.00 A > 5.00 sec	Diagnostic enabled ********** Actual pump speed ********** WCP_Current_OOR_FA ********** Powertrain relay voltage Or LTL direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** > 1,000 rpm ********** = False ********** >= 11.0 Volts True **********	16 failures out of 20 samples 1000ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SCR NOx Catalyst Efficiency Below Threshold Bank 1 Catalyst 2 - EWMA Enabled	P2C7A	The diagnosis checks if there is a malfunction in the Underfloor SCR (UF SCR, or SCR2) catalyst by measuring its capability to store NH3 and to convert NOx. The monitor is based on two NOx sensors (upstream & downstream SCR2, also defined as NOx#2 and NOx#3 respectively) that measure both NH3 and NOx. The diagnostic parameter is SCR2 efficiency (it is indeed an "efficiency" index since it considers both NH3 storage capability and NOx conversion). Measured efficiency is compared to reference one (based on calibratable offset): - Measured efficiency is calculated as η_Eff_SCR2_Msrd = 1 - [∫ NOx_SCR2_Dwn_Msrd / ∫ NOx_SCR1_Up_Msrd]	EWMA filtering is applied to the difference between measured SCR2 efficiency (η_Eff_SCR2_Msrd) and reference one (η_Eff_SCR2_Ref)	Fail threshold is = 0, Repass threshold is = 0	Test enabled by calibration; No active DTCs; Diagnostic system not disabled; Test not yet executed on current key cycle except the case where EWMA filtering is in Rapid Response (RR) or Fast Initial Response (FIR) state; Tests per trip up to calibratable value when EWMA filter is in Fast Initial Response (FIR) state; Total tests executed in Fast Initial Response (FIR) state up to calibratable value; Tests per trip up to calibratable value when	CalOut = 1 [Boolean]; ≠ NOX_Snsr2_NOx_Flt ≠ NOX_Snsr3_NOx_Flt ≠ EGT_TempSCR2_UpFlt ≠ EGP_PresSCR2_UpFlt ≠ EXF_TotExhSCR2_UpFlt ≠ SCR_RDP_Flt ≠ SCR_TipStuckFltSt ≠ SCR_DEFMV_FA ≠ SCR_ChemicalMdlFlt_SCR2 ; NotDsbl = True [Boolean]; NotRun = True [Boolean]; FIR test trip < 1 ; FIR tot tests < 2 ; RR test trip < 1 ;	One failure to set the DTC.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		- Reference efficiency is evaluated as η_Eff_SCR2_Ref = 1 - [∫ NOx_SCR2_Dwn_Ref / ∫ NOx_SCR1_Up_Msrd] NOx_SCR2_Dwn_Ref is calculated as NOx_SCR2_Dwn_Ref = NOx_SCR2_Up_Msrd * offset The offset (**K_EffOffset_SCR2**) is calibrated in order to detect a malfunction. Test is performed when NOx+NH3 integral upstream SCR2 reaches 400.00 [mg]. Use this section if EWMA filter is enabled (1.00 == 1 [Boolean]).			EWMA filter is in Rapid Response (RR) state; Total tests executed in Rapid Response (RR) state up to calibratable value; DEF system ready to inject; Urea inside the tank not frozen; Debounce time elapsed after DEF defrost has been completed; Upstream SCR2 NOx sensor measurement reliable; Downstream SCR2 NOx sensor measurement reliable; Slip detection SCR2 reliable; Number of DPF regeneration events successfully completed after vehicle exits from assembly plant (SCR2 catalyst de-greened); SCR service bay test not active;	 RR tot tests < 4 ; DEF ready = True [Boolean]; DEF tank status = DEF_TankNotFrozen [Enumerative]; Debounce = 0 [s]; Reliable = True [Boolean]; Reliable = True [Boolean]; Slip detection SCR2 reliable = True [Boolean]; DPF Rgn Compt > 0 [-]; Service Bay Test == ServNotRunning [Enumerative];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Debounce time elapsed after exiting from SCR service bay test; Outside ambient temperature higher than calibration with hysteresis; Ambient pressure higher than calibration with hysteresis; SCR1 average temperature in range; Debounce time elapsed after SCR1 average temperature is in range; Difference between SCR2 upstream and SCR2 downstream temperatures: - higher than first calibration curve (f[SCR2 mean temperature]) AND - lower than second calibration curve (f[SCR2 mean temperature]); Debounce time elapsed after condition based on difference between SCR2 upstream and downstream temperature is met; Exhaust mass flow	Debounce = 0 [s]; OAT > -20 [°C]; -20 [°C] < hysteresis range < -20 [°C] Pressure > 72 [kPa]; 70 [°C] < hysteresis range < 72 [°C] 220.00 [°C] < SCR1 mean temperature < 400 [°C]; Debounce = 5 [s]; SCR2 up/down diff temperature > **T_MinTempGrad_SCR2** [°C] SCR2 up/down diff temperature < **T_MaxTempGrad_SCR2** [°C]; Debounce = 10 [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					upstream SCR2 and SCR2 average temperature within calibratable limits defined by 2 size table (f[exhaust mass flow, SCR2 average temperature]), enabled if table output is greater than calibration; Debounce time elapsed after condition based on exhaust mass flow upstream SCR2 and SCR2 average temperature is met; SCR2 mean temperature time derivative within limits defined by maximum and minimum calibrations and debounce time elapsed based on following logic: - while SCR2 mean temperature time derivative is outside the limits, the system continuously evaluates the debounce time based on calibration curve (f[SCR2 mean temperature time derivative]) and records the maximum value; - instead when SCR2 mean temperature time derivative gets within the limits, countdown starts until debounce time has been reached;	**K_EffExhFlowCond_SCR2** > 1 [-]; Debounce = 5 [s]; -2 < Delta temperature < 2 [°C/s]; Debounce = **t_DerTempDsblTmr_SCR2** [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Upstream SCR2 NOx flow measurement lower than calibration;	SCR2 NOx up flow < 25 [mg/s];		
					Upstream SCR2 NOx flow measurement higher than calibration;	SCR2 NOx up flow > 0 [mg/s];		
					Upstream SCR2 NOx sensor measurement higher than calibration;	SCR2 NOx up > 35 [ppm];		
					Upstream SCR2 NOx sensor measurement lower than calibration;	SCR2 NOx up < 500 [ppm];		
					Upstream SCR2 absolute NOx flow derivative lower than calibration;	Delta SCR2 NOx up flow < 15 [mg/s^2];		
					Debounce time elapsed when all NOx conditions become true;	Debounce = 1 [s];		
					Slip conditions: - debounce time elapsed when no slip downstream SCR2 is detected any more, OR	Debounce = 30.00 [s]		
					- when slip is active, NOx flow upstream SCR2 accumulated shall be greater than a calibration curve (f[SCR2 average temperature]);	∫ NOx_SCR2Up > **m_SlipNOxIntglThrsh_SCR2** [mg];		
					Specific combustion modes not active;	Cmb ≠ KaSCRR_b_MontrCombMode_SCR2 [Enumerative];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Debounce time elapsed after exiting from specific combustion modes; SCR2 NH3 storage deviation error (difference between estimated storage and set-point): - higher than first calibration curve (f[SCR2 average temperature]) AND - lower than second calibration curve (f[SCR2 average temperature]); SCR2 NH3 storage: - higher than first calibration curve (f[SCR2 average temperature]) AND - lower than second calibration curve (f[SCR2 average temperature, exhaust mass flow upstream SCR2]) considering also SCR2 catalyst aging (one curve for degreened component and another curve for aged component, with interpolation for medium aging levels); Debounce time elapsed after conditions based on SCR2 NH3 storage deviation error and SCR2 NH3 storage level are met; SCR dosing in NH3	Debounce = 60 [s]; SCR2 NH3 deviation > **m_NH3_StrgDevErrMin_SCR2** [g] SCR2 NH3 deviation < **m_NH3_StrgDevErrMax_SCR2** [g]; SCR2 NH3 storage > **m_NH3_StrgMin_SCR2** [g]; SCR2 NH3 storage (if catalyst is degreened) < **m_NH3_StrgMax_SCR2** [g]; SCR2 NH3 storage (if catalyst is aged) < **m_NH3_StrgMaxAge_SCR2** [g]; interpolation for medium aging levels; Debounce = 5 [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					storage control or in intrusive NH3 storage control; Debounce time elapsed afetr switching to NH3 storage control or intrusive NH3 storage control;	Dos = NH3_StrgCntrl | Intrsv_NH3_StrgCntrl [Enumerative]; Debounce = 10 [s];		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Underspeed Performance Fault [LIN Bus Electric PWM Fans Only - Internal or External controller]	P2CB9	Measured actual fan speed is monitored against a calibrated lower acceptable limit for the cooling fan RPM under normal operating conditions. The diagnostic is set when the threshold is crossed. This diagnostic ensures that the fan is not under cooling. Only after first fan activation, the fan will be held commanded on for enough time to ensure this monitor has an opportunity to mature a decision.	Measured Fan Speed	<= Speed Low Limit [Supporting Table] **P2CB9_LIN_Threshold**	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In-Range e] LIN Bus based Fan Operation Enabled f] LIN Bus Lost Communication Fault Active g] LIN Bus Continuous Operation Fault Active h] Fan Commanded On	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <> True d] > 11.00 volts e] == TRUE f] <> True g] <> True i] == TRUE	16.00 failures / 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 1 Low Voltage	P3051	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 1 for short to ground faults.	DC/DC Converter Actuator Voltage Raw Value 1	< 1 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	1 TRUE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 2 Low Voltage	P3052	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 2 for short to ground faults.	DC/DC Converter Actuator Voltage Raw Value 2	< 1 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	1 TRUE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 1 High Voltage	P3053	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 1 for short to battery faults.	DC/DC Converter Actuator Voltage Raw Value 1	> 28 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	1 TRUE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage Sensor Circuit 2 High Voltage	P3054	Diagnoses the DC/DC Converter Actuator Voltage Sensor Circuit 2 for short to battery faults.	DC/DC Converter Actuator Voltage Raw Value 2	> 28 Volt	Diagnostic enabled Run/Crank or Accessory Battery Voltage	1 TRUE >= 6.60 Volts	640 failed samples out of 800 samples in 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage 1 Performance	P3055	Detects DC/DC Converter Actuator Voltage 1 Performance issues	Bypass Mode: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine running OR Engine stopped Battery Voltage	1 TRUE for > 160 loops in 6.25 ms loop for > 160 loops in 6.25 ms loop >= 6.60 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips
			Stabilize Mode- Auto-Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking Battery Voltage	1 TRUE for > 0 loops in 6.25 ms loop >= 6.60 Volts	16 failed samples out of 32 samples in a 6.25 ms loop	
			Stablize Mode-Auto-Cranking Events: Number of failed auto-cranking events exceeds threshold	> 2 failed auto-cranking events	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking	1 TRUE has occurred	2 failed auto-crank events out of 3 consecutive auto-crank events	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Actuator Voltage 2 Performance	P3056	Detects DC/DC Converter Actuator Voltage 2 Performance issues	Bypass Mode: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 2 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine running OR Engine stopped Battery Voltage	1 TRUE for > 160 loops in 6.25 ms loop for > 160 loops in 6.25 ms loop >= 6.60 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips
			Stabilize Mode- Auto-Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 2 and ECM Run/Crank	> 1 Volt	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking Battery Voltage	1 TRUE for > 0 loops in 6.25 ms loop >= 6.60 Volts	16 failed samples out of 32 samples in a 6.25 ms loop	
			Stablize Mode-Auto-Cranking Events: Number of failed auto-cranking events exceeds threshold	> 2 failed auto-cranking events	Diagnostic enabled Run/Crank or Accessory Engine auto-cranking	1 TRUE has occurred	2 failed auto-crank events out of 3 consecutive auto-crank events	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Ignition Switch Run/ Start Position Ciruit High Voltage	P305B	Diagnoses the DC/DC Converter Ignition Switch Run/Start Position circuit for circuit high faults	DC/DC Converter Ignition Switch Run/Start Position	<> ECM Ignition Switch Run/Start Position	Diagnostic enabled Run/Crank Accessory Battery Voltage	1 FALSE TRUE >= 6.60 Volts	320 failed samples out of 400 samples in a 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Ignition Switch Run/ Start Position Ciruit Low Voltage	P305C	Diagnoses the DC/DC Converter Ignition Switch Run/Start Position circuit for circuit low faults	DC/DC Converter Ignition Switch Run/Start Position	<> ECM Ignition Switch Run/Start Position	Diagnostic enabled Run/Crank Accessory Battery Voltage	1 TRUE TRUE >= 6.60 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Circuit High Voltage	P305D	Diagnoses the DC/DC Converter Crank Control Circuit for circuit high faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled Run/Crank ECM Crank Control Battery Voltage	1 TRUE FALSE >= 6.60 Volts	640 failed samples out of 800 samples in a 6.25 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Circuit Low Voltage	P305E	Diagnoses the DC/DC Converter Crank Control Circuit for circuit low faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled Run/Crank or Accessory ECM Crank Control Battery Voltage	1 TRUE TRUE >= 6.60 Volts	24 failed samples out of 32 samples in a 6.25 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Pump "A" Speed Out of Range Low	P3077	This diagnostic detects if the actual speed is out of range low. If the enable criteria are met and the actual speed is below a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.Detects when the coolant pump speed is out of range low	Pump Feedback Speed	<= -1.00 RPM	All of the following criteria are met for 12V System Voltage PECR_AuxCoolPmpSpdActl_FoI PECR_AuxCoolPmpSpdActl_Av	>= 2.00 s > 11.00 V (with hysteresis disable < 10.00 V) = Not Active = Not Active	40 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Coolant Pump "A" Speed Out of Range High	P3078	This diagnostic detects if the actual speed is out of range high. If the enable criteria are met and the actual speed is above a calibrated threshold, the fail counter will increment. If the calibrated fail count threshold is met before the calibrated sample count, the diagnostic will report a FAIL and if not it will report a PASS. The diagnostic will continue to report as long as the enablement criteria are met.	Pump Feedback Speed	>= 4,000.00 RPM	All of the following criteria are met for 12V System Voltage PECR_AuxCoolPmpSpdActl_FoI PECR_AuxCoolPmpSpdActl_Av	>= 2.00 s > 11.00 V (with hysteresis disable < 10.00 V) = Not Active = Not Active	40 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P30D6	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 2	P30D7	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 3	P30D8	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 4	P30D9	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 5	P30DA	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 6	P30DB	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 7	P30DC	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 8	P30DD	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 6.41 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Rail Pressure Sensor 2 Signal Message Counter Incorrect	P30DE	This DTC detects when the synchronization with the diagnostic feedback protocol is lost for the entire protocol period.	The state of the diagnostic feedback prtocol is	== *NoSync*	**Rail Pressure Sensor Configuration** Run crank voltage (Starter motor is not engaged OR Starter motor has been engaged for a time OR Run crank voltage No active DTC:	= CeFHPG_e_RPS_Double Track ≥ 11.0 V ≥ 15 s > 8.4 V) FHP_RPS_CktFA FHP_RPS2_CktFA	70.00 failures out of 70.00 samples 6.25 ms/samples	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Out of Range Low [LIN Bus Electric PWM Fans Only - Internal or External controller]	P30EE	The reported actual fan speed in RPM exceeds an lower limit for the fan speed, indicating that there is a failure of the measurement of the fan speed	Measured LIN Fan1 Speed	< = -110.00 rpm	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In Range e] LIN Bus based Fan Operation Enabled f] LIN Serial data Lost communication Fault Active g] LIN Serial data Continuous Operation Fault Active	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <> True d] > 11.00 volts e] == TRUE f] <> True g] <> True	16.00 failures out of 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Out of Range High [LIN Bus Electric PWM Fans Only - Internal or External controller]	P30EF	The reported actual fan speed in RPM exceeds an upper limit for the fan speed, indicating that there is a failure of the measurement of the fan speed	Measured LIN Fan1 Speed	> = 4,000.00 rpm	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In Range e] LIN Bus based Fan Operation Enabled f] LIN Bus Lost Communication Fault Active g] LIN Bus serial data Continuous Operation Fault Active	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <> True d] > 11.00 volts e] == TRUE f] <> True g] <> True	16.00 failures out of 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Out of Range Low [LIN Bus Electric PWM Fans Only - Internal or External controller]	P30F0	The reported actual fan speed in RPM exceeds an lower limit for the fan speed, indicating that there is a failure of the measurement of the fan speed	Measured LIN Fan2 Speed	< = -110.00 rpm	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In Range e] LIN Bus based Fan Operation Enabled f] LIN Serial data Lost communication Fault Active g] LIN Serial data Continuous Operation Fault Active	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <> True d] > 11.00 volts e] == TRUE f] <> True g] <> True	16.00 failures out of 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Out of Range High [LIN Bus Electric PWM Fans Only - Internal or External controller]	P30F1	The reported actual fan speed in RPM exceeds an upper limit for the fan speed, indicating that there is a failure of the measurement of the fan speed	Measured LIN Fan2 Speed	> = 4,000.00 rpm	a] Diagnostic Enabled b] Configuration calibration for number of fans c] Diagnostic System Disabled d] Battery Voltage In Range e] LIN Bus based Fan Operation Enabled f] LIN Bus Lost Communication Fault Active g] LIN Bus serial data Continuous Operation Fault Active	a] == 1.00 [True if 1; False if 0] b] >= 1 unit c] <> True d] > 11.00 volts e] == TRUE f] <> True g] <> True	16.00 failures out of 20.00 samples; 1000 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake System Vehicle Speed Limit Request Signal Message Counter Incorrect	P314F	This DTC monitors for an error in communication with the Brake System Vehicle Speed Limit Request Signal	Communication of the Alive Rolling Count or Protection Value of the Brake System Vehicle Speed Limit Request Signal over CAN bus is incorrect for out of total samples	 >= 8.00 counts >= 10.00 counts	Message frame All the following conditions are met for Power Mode Powertrain Relay Voltage Run/Crank Ignition Voltage	= Is avaialble >= 3,000.00 milliseconds = Run >= 11.00 Volts >= 11.00 Volts	Executes in 250ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Temperature Coolant Loop Pump Speed Performance	P3196	This DTC indicates a pump speed performance failure. Two fault paths are considered. When pump is commanded with pump speed > 0 and commanded pump speed = 0. When the On path fails, the off path is disabled until the ON path completes a OK cycle.	Absolut pump speed error =Abs(Desired pump speed - Actual Pump Speed) For mor than	> 750 rpm > 8.00 sec	Diagnostic enabled ********** Desired pump speed ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No CAC device control acitve - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** > 0 rpm ********** >= 11.0 Volts True **********	16 failures out of 20 samples 1000ms / sample	Type B, 2 Trips
			Actual pump speed For more than	> 500 rpm > 10.00 sec	Diagnostic enabled Off Diagnostic enabled ********** WCP_SpeedOnFA ********** Desired pump speed ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No CAC device control acitve - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True True ********** = False ********** = 0 rpm ********** >= 11.0 Volts True **********	16 failures out of 20 samples 1000ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Temperature Coolant Loop Pump Motor Current Out Of Range High	P3198	This DTC indicates a out of range high failure of the pump motor current.	Actual Motor Current	> 12.00 A	Diagnostic enabled ********** Actual pump speed ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** > 1,000 rpm ********** >= 11.0 Volts True **********	8 failures out of 10 samples 1000ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Temperature Coolant Loop Pump Motor Current Out Of Range Low	P3199	This DTC indicates a out of range low failure of the pump motor current. Two fault paths are considered. When pump is commanded with pump speed > 0 and commanded pump speed = 0.	Actual Motor Current For more than	< -0.10 A > 5.00 sec	Diagnostic enabled ********** Actual pump speed ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled- No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** > 1,000 rpm ********** >= 11.0 Volts True **********	8 failures out of 10 samples 1000ms / sample	Type B, 2 Trips
			Actual Motor Current For more than	< -0.20 A > 5.00 sec	Diagnostic enabled ********** Actual pump speed ********** Powertrain relay voltage Or WCP direct connected too Batt ********** - Pump enabled - Engine does not crank - Diagnostic system not disabled - No Fault active ICP_CWP_LcFA ICP_CWP_Rsp_FoFA	True ********** = 1,000 rpm ********** >= 11.0 Volts True **********	8 failures out of 10 samples 1000ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures equals or exceeds before the sample time of is reached	5 counts (equivalent to 812.51 milliseconds) 812.51 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	 > 15.00 milliseconds > 8.41 Volts >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>= 11.00 Volts >= 9.00 Volts > 15.00 milliseconds > 8.41 Volts >= 6.41 Volts Enabled >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures equals or exceeds before the sample time of is reached	5 counts (equivalent to 812.51 milliseconds) 812.51 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	> 15.00 milliseconds > 8.41 Volts >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>= 11.00 Volts >= 9.00 Volts > 15.00 milliseconds > 8.41 Volts >= 6.41 Volts Enabled >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Powertrain Sensor CAN Bus Off	U0076	This DTC monitors for a Powertrain Sensor Bus S off condition	Bus off failures equals or exceeds before the sample time of is reached	5 counts (equivalent to 812.51 milliseconds) 812.51 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	> 15.00 milliseconds > 8.41 Volts >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>= 11.00 Volts >= 9.00 Volts > 15.00 milliseconds > 8.41 Volts >= 6.41 Volts Enabled >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the Transmission Control Module.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0BD	≥ 10,000.00 milliseconds				
			Message $0C7	≥ 500.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $0F9	≥ 500.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $189	≥ 500.00 milliseconds	If message is on Bus S: U0076 not active			
			Message $199	≥ 500.00 milliseconds	CAN channel is requesting full communications			
			Message $19D	≥ 500.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $1AF	≥ 500.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $1F5	≥ 500.00 milliseconds	Accessory mode to off mode not pending			
			Message $4C9	≥ 10,000.00 milliseconds	Battery voltage	> 11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<= 18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Transfer Case Control Module	U0102	This DTC monitors for a loss of communication with the Transfer Case Control Module.	Message is not received from controller for Message $1CB Message $1CC	 ≥ 10,000.00 milliseconds ≥ 500.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Cruise Control Module	U0104	This DTC monitors for a loss of communication with the Cruise Control Module.	Message is not received from controller for Message $2CB Message $2CD	 ≥ 500.00 milliseconds ≥ 500.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Glow Plug Control Module	U0106	This DTC monitors for a loss of communication with the Glow Plug Control Module.	Message is not received from controller for Message $3BD	≥milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Reductant Control Module (SCR)	U010E	This DTC monitors for a loss of communication with the Reductant Control Module (SCR).	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
			Message $092	≥milliseconds	All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $4CC	≥milliseconds	If message is on Bus A: U0073 not active			
			Message $4CD	≥milliseconds	If message is on Bus B: U0074 not active			
			Message $4E5	≥milliseconds	If message is on Bus S: U0076 not active			
			Message $4E6	≥milliseconds	CAN channel is requesting full communications			
			Message $4E7	≥milliseconds	Normal CAN transmission on Bus is enabled			
			Message $4E8	≥milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $4E9	≥milliseconds	Accessory mode to off mode not pending			
					Battery voltage	> 11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<= 18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Brake System Control Module	U0129	This DTC monitors for a loss of communication with the Brake System Control Module.	Message is not received from controller for Message $0C1 Message $0C5 Message $0D1 Message $17D Message $1C7 Message $1E9 Message $1FC Message $22A Message $2F1 Message $2F9 Message $4F9	 ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Power Steering Control Module	U0131	This DTC monitors for a loss of communication with the Power Steering Control Module.	Message is not received from controller for Message $1E5	≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Safety Emissions Neutral Diagnostic"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $12A Message $1E1 Message $1F1 Message $1F3 Message $3C9 Message $3CB Message $3F1 Message $451 Message $4D7 Message $4E1 Message $4E9	≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type C, No SVS "Emissions Neutral Diagnostics – Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Gateway A	U0146	This DTC monitors for a loss of communication with Gateway A.	Message is not received from controller for Message $3CF	≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Battery Monitor Module	U01B0	This DTC monitors for a loss of communication with the Battery Monitor Module on the LIN bus.	Message is not received from device for IBSAmpHourChg_18_C02 IBSAmpHourDisChrg_19_C02 IBSCalcData_16_C02 IBSCfgDataRtn_1E_C02 IBSCurrentFOMData_1A_C02 IBSFOMData_1C_C02 IBSMeasuredTemp_17_C02 IBSMVIData_15_C02 IBSVehStartData_1D_C02 IBSVoltageFOMData_1B_C02	 >= 1,250.00 milliseconds >= 1,250.00 milliseconds >= 2,500.00 milliseconds >= 2,500.00 milliseconds >= 5,000.00 milliseconds >= 5,000.00 milliseconds >= 625.00 milliseconds >= 625.00 milliseconds >= 2,500.00 milliseconds >= 5,000.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII If OBDII: Run/Crank ignition	 Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >= 9.00 Volts > 15.00 milliseconds > 8.41 Volts >= 6.41 Volts Enabled >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Active Grill Air Shutter Module A	U0284	This DTC monitors for a loss of communication on the LIN bus with Shutter Module A.	Message is not received from device for ACM1Rsp_31_C02	 >= 1,250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled	 Enabled Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Active Grill Air Shutter Module B	U0285	This DTC monitors for a loss of communication on the LIN bus with Shutter Module B.	Message is not received from device for ACM2Rsp_11_C02	>= 1,250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled	 Disabled Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With NOx Sensor A	U029D	This DTC monitors for a loss of communication with NOx Sensor A.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0B0	≥ 500.00 milliseconds				
			Message $0B1	≥ 500.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $0B5	≥ 500.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $0B7	≥ 500.00 milliseconds	If message is on Bus S: U0076 not active			
			Message $289	≥ 500.00 milliseconds	CAN channel is requesting full communications			
			Message $296	≥ 10,000.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $591	≥ 10,000.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
					Accessory mode to off mode not pending			
					Battery voltage	> 11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<= 18.00 Volts		
					Controller type: OBD Controller If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With NOx Sensor B (post catalyst NOx sensor)	U029E	This DTC monitors for a loss of communication with NOx Sensor B.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
			Message $0A4	≥ 500.00 milliseconds	All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0B2	≥ 500.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $0B6	≥ 500.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $0B8	≥ 500.00 milliseconds	If message is on Bus S: U0076 not active			
			Message $28B	≥ 500.00 milliseconds	CAN channel is requesting full communications			
			Message $297	≥ 10,000.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $592	≥ 10,000.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
					Accessory mode to off mode not pending			
					Battery voltage	> 11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<= 18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With NOx Sensor C	U02A1	This DTC monitors for a loss of communication with NOx Sensor C.	Message is not received from controller for Message $0C0 Message $0C2 Message $28D Message $295 Message $593	 ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With PM Sensor (Diesel Particulate)	U02A3	This DTC monitors for a loss of communication with the PM Sensor (Diesel Particulate).	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $3A3	≥ 10,000.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $3A5	≥ 10,000.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $3A8	≥ 10,000.00 milliseconds	If message is on Bus S: U0076 not active			
			Message $3A9	≥ 10,000.00 milliseconds	CAN channel is requesting full communications			
			Message $3AA	≥ 10,000.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $3AB	≥ 10,000.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $497	≥ 10,000.00 milliseconds	Accessory mode to off mode not pending			
					Battery voltage	> 11.00 Volts		
					Conroller is an OBD controller Or Battery Voltage	<= 18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Mass or Volume Air Flow Sensor A	U060F	This DTC monitors for a loss of communication on the LIN bus with Mass or Volume Air Flow Sensor A.	Message is not received from device for MAF_Rsp_Press_2B_C03 MAF_Rsp_TmpHum_2A_C03	 >= 62.50 milliseconds >= 250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII If OBDII: Run/Crank ignition	 Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >= 9.00 Volts > 15.00 milliseconds > 8.41 Volts >= 6.41 Volts Enabled >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Engine Coolant Bypass Valve C	U0617	Communication Check This DTC will detect if SENT communication was lost for the Engine Coolant Bypass Valve C Sensor	If any of the following conditions are met a failure count will be recorded: **Condition 1:** HWIO message faults **Condition 2:** Pulse count delta AND Message age **Condition 3:** Voltage on SENT pin is greater than a controller specific threshold AND Message age **Condition 4:** Voltage on SENT pin is less than a controller specific threshold AND Message age	 = No Fault >0 > 6.25 ms > 6.25 ms > 6.25 ms	Run Crank Ignition in Range Engine not cranking Engine Diag System	 = True = True = Enabled	4 seconds out of a 5 seconds window	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Loss of Communication with Auxiliary Electric Water Pump	U0623	This DTC monitors for a loss of communication on the LIN bus with the Auxiliary Electric Water Pump	Message is not received from device for AWP_Rsp_36_C02	>= 2,500.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled	 Enabled Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Loss Of Communication with Low Temperature Coolant Loop Pump	U062F	This DTC monitors for a loss of communication on the LIN bus with the Low Temperature Coolant Loop Pump.	Message is not received from device for CWP_Rsp_25_C02	>= 2,500.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII If OBDII: Run/Crank ignition	 Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts >= 11.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	 >= 9.00 Volts > 15.00 milliseconds > 8.41 Volts >= 6.41 Volts Enabled >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 LIN Communication Failure	U0632	This DTC monitors for a loss of communication on the LIN bus with Cooling Fan 1.	Message is not received from device for CFM1_Rsp_2D_C02	>= 2,500.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Engine is running Or Engine cooling fan operation is enabled via received CAN signal and propulsion system is active for All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage	Enabled Enabled >= 0.00 seconds >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 LIN Communication Failure	U0633	This DTC monitors for a loss of communication on the LIN bus with Cooling Fan 2.	Message is not received from device for CFM2_Rsp_0D_C02	>= 2,500.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Engine is running Or Engine cooling fan operation is enabled via received CAN signal and propulsion system is active for All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage	Enabled Enabled >= 0.00 seconds >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Engine Coolant Flow Control Valve Position Sensor	U063F	This monitor checks whether communication with the Engine Coolant Flow Control Valve SENT position sensor is lost.	A malfunction is detected if any of the following conditions occur (based on information provided by HWIO): **Condition 1**: (a) Time since last valid SENT message higher than a threshold AND (b) SENT position protocol status **Condition 2**: (a) Time since last valid SENT message higher than a threshold AND (b) SENT position protocol status **Condition 3**: SENT message faults **Condition 4**: (a) Time since last valid SENT message higher than a threshold AND (b) SENT pulse counter has been updated	 > 6.25 [ms] == STEADY LOW > 6.25 [ms] == STEADY HIGH > 0 > 6.25 [ms]	Test enabled Powertrain relay voltage Engine cranking Diagnostic system enabled	== 1.00 > 11.00 [V] == False == True	160.00 fails out of 200.00 samples Sampling rate: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 3 LIN Communication Failure	U067C	This DTC monitors for a loss of communication on the LIN bus with Cooling Fan 3.	Message is not received from device for CFM3_Rsp_2D_C04	>= 2,437.50 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Engine is running Or Engine cooling fan operation is enabled via received CAN signal and propulsion system is active for All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage	Enabled Enabled >= 0.00 seconds >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII:			
					Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD:			
					Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure:			
					Starter motor engaged for	> 15.00 milliseconds		
					Or			
					Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure:			
					Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	Enabled		
					Or			
					Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Engine Coolant Bypass Valve D	U111A	This DTC monitors for a loss of communication on the LIN bus with Engine Coolant Bypass Valve D	Message is not received from controller for BRV_Rsp_29_C05	>= 250.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled All below criteria have been met for Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled	 Enabled Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	LIN bus communication executes in 500ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 1	U1345	This DTC monitors for a LIN bus off condition on LIN Bus 1.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 1 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	 = Total number of slave nodes on LIN Bus 1 that have reported lost communications DTCs >= 10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized The following criteria have been enabled for: LIN channel is requesting full communications Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII If OBDII:	 Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Dependent on bus loading.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		
					LIN channel Wakeup Method:			
					Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		
					LIN channel is requesting			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					full communications LIN module is initialized The following criteria have been enabled for: Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 2	U1346	This DTC monitors for a LIN bus off condition on LIN Bus 2.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 2 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	= Total number of slave nodes on LIN Bus 2 that have reported lost communications DTCs >= 10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized The following criteria have been enabled for: LIN channel is requesting full communications Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII If OBDII:	Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Dependent on bus loading.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		
					LIN channel Wakeup Method:			
					Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		
					LIN channel is requesting			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					full communications LIN module is initialized The following criteria have been enabled for: Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 4	U1348	This DTC monitors for a LIN bus 4 off condition.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 4 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	 = Total number of slave nodes on LIN Bus 4 that have reported lost communications DTCs >= 10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized The following criteria have been enabled for: LIN channel is requesting full communications Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII If OBDII:	 Enabled Enabled >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Dependent on bus loading.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15.00 milliseconds		
					Or Run/Crank ignition voltage	> 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		
					LIN channel Wakeup Method:			
					Diagnostic is enabled	Enabled		
					LIN channel is enabled	Enabled		
					LIN channel is requesting			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					full communications LIN module is initialized The following criteria have been enabled for: Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Fuel Pump Driver Control Module on Bus S	U18A2	This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module on Bus S.	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					All below criteria have been met for	>= 3,000.00 milliseconds		
			Message $0C3	≥ 10,000.00 milliseconds	If message is on Bus A: U0073 not active			
			Message $0CB	≥ 10,000.00 milliseconds	If message is on Bus B: U0074 not active			
			Message $0CC	≥ 10,000.00 milliseconds	If message is on Bus S: U0076 not active			
			Message $2C1	≥ 10,000.00 milliseconds	CAN channel is requesting full communications			
			Message $2D7	≥ 10,000.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message $2D9	≥ 10,000.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message $3EB	≥ 10,000.00 milliseconds	Accessory mode to off mode not pending			
			Message $3EC	≥ 10,000.00 milliseconds	Battery voltage	> 11.00 Volts		
			Message $3EE	≥ 10,000.00 milliseconds	Conroller is an OBD controller Or Battery Voltage	<= 18.00 Volts		
					Controller type: OBD Controller			
					If power mode = Run/ Crank:			
					Power Mode is run			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With DC/ DC Converter Control Module on Bus B	U18A7	This DTC monitors for a loss of communication with the DC/DC Converter Control Module on Bus B.	Message is not received from controller for Message $0A0 Message $1D2	 ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 3,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15.00 milliseconds > 8.41 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 6.41 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Glow Plug Control Module Lost Communication with Engine Control Module	U18C8	This DTC monitors for a Glow Plug Control Module loss of communication with the Engine Control Module.	The GPCM Diagnostic Status Message signal in GMLAN frame $3BD from the GPCM has a value of : for the Diagnostic Status signal.	CeDFIR_e_GlowPlugCMLostCommECM	General Enable Criteria: Message $3BD U18C8 Glow Plug Control Module	 Is being received Not Active on Current Key Cycle is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with ECM	U18D5	This DTC monitors for a CGM Lost Communication with ECM error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with ECM DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module ECM	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with TCM	U18D7	This DTC monitors for a CGM Lost Communication with TCM error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with TCM DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module TCM	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with BSCM1	U18DC	This DTC monitors for a CGM Lost Communication with BSCM1 error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with BSCM1 DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module BSCM1	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
CGM Lost Communication with GPCM	U18DE	This DTC monitors for a CGM Lost Communication with GPCM error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the CGM Lost Communication with GPCM DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module GPCM	 is being received is present on the bus is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Zone Module Lost Communication with Fuel Level Sensor	U2200	DTC will detect loss of communication with primary fuel level sender signal from fuel tank zone module.	Fuel level signal is missing	>= 16.00 counts	a] Diagnostic enabled b] Device feedback faulted c]Diagnostic system disabled	a] = 0.00 [1.00 = TRUE; 0 <> TRUE]	16.00 failures of 20.00 samples 250 millisec / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module High Speed CAN Bus Off	U2413	This DTC monitors for a Central Gateway Module High Speed CAN Bus Off error as determined by the CGM	The CGM Diagnostic Status Message signal in GMLAN frame $3CF indicates that the Central Gateway Module High Speed CAN Bus Off DTC has set in the CGM.		General Enable Criteria: Message $3CF Central Gateway Module	 is being received is present on the bus	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Position Exceeded Learning Limit (Single and Two stage VGT DC Motor)	P003A	This monitor checks if the VGT position SENT sensor has an offset with respect to the nominal positions where the valve does the learning procedure (fully closed and/or fully open)	SENT position raw voltage when the valve is in fully closed position < low threshold OR SENT position raw voltage when the valve is in fully closed position > high threshold OR SENT position raw voltage when the valve is in wide open position < low threshold OR SENT position raw voltage when the valve is in wide open position > high threshold	< 72.00 [%5V] OR > 89.00 [%5V] OR < 14.00 [%5V] OR > 32.00 [%5V]	Test enabled by calibration Key signal is off Learning procedure at key off in fully closed and/or wide open positions have been successfully completed: - engine coolant temperature in range; - no faults present on coolant temperature sensor. - outside air temperature greater than a low threshold - no faults present on outside air temperature sensor. - battery voltage greater than a low threshold No faults present on VGT position sensor, VGT valve, VGTposition deviation. End Of Trip event has elapsed	== 1.00 >= 30.00 (°C) <= 150.00 (°C) ECT_Sensor_FA ==FALSE >= -40.00 (°C) OAT_PtEstFiltFA >= 9.50 (V) VGT_PstnSnsrFA ==FALSE VGT_ActCktFA==FALSE VGT_PstnCntrlFA ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Control Circuit (Single and Two stage VGT DC Motor)	P0045	This monitor checks if the DC-Motor VGT commands are in open circuit	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is OFF HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Performance (Single and Two stage VGT DC Motor)	P0046	This monitor detects an obstruction on the actuator (obstruction found during the vanes opening or closing) checking the setpoint position against the position measured by the VGT Position Sensor	Absolute value of position tracking error (setpoint position - measured position)	> 10.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range VGT position closed loop control active (no faults present on VGT position sensor, VGT vanes, VGT position control deviation) VGT position setpoint in steady state conditions for minimum time Engine coolant temperature higher or equal to minimum threshold OR Engine cooling system target temperature reached (thermostat opening) No faults present on engine coolant temperature sensor	== 1.00 > 11.00 [V] VGT_PstnSnsrFA ==FALSE VGT_ActCktFA==FALSE VGT_PstnCntrlFA ==FALSE > -125.00 [%/s] < 125.00 [%/s] for >= 0.50 [s] >= 0.00 [°C] ECT_Sensor_FA ==FALSE	960.00 fail counts out of 1,200.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Outside air temperature higher or equal to minimum threshold No faults present on outside air temperature sensor No mechanical stop soft approach in progress No anti-sticking procedure in progress	>= -60.00 [°C] OAT_PtEstFiltFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Control Circuit High (Single and Two stage VGT DC Motor)	P0048	This monitor checks if the DC-Motor VGT commands are shorted to power supply	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Up Circuit Performance	P007B	This monitor checks if the CAC up air temperature sensor is irrational at key on when compared with two reference temperature sensors after a long soak time	Charge air cooler up air temperature is compared at power up with an average temperature calculated using the intake manifold air temperature sensor and the fuel temperature sensor over a calibratable number of samples	> 20.00 [°C]	Test enabled by calibration	== 1.00	Test executed after a counter of 10.00 samples	Type B, 2 Trips
					Key on and engine not running or engine running for less than a calibratable time	< 2.00 [s]	Functional task: 100 ms	
					Runk Crank Relay voltage in range	> 11.00 [V]		
					The engine has not run for a calibratable time since last key off	>= 28,800.00 [s]		
					No faults detected on engine off timer	EngineModeNotRunTimerError ==FALSE		
					Absolute value of the difference between intake manifold air temperature and fuel temperature smaller than a calibratable threshold	< 45.00 [°C]		
					No electrical or self-correlated faults detected on charge air cooler up air temperature sensors	CIT_CAC_UpCktFA ==FALSE CIT_CAC_UpSelfCorFA ==FALSE		
					No faults detected on intake manifold air temperature sensor	MnfdTempSensorFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No faults detected on fuel temperature sensor	FTS_FTS_Flt==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Up Circuit Low	P007C	This monitor checks if the CAC up air temperature sensor is out of electrical range low	Charge air cooler up air temperature resistance value < low threshold	< 55.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	== 1.00 > 11.00 [V]	30.00 fail counter over 38.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Up Circuit High	P007D	This monitor checks if the CAC up air temperature sensor is out of electrical range high	Charge air cooler up air temperature resistance value > high threshold	> 20,000,000.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	== 1.00 > 11.00 [V]	30.00 fail counter over 38.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Up Circuit Intermittent/ Erratic	P007E	This monitor checks if the CAC up air temperature has an intermittent fault	Charge air cooler up air temperature value > T_MAX_threshold OR Charge air cooler up air temperature value < T_MIN_threshold where - T_MAX_threshold = (1 - alpha)*T_MAX + alpha*T_last_good - T_MIN_threshold = (1 - alpha)*T_MIN + alpha*T_last_good - alpha = e^(#fails + 1)*(ts/ tau) - #fails = number of consecutive samples where the test failed - ts = sensor sampling time - tau = sensor filter response time - T_MAX = sensor maximum actual reading - T_MIN = sensor minimum actual reading - T_last_good = last good temperature measured by the sensor	> 300.00 [°C] < -60.00 [°C]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range No electrical faults detected on CAC up air temperature sensor	== 1.00 > 11.00 [V] CIT_CAC_UpCktFA ==FALSE	60.00 fail counter over 75.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Coolant Temperature Sensor "A" Circuit Range/ Performance	P00DF	This monitor checks if the CAC inlet water temperature sensor is irrational at key on when compared with two reference temperature sensors after a long soak time	CAC inlet water temperature is compared at power up with an average temperature calculated using the CAC inlet gas temperature sensor and the CAC outlet gas temperature sensor over a calibratable number of samples.		Test enabled by calibration	1.00 ==TRUE	The averaged temperatures are calculated over 10.00 samples.	Type B, 2 Trips
					Key on and engine not running or engine running for less than a calibratable time	< 2.00 [s]	No debounce is present: DTC sets as soon as the error is present	
					Engine not cranking	==TRUE		
			Temperature difference (absolute value)	> 20.00 [°C]	Runk Crank Relay voltage in range	> 11.00 [V]	Function task: at key on	
					The engine has not run for a calibratable time since last key off	>= 28,800.00 [s]		
					No faults detected on engine off timer	EngineModeNotRunTimerError ==FALSE		
					Absolute value of the difference between CAC inlet gas temperature and CAC outlet gas temperature smaller than a calibratable threshold	< 45.00 [°C]		
					Sensor Performance Check not yet completed in current driving cycle	==TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No faults detected on CAC inlet gas temperature sensor No faults detected on CAC outlet gas temperature sensor No electrical or intermittent faults detected on CAC inlet water temperature sensor	CIT_CAC_UpFA ==FALSE CIT_CAC_DwnFA ==FALSE CIW_TempInCktFA ==FALSE CIW_TempInSlfCorFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Coolant Temperature Sensor "A" Circuit Low	P00E0	This monitor checks if the CAC inlet water temperature sensor is out of electrical range low	Temperature raw resistance < low threshold	< 70.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	1.00 == TRUE > 11.00 [V]	30.00 fail counts out of 38.00 sample counts Function task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Coolant Temperature Sensor "A" Circuit High	P00E1	This monitor checks if the CAC inlet water temperature sensor is out of electrical range high	Temperature raw resistance > high threshold	> 166,297.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	1.00 == TRUE > 11.00 [V]	30.00 fail counts out of 38.00 sample counts Function task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Coolant Temperature Sensor "A" Intermittent/ Erratic	P00E2	This monitor checks if the CAC inlet water temperature sensor has an intermittent fault.	CAC inlet water temperature value > T_MAX_threshold OR CAC inlet water temperature value < T_MIN_threshold where - T_MAX_threshold = (1 - alpha)*T_MAX + alpha*T_last_good - T_MIN_threshold = (1 - alpha)*T_MIN + alpha*T_last_good - alpha = e^(#fails + 1)*(ts/ tau) - #fails = number of consecutive samples where the test failed - ts = sensor sampling time - tau = sensor filter response time - T_MAX = sensor maximum actual reading - T_MIN = sensor minimum actual reading - T_last_good = last good temperature measured by the sensor	> 150.00 [°C] < -60.00 [°C]	Test enabled by calibration Engine not cranking Run Crank Relay voltage in range No electrical faults detected on CAC inlet water temperature sensor	1.00 ==TRUE ==TRUE > 11.00 [V] CIW_TempInCktFA ==FALSE	60.00 fail counter over 75.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow (MAF) Sensor Performance	P0101	This monitor checks if the MAF sensor measure is coherent with MAF estimation when the HP EGR and LP EGR are closed. It is able to detect MAF sensor wiring harness poor contacts, MAF sensor internal fault (offset), leaks from the induction air circuit, leaks from the recirculation exhuast gas circuit. For OBDII market, it can be used to detect a PCV disconnection in case a dedicated pressure sensor is not present. The standard test can be calibrated to run when engine conditions are recognised as IDLE, OVERRUN or HIGH LOAD. An intrusive test can be enabled in idle, to force the HP EGR and the LP EGR to close when particular conditions are encountered, to allow the monitoring to run. An intrusive test can be enabled in overrun, to force the HP EGR and the LP EGR to close and the throttle valve to open when particular	Drift high check: drift of the mass air flow Drift low check: drift of the mass air flow The drift of the mass air flow is calculated as the ratio between the MAF sensor reading and the estimated mass air flow. The ratio is averaged over a calibrate-able cumulative transient time. If, by calibration, CeMAFD_e_ArflRaw ==CeMAFD_e_ArflRaw, the MAF sensor reading is given by the raw MAF value multiplied by the **P0101: Pulsation Map**	> 1.25 [ratio] < 0.75 [ratio]	Calibration on diagnostic enabling PT relay supply voltage in range MAF sensor is not depowered Estimated mass air flow is valid No Electrical or offset fault present on MAF sensor Outside Ambient Temperature in range OR Fault present on Ouside Air temperature Induction air temperature No fault present on induction air temperature sensor	**P0101: MAF performance enabling** ==TRUE > 11.00 [V] ==TRUE MAF_AirFlowEstdSS_NotVld ==FALSE MAF_MAF_SnsrCktOffstFA ==FALSE MAF_MAF_SnsrCktOffstTFKO ==FALSE >= -20.00 [°C] OR OAT_PtEstFiltFA==TRUE > -20.00 [°C] IAT_SensorFA ==FALSE IAT_SensorTFTKO ==FALSE	Test is evaluated after the enabling conditions are satisfied for a number of samples == 500.00 Sampling time is: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		conditions are encountered, to allow the monitoring to run in case the Diesel Exhaust Cooling Prevention (DECP) strategy is requiring EGR usage and/or throttle control during cut-off maneuvers.			(Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	> 40.00 [°C] ==TRUE < 130.00 [°C]		
					No faults detected on engine coolant temperature sensor	ECT_Sensor_FA ==FALSE ECT_Sensor_TFTKO ==FALSE		
					Barometric pressure	> 69.50 [kPa]		
					No faults detected on barometric pressure sensor	AAP_AmbientAirPresDfltd ==FALSE AAP_AmbPresSnsrTFTKO ==FALSE		
					Throttle valve position	> 85.00 [%]		
					No faults detected on Throttle valve position sensor	TPS_PstnSnsrFA ==FALSE		
					HP EGR valve position	<= 0.00 [%]		
					No faults detected on HP EGR valve position sensor	EGR_PstnSnsrFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					LP EGR valve position No faults detected on LP EGR valve position sensor Engine works in IDLE, OVERRUN or HIGH LOAD conditions	<= 1.00 [%] LPE_PstnSnsrFA ==FALSE Refer to "Engine conditions" Free Form		
			Drift high check: drift of the mass air flow Drift low check: drift of the mass air flow The drift of the mass air flow is calculated as the ratio between the MAF sensor reading and the estimated mass air flow. The ratio is averaged over a calibrate-able cumulative transient time. If, by calibration, CeMAFD_e_ArflRaw ==CeMAFD_e_ArflRaw, the MAF sensor reading is given by the raw MAF value multiplied by the **P0101: Pulsation Map**	> 1.25 [ratio] < 0.75 [ratio]	Intrusive Test in idle enabled by calibration MAF rationality monitoring enabled by calibration Diagnostic has not run in current driving cycle yet Calibratable SCR dosing condition SCR predicted NOx conversion efficiency Air control is working only in EGR control: Desired	0.00 ==TRUE **P0101: MAF performance enabling** ==TRUE ==TRUE IF 0.00 ==TRUE: SCR dosing condition is NH3 storage control OR intrusive NH3 storage control OR transient dosing control. IF 0.00 ==FALSE: No restrictions on SCR dosing > 0.60 [ratio]	Test is evaluated after the enabling conditions are satisfied for a number of samples == 500.00 Sampling time is: 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					EGR rate	= 100%		
					Vehicle speed	< 3.00 [kph]		
					No faults detected on vehicle speed sensor	VehicleSpeedSensor_FA ==FALSE		
					Desired fuel in range, with hysteresis OR	Enabled if < 10.00 [mm^3] AND > 4.00 [mm^3] Disabled if > 12.00 [mm^3] OR < 2.00 [mm^3]		
					(Speed Control Mode is Idle AND No faults detected on Speed Control) (OBDII market only)	==TRUE FUL_IFM_IdleFuelQntyFA ==FALSE		
					PT relay supply voltage in range	> 11.00 [V]		
					MAF sensor is not depowered	==TRUE		
					Estimated mass air flow is valid	MAF_AirFlowEstdSS_Not Vld ==FALSE		
					No Electrical or offset fault present on MAF sensor	MAF_MAF_SnsrCktOffstF A ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						MAF_MAF_SnsrCktOffstTFKO ==FALSE		
					Outside Ambient Temperature in range OR Fault present on Ouside Air temperature	> -20.00 [°C] OR OAT_PtEstFiltFA==TRUE		
					Induction air temperature	> -20.00 [°C]		
					No fault present on induction air temperature sensor	IAT_SensorFA ==FALSE IAT_SensorTFTKO ==FALSE		
					(Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	> 40.00 [°C] ==TRUE < 130.00 [°C]		
					No faults detected on engine coolant temperature sensor	ECT_Sensor_FA ==FALSE ECT_Sensor_TFTKO ==FALSE		
					Barometric pressure	> 69.50 [kPa]		
					No faults detected on barometric pressure sensor	AAP_AmbientAirPresDfltd ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						AAP_AmbPresSnsrTFTKO ==FALSE		
					Throttle valve position	> 85.00 [%]		
					No faults detected on Throttle valve position sensor	TPS_PstnSnsrFA ==FALSE		
					Engine speed in range OR (Speed Control Mode is Idle AND No faults detected on Speed Control) (OBDII market only)	> 1,000.00 [rpm] < 660.00 [rpm] ==TRUE IAC_SystemRPM_FA ==FALSE		
					for a time	>= 10.00 [s]		
					Intake manifold pressure in range	> 69.60 [kPa] < 130.00 [kPa]		
					Intake manifold pressure is in steady state (SS)	when SS is OFF, the first value of Intake manifold pressure is taken as reference (p_ref); then, | Intake manifold pressure - p_ref| < 3.00 [kPa] for maintaining the SS ON		
					Time elapsed after previous intrusive test request has aborted	> 10.00 [s]		
					Once all the conditions			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					above are satisfied, additional conditions on HP EGR and LP EGR valves must be verified within a time limit: HP EGR valve position No faults detected on HP EGR valve position sensor LP EGR valve position No faults detected on LP EGR valve position sensor All conditions are verified for a time	 < 0.25 [s] <= 0.00 [%] EGR_PstnSnsrFA ==FALSE <= 1.00 [%] LPE_PstnSnsrFA ==FALSE > 2.00 [s]		
			Drift high check: drift of the mass air flow Drift low check: drift of the mass air flow The drift of the mass air flow is calculated as the ratio between the MAF sensor reading and the estimated mass air flow. The ratio is averaged over a calibrate-able cumulative transient time. If, by calibration,	> 1.25 [ratio] < 0.75 [ratio]	Intrusive Test in overrun enabled by calibration MAF rationality monitoring enabled by calibration Diagnostic has not run in current driving cycle yet PT relay supply voltage in range MAF sensor is not	0.00 ==TRUE **P0101: MAF performance enabling** ==TRUE ==TRUE > 11.00 [V] ==TRUE	Test is evaluated after the enabling conditions are satisfied for a number of samples == 500.00 Sampling time is: 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeMAFD_e_ArflRaw ==CeMAFD_e_ArflRaw, the MAF sensor reading is given by the raw MAF value multiplied by the **P0101: Pulsation Map**		depowered			
					Estimated mass air flow is valid	MAF_AirFlowEstdSS_NotVld ==FALSE		
					No Electrical or offset fault present on MAF sensor	MAF_MAF_SnsrCktOffstFA ==FALSE MAF_MAF_SnsrCktOffstTFKO ==FALSE		
					Outside Ambient Temperature in range OR Fault present on Ouside Air temperature	> -20.00 [°C] OR OAT_PtEstFiltFA==TRUE		
					Induction air temperature	> -20.00 [°C]		
					No fault present on induction air temperature sensor	IAT_SensorFA ==FALSE IAT_SensorTFTKO ==FALSE		
					(Engine Coolant Temperature OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature	> 40.00 [°C] ==TRUE < 130.00 [°C]		
					No faults detected on	ECT_Sensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					engine coolant temperature sensor	==FALSE ECT_Sensor_TFTKO ==FALSE		
					Barometric pressure	> 69.50 [kPa]		
					No faults detected on barometric pressure sensor	AAP_AmbientAirPresDfltd ==FALSE AAP_AmbPresSnsrTFTKO ==FALSE		
					Time elapsed after previous intrusive test request has aborted	> 10.00 [s]		
					Engine works in OVERRUN conditions, except for the conditions on Intake manifold pressure in range and in steady state (SS)	Refer to "Engine conditions" Free Form		
					Intake manifold pressure greater than a threshold	> **P0101: Manifold pressure Low limit in (Overrun** - 0.00) [kPa]		
					Intake manifold pressure lower than a threshold, with hysteresis	TRUE if: < **P0101: Manifold pressure High limit in (Overrun** - 0.00) [kPa]; FALSE if:		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						> **P0101: Manifold pressure High limit in Overrun** [kPa]		
					Once all the conditions above are satisfied, additional conditions on HP EGR, LP EGR and throttle must be verified within a time limit:	< 0.25 [s]		
					HP EGR valve position	<= 0.00 [%]		
					No faults detected on HP EGR valve position sensor	EGR_PstnSnsrFA ==FALSE		
					LP EGR valve position	<= 1.00 [%]		
					No faults detected on LP EGR valve position sensor	LPE_PstnSnsrFA ==FALSE		
					Throttle valve position	> 85.00 [%]		
					No faults detected on Throttle valve position sensor	TPS_PstnSnsrFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow (MAF) Sensor Circuit Low	P0102	This monitor checks if the MAF sensor is out of electrical range low. The MAF sensor is out of electrical range low in case of sensor internal fault or wiring harness faults.	MAF frequency value	< 1,150.00 [Hz]	Test enabled by calibration PT relay supply voltage in range Share High Side Driver closed All conditions are valid for a time	1.00 ==TRUE > 11.00 [V] ==TRUE >= 1.00 [s]	30.00 fail counts out of 38.00 sample counts Function task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow (MAF) Sensor Circuit High	P0103	This monitor checks if the MAF sensor is out of electrical range high. The MAF sensor is out of electrical range high in case of sensor internal fault or wiring harness faults.	MAF frequency value	> 5,250.00 [Hz]	Test enabled by calibration PT relay supply voltage in range Share High Side Driver closed All conditions are valid for a time	1.00 ==TRUE > 11.00 [V] ==TRUE >= 1.00 [s]	30.00 fail counts out of 38.00 sample counts Function task:100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Trim System Lean Bank 1	P0171	This DTC monitors if FSA control system has reached its maximum authority and cannot achieve the target. An error shall be detected when the fuel adjustment value (mm3) released by FSA is saturatedat its minimum value.	Released FSA fuel correction value	< refer to supporting table (**KtFADC_V_FSA_Fuel Min**) [mm3]	System voltage in range FSA correction release enabled (FSA Learning is active OR DFSA Learning is active) for a time Ambient air pressure OBD Coolant Enable Criteria OR Engine coolant temperature Ambient air temperature No Low fuel tank level indication No pending or confirmed DTCs	> 11.00 [V] refer to "FSA Control Flag" Free Form FAD_FSA_NormRngCrtn Valid refer to "FSA Control Flag" Free Form (FAD_FSA_EnblLrn OR FAD_DFSA_EnblLrn) > 1.00 [s] > 70.00 [kPa] = TRUE > 45.00 [°C] > -20.00 [°C] LowFuelConditionDiagnostic AmbPresDfltdStatus (ECT_Sensor_TFTKO AND ECT_Sensor_FA) OAT_PtEstFiltFA	Time counter: 200 failures out of 400 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Trim System Rich Bank 1	P0172	This DTC monitors if FSA control system has reached its maximum authority and cannot achieve the target. An error shall be detected when the fuel adjustment value (mm3) released by FSA is saturatedat its maximum value.	Released FSA fuel correction value	> refer to supporting table (**KtFADC_V_FSA_Fuel Max**)[mm3]	System voltage in range FSA correction release enabled (FSA Learning is active OR DFSA Learning is active) for a time Ambient air pressure OBD Coolant Enable Criteria OR Engine coolant temperature Ambient air temperature No Low fuel tank level indication No pending or confirmed DTCs	> 11.00 [V] refer to "FSA Control Flag" Free Form FAD_FSA_NormRngCrtn Valid refer to "FSA Control Flag" Free Form (FAD_FSA_EnblLrn OR FAD_DFSA_EnblLrn) > 1.00 [s] > 70.00 [kPa] = TRUE > 45.00 [°C] > -20.00 [°C] LowFuelConditionDiagnostic AmbPresDfltdStatus (ECT_Sensor_TFTKO AND ECT_Sensor_FA) OAT_PtEstFiltFA	Time counter: 200 failures out of 400 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injection Timing Perfomance - Over Retarded	P01CB	This diagnosis is able to detect an excessive negative drift on fuel injection quantity and timing affecting injector 1. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 1. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated with VSQA (To fail Validation)	< 50.00 [%] > 120.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is higher than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injection Timing Perfomance - Over Advanced	P01CC	This diagnosis is able to detect an excessive positive drift on fuel injection quantity and timing affecting injector 1. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 1. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated with VSQA (To fail Validation)	< 50.00 [%] < -105.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is lower than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injection Timing Perfomance - Over Retarded	P01CD	This diagnosis is able to detect an excessive negative drift on fuel injection quantity and timing affecting injector 2. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 2. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated with VSQA (To fail Validation)	< 50.00 [%] > 120.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is higher than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injection Timing Perfomance - Over Advanced	P01CE	This diagnosis is able to detect an excessive positive drift on fuel injection quantity and timing affecting injector 2. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 2. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated with VSQA (To fail Validation)	< 50.00 [%] < -105.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation. Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is lowerthan a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injection Timing Perfomance - Over Retarded	P01CF	This diagnosis is able to detect an excessive negative drift on fuel injection quantity and timing affecting injector 3. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 3. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] > 120.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is higher than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injection Timing Perfomance - Over Advanced	P01D0	This diagnosis is able to detect an excessive positive drift on fuel injection quantity and timing affecting injector 3. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 3. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] < -105.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation. Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is lowerthan a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injection Timing Perfomance - Over Retarded	P01D1	This diagnosis is able to detect an excessive negative drift on fuel injection quantity and timing affecting injector 4. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 4. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] > 120.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is higher than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injection Timing Perfomance - Over Advanced	P01D2	This diagnosis is able to detect an excessive positive drift on fuel injection quantity and timing affecting injector 4. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 4. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] < -105.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation. Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is lowerthan a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Injection Timing Perfomance - Over Retarded	P01D3	This diagnosis is able to detect an excessive negative drift on fuel injection quantity and timing affecting injector 5. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 5. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] > 120.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is higher than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Injection Timing Perfomance - Over Advanced	P01D4	This diagnosis is able to detect an excessive positive drift on fuel injection quantity and timing affecting injector 5. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 5. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] < -105.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation. Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is lowerthan a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Injection Timing Perfomance - Over Retarded	P01D5	This diagnosis is able to detect an excessive negative drift on fuel injection quantity and timing affecting injector 6. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 6. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] > 120.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is higher than a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Injection Timing Perfomance - Over Advanced	P01D6	This diagnosis is able to detect an excessive positive drift on fuel injection quantity and timing affecting injector 6. During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the angular acceleration produced during the combustion phase. By comparing the angular acceleration value produced during the combustion phase with the angular acceleration that would be produced during the combustion of a nominal fuel quantity (e.g. 1,5mm3), the SQA is able to calculate the drift, in term of energizing time, on injector 6. Several injections, with different injection quantities, are performed in order to define the correct DeltaET to reach the target crank wheel angular acceleration and obtain the injector behavior in the small	Suspicious confidence level of tested injector (To fail suspicious), function of Current Energizing time calculated with SSQA and delta Energizing time calculated in the previous test: **KtFADD_Pct_SSQA_InjSuspConfLvl** (Delta Enegizing Time, Delta Energizing Time old) In case the first test fails: Delta Energizing time calculated by VSQA (To fail Validation)	< 50.00 [%] < -105.00 [us]	SQA Diagnosis enabled SSQA and VSQA enabled via calibration Baro Pressure Ambient temp No Low Fuel level tank indication AND Boolean Flag used to enable low fuel level check is TRUE XSQA Learning conditions enabled Power Take Off not active AND Boolean Flag used to disable SQA in case of power take off active	1.00 1.00 >= 70.00 [kPa] >= -9.00 [°C] LowFuelConditionDiagnostic 1.00 FAD_XSQA_LrnCondEnbl = 0.00	Inj_To_PassFail_SSQA Number of injections in case sospicious pass or (if sospicious fails) Inj_To_PassFail_SSQA +Inj_To_PassFail_VSQA number of injections to pass or fail validation. Once per Trip if suspicious and validations (in case of sospicious injectors detected) have been already completed in the previous driving cycle, otherwise the diagnosis starts from the interrupted status. Sample Rate: [1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		quantity area. This energizing time is then used for the diagnostic test that is performed in two different steps: The first is the suspicious (SSQA) in which all the injectors are classified as suspicious or not suspicious. During this phase several injections are performed on all the injectors in order to calculate the drift, in term of energizing time, of each injector. The drift found is then used together with the drift found in the previous test to enter a calibrate-able map in which a confidence level between 0 and 100% is given to each injector. The confidence levels depends on the delta energizing time between two consecutive tests. An injector is considered suspicious if the confidence level is lower than a calibrate-able threshold. The suspicious phase can only report test pass for not suspicious injectors while the injectors that fail the						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		suspicious are tested by means of VSQA (Validation Small Quantity Adjustment) in order to validate or not the fault. The validation starts from the most suspicious injector (using the distance of current DeltaET from the VSQA calibrate-able thresholds) found during Suspicious phase and performs a calibrate-able number of injections, generally higher than the number of injection performed during suspicious, in order to find out a more accurate drift value for the tested injector. If the Delta Energizing time calculated during this phase is lowerthan a calibrate-able threshold a DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Open Circuit	P0201	This DTC checks the Injector 1 circuit for electrical integrity during operation.	Low current through the low side driver during operation indicates open circuit	Open circuit: circuit attached to the Controller external connections has an impedance >= 200 K Ohm	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderA and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderA	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Open Circuit	P0202	This DTC checks the Injector 2 circuit for electrical integrity during operation.	Low current through the low side driver during operation indicates open circuit	Open circuit: circuit attached to the Controller external connections has an impedance >= 200 K Ohm	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderB and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderB	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Open Circuit	P0203	This DTC checks the Injector 3 circuit for electrical integrity during operation.	Low current through the low side driver during operation indicates open circuit	Open circuit: circuit attached to the Controller external connections has an impedance >= 200 K Ohm	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderH and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderH	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Open Circuit	P0204	This DTC checks the Injector 4 circuit for electrical integrity during operation.	Low current through the low side driver during operation indicates open circuit	Open circuit: circuit attached to the Controller external connections has an impedance >= 200 K Ohm	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderE and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderE	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Open Circuit	P0205	This DTC checks the Injector 5 circuit for electrical integrity during operation.	Low current through the low side driver during operation indicates open circuit	Open circuit: circuit attached to the Controller external connections has an impedance >= 200 K Ohm	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderF and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderF	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Open Circuit	P0206	This DTC checks the Injector 6 circuit for electrical integrity during operation.	Low current through the low side driver during operation indicates open circuit	Open circuit: circuit attached to the Controller external connections has an impedance >= 200 K Ohm	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderG and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderG	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injection Timing	P020A	This DTC detects an Injector fault or ECU fault that causes pull In period of the current pulse out of range on injector 1 The pull in period is the time for the injection current to rise to the current level (20.00 [A]) at the beginning of the pulse	Measurement of the Pull In period of the current pulse of the injector 1 provided by HWIO	< 50.00 [us] OR > 90.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one injection pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderA or (Active DTC: and Strategy to reactivate the injector enabled and the injector has been commanded on for a time) and No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderA FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO == TRUE); FUL_PullInCylErrFlt_CiEPSR_CylinderA == 1.00 >0.1 us -	7 failures out of 14 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injection Timing	P020B	This DTC detects an Injector fault or ECU fault that causes pull In period of the current pulse out of range on injector 2 The pull in period is the time for the injection current to rise to the current level (20.00 [A]) at the beginning of the pulse	Measurement of the Pull In period of the current pulse of the injector 2 provided by HWIO	< 50.00 [us] OR > 90.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one injection pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderB or (Active DTC and Strategy to reactivate the injector enabled and the injector has been commanded on for a time) and No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderB FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO == TRUE); FUL_PullInCylErrFlt_CiEPSR_CylinderB == 1.00 >0.1 us -	7 failures out of 14 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injection Timing	P020C	This DTC detects an Injector fault or ECU fault that causes pull In period of the current pulse out of range on injector 3 The pull in period is the time for the injection current to rise to the current level (20.00 [A]) at the beginning of the pulse	Measurement of the Pull In period of the current pulse of the injector 3 provided by HWIO	< 50.00 [us] OR > 90.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one injection pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderC or (Active DTC and Strategy to reactivate the injector enabled and the injector has been commanded on for a time) and No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderC FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO == TRUE); FUL_PullInCylErrFlt_CiEPSR_CylinderC == 1.00 >0.1 us -	7 failures out of 14 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injection Timing	P020D	This DTC detects an Injector fault or ECU fault that causes pull In period of the current pulse out of range on injector 4 The pull in period is the time for the injection current to rise to the current level (20.00 [A]) at the beginning of the pulse	Measurement of the Pull In period of the current pulse of the injector 4 provided by HWIO	< 50.00 [us] OR > 90.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one injection pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderD or (Active DTC and Strategy to reactivate the injector enabled and the injector has been commanded on for a time) and No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderD FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO == TRUE); FUL_PullInCylErrFlt_CiEPSR_CylinderD 1.00 >0.1 us -	7 failures out of 14 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Injection Timing	P020E	This DTC detects an Injector fault or ECU fault that causes pull In period of the current pulse out of range on injector 5 The pull in period is the time for the injection current to rise to the current level (20.00 [A]) at the beginning of the pulse	Measurement of the Pull In period of the current pulse of the injector 5 provided by HWIO	< 50.00 [us] OR > 90.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one injection pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderE or (Active DTC and Strategy to reactivate the injector enabled and the injector has been commanded on for a time) and No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderE FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO == TRUE); FUL_PullInCylErrFlt_CiEPSR_CylinderE == 1.00 >0.1 us -	7 failures out of 14 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Injection Timing	P020F	This DTC detects an Injector fault or ECU fault that causes pull In period of the current pulse out of range on injector 6 The pull in period is the time for the injection current to rise to the current level (20.00 [A]) at the beginning of the pulse	Measurement of the Pull In period of the current pulse of the injector 6 provided by HWIO	< 50.00 [us] OR > 90.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one injection pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderF or (Active DTC and Strategy to reactivate the injector enabled and the injector has been commanded on for a time) and No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderF FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO == TRUE); FUL_PullInCylErrFlt_CiEPSR_CylinderF == 1.00 >0.1 us -	7 failures out of 14 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Injection Timing Control Circuit	P0216	This DTC detects an ECU internal fault, by comparing the cumulative injection pulse width provided by HWIO and the cumulative injection pulse width calculated by Application SW.
		A calibration is used to define the pulses that have to be taken into account to calculate the cumulative injection pulse width, both by HWIO and by application SW.
		Two different thresholds are defined for detecting the fault. The high threshold depends on the number of injection pulses active, i.e. the injection pulses driven and monitored.
			The cumulative injection pulse width (both HWIO and Application SW) is calculated by considering only the pulses to be monitored, defined in the calibration **P0216_ET_CumulEnbl**
			
			if (Cumulative injection pulse width read by HWIO > Cumulative injection pulse width calculated by Application SW)
			{
			|Cumulative injection pulse width read by HWIO - Cumulative injection pulse width calculated by Application SW|
			}
			else
			{
			|Cumulative injection pulse width read by HWIO - Cumulative injection pulse width calculated by Application SW|
			}
			
			OR
			information of dropped pulse reported by HWIO
			
			Cumulative injection pulse width calculated by
				>
				P0216_PulsWidthErrHi
				[us] depending on the number of injection pulses active
				
				> 40.00 [us]
					Test enabled by calibration;
					
					and
					Battery voltage
					
					and
					Key ON
					
					and
					No active DTC's:
					
					and
					No active DTC for the upcoming cylinder in compression:
					
					and
					At least one Injection
						== 1.00 [Boolean]
						
						> 11.00 [V]
						
						-
						
						FUL_CntrlrStTFTKO
						FUL_BoostVoltTFTKO
						
						FUL_CylInjCktFlt_CiEPSR_CylinderA
						FUL_CylInjCktFlt_CiEPSR_CylinderB
						FUL_CylInjCktFlt_CiEPSR_CylinderC
						FUL_CylInjCktFlt_CiEPSR_CylinderD
						FUL_CylInjCktFlt_CiEPSR_CylinderE
						FUL_CylInjCktFlt_CiEPSR_CylinderF
						FUL_PullInCylErrFlt_CiEPSR_CylinderA
						FUL_PullInCylErrFlt_CiEPSR_CylinderB
						FUL_PullInCylErrFlt_CiEPSR_CylinderC
						FUL_PullInCylErrFlt_CiEPSR_CylinderD
						FUL_PullInCylErrFlt_CiEPSR_CylinderE
						FUL_PullInCylErrFlt_CiEPSR_CylinderF
							8 failures out of 96 samples
							
							or
							
							23 consecutive failures
							
							1 sample every cylinder firing
							
							Continuous
								Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Application SW is equal to the sum of the programmed pulses width and the end of injection period measurement provided by HWIO.		Pulse is requested by the application software (FUL_FuelInjected and	== TRUE);		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Control Circuit Low Voltage	P0261	This DTC detects a short circuit to ground of the low side driver circuit of Injector 1.	Voltage low across low side drive during off state indicates short-to-ground	Short to ground: impedence between LS pin and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderA and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderA	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Control Circuit High Voltage	P0262	This DTC detects a short circuit to power supply of the low side driver circuit of Injector 1.	Voltage high across low side driver during On state indicates short to power	Short to power: impedence between LS pin and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderA and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderA	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Control Circuit Low Voltage	P0264	This DTC detects a short circuit to ground of the low side driver circuit of Injector 2.	Voltage low across low side drive during off state indicates short-to-ground	Short to ground: impedence between LS pin and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderB and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderB	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Control Circuit High Voltage	P0265	This DTC detects a short circuit to power supply of the low side driver circuit of Injector 2.	Voltage high across low side driver during On state indicates short to power	Short to power: impedence between LS pin and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderB and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderB	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Control Circuit Low Voltage	P0267	This DTC detects a short circuit to ground of the low side driver circuit of Injector 3.	Voltage low across low side drive during off state indicates short-to-ground	Short to ground: impedence between LS pin and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderH and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderH	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Control Circuit High Voltage	P0268	This DTC detects a short circuit to power supply of the low side driver circuit of Injector 3.	Voltage high across low side driver during On state indicates short to power	Short to power: impedence between LS pin and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderH and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderH	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Efficiency Below Threshold (OBDII market only)	P026A	This monitor checks the Charge Air Cooler efficiency deterioration, that would cause vehicle's emissions to exceed specific emission levels. It applies to both air-cooled and water-cooled Charge Air Coolers (WCAC), depending on application. The reference temperature can be selected to account for different architectures or applications, in order to guarantee a robust WPA/BPU separation in all conditions. The selectable temperature sensors used as reference are: Outside Air Temperature, Induction Air Temperature, WCAC inlet coolant temperature.	Charge Air Cooler Efficiency (averaged over a calibrate-able cumulative transient time) is compared with a threshold. Charge Air Cooler Efficiency is computed as the ratio between (CAC upstream temperature - CAC downstream temperature) and (CAC upstream temperature - Reference temperature). Reference temperature can be selected via calibration CeCIDG_e_WCAC_WaterTempIn : - if equal to CeCIDG_e_InductTemp, it is the induction air temperature; - if equal to CeCIDG_e_OutsideTemp, it is the outside air temperature; - if equal to CeCIDG_e_WCAC_WaterTempIn, it is the water temperature at the WCAC inlet. Each sample of the computed Charge Air Cooler Efficiency (before	< 42.00 [%] **P026A: Efficiency Offset** [%]	Calibration on diagnostic enabling Diagnostic has not run in current driving cycle yet Vehicle speed in range Compressor flow (Air + LP EGR) in range Engine coolant temperature in range OR OBD Coolant Enable Criteria Throttle valve position Pressure ratio through the compressor in range Temperature difference between upstream charge air cooler temperature and Reference temperature in range Water pump speed in range Environmental pressure in	1.00 ==TRUE ==TRUE > 30.00 [kph] > 40.00 [mg/s] < 200.00 [mg/s] > 60.00 [°C] ==TRUE > 85.00 [%] > 1.25 [ratio] > 50.00 [°C] > 1,400.00 [rpm] > 69.60 [kPa]	Test executed after 160.00 samples are collected and their average is computed Function task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			the average) is corrected by an offset depending on the compressor flow and the water pump speed.		range			
					Environmental temperature in range	> -9.00 [°C]		
					No fault on vehicle speed sensor	VehicleSpeedSensor_FA ==FALSE		
					No fault on engine coolant temperature sensor	ECT_Sensor_FA ==FALSE		
					No fault on throttle position sensor	TPS_PstnSnsrFA ==FALSE		
					No fault on ambient pressure sensor	AAP_AmbientAirPresDfltd ==FALSE		
					No fault on ambient temperature sensor	OAT_PtEstFiltFA ==FALSE		
					No fault on Reference temperature sensor	OAT_PtEstFiltFA ==FALSE OR IAT_SensorFA==FALSE OR CIW_TempInFA==FALSE		
					No fault on charge air cooler upstream and downstream temperature sensors	CIT_CAC_UpFA==FALSE CIT_CAC_DwnFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Compressor flow estimation is valid	INM_ComprTotFlowNotVld ==FALSE		
					No fault on Intake Manifold Pressure sensor	MAP_SensorFA==FALSE		
					No fault on Water pump speed sensor	ICPR_b_IC_PmpPerfFA ==FALSE, OR ICPR_b_IC_PmpCktFA ==FALSE, OR ICP_CWP_LcFA ==FALSE, OR ICP_CWP_Rsp_FoFA ==FALSE		
					All the enabling conditions last for a time	>= 4.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injection Timing Performance	P026B	This DTC detects an injection timing only fault by comparison of the requested Start Of Injection by Application SW and the scheduled SOI by HWIO SW.	Comparison of the requested Start Of Injection by Application SW and the scheduled SOI by HWIO SW for all cylinders.	< -5.00 OR > 5.00	Test enabled by calibration AND Engine Speed in range AND At least one injection pulse is commanded by Application SW on all cylinders in the previous engine cycle FUL_FuelInjectedCyl_CiEPSR_CylinderA FUL_FuelInjectedCyl_CiEPSR_CylinderB FUL_FuelInjectedCyl_CiEPSR_CylinderC FUL_FuelInjectedCyl_CiEPSR_CylinderD FUL_FuelInjectedCyl_CiEPSR_CylinderE FUL_FuelInjectedCyl_CiEPSR_CylinderF FUL_FuelInjectedCyl_CiEPSR_CylinderG FUL_FuelInjectedCyl_CiEPSR_CylinderH AND At least one injection pulse is commanded by HWIO OR at least one post injection is commanded by Application SW, on all cylinders in the previous engine cycle	== 1.00 >400 [rpm] AND < 3,000.00 ==TRUE;	280.00 failures out of 400.00 samples 1 sample every engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND No information of dropped pulse reported by HWIO AND No electrical fault on injectors are present AND No Injection Controller Fault AND No faults on crankshaft sensor for the entire driving cycle	FUL_FuelInjCkt_FA FUL_CntrlStFA CrankSensor_FA AND CrankSensor_TFTKO		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Injection Quantity Lower Than Expected	P026C	An error shall be detected when the fuel adjustment value (mm3) released by FSA is below a calibrated threshold.	Released FSA fuel correction value lower than a threshold A selected based on active combustion mode (refer to supporting table **KaFADR_e_FSA_ECM_CombModeGrp**) multiplied per ambient air pressure correction factor B	< A*B A = (If Group1 is selected: refer to supporting table **KtFADD_V_FSA_ECM_LoThrshGrp1** If Group2 is selected: refer to supporting table **KtFADD_V_FSA_ECM_LoThrshGrp2** If Group3 is selected: refer to supporting table **KtFADD_V_FSA_ECM_LoThrshGrp3**) [mm^3] B = (refer to supporting table **KtFADD_K_FSA_ECM_PresAmbWghtLo**)	Following conditions are met for a calibrated time: a. System voltage in range b. FSA correction release enabled c. FSA Learning is active OR (DFSA Learning is active AND Boolean Flag used to enable DFSA learningactive check is TRUE) for a time d. Ambient air pressure e. (Power Take-Off (PTO) is not active OR Boolean flag used to disable FSA in case of PTO active is FALSE) f. (OBD Coolant Enable Criteria OR Engine coolant temperature) g. Ambient air temperature h. Gear engaged	> 0.00 + 1.00 [s] > 11.00 [V] refer to "FSA Control Flag" Free Form FAD_FSA_NormRngCrtn Valid refer to "FSA Control Flag" Free Form FAD_FSA_EnblLrn OR (FAD_DFSA_EnblLrn AND 1 [boolean]) > 1.00 [s] > 70.00 [kPa] 0 [boolean] = TRUE > 45.00 [°C] > -20.00 [°C] different from Neutral or Parking	Time counter: 200 failures out of 400 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					for a time (only in case of Automatic Transmission)	> 0.50 [s]		
					i. Engine speed in operating range	> 1,100 [rpm] < 1,800 [rpm]		
					j. Engine speed gradient for a time	< 85 [rpm/25ms] > 0.50 [s]		
					k. Injected fuel quantity in operating range	> 15 [mm^3] < 50 [mm^3]		
					l. Injected fuel quantity gradient for a time	< 1.00 [mm^3/25ms] > 2.00 [s]		
					m. Vehicle speed in operating range for a time	> 30 [kph] < 140 [kph] > 0.50 [s]		
					n. Difference between FSA estimated error and FSA correction quantity	< 1,000.00 [mm^3]		
					o. Active combustion mode in selected group	refer to supporting table **KaFADR_e_FSA_ECM_** (**CombModeGrp**)		
					p. No Low fuel tank level indication	LowFuelConditionDiagnostic		
					q. No pending or confirmed DTCs	(ECT_Sensor_TFTKO AND ECT_Sensor_FA) OAT_PtEstFiltFA FAD_FSA_LrnShtOffReq OXY_eqr_TurbDwn_FSA_NotVld		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Injection Quantity Higher Than Expected	P026D	An error shall be detected when the fuel adjustment value (mm^3) released by FSA is above a calibrated threshold.	Released FSA fuel correction value higher than a threshold A selected based on active combustion mode (refer to supporting table **KaFADR_e_FSA_ECM_CombModeGrp**) multiplied per ambient air pressure correction factor B	> A*B A = (If Group1 is selected: refer to supporting table **KtFADD_V_FSA_ECM_HiThrshGrp1** If Group2 is selected: refer to supporting table **KtFADD_V_FSA_ECM_HiThrshGrp2** If Group3 is selected: refer to supporting table **KtFADD_V_FSA_ECM_HiThrshGrp3**) [mm^3] B = (refer to supporting table **KtFADD_K_FSA_ECM_PresAmbWghtHi**)	Following conditions are met for a calibrated time: a. System voltage in range b. FSA correction release enabled c. FSA Learning is active OR (DFSA Learning is active AND Boolean Flag used to enable DFSA learningactive check is TRUE) for a time d. Ambient air pressure e. (Power Take-Off (PTO) is not active OR Boolean flag used to disable FSA in case of PTO active is FALSE) f. (OBD Coolant Enable Criteria OR Engine coolant temperature) g. Ambient air temperature h. Gear engaged	> 0.00 + 1.00 [s] > 11.00 [V] refer to "FSA Control Flag" Free Form FAD_FSA_NormRngCrtnValid refer to "FSA Control Flag" Free Form FAD_FSA_EnblLrn OR (FAD_DFSA_EnblLrn AND 1 [boolean]) > 1.00 [s] > 70.00 [kPa] 0 [boolean] = TRUE > 45.00 [°C] > -20.00 [°C] different from Neutral or	Time counter: 200 failures out of 400 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Parking		
					for a time	> 0.50 [s]		
					i. Engine speed in operating range	> 1,100 [rpm] < 1,800 [rpm]		
					j. Engine speed gradient for a time	< 85 [rpm/25ms] > 0.50 [s]		
					k. Injected fuel quantity in operating range	> 15 [mm^3] < 50 [mm^3]		
					l. Injected fuel quantity gradient for a time	< 1.00 [mm^3/25ms] > 2.00 [s]		
					m. Vehicle speed in operating range for a time	> 30 [kph] < 140 [kph] > 0.50 [s]		
					n. Difference between FSA estimated error and FSA correction quantity	< 1,000.00 [mm^3]		
					o. Active combustion mode in selected group	refer to supporting table **KaFADR_e_FSA_ECM_** (**CombModeGrp**)		
					p. No Low fuel tank level indication	LowFuelConditionDiagnostic		
					q. No pending or confirmed DTCs	(ECT_Sensor_TFTKO AND ECT_Sensor_FA) OAT_PtEstFiltFA FAD_FSA_LrnShtOffReq OXY_eqr_TurbDwn_FSA_NotVld		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Control Circuit Low Voltage	P0270	This DTC detects a short circuit to ground of the low side driver circuit of Injector 4.	Voltage low across low side drive during off state indicates short-to-ground	Short to ground: impedence between LS pin and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderE and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderE	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Control Circuit High Voltage	P0271	This DTC detects a short circuit to power supply of the low side driver circuit of Injector 4.	Voltage high across low side driver during On state indicates short to power	Short to power: impedence between LS pin and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderE and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderE	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Control Circuit Low Voltage	P0273	This DTC detects a short circuit to ground of the low side driver circuit of Injector 5.	Voltage low across low side drive during off state indicates short-to-ground	Short to ground: impedence between LS pin and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderF and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderF	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Control Circuit High Voltage	P0274	This DTC detects a short circuit to power supply of the low side driver circuit of Injector 5.	Voltage high across low side driver during On state indicates short to power	Short to power: impedence between LS pin and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderF and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderF	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Control Circuit Low Voltage	P0276	This DTC detects a short circuit to ground of the low side driver circuit of Injector 6.	Voltage low across low side drive during off state indicates short-to-ground	Short to ground: impedence between LS pin and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderG and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderG	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Control Circuit High Voltage	P0277	This DTC detects a short circuit to power supply of the low side driver circuit of Injector 6.	Voltage high across low side driver during On state indicates short to power	Short to power: impedence between LS pin and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderG and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderG	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Fuel Injector Offset Learning At Min Limit	P02CC	This diagnosis (Min Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 1. The result of this test is then stored in a boolean NV array cointaing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	< **KaFADC_t_SQA_MinAdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. 1 Sample every cylinder firing event.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is lower than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Fuel Injector Offset Learning At Max Limit	P02CD	This diagnosis (Max Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 1. The result of this test is then stored in a boolean NV array cointaing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	> **KaFADC_t_SQA_Max AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is higher than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Fuel Injector Offset Learning At Min Limit	P02CE	This diagnosis (Min Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 2. The result of this test is then stored in a boolean NV array cointaing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	< **KaFADC_t_SQA_MinAdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is lower than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Fuel Injector Offset Learning At Max Limit	P02CF	This diagnosis (Max Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 2. The result of this test is then stored in a boolean NV array cointaing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	> **KaFADC_t_SQA_Max AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is higher than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Fuel Injector Offset Learning At Min Limit	P02D0	This diagnosis (Min Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 3. The result of this test is then stored in a boolean NV array cointaing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	< **KaFADC_t_SQA_MinAdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is lower than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Fuel Injector Offset Learning At Max Limit	P02D1	This diagnosis (Max Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 3 The result of this test is then stored in a boolean NV array cointaing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	> **KaFADC_t_SQA_Max AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is higher than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Fuel Injector Offset Learning At Min Limit	P02D2	This diagnosis (Min Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 4. The result of this test is then stored in a boolean NV array cointaing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	 < **KaFADC_t_SQA_Min AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is lower than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Fuel Injector Offset Learning At Max Limit	P02D3	This diagnosis (Max Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 4 The result of this test is then stored in a boolean NV array cointaing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	> **KaFADC_t_SQA_Max AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is higher than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Fuel Injector Offset Learning At Min Limit	P02D4	This diagnosis (Min Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 5. The result of this test is then stored in a boolean NV array cointaing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	< **KaFADC_t_SQA_MinAdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is lower than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Fuel Injector Offset Learning At Max Limit	P02D5	This diagnosis (Max Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 5 The result of this test is then stored in a boolean NV array cointaing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	> **KaFADC_t_SQA_Max AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is higher than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Fuel Injector Offset Learning At Min Limit	P02D6	This diagnosis (Min Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 6. The result of this test is then stored in a boolean NV array cointaing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	 < **KaFADC_t_SQA_MinAdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is lower than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Minimum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for minimum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Fuel Injector Offset Learning At Max Limit	P02D7	This diagnosis (Max Authority monitoring) performs a check on the absolute Energizing Time learnt by SQA (Small Quantity Adjustment). During Diesel Fuel Cut-off conditions SQA command the injection of a known quantity on one injector (e.g. 1,5mm^3) and checks, by means of crank-wheel sensor, the torque produced during the combustion phase. Two different learning strategies are used: Target SQA (TSQA): This strategy is a closed loop between fuel quantity injected and torque produced during combustion phase. The fuel quantity injected is increased/decreased until the angular acceleration target is reached. The Delta Energizing Time needed to achieve the target is then stored in SQA Map. Extrapolated SQA (ESQA): With this strategy several injections with different injection quantities are performed and, for	Each time a new value is entered in SQA map the diagnosis checks if: - DeltaET learnt by (x) SQA on cylinder 6 The result of this test is then stored in a boolean NV array cointaing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE.	> **KaFADC_t_SQA_Max AdptDeltET[us]**	SQA Diagnosis enabled (x)SQA injection management enabled	1.00 FAD_SQA_InjMgntEnbld	Time required to perform a learning with (x) SQA. [Sample Rate: 1 Sample every cylinder firing event].	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		each quantity, a delta ET is calculated using the difference between the torque produced during the combustion phase and the torque that would be produced during the combustion of a nominal fuel quantity. The results are then extrapolated in order to find the behaviour in all small quantity area. Each time a new value is entered in SQA map, regardless the strategies used to perform the learning (TSQA, ESQA, …), the diagnosis checks if the DeltaET learned by SQA is higher than a calibrateable threshold. The result of this test is then stored in a boolean NV array containing the status of Maximum authority test (TRUE=Saturated, FALSE= Not saturated) for all the rail pressure levels defined for SQA. The DTC for maximum authority reached is set if, at least one element of the array is equal to TRUE and is unset when all the elements of the array are equal to FALSE (no saturated values stored in SQA						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		map).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Control Circuit	P02E0	This monitor checks if the Throttle commands are in open circuit	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is OFF HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Performance	P02E1	This monitor detects an obstruction on the actuator (obstruction found during the Throttle valve opening or closing) checking the setpoint position against the position measured by the Throttle Position Sensor	|Throttle Position Tracking Error| (setpoint position - measured position) > maximum threshold	> 10.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Engine coolant temperature higher or equal to minimum threshold OR Engine cooling system target temperature reached (thermostat opening) No faults present on engine coolant temperature sensor Outside air temperature higher or equal to minimum threshold No faults present on outside air temperature sensor Throttle position closed loop control active (no faults present on Throttle position sensor, Throttle valve, Throttle position control deviation) Throttle position setpoint in steady state conditions for minimum time	== 1.00 > 11.00 [V] >= 30.00 [°C] ECT_Sensor_FA ==FALSE >= -20.00 [°C] OAT_PtEstFiltFA ==FALSE TPS_PstnSnsrCktFlt== FALSETPS_ActrFA == FALSETPS_PstnDvtnFA == FALSE > -100.00 [%/s] < 100.00 [%/s] for >= 0.30 [s]	960.00 fail counts out of 1,200.00 sample counts 480.00 fail counts to enable the open circuit check (P02E0) Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No mechanical stop soft approach in progress No anti-sticking procedure in progress			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Control Circuit High	P02E3	This monitor checks if the Throttle commands are shorted to power supply	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 9 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Stuck Closed	P02E5	This monitor detects the Throttle valve mechanically stuck in a certain position different from its defaulted position (fully open) when the actuator is no longer driven (missing dafaulted position)	Measured Throttle position < minimum threshold	< 75.00 [%]	P02E1 is already set Waiting time after driver shut off > minimum threshold (needed for the spring to drive the valve in its defaulted position) No faults present on Throttle position sensor, Throttle valve, Throttle position control deviation	> 2.00 [s] TPS_PstnSnsrFA== FALSE TPS_ActrFA == FALSE TPS_PstnDvtnFA == FALSE	No debounce is present: DTC sets as soon as the error is present Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Position Sensor Circuit Low (SENT position sensor)	P02E8	This monitor checks if the Throttle SENT position sensor is out of electrical range low	SENT position raw voltage < low threshold	< 1.00 [%5V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on Throttle SENT communication	== 1.00 > 11.00 [V] TPS_SENT_LossCommFlt == FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Position Sensor Circuit High (SENT position sensor)	P02E9	This monitor checks if the Throttle SENT position sensor is out of electrical range low	SENT position raw voltage > high threshold	> 99.00 [%5V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on Throttle SENT communication	== 1.00 > 11.00 [V] TPS_SENT_LossCommFlt == FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Current Range/ Performance	P02EB	This monitor checks if an excessive current flows through the Throttle DC-Motor (e.g. shunt circuit between load, Throttle DC-Motor internal faults, etc).	Current flowing through the H-Bridge higher than a threshold (error information provided by HWIO)	> 5.5 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on Throttle DC Motor current range/performance H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V] TPS_MtrCurrLimTFTKO == FALSE	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injector Circuit Range/ Performance	P02EE	This DTC detects an Injector fault or ECU fault that causes injector 1 End Of Injection period out of range The End Of Injection period is the time for the current in the injector to fall from the Hold or Bypass current to zero Ampere	Measurement of the Fall period of the current pulse of the injector 1 provided by HWIO	> 24.00 [us] OR < 7.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one Injection Pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderA No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderA FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO FUL_PullInCylErrFlt_CiEPSR_CylinderA == TRUE) -	11 failures out of 22 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injector Circuit Range/ Performance	P02EF	This DTC detects an Injector fault or ECU fault that causes injector 2 End Of Injection period out of range The End Of Injection period is the time for the current in the injector to fall from the Hold or Bypass current to zero Ampere	Measurement of the Fall period of the current pulse of the injector 2 provided by HWIO	> 24.00 [us] OR < 7.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one Injection Pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderB No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderB FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO FUL_PullInCylErrFlt_CiEPSR_CylinderB == TRUE) -	11 failures out of 22 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injector Circuit Range/ Performance	P02F0	This DTC detects an Injector fault or ECU fault that causes injector 3 End Of Injection period out of range The End Of Injection period is the time for the current in the injector to fall from the Hold or Bypass current to zero Ampere	Measurement of the Fall period of the current pulse of the injector 3 provided by HWIO	> 24.00 [us] OR 7.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one Injection Pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderC No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderC FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO FUL_PullInCylErrFlt_CiEPSR_CylinderC == TRUE) -	11 failures out of 22 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injector Circuit Range/ Performance	P02F1	This DTC detects an Injector fault or ECU fault that causes injector 4 End Of Injection period out of range The End Of Injection period is the time for the current in the injector to fall from the Hold or Bypass current to zero Ampere	Measurement of the Fall period of the current pulse of the injector 4 provided by HWIO	> 24.00 [us] OR < 7.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one Injection Pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderD No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderD FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO FUL_PullInCylErrFlt_CiEPSR_CylinderD == TRUE) -	11 failures out of 22 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Injector Circuit Range/ Performance	P02F2	This DTC detects an Injector fault or ECU fault that causes injector 5 End Of Injection period out of range The End Of Injection period is the time for the current in the injector to fall from the Hold or Bypass current to zero Ampere	Measurement of the Fall period of the current pulse of the injector 5 provided by HWIO	> 24.00 [us] OR < 7.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one Injection Pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderE No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderE FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO FUL_PullInCylErrFlt_CiEPSR_CylinderE == TRUE) -	11 failures out of 22 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Injector Circuit Range/ Performance	P02F3	This DTC detects an Injector fault or ECU fault that causes injector 6 End Of Injection period out of range The End Of Injection period is the time for the current in the injector to fall from the Hold or Bypass current to zero Ampere	Measurement of the Fall period of the current pulse of the injector 6 provided by HWIO	> 24.00 [us] OR < 7.00 [us]	Test enabled by calibration; and Battery voltage and Key ON and No active DTC's: and At least one Injection Pulse is requested by the application software; (FUL_FuelInjectedCyl_CiEPSR_CylinderF No information of dropped pulse reported by HWIO	== 1 [Boolean] > 11.00 [V] - FUL_CylInjCktFlt_CiEPSR_CylinderF FUL_CntrlrStTFTKO FUL_BoostVoltTFTKO FUL_PullInCylErrFlt_CiEPSR_CylinderF == TRUE) -	11 failures out of 22 samples 1 sample every engine cycle Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Glow Plug/ Heater Indicator Control Circuit Low	P037A	This DTC checks the wait to start lamp circuit for electrical integrity during operation. Wait to start lamp pin shorted to ground.	Test performed by HWIO. A ground short condition shall be detected if the circuit attached to the controller external connection has an impedance R to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND. The short to ground faults are not required to be detected when the Off state diagnostic leakage current source is Disabled.	R = 0.5 Ω	Glow Lamp present Test enabled Run/Crank On Run/Crank voltage Engine cranking	== 1.00 [boolean] == 1.00 [boolean] == True > 11.00 V == False	10.00 failures out of 15.00 samples (*) (*) Ground short monitoring is implemented in HWIO which means no further debouncing is needed in case of short to ground	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Glow Plug/ Heater Indicator Control Circuit High	P037B	This DTC checks the wait to start lamp circuit for electrical integrity during operation. Wait to start lamp pin shorted to high voltage.	Test performed by HWIO. A power short condition shall be detected if the circuit attached to the Controller external connection has an impedance R to a voltage source within the Normal Operating Voltage Range or the High Operating Voltage Range.	R = 0.5 Ω	Glow Lamp present Test enabled Run/Crank On Run/Crank voltage Engine cranking	== 1.00 [boolean] == 1.00 [boolean] == True > 11.00 V == False	5.00 failures out of 8.00 samples Sampling rate: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Glow Plug/ Heater Indicator Control Circuit/Open	P0381	This DTC checks the wait to start lamp circuit for electrical integrity during operation. Wait to start lamp pin open circuit.	Test performed by HWIO. An open circuit condition shall be detected if the circuit attached to the Controller external connection has an impedance Ropendet and shall not be detected if the circuit impedance is less than the Ropmin. The open circuit faults are not required to be detected when the Off state diagnostic leakage current source is Disabled.	Ropendet = 300 Ω Ropmin = 10 Ω	Glow Lamp present Test enabled Run/Crank On Run/Crank voltage Engine cranking	== 1.00 [boolean] == 1.00 [boolean] == True > 11.00 V == False	10.00 failures out of 15.00 samples (*) (*) Open load monitoring is implemented in HWIO which means no further debouncing is needed in case of open load	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Control Circuit	P0403	This monitor checks if the HP EGR commands are in open circuit	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is OFF Valve requested in a position different from fully closed (default position) Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Position Performance	P0404	This monitor detects an obstruction on the actuator (obstruction found during the HP EGR valve opening or closing) checking the setpoint position against the position measured by the HP EGR Position Sensor	|HP EGR Position Tracking Error| (setpoint position - measured position) > maximum threshold	> 15.00 [%]	Test enabled by calibration	== 1.00	960.00 fail counts out of 1,200.00 sample counts	Type A, 1 Trips
					Diagnostic system enabled (no clear code or EOT in progress)		480.00 fail counts to enable the open circuit check (P0403)	
					System out of the cranking phase		Function task: 6.25 ms	
					PT relay supply voltage in range	> 11.00 [V]		
					Engine coolant temperature higher or equal to minimum threshold OR Engine cooling system target temperature reached (thermostat opening)	>= 30.00 [°C]		
					No faults present on engine coolant temperature sensor	ECT_Sensor_FA ==FALSE		
					Outside air temperature higher or equal to minimum threshold	>= -20.00 [°C]		
					No faults present on outside air temperature sensor	OAT_PtEstFiltFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					HP EGR position setpoint in steady state conditions for minimum time	> -50.00 [%/s] < 50.00 [%/s] for >= 0.38 [s]		
					HP EGR position closed loop control active			
					No mechanical stop soft approach in progress			
					No anti-sticking procedure in progress			
					No faults present on HP EGR position sensor, HP EGR valve, HP EGR position control deviation	EGR_PstnShtOffReq ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Position Sensor Circuit Low Voltage (SENT position sensor)	P0405	This monitor checks if the HP EGR SENT position sensor is out of electrical range low	SENT position raw voltage < low threshold	< 1.00 [%5V]	Test enabled by calibration SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) No fault on SENT communication	== 1.00 == 1.00 > 11.00 [V] EGR_SENT_LossCommFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Position Sensor Circuit High Voltage (SENT position sensor)	P0406	This monitor checks if the HP EGR SENT position sensor is out of electrical range high	SENT position raw voltage > high threshold	> 99.00 [%5V]	Test enabled by calibration SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) No fault on SENT communication	== 1.00 == 1.00 > 11.00 [V] EGR_SENT_LossCommFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt Range/ Performance	P041B	ECM determines that the EGR temperature Sensor 1 has not moved enought since start (Stuck)	ECM determines that after an allowed amount of engine consumed airflow following a long enough soak, the Up Stream Temperature sensor has not change enough.	ABS(Initial upstream temperature - final upstream temperature) <= **UP Stream Stk Temp Vrtn**	System supply voltage Engine soak (not run) time No Active DTCs Engine is running	> 11.00 Volts >= 28,800.00 sec P262B	cumulative Time > 4.50 continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt Low	P041C	Diagnose the EGR Up Stream Temperature sensor circuit low	The ECM detects that the measured resistance of the temperature sensor is out of range low.	Measured Resistance of the Temperature sensor < 10.00 Ω impedance	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	30 failures out of 38 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt High	P041D	Diagnose the EGR Up Stream Temperature sensor circuit high	The ECM detects that the measured resistance of the temperature sensor is out of range high.	Measured Resistance of the Temperature sensor > 20,000,000.00 Ω impedance	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	30 failures out of 38 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 Ckt Intermittent/ Erratic	P041E	Detects a temperature sensor that is showing erratic or intermittent temperature readings	The absoluted value of the loop to loop (100 ms / sample) resistance change of the temperature sensor is greater than the allowed rate of change.	Delta chage > 25.00 Ω impedance	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.00 Volts	60 failures out of 75 samples 100 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Control Stuck Open	P042E	This monitor detects the HP EGR valve mechanically stuck in a certain position different from its defaulted position (fully closed) when the actuator is no longer driven (missing dafaulted position)	Measured HP EGR position > maximum threshold	> 6.00 [%]	P0404 is already set Waiting time after driver shut off > minimum threshold (needed for the spring to drive the valve in its defaulted position) Diagnostic system enabled (no clear code or EOT in progress) No faults present on HP EGR position sensor, HP EGR valve, HP EGR position control deviation	 > 2.00 [s] EGR_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Position Sensor Circuit Low Voltage (SENT position sensor)	P044C	This monitor checks if the LP EGR SENT position sensor is out of electrical range low	SENT position raw voltage < low threshold	< 1.00 [%5V]	Test enabled by calibration SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) No fault on SENT communication	== 1.00 == 1.00 > 11.00 [V] LPE_SENT_LossCommFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Position Sensor Circuit High Voltage (SENT position sensor)	P044D	This monitor checks if the LP EGR SENT position sensor is out of electrical range high	SENT position raw voltage > high threshold	> 99.00 [%5V]	Test enabled by calibration SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) No fault on SENT communication	== 1.00 == 1.00 > 11.00 [V] LPE_SENT_LossCommFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Control Circuit	P045A	This monitor checks if the LP EGR commands are in open circuit	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is OFF Valve requested in a position different from fully closed (default position) Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Position Performance	P045B	This monitor detects an obstruction on the actuator (obstruction found during the LP EGR valve opening or closing) checking the setpoint position against the position measured by the LP EGR Position Sensor	|LP EGR Position Tracking Error| (setpoint position - measured position) > maximum threshold	> 10.00 [%]	Test enabled by calibration	== 1.00	960.00 fail counts out of 1,200.00 sample counts 480.00 fail counts to enable the open circuit check (P045A) Function task: 6.25 ms	Type A, 1 Trips
					Diagnostic system enabled (no clear code or EOT in progress)			
					System out of the cranking phase			
					PT relay supply voltage in range	> 11.00 [V]		
					Engine coolant temperature higher or equal to minimum threshold OR Engine cooling system target temperature reached (thermostat opening)	>= 30.00 [°C]		
					No faults present on engine coolant temperature sensor	ECT_Sensor_FA ==FALSE		
					Outside air temperature higher or equal to minimum threshold	>= -20.00 [°C]		
					No faults present on outside air temperature sensor	OAT_PtEstFiltFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					LP EGR position setpoint in steady state conditions for minimum time	> -50.00 [%/s] < 50.00 [%/s] for >= 0.35 [s]		
					LP EGR position closed loop control active			
					No mechanical stop soft approach in progress			
					No anti-sticking procedure in progress			
					No faults present on LP EGR position sensor, LP EGR valve, LP EGR position control deviation	LPE_PstnShtOffReq ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Control Circuit High Voltage	P045D	This monitor checks if the LP EGR commands are shorted to power supply	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Control Stuck Open	P045E	This monitor detects the LP EGR valve mechanically stuck in a certain position different from its defaulted position (fully closed) when the actuator is no longer driven (missing dafaulted position)	Measured LP EGR position > minimum threshold	> 30.00 [%]	P045B is already set Waiting time after driver shut off > minimum threshold (needed for the spring to drive the valve in its defaulted position) Diagnostic system enabled (no clear code or EOT in progress) No faults present on LP EGR position sensor, LP EGR valve, LP EGR position control deviation	 > 2.00 [s] LPE_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Control Circuit	P0475	This monitor checks if the ETV commands are in open circuit	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is OFF Valve requested in a position different from fully open (default position) Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Position Performance	P0476	This monitor detects an obstruction on the actuator (obstruction found during the ETV opening or closing) checking the setpoint position against the position measured by the ETV Position Sensor	|ETV Position Tracking Error| (setpoint position - measured position) > maximum threshold	> 10.00 [%]	Test enabled by calibration	== 1.00	960.00 fail counts out of 1,200.00 sample counts	Type A, 1 Trips
					Diagnostic system enabled (no clear code or EOT in progress)		480.00 fail counts to enable the open circuit check (P0475)	
					System out of the cranking phase		Function task: 6.25 ms	
					PT relay supply voltage in range	> 11.00 [V]		
					Engine coolant temperature higher or equal to minimum threshold OR Engine cooling system target temperature reached (thermostat opening)	>= 30.00 [°C]		
					No faults present on engine coolant temperature sensor	ECT_Sensor_FA ==FALSE		
					Outside air temperature higher or equal to minimum threshold	>= -20.00 [°C]		
					No faults present on outside air temperature sensor	OAT_PtEstFiltFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					ETV position setpoint in steady state conditions for minimum time	> -100.00 [%/s] < 100.00 [%/s] for >= 0.50 [s]		
					ETV position closed loop control active			
					No mechanical stop soft approach in progress			
					No anti-sticking procedure in progress			
					No faults present on ETV position sensor, ETV valve, ETV position control deviation	LEV_PstnShtOffReq ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Control Circuit High Voltage	P0478	This monitor checks if the ETV commands are shorted to power supply	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Control Stuck Closed	P048A	This monitor detects the ETV mechanically stuck in a certain position different from its defaulted position (fully open) when the actuator is no longer driven (missing dafaulted position)	Measured ETV position < maximum threshold	< 70.00 [%]	P0476 is already set Waiting time after driver shut off > minimum threshold (needed for the spring to drive the valve in its defaulted position) Diagnostic system enabled (no clear code or EOT in progress) No faults present on ETV position sensor, ETV valve, ETV position control deviation	> 2.00 [s] LEV_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Position Sensor Circuit Low Voltage (SENT position sensor)	P048D	This monitor checks if the ETV SENT position sensor is out of electrical range low	SENT position raw voltage < low threshold	< 1.00 [%5V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) No fault on SENT communication	== 1.00 > 11.00 [V] LEV_SENT_LossCommFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Position Sensor Circuit High Voltage (SENT position sensor)	P048E	This monitor checks if the ETV SENT position sensor is out of electrical range high	SENT position raw voltage > high threshold	> 99.00 [%5V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) No fault on SENT communication	== 1.00 > 11.00 [V] LEV_SENT_LossCommFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Control Circuit High Voltage	P0490	This monitor checks if the HP EGR commands are shorted to power supply	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Position Exceeded Learning Limit (SENT position sensor)	P049D	This monitor checks if the HP EGR SENT position sensor has an offset with respect to the nominal position where the valve does the learning procedure (fully closed)	SENT position raw voltage when the valve is in fully closed position < low threshold OR SENT position raw voltage when the valve is in fully closed position > high threshold	< 5.00 [%5V] OR > 12.00 [%5V]	Test enabled by calibration Key signal is off Learning procedure at key off in fully closed position has been successfully completed: - engine coolant temperature in range; - no faults present on engine coolant temperature sensor; - outside air temperature above a threshold; - no faults present on outside air temperature sensor. Position control in closed loop: battery voltage above a threshold No faults present on HP EGR position sensor, HP EGR valve, HP EGR position control deviation End Of Trip event has elapsed	== 1.00 >= 30.00 [°C] <= 150.00 [°C] ECT_Sensor_FA ==FALSE >= -40.00 [°C] OAT_PtEstFiltFA ==FALSE >= 9.50 [V] EGR_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Diagnostic system enabled (no clear code or EOT in progress)			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Position Exceeded Learning Limit (SENT position sensor)	P049E	This monitor checks if the LP EGR SENT position sensor has an offset with respect to the nominal positions where the valve does the learning procedure (fully closed and/or fully open)	SENT position raw voltage when the valve is in fully closed position < low threshold OR SENT position raw voltage when the valve is in fully closed position > high threshold OR SENT position raw voltage when the valve is in wide open position < low threshold OR SENT position raw voltage when the valve is in wide open position > high threshold	< 7.00 [%5V] OR > 12.50 [%5V] OR < 0.00 [%5V] OR > 100.00 [%5V]	Test enabled by calibration Key signal is off Learning procedure at key off in fully closed and/or wide open positions have been successfully completed: - engine coolant temperature in range; - no faults present on engine coolant temperature sensor; - outside air temperature above a threshold; - no faults present on outside air temperature sensor. Position control in closed loop: battery voltage above a threshold No faults present on LP EGR position sensor, LP EGR valve, LP EGR position control deviation End Of Trip event has elapsed	== 1.00 >= 30.00 [°C] <= 150.00 [°C] ECT_Sensor_FA ==FALSE >= -40.00 [°C] OAT_PtEstFiltFA ==FALSE >= 9.50 [V] LPE_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Diagnostic system enabled (no clear code or EOT in progress)			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor C Circuit Range/ Performance	P04CF	This monitor checks if the LP EGR up air temperature sensor is irrational at key on when compared with two reference temperature sensors after a long soak time.	LP EGR up air temperature is compared at power up with an average temperature calculated using the intake manifold air temperature sensor and the fuel temperature sensor over a calibratable number of samples. Temperature difference (absolute value)	> 20.00 [°C]	Test enabled by calibration Key on and engine not running or engine running for less than a calibratable time Engine not cranking Runk Crank Relay voltage in range The engine has not run for a calibratable time since last key off No faults detected on engine off timer Absolute value of the difference between intake manifold air temperature and fuel temperature smaller than a calibratable threshold Sensor Performance Check not yet completed in current driving cycle No faults detected on	1.00 ==TRUE < 2.00 [s] ==TRUE > 11.00 [V] > 28,800.00 [s] EngineModeNotRunTimerError ==FALSE < 45.00 [°C] ==TRUE MnfdTempSensorFA	The averaged temperatures are calculated over 10.00 samples. No debounce is present: DTC sets as soon as the error is present Functional task: at key on	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					intake manifold air temperature sensor	==FALSE		
					No faults detected on fuel temperature sensor	FTS_FTS_Flt==FALSE		
					No electrical or intermittent fault detected on LP EGR up air temperature sensor	LPE_TempSnsrCktFA ==FALSE LPE_TempSnsrSelfCorFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor C Circuit Low	P04D0	This monitor checks if the LP EGR up temperature sensor is out of electrical range low.	LP EGR up temperature raw resistance < low threshold	< 7.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	1.00 ==TRUE ==TRUE > 11.00 [V]	30.00 fail counts out of 38.00 sample counts Functional task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor C Circuit High	P04D1	This monitor checks if the LP EGR up temperature sensor is out of electrical range high.	LP EGR up temperature raw resistance > high threshold	> 20,000,000.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	1.00 ==TRUE ==TRUE > 11.00 [V]	30.00 fail counts out of 38.00 sample counts Functional task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor C Circuit Intermittent/ Erratic	P04D2	This monitor checks if the LP EGR up air temperature sensor has an intermittent fault.	LP EGR up air temperature value > T_MAX_threshold OR LP EGR up air temperature value < T_MIN_threshold where - T_MAX_threshold = (1 - alpha)*T_MAX + alpha*T_last_good - T_MIN_threshold = (1 - alpha)*T_MIN + alpha*T_last_good - alpha = e^(#fails + 1)*(ts/ tau) - #fails = number of consecutive samples where the test failed - ts = sensor sampling time - tau = sensor filter response time - T_MAX = sensor maximum actual reading - T_MIN = sensor minimum actual reading - T_last_good = last good temperature measured by the sensor	> 320.00 [°C] < -60.00 [°C]	Test enabled by calibration Engine not cranking Run Crank Relay voltage in range No electrical faults detected on LP EGR up air temperature sensor	1.00 ==TRUE ==TRUE > 11.00 [V] LPE_TempSnsrCktFA ==FALSE	60.00 fail counters over 75.00 sample counters Functional task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 1 out of range monitoring Low	P0545	This monitor has the purpose of warning the system/driver that an electrical problem on EGT 1 sensor is present. Failure mode: Out Of Range Low (short circuit to ground) The monitor compares the EGT raw value (resistance value) with a minimum threshold; if this threshold is overcome, a OOR Low error is detected.	The monitor compares the EGT 1 raw value (resistance value) with a minimum threshold; if this threshold is overcome, a OOR Low error is detected.	< 125 [Ohm]	Monitor enabled by dedicated calibration AND Engine cranking AND Supply voltage in range AND Ignition run crank active AND Diagnostic system reset status	1 [Boolean] == FALSE == TRUE == TRUE == FALSE	10 fail samples over 20 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 1 out of range monitoring High	P0546	This monitor has the purpose of warning the system/driver that an electrical problem on EGT 1 sensor is present. Failure modes: Out Of Range High (open circuit, short circuit to supply, broken wiring) The monitor compares the EGT raw value (resistance value) with a maximum threshold; if this threshold is overcome, a OOR High error is detected.	The monitor compares the EGT 1 raw value (resistance value) with a maximum threshold; if this threshold is overcome, a OOR High error is detected.	> 1,000 [Ohm]	Monitor enabled by dedicated calibration AND Engine cranking AND Supply voltage in range AND Ignition run crank active AND Diagnostic system reset status	1 [Boolean] == FALSE == TRUE == TRUE == FALSE	10 fail samples over 20 samples Function task: 100ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Idle Control System - Fuel Quantity Lower Than Expected	P054E	This DTC detects if the fuel quantity of the torque forming pulses is lower than the expected fuel quantity request when the engine is idle. Depending on combustion mode and gear, different maps of fuel quantity thresholds can be used. Each map depends on engine speed and engine coolant temperature	Depending on Combustion Mode
			
			case **StrongExhGasWarmUp:**
			{
			<u>transmission in Gear:</u>
			Fuel quantity of the torque forming pulses
			
			<u>transmission in Park/ Neutral:</u>
			Fuel quantity of the torque forming pulses
			
			}
			
			case **SoftExhGasWarmUp:**
			{
			<u>transmission in Gear:</u>
			Fuel quantity of the torque forming pulses
				< 0.5* **P054E_IFM_MinFuelIdleV3_G** [mm^3] depending on engine speed and engine coolant temperature
				
				< 0.5* **P054E_IFM_MinFuelIdleV3_PN** [mm^3] depending on engine speed and engine coolant temperature
				
				< 0.5* **P054E_IFM_MinFuelIdleV2_G** [mm^3] depending on engine speed and engine coolant
					For enabling the monitor, all the following conditions must be satisfied continuously for more than
					
					Test enabled by calibration
					
					and current gear
					
					and depending on **Gear Selection Calibration =** CeFULR_e_InGearNeutralPark (<u>CeFULR_e_InGear:</u> transmission
					
					<u>CeFULR_e_NeutralPark:</u> transmission
					
					<u>CeFULR_e_InGearNeutralPark:</u> transmission)
					
					and engine speed
					
					and engine speed
						4.00 [s]
						
						1.00 [Boolean]
						
						unchanged
						
						in gear
						
						in park/neutral
						
						in gear and in park neutral
						
						> hysteresis(511.00 , 511.00 + 5.00)[rpm]
						
						<hysteresis(1,560.00 , 1,560.00 + 5.00)[rpm]
							200.00 failures out of 255.00 samples
							
							1 sample every cylinder firing event
								Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				temperature				
			transmission in Park/ Neutral: Fuel quantity of the torque forming pulses	< 0.5* **P054E_IFM_MinFuelldleV2_PN** [mm^3] depending on engine speed and engine coolant temperature	and (OBD Coolant Enable Criteria OR engine coolant temperature) and outside air temperature and vehicle speed and enabled in the combustion mode and Accelerator Pedal Position and Engine running and PTO_PTO_Active and Run Crank voltage and if the transmission is manual	== TRUE > hysteresis(-21.00 , -20.00) [°C] > hysteresis(-21.00 , -20.00) [°C] < 3.00 [kph] **P054E_IFM_CombModesEnbl** <= 0.05 [%] - == 0 [Boolean] >= 11.00 [V]		

			}
			case
			HC unloading driving and park/neutral (HCS_DeHC_Drive || HCS_DeHC_Park):
			{
			transmission in Gear:
			Fuel quantity of the torque forming pulses
				< 0.5*
				P054E_IFM_MinFuelldleHC_G
				[mm^3] depending on engine speed and engine coolant temperature				

			transmission in Park/ Neutral: Fuel quantity of the torque forming pulses	< 0.5* **P054E_IFM_MinFuelldleHC_PN** [mm^3] depending on engine speed and engine coolant temperature				
			}					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

			default:
			{
			transmission in Gear:
			Fuel quantity of the torque forming pulses
			
			transmission in Park/ Neutral:
			Fuel quantity of the torque forming pulses
			
			}
				< 0.5*
				P054E_IFM_MinFuelIdleC1_G
				[mm^3] depending on engine speed and engine coolant temperature
				
				< 0.5*
				P054E_IFM_MinFuelIdleC1_PN
				[mm^3] depending on engine speed and engine coolant temperature
					(
					if the Gear is Neutral
					AND
					the clutch pedal position
					
					OR
					
					the clutch pedal position
					)
					
					and
					No active DTC's:
					
					No Neutral Locked Turbine Fault active and Fault Pending:
					VeTLKR_b_NLT_ActvFA
					AND
					VeTLKR_b_NLT_ActvFP
					
					Depending on the **OAT Source Calibration =** CeOATR_e_ECM_OAT_Sensor
					(
					CeOATR_e_NonOBD_NonECM_NonVICM:
					
					default:
					)
						> 75.00
						
						< 15.00
						
						==0 [Boolean]
						
						==0 [Boolean]
						
						OAT_OAT_SnsrNonEmissFA
						
						OAT_PtEstFiltFA
						
						CrankSensor_TFTKO
						
						ECT_Sensor_FA
						
						Transmission Estimated Gear Validity
						
						VehicleSpeedSensor_FA
						
						AcceleratorPedalFailure
						
						ClutchPedalPosSensor_FA
						
						NLT_ActvErr
						
						(FUL_GenericInjSysFA
						AND
						FUL_GenericInjSysFlt		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Idle Control System - Fuel Quantity Higher Than Expected	P054F	This DTC detects if the fuel quantity of the torque forming pulse is higher than the expected fuel quantity request when the engine is idle. Depending on combustion mode and gear, different maps of fuel quantity thresholds can be used. Each map depends on engine speed and engine coolant temperature	Depending on Combustion Mode
			
			case **StrongExhGasWarmUp**:
			{
			transmission in Gear:
			Fuel quantity of the torque forming pulses
			
			transmission in Park/ Neutral:
			Fuel quantity of the torque forming pulses
			
			}
			
			case **SoftExhGasWarmUp:**
			{
			transmission in Gear:
			Fuel quantity of the torque forming pulses
				> 1.5* **P054F_IFM_MaxFuelIdleV3_G** [mm^3] depending on engine speed and engine coolant temperature
				
				> 1.5* **P054F_IFM_MaxFuelIdleV3_PN** [mm^3] depending on engine speed and engine coolant temperature
				
				> 1.5* **P054F_IFM_MaxFuelIdleV2_G** [mm^3] depending on engine speed and engine coolant temperature
					For enabling the monitor, all the following conditions must be satisfied continuously for more than
					
					Test enabled by calibration
					
					and current gear
					
					and depending on **Gear Selection Calibration =** CeFULR_e_InGearNeutralPark
					{
					CeFULR_e_InGear: transmission
					
					CeFULR_e_NeutralPark: transmission
					
					CeFULR_e_InGearNeutralPark: transmission
					}
					
					and engine speed
					
					and engine speed
					
					and
						4.00 [s]
						
						1.00 [Boolean]
						
						unchanged
						
						in gear
						
						in park/neutral
						
						in gear and in park neutral
						
						> hysteresis(511.00 , 511.00 + 5.00) [rpm]
						
						< hysteresis(1,560.00 , 1,560.00 + 5.00) [rpm]
							200.00 failures out of 255.00 samples
							
							1 sample every cylinder firing event
								Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

			transmission in Park/ Neutral:
			Fuel quantity of the torque forming pulses
			
			}
			
			case
			HC unloading driving and park/neutral (HCS_DeHC_Drive || HCS_DeHC_Park):
			{
			transmission in Gear:
			Fuel quantity of the torque forming pulses
			
			transmission in Park/ Neutral:
			Fuel quantity of the torque forming pulses
			
			}
			
			default:
				> 1.5*
				P054F_IFM_MaxFuelIdleV2_PN
				[mm^3] depending on engine speed and engine coolant temperature
				
				> 1.5*
				P054F_IFM_MaxFuelIdleHC_G
				[mm^3] depending on engine speed and engine coolant temperature
				
				> 1.5*
				P054F_IFM_MaxFuelIdleHC_PN
				[mm^3] depending on engine speed and engine coolant temperature
					{
					OBD Coolant Enable Criteria
					
					OR
					engine coolant temperature
					
					}
					
					and
					outside air temperature
					
					and
					vehicle speed
					
					and
					enabled in the combustion mode
					
					and
					Accelerator Pedal Position
					
					and
					Engine running
					
					and
					PTO_PTO_Active
					
					and
					Run Crank voltage
					
					and
					if the transmission is manual
					(
					if the Gear is Neutral
					AND
					the clutch pedal position
						== TRUE
						
						> hysteresis(-21.00 , -20.00) [°C]
						
						> hysteresis(-21.00 , -20.00) [°C]
						
						< 3.00 [kph]
						
						P054F_IFM_CombModesEnbl
						
						<= 0.05 [%]
						
						-
						
						== 0 [Boolean]
						
						>= 11.00 [V]
						
						> 75.00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

			{
			transmission in Gear:
			Fuel quantity of the torque forming pulses
			
			transmission in Park/ Neutral:
			Fuel quantity of the torque forming pulses
			
			}
				> 1.5*
				P054F_IFM_MaxFuelIdleC1_G
				[mm^3] depending on engine speed and engine coolant temperature
				
				> 1.5*
				P054F_IFM_MaxFuelIdleC1_PN
				[mm^3] depending on engine speed and engine coolant temperature
					OR
					the clutch pedal position
					)
					and
					No active DTC's:
					Depending on the **OAT Source Calibration =** CeOATR_e_ECM_OAT_Sensor
					{
					CeOATR_e_NonOBD_NonECM_NonVICM:
					default:
					}
						< 15.00
						OAT_OAT_SnsrNonEmissFA
						OAT_PtEstFiltFA
						CrankSensor_TFTKO
						ECT_Sensor_FA
						Transmission Estimated Gear Validity
						VehicleSpeedSensor_FA
						AcceleratorPedalFailure
						ClutchPedalPosSensor_FA
						NLT_ActvErr
						(FUL_GenericInjSysFA AND FUL_GenericInjSysFlt
						)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Fuel Injector Control Performance	P062B	This DTC Diagnoses the internal fuel injector control module circuit for circuit faults. The following check are performed: - Chip initialization - Boost voltage - chip test - Code and Parameter - SPI error (SPI communication failed) - ASIC Supply Under/ Over Voltage - ASIC Configuration Register Error - ASIC SPI Fault - ASIC DC-DC Over Voltage/Current - ASIC external clock lost - Injector Timeout Reached - Injector RAM Corruption	Driver Status OR (Driver Status for a number of samples)	== FAILED (chip test not passed OR Wrong download of microcode OR SPI error) == NOT INITIALIZED (chip not initialized OR Boost Voltage < 40.00) > 10 samples	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Boost Voltage has achieved (at least one time)	== 1 [Boolean] ≥ 6.41 [V] - - 40.00 [V]	17 failures out of 34 samples 12.5 ms / sample Continuous	Type A, 1 Trips
			Driver Status	== FAILED (ASIC power supply voltage is < 4.5 V or >33 V)	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Boost Voltage has achieved (at least one time)	== 1 [Boolean] ≥ 6.41 [V] - - 40.00 [V]	8.00 failures out of 16.00 samples 12.5 ms / sample Continuous	
			Driver Status	== FAILED (Injector control circuit configuration register corrupted)	Test enabled by calibration; and Battery voltage and Key ON	== 1 [Boolean] ≥ 6.41 [V] -	8.00 failures out of 16.00 samples 12.5 ms / sample Continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					and Engine is not cranking and Boost Voltage has achieved (at least one time)	- 40.00 [V]		
			Driver Status	== FAILED (SPI Communicatio error)	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Boost Voltage has achieved (at least one time)	== 1 [Boolean] ≥ 6.41 [V] - - 40.00 [V]	8.00 failures out of 16.00 samples 12.5 ms / sample Continuous	
			Driver Status	== FAILED (the Boost converter voltage or current are out of range)	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Boost Voltage has achieved (at least one time)	== 1 [Boolean] ≥ 6.41 [V] - - 40.00 [V]	8.00 failures out of 16.00 samples 12.5 ms / sample Continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Driver Status	== FAILED (Injector control circuit external clock is no longer available)	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Boost Voltage has achieved (at least one time)	== 1 [Boolean] ≥ 6.41 [V] - - 40.00 [V]	8.00 failures out of 16.00 samples 12.5 ms / sample Continuous	
			Driver Status	== FAILED (the injector has been commanded ON for a time > 8,000.00 us)	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Boost Voltage has achieved (at least one time)	== 1 [Boolean] ≥ 6.41 [V] - - 40.00 [V]	**P062B_CSM_ASIC_TimeOutReached_FailLim** failures out of **P062B_CSM_ASIC_TimeOutReached_SmplLim** samples LoresC	
			Driver Status	== FAILED (Injector control circuit SPRAM and DPRAM corrupted)	Test enabled by calibration; and Battery voltage and Key ON	== 1 [Boolean] ≥ 6.41 [V] -	**P062B_CSM_ASIC_RAMCorruption_FailLim** failures out of **P062B_CSM_ASIC_RAMCorruption_SmplLim** samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					and Engine is not cranking and Boost Voltage has achieved (at least one time)	 - 40.00 [V]	LoresC	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Injector Driver Circuit Performance Bank 1	P062D	This DTC detects if there is: open circuit of the power supply line of the injector or Boost voltage fault or ECU internal fault The monitoring determines if the boost voltage is above a threshold or below another threshlod with hysteresis	Internal ECU Boost Voltage	> 60.00 [V] OR < hysteresis(40.00 , 41.00) [V]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking	== 1 [Boolean] > 11.00 [V] - -	40 failures out of 80 samples 6.25 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Initial Position Exceeded Learning Limit (Single and Two stage VGT DC Motor)	P100B	This monitor checks if the positions of the VGT DC Motor open / closed mechanical stops measured at End Of Line during the learning procedure are plausibile	SENT position raw voltage when the valve is in fully closed position (learned at supplier plant) < low threshold OR SENT position raw voltage when the valve is in fully closed position (learned at supplier plant) > high threshold OR SENT position raw voltage when the valve is in wide open position (learned at supplier plant) < low threshold OR SENT position raw voltage when the valve is in wide open position (learned at supplier plant) > high threshold OR SENT position raw voltage when the valve is at the minimum flow position (learned at supplier plant) < low threshold OR	< 72.00 [%5V] OR > 89.00 [%5V] OR < 0.00 [%5V] OR > 100.00 [%5V] OR < 70.00 [%5V] OR	Test enabled by calibration End Of Line Learning procedure at key off in fully closed and/or wide open positions have been successfully completed: No faults present on VGT position sensor, VGT valve, VGTposition deviation.	== 1.00 VGT_PstnSnsrFA ==FALSE VGT_ActCktFA==FALSE VGT_PstnCntrlFA ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at EOL	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			SENT position raw voltage when the valve is at the minimum flow position (learned at supplier plant) > high threshold	> 74.00 [%5V]OR				
			OR	OR				
			SENT position raw voltage when the valve is in fully closed position (learned at End Of Line) < low threshold	< 72.00 [%5V]				
			OR	OR				
			SENT position raw voltage when the valve is in fully closed position (learned at End Of Line) > high threshold	> 89.00 [%5V]				
			OR	OR				
			SENT position raw voltage when the valve is in wide open position (learned at End Of Line) < low threshold	< 14.00 [%5V]				
			OR	OR				
			SENT position raw voltage when the valve is in wide open position (learned at End Of Line) > high threshold	> 32.00 [%5V]				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Rail Pressure deviation during cut off	P1089	This diagnosis is able to check if, during SQA learning, the pressure set-point requested by SQA is correctly reached and maintained (in rail pressure range defined for SQA), in order to allow SQA to perform the learning.	Fuel Rail pressure	> SQA Rail Pressure Set-point + **KaFADC_p_SQA_Lrn Delt** OR < SQA Rail Pressure Set-point - **KaFADC_p_SQA_Lrn Delt**	Test enabled by calibration All enabling conditions for SQA learning different from Rail Pressure in range are satified Calibrateable delay time since SQA started to request rail pressure set-point has expired.	1.00 FAD_SQA_LrnPresEnbl 2,000.00	800.00 Fail Samples over 1,143.00 samples. 1 Sample every 12,5ms.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Control Circuit Shorted	P10C0	This monitor checks if the ETV commands are shorted one other	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Actuator Control Circuit Shorted (Swirl DC Motor)	P10C1	This monitor checks if the Swirl commands are shorted one other	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Down Circuit Performance	P10D5	This monitor checks if the CAC down air temperature sensor is irrational at key on when compared with two reference temperature sensors after a long soak time	Charge air cooler down air temperature is compared at power up with an average temperature calculated using the intake manifold air temperature sensor and the fuel temperature sensor over a calibratable number of samples	> 20.00 [°C]	Enablement calibration set to TRUE	== 1.00	Test executed after a counter of 10.00 samples	Type B, 2 Trips
					Key on and engine not running or engine running for less than a calibratable time	< 2.00 [s]	Functional task: 100 ms	
					Runk Crank Relay voltage in range	> 11.00 [V]		
					The engine has not run for a calibratable time since last key off	>= 28,800.00 [s]		
					No faults detected on engine off timer	EngineModeNotRunTimerError ==FALSE		
					Absolute value of the difference between intake manifold air temperature and fuel temperature smaller than a calibratable threshold	< 45.00 [°C]		
					No electrical or self-correlated faults detected on charge air cooler down air temperature sensors	CIT_CAC_DwnCktFA ==FALSE OR CIT_CAC_DwnSelfCorFA ==FALSE		
					No faults detected on intake manifold air	MnfdTempSensorFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					temperature sensor No faults detected on fuel temperature sensor	 FTS_FTS_Flt==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Down Circuit Low	P10D6	This monitor checks if the CAC down air temperature sensor is out of electrical range low	Charge air cooler down air temperature resistance value < low threshold	< 250.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	== 1.00 > 11.00 [V]	30.00 fail counter over 38.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Down Circuit High	P10D7	This monitor checks if the CAC down air temperature sensoris out of electrical range high	Charge air cooler down air temperature resistance value > high threshold	> 20,000,000.00 [ohm]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range	== 1.00 > 11.00 [V]	30.00 fail counter over 38.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Charge Air Cooler Temperature Sensor Down Circuit Intermittent/ Erratic	P10D8	This monitor checks if the CAC down air temperature has an intermittent fault	Charge air cooler down air temperature value > T_MAX_threshold OR Charge air cooler down air temperature value < T_MIN_threshold where - T_MAX_threshold = (1 - alpha)*T_MAX + alpha*T_last_good - T_MIN_threshold = (1 - alpha)*T_MIN + alpha*T_last_good - alpha = e^(#fails + 1)*(ts/ tau) - #fails = number of consecutive samples where the test failed - ts = sensor sampling time - tau = sensor filter response time - T_MAX = sensor maximum actual reading - T_MIN = sensor minimum actual reading - T_last_good = last good temperature measured by the sensor	> 300.00 [°C] < -60.00 [°C]	Test enabled by calibration Engine not cranking Runk Crank Relay voltage in range No electrical faults detected on CAC down air temperature sensor	== 1.00 > 11.00 [V] CIT_CAC_DwnCktFA ==FALSE	60.00 fail counter over 75.00 sample counter Functional task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Current Range/ Performance	P10EB	This monitor checks if an excessive current flows through the ETV DC-Motor (e.g. shunt circuit between load, ETV DC-Motor internal faults, etc).	Current flowing through the H-Bridge higher than a threshold (error information provided by HWIO)	> 6.3 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on ETV DC Motor current range/ performance H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V] LEV_MtrCurrLimTFTKO ==FALSE	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Actuator Driver Current High (Swirl DC Motor)	P10EC	This monitor checks if an excessive current flows through the Swirl DC-Motor (e.g. shunt circuit between load, Swirl DC-Motor internal faults, etc).	Current flowing through the H-Bridge higher than a threshold (error information provided by HWIO)	> 6.3 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Actuator Driver Temperature Too High	P10ED	This monitor checks if the temperature of the Swirl DC-Motor increases too much (e.g. Swirl DC-Motor internal faults, etc).	H-Bridge driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 1 plausibility at key on monitoring	P113B	This function has the purpose of warning the system/driver that EGT 1 sensor behavior is not plausible, considering the signal value after a soaking phase and comparing it with a reference expected signal. Failure modes: - Sensor internal malfunctions (offset or drift) - Wiring harness deterioration - ECU input logic fault EGT sensor value (converted raw signal) is not comparable with the expected average temperature measured by other temperature sensors at the beginning of the driving cycle; current temperature value read by the sensor shall not differ from the average for a maximum calibratable amount that is selected between a reference value evaluated with NO parking heater strategy active and a value estimated in case the parking heater strategy active. The average value is evaluated considering:	EGT 1 sensor value (converted raw signal) is not comparable with the expected average temperature (EGT_Avg) calculated starting by other temperature sensors measures at the beginning of the driving cycle; current temperature value read by the sensor differs from the average for a maximum calibratable amount that is selected between a reference value evaluated with NO parking heater strategy active and a value estimated in case the parking heater strategy active.	> 20 [°C]	Monitor enabled by dedicated calibration AND Supply voltage in range AND No electrical checks failed last key on AND Punctual electrical errors affecting the sensor AND Diagnostic system reset status AND Rationality check run at last key on AND Fuel fired heater detection state not unknown/ delayed OR parking heater strategy for temperature sensor rationality monitoring not enabled AND Reference temperature calculation completion	1 [Boolean] == TRUE EGT_ExhGas1_CktTFTKO ==FALSE ==FALSE ==FALSE ==TRUE == TRUE	2 fail samples out of 2 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		engine coolant temperature, fuel temperature, ambient air temperature, intake air temperature, catalyst up and down temperature, SCR down temperature, particulate filter up and down temperature, maximum and minimum read temperature values. The monitor runs at the first key on after a soaking phase.			status, in particular: - Minimum engine-off time AND - Minimum number of available sensors	 > 28,800.00 [s] >= 4		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 2 plausibility at key on monitoring	P113C	This function has the purpose of warning the system/driver that EGT 2 sensor behavior is not plausible, considering the signal value after a soaking phase and comparing it with a reference expected signal. Failure modes: - Sensor internal malfunctions (offset or drift) - Wiring harness deterioration - ECU input logic fault EGT sensor value (converted raw signal) is not comparable with the expected average temperature measured by other temperature sensors at the beginning of the driving cycle; current temperature value read by the sensor shall not differ from the average for a maximum calibratable amount that is selected between a reference value evaluated with NO parking heater strategy active and a value estimated in case the parking heater strategy active. The average value is evaluated considering:	EGT 2 sensor value (converted raw signal) is not comparable with the expected average temperature (EGT_Avg) calculated starting by other temperature sensors measures at the beginning of the driving cycle; current temperature value read by the sensor differs from the average for a maximum calibratable amount that is selected between a reference value evaluated with NO parking heater strategy active and a value estimated in case the parking heater strategy active.	> 25 [°C]	Monitor enabled by dedicated calibration AND Supply voltage in range AND No electrical checks failed last key on AND Punctual electrical errors affecting the sensor AND Diagnostic system reset status AND Rationality check run at last key on AND Fuel fired heater detection state not unknown/ delayed OR parking heater strategy for temperature sensor rationality monitoring not enabled AND Reference temperature calculation completion	1 [Boolean] == TRUE EGT_ExhGas2_CktTFTKO ==FALSE ==FALSE ==FALSE ==TRUE == TRUE	2 fail samples out of 2 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		engine coolant temperature, fuel temperature, ambient air temperature, intake air temperature, catalyst up and down temperature, SCR down temperature, particulate filter up and down temperature, maximum and minimum read temperature values. The monitor runs at the first key on after a soaking phase.			status, in particular: - Minimum engine-off time AND - Minimum number of available sensors	 > 28,800.00 [s] >= 4		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 3 plausibility at key on monitoring	P113D	This function has the purpose of warning the system/driver that EGT 3 sensor behavior is not plausible, considering the signal value after a soaking phase and comparing it with a reference expected signal. Failure modes: - Sensor internal malfunctions (offset or drift) - Wiring harness deterioration - ECU input logic fault EGT sensor value (converted raw signal) is not comparable with the expected average temperature measured by other temperature sensors at the beginning of the driving cycle; current temperature value read by the sensor shall not differ from the average for a maximum calibratable amount that is selected between a reference value evaluated with NO parking heater strategy active and a value estimated in case the parking heater strategy active. The average value is evaluated considering:	EGT 3 sensor value (converted raw signal) is not comparable with the expected average temperature (EGT_Avg) calculated starting by other temperature sensors measures at the beginning of the driving cycle; current temperature value read by the sensor differs from the average for a maximum calibratable amount that is selected between a reference value evaluated with NO parking heater strategy active and a value estimated in case the parking heater strategy active.	> 30 [°C]	Monitor enabled by dedicated calibration AND Supply voltage in range AND No electrical checks failed last key on AND Punctual electrical errors affecting the sensor AND Diagnostic system reset status AND Rationality check run at last key on AND Fuel fired heater detection state not unknown/ delayed OR parking heater strategy for temperature sensor rationality monitoring not enabled AND Reference temperature calculation completion	1 [Boolean] == TRUE EGT_ExhGas3_CktTFTKO ==FALSE ==FALSE ==FALSE ==TRUE == TRUE	2 fail samples out of 2 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		engine coolant temperature, fuel temperature, ambient air temperature, intake air temperature, catalyst up and down temperature, SCR down temperature, particulate filter up and down temperature, maximum and minimum read temperature values. The monitor runs at the first key on after a soaking phase.			status, in particular: - Minimum engine-off time AND - Minimum number of available sensors	 > 28,800.00 [s] >= 4		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Reference Voltage Circuit	P115E	This diagnosis verifies Engine Out NOx Sensor O2 binary reference voltage pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 O2 Binary reference voltage (P+ pin)	open circuit on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Reference Voltage Circuit Low Voltage	P115F	This diagnosis verifies Engine Out NOx Sensor binary reference voltage pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 1 O2 Binary reference voltage (P+ pin)	groundshort on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Reference Voltage Circuit High Voltage	P1160	This diagnosis verifies Engine Out NOx Sensor binary reference voltage pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 1 O2 Binary reference voltage (P+ pin)	powershort on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Signal Circuit	P116A	This diagnosis verifies Engine Out NOx Sensor linear lambda circuit pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 O2 Linear pin (P-)	open circuit on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Signal Circuit Low Voltage	P116B	This diagnosis verifies Engine Out NOx Sensor linear lambda circuit pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 1 O2 Linear pin (P-)	groundshort on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Signal Circuit High Voltage	P116C	This diagnosis verifies Engine Out NOx Sensor linear lambda circuit pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 1 O2 Linear pin (P-)	powershort on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Pump Current Control Circuit	P116D	This diagnosis verifies Engine Out NOx Sensor O2 reference circuit pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 O2 Reference pin(M1, auxiliary pumping current)	open circuit on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Pump Current Control Circuit Low Voltage	P116E	This diagnosis verifies Engine Out NOx Sensor O2 reference circuit pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 1 O2 Reference pin (M1, auxiliary pumping current)	groundshort on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Pump Current Control Circuit High Voltage	P116F	This diagnosis verifies Engine Out NOx Sensor O2 reference circuit pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 1 O2 Reference pin (M1, auxiliary pumping current)	powershort on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Temperature Not Plausible	P118B	This diagnosis detects a soot sensor temperature sensor damaged or a possible parassitic resistance on the wiring harness between the soot sensor heater and the soot sensor control unit	The absolute value of the difference between the soot sensor electrode temperature at power-up and the average of temperature sensors (EGT_Avg)	> 30.00 °C	Key is turned on		No time debounce	Type B, 2 Trips
					Ignition voltage in range	> 11.00		
					Soot Sensor bus relay is commanded on	NOT(SBR_RlyFA)		
					No electrical fault active on Soot Sensor bus relay			
					No faults of CAN communication loss with Soot Sensor	NOT(U02A3)		
					No Soot Sensor supply undervoltage detected, i.e. supply sensor voltage for a time	> 9.00 V > 0.10 s		
					No electrical fault detected on Soot Sensor	NOT(SOT_ElecIFlt)		
					If enabled, the Soot Sensor temperature circuit low and high monitoring reported a test pass	TPTKO on P1477 TPTKO on P1478		
					Ambient Air pressure	> 70.00 KPa		
					Ambient air pressure sensor not faulty	AmbPresDfltdStatus = CeAAPR_e_AmbPresNot Dfltd		
					Time since Soot Sensor heating off when the sensor temperature has	> 600.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					been stored is			
					Timer since Soot Sensor heating off is not affected by error on module off timer	NOT(ModuleOffTimeErr)		
					Calculation of the reference temperature at system start up is valid:	EGT_TempAvgVld		
					- minimum time from the previous key off to enable the reference temperature calculation	> 28,800.00		
					Diagnostic has not yet reported a pass or failure	NOT (TPTKO OR TFTKO) on P118B		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Temperature Sensor Performance - During Engine Running Test Bank 1 Sensor 1	P118E	This monitor has the purpose of warning the system/driver that EGT 1 sensor behavior is not plausible, considering the signal value in dynamic conditions and comparing it with a modeled signal. Failure modes: sensor internal malfunctioning (offset or drift). The monitor compares the EGT signal read by the sensor with a modeled temperature signal. If the difference between the temperature values overcomes two calibratable thresholds (highest and lowest allowed difference), an error is detected.	The monitor compares EGT 1 signal read by the sensor with a modeled temperature signal. If the difference between the temperature values overcomes two calibratable thresholds, an error is detected.	> 195.97 [°C] OR < -195.97 [°C]	Monitor enabled by dedicated calibration AND Diagnostic system reset status AND Exhaust manifold pressure reliability flag AND No faults affecting EGT sensors AND Temperature estimation in range AND Minimum elapsed time in engine not running	1.00 ==FALSE ==TRUE EGT_ExhGas1_StkFA AND EGT_ExhGas1_StkTFTKO AND EGT_ExhGas1_CktFA AND EGT_ExhGas1_CktTFTKO AND EGT_ExhGas1_QckChgFA AND EGT_ExhGas1_QckChgTFTKO > 155.97 [°C] < 700.00 [°C] >= 0.00 [s]	6.00 fail samples out of 8.00 over 5.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					conditions			
					AND			
					Engine not running timer error flag	==FALSE		
					AND			
					Dynamic check validity	==TRUE		
					AND			
					Temperature estimation not in fault	EGT_EGT1_DiagMdlFlt == FALSE		
					AND			
					Supply voltage in range	> 11.00 [V]		
					AND			
					Minimum transition time elapsed after moving from combustion modes affecting the temperature estimation for a long period	>= 100.00 [s]		
					AND			
					Minimum transition time elapsed after moving from combustion modes affecting the temperature estimation for a short period	>= 60.00 [s]		
					AND			
					Minimum time elapsed in engine running phase	>= 30.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND			
					Limited modeled temperature changing rate, evaluated in a certain time window	< 50.00 degC over CeEGTR_e_IndexMax5000ms		
					AND			
					Fuel request and engine speed in range	**EGT1 DynChk EngPtEnbl**		
					AND			
					Minimum time elapsed once all other enabling conditions are met	> 4.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Temperature Sensor Performance - During Engine Running Test Bank 1 Sensor 2	P118F	This monitor has the purpose of warning the system/driver that EGT 2 sensor behavior is not plausible, considering the signal value in dynamic conditions and comparing it with a modeled signal. Failure modes: sensor internal malfunctioning (offset or drift). The monitor compares the EGT signal read by the sensor with a modeled temperature signal. If the difference between the temperature values overcomes two calibratable thresholds (highest and lowest allowed difference), an error is detected.	The monitor compares EGT 2 signal read by the sensor with a modeled temperature signal. If the difference between the temperature values overcomes two calibratable thresholds, an error is detected.	> 156.19 [°C] OR < -156.19 [°C]	Monitor enabled by dedicated calibration AND Diagnostic system reset status AND Exhaust manifold pressure reliability flag AND No faults affecting EGT sensors AND Temperature estimation in range AND Minimum elapsed time in engine not running	1.00 ==FALSE ==TRUE EGT_ExhGas2_StkFA AND EGT_ExhGas2_StkTFTKO AND EGT_ExhGas2_CktFA AND EGT_ExhGas2_CktTFTKO AND EGT_ExhGas2_QckChgFA AND EGT_ExhGas2_QckChgTFTKO > 116.59 [°C] < 840.00 [°C] >= 0.00 [s]	6.00 fail samples out of 8.00 over 5.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					conditions			
					AND			
					Engine not running timer error flag	==FALSE		
					AND			
					Dynamic check validity	==TRUE		
					AND			
					Temperature estimation not in fault	EGT_EGT2_DiagMdlFlt == FALSE		
					AND			
					Supply voltage in range	> 11.00 [V]		
					AND			
					Minimum transition time elapsed after moving from combustion modes affecting the temperature estimation for a long period	>= 150.00 [s]		
					AND			
					Minimum transition time elapsed after moving from combustion modes affecting the temperature estimation for a short period	>= 60.00 [s]		
					AND			
					Minimum time elapsed in engine running phase	>= 120.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND			
					Limited modeled temperature changing rate, evaluated in a certain time window	< 10.00 degC over CeEGTR_e_IndexMax5000ms		
					AND			
					Fuel request and engine speed in range	**EGT1 DynChk EngPtEnbl**		
					AND			
					Minimum time elapsed once all other enabling conditions are met	> 8.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Low Reference Circuit	P1192	This diagnosis verifies Engine Out NOx Sensor Low Reference Circuit for Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 Low Reference pin (Ref)	open circuit on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Low Reference Circuit Low Voltage	P1193	This diagnosis verifies Engine Out NOx Sensor Low Reference Circuit for Short to Ground	Check if there is an short circuit to ground on NOx Sensor 1 Low Reference pin (Ref)	groundshort on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 O2 Low Reference Circuit High Voltage	P1194	This diagnosis verifies Engine Out NOx Sensor Low Reference Circuit for Short to Battery	Check if there is an short circuit to power supply on NOx Sensor 1 Low Reference pin (Ref)	powershort on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Temperature Sensor Performance - During Engine Running Test Bank 1 Sensor 3	P1196	This monitor has the purpose of warning the system/driver that EGT 3 sensor behavior is not plausible, considering the signal value in dynamic conditions and comparing it with a modeled signal. Failure modes: sensor internal malfunctioning (offset or drift). The monitor compares the EGT signal read by the sensor with a modeled temperature signal. If the difference between the temperature values overcomes two calibratable thresholds (highest and lowest allowed difference), an error is detected.	The monitor compares EGT 3 signal read by the sensor with a modeled temperature signal. If the difference between the temperature values overcomes two calibratable thresholds, an error is detected.	> 182.99 [°C] OR < -182.99 [°C]	Monitor enabled by dedicated calibration AND Diagnostic system reset status AND Exhaust manifold pressure reliability flag AND No faults affecting EGT sensors AND Temperature estimation in range AND Minimum elapsed time in engine not running	1.00 ==FALSE ==TRUE EGT_ExhGas3_StkFA AND EGT_ExhGas3_StkTFTKO AND EGT_ExhGas3_CktFA AND EGT_ExhGas3_CktTFTKO AND EGT_ExhGas3_QckChgFA AND EGT_ExhGas3_QckChgTFTKO > 142.99 [°C] < 815.00 [°C] >= 0.00 [s]	6.00 fail samples out of 8.00 over 2.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					conditions			
					AND			
					Engine not running timer error flag	==FALSE		
					AND			
					Dynamic check validity	==TRUE		
					AND			
					Temperature estimation not in fault	EGT_EGT3_DiagMdlFlt == FALSE		
					AND			
					Supply voltage in range	> 11.00 [V]		
					AND			
					Minimum transition time elapsed after moving from combustion modes affecting the temperature estimation for a long period	>= 550.00 [s]		
					AND			
					Minimum transition time elapsed after moving from combustion modes affecting the temperature estimation for a short period	>= 260.00 [s]		
					AND			
					Minimum time elapsed in engine running phase	>= 120.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND			
					Limited modeled temperature changing rate, evaluated in a certain time window	< 5.00 degC over CeEGTR_e_IndexMax5000ms		
					AND			
					Fuel request and engine speed in range	**EGT3 DynChk EngPtEnbl**		
					AND			
					Minimum time elapsed once all other enabling conditions are met	> 8.00 [s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Signal Circuit	P119A	This diagnosis verifies Engine Out NOx Sensor NOx Circuit for Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 NOx-related measurement pin (M2)	open circuit on M2	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Signal Circuit Low Voltage	P119B	This diagnosis verifies Engine Out NOx Sensor NOx Circuit for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 1 NOx-related measurement pin (M2)	groundshort on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Signal Circuit High Voltage	P119C	This diagnosis verifies Engine Out NOx Sensor NOx Circuit for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 1 NOx-related measurement pin (M2)	powershort on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Signal Circuit	P119D	This diagnosis verifies Post Catalyst NOx Sensor NOx Circuit for Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 NOx-related measurement pin (M2)	open circuit on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Signal Circuit Low Voltage	P119E	This diagnosis verifies Post Catalyst NOx Sensor NOx Circuit for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 NOx-related measurement pin (M2)	groundshort on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Signal Circuit High Voltage	P119F	This diagnosis verifies Post Catalyst NOx Sensor NOx Circuit for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 2 NOx-related measurement pin (M2)	powershort on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Reference Voltage Circuit	P11BE	This diagnosis verifies Post Catalyst NOx Sensor binary reference voltage pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 O2 Binary reference voltage (P+ pin)	open circuit on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:P30B5	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Reference Voltage Circuit Low Voltage	P11BF	This diagnosis verifies Post Catalyst NOx Sensor binary reference voltage pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 O2 Binary reference voltage (P+ pin)	groundshort on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Reference Voltage Circuit High Voltage	P11C0	This diagnosis verifies Post Catalyst NOx Sensor binary reference voltage pin for Short to Battery	Check if there is an short circuit to power supply on NOx Sensor 2 O2 Binary reference voltage (P+ pin)	powershort on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached P30B5No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Ground Circuit	P11C5	This diagnosis verifies Engine Out NOx Sensor heater ground circuit open	Check if there is an open circuit on NOx Sensor 1 heater reference pin (H-)	open circuit on H- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Ground Circuit High Voltage	P11C6	This diagnosis verifies Engine Out NOx Sensor heater ground circuit Short to Battery	Check if there is short circuit to power supply on NOx Sensor 1 heater reference pin (H-)	powershort on H-	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Ground Circuit	P11C7	This diagnosis verifies Post Catalyst NOx Sensor heater ground circuit open	Check if there is an open circuit on NOx Sensor 2 heater reference pin (H-)	open circuit on H- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Ground Circuit High Voltage	P11C8	This diagnosis verifies Post Catalyst NOx Sensor heater ground circuit Short to Battery	Check if there is a short circuit to power on NOx Sensor 2 heater reference pin (H-)	powershort on H- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Performance - Signal Low Bank 1 Sensor 1	P11CC	This diagnosis verifies the plausibility of Engine Out NOx Sensor signal	Check if (Engine Out NOx Sensor signal - NOx Model)/NOx Model with EWMA filter is above or below two calibratable thresholds	< -51 % OR > 70.00 %	Engine is running Powertrain relay voltage No failure on any NOx model inputs Injection small quantity adjustment (SQA) learning is not active No failure on NOx1 CAN communication No electrical failure on NOx1 Sensor No out of range low failure on NOx1 Sensor No out of range high failure on NOx1 Sensor No current control failure on NOx1 Sensor No offset failure on NOx1 Sensor No increasing dynamic failure on NOx1 Sensor No decreasing dynamic failure on NOx1 Sensor	TRUE > 11.00 V EXM_NOxMdl_ExhMnfdNotVld ==FALSE FAD_SQA_LrnET_Enbl ==FALSE CAN_LostComm_FltN_BusB_NOxSnsr_A ==FALSE NOX_Snsr1_FltSt ==FALSE NOX_NOx1_OutOfRngLoFlt ==FALSE NOX_NOx1_OutOfRngHiFlt ==FALSE NOX_NOx1_StBitChkFlt ==FALSE NOX_NOx1_OfstMontrFlt ==FALSE NOX_NOx1_IncrDynChkFlt ==FALSE NOX_NOx1_DecrDynChkFlt ==FALSE	Test per trip: 1 If Fast Initial Response EWMA is active then 1 test per trip are allowed If Rapid Response EWMA is active then 2 test per trip are allowed The signal for the monitor check is calculated at first collecting and averaging 100.00 samples, than filtering the resulting mean value by means of a first-order filter. The filter gain calibration (1) can assume the following values: - 0.75 if FIR is active - 0.25 if RR is active - 0.16 if neither FIR and RR are active (1) The EWMA	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No DTC set: No failure on outside air temperature Sensor No failure on ambient air temperature Sensor no falut on upstream catalyst exhaust pressure model inputs No failure on engine coolant temperature Sensor No failure on injectors No failure on high pressure fuel rail system No failure on intake manifold absolute pressure Sensor Modeled Engine Out NOx concentration Steady state detection: a) Modeled Engine Out NOx concentration step at 100 ms. b) condition a) is fulfilled for time Ambient air pressure Outside air temperature	P30B4 OAT_PtEstFiltFA ==FALSE AmbPresDfltdStatus ==FALSE EGP_PresCatUpFlt ==FALSE ECT_Sensor_FA ==FALSE FUL_GenericInjSysFlt ==FALSE FHP_InjLeakageFA ==FALSE MAP_SensorFA==FALSE > 105 ppm < 5 ppm > 3.00 sec > 72 kPa < 200 kPa > -20 °C < 300 °C	filter is active if the filter gain is calibrated with a value lower than 1, otherwise EWMA filter is cal-out.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Combustion mode dependent enabling flag	**NOX_S1_PlausChkEnblCmbMode**		
					Intake manifold absolute pressure	< 250 kPA		
					Injection fuel quantity requested	For normal combustion mode: > 22.00 mm^3 < 50.00 mm^3 For other combustion modes: > 20 mm^3 < 42 mm^3		
					Engine speed	For normal combustion mode: > 1,240 rpm < 1,620 rpm For other combustion modes: > 1,620 rpm < 1,225 rpm		
					Engine coolant temperature	> 70 °C < 120 °C		
					Sensor dewpoint is reached	TRUE		
					Diagnostic test results during EWMA FIR mode	< 1		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Signal Circuit	P11D0	This diagnosis verifies Post Catalyst NOx Sensor O2 reference circuit pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 O2 Linear pin (P-)	open circuit on P-	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Signal Circuit Low Voltage	P11D1	This diagnosis verifies Post Catalyst NOx Sensor linear lambda circuit pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 O2 Linear pin (P-)	groundshort on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Signal Circuit High Voltage	P11D2	This diagnosis verifies Post Catalyst NOx Sensor linear lambda circuit pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 2 O2 Linear pin (P-)	powershort on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Offset Learning At Min Limit - Bank 1 Sensor 1	P11D3	This diagnosis verifies if Engine Out NOx Sensor raw signal is affected by an offset	Check if NOx1 signal has an offset by learning the raw value in stable conditions during fuel cut off maneuver. A fault is detected if one of the following conditions is true: 1. Mean of all NOx Sensor readings (where every reading is the mean value of a sampling window) OR 2. Mean of all NOx Sensor readings (where every reading is the mean value of a sampling window)	< -50.00 ppm > 180.00 ppm	Combustion mode dependent enabling flag Engine is running Engine is not cranking Powertrain relay voltage NOx Sensor Bus relay is commanded ON Engine Out NOx Sensor is present in the exhaust Sensor heater is in range: a) (Sensor heater raw resistance - Sensor heater target resistance) / Sensor heater target resistence b) condition a) is fulfilled for time Sensor supply in range Sensor dewpoint is reached Injection small quantity adjustment (SQA) learning is not active EGR measured position Exhaust mass flow is within a range DEF injection is within a range	**NOX_S1_OfstMntrEnblCmbMode** TRUE TRUE > 11.00 V TRUE TRUE < 0.06 % > - 0.06 % > 10.00 sec > 9.90 V TRUE FAD_SQA_LrnET_Enbl ==FALSE < 100.00 % < 80.00 g/s > 10.00 g/s < 500.00 mg/s > -1.00 mg/s	The monitor runs after fuel cut off maneuver, when air mass integral exceeds 20.00 g and Engine Out NOx signal is stable for at least 0.00 s. The NOx value used for the monitor is calculated after sampling up to 10.00 sampling windows (each one made up of 10.00 samples), averaging the mean values of every window. Once computed this value, the diagnostic provides a result. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine speed is within a range	< 4,500.00 rpm > 800.00 rpm		
					Engine Out NOx Sensor temperature is within a range	< 410.00 °C > -20.00 °C		
					Fuel request is steady state when all the following conditions are verified: a) Fuel request derivative b) Fuel request within a range c) conditions a) and b) are fulfilled for a time	 < 0.01 mm^3/s < 0.00 mm^3 > -1.00 mm^3 > 3.00 s		
					Intake manifold absolute pressure	< 1,000.00 kPa		
					No failure on intake manifold absolute pressure Sensor	MAP_SensorFA==FALSE		
					No electrical failure on NOx1 Sensor	NOX_Snsr1_FltSt ==FALSE		
					No current control failure on NOx1 Sensor	NOX_NOx1_StBitChkFlt ==FALSE		
					No out of range low failure on NOx1 Sensor	NOX_NOx1_OutOfRngLo Flt ==FALSE		
					No out of range high failure on NOx1 Sensor	NOX_NOx1_OutOfRngHi Flt ==FALSE		
					No failure on NOx1 Sensor signal plausibility	NOX_NOx1_NOxPlausFlt ==FALSE		
					No failure on NOx1	NOX_NOx1_DynChkFlt		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Sensor signal dynamic No failure on NOx1 CAN communication No failure on EGR valve actuator No failure on high pressure fuel rail system No failure on injectors No fault on any exhaust mass flow model input No failure on air control system No failure on NOx Sensor Bus relay circuit No failure on Upstream SCR temperature Sensor No DTC set:	==FALSE CAN_LostComm_FltN_BusB_NOxSnsr_A ==FALSE EGR_PstnShtOffReqFA ==FALSE FHP_InjLeakageFA ==FALSE FUL_GenericInjSysFlt ==FALSE EXM_TurbFlowNotValid ==FALSE AIC_AirShtOffReq ==FALSE SBR_RlyFA==FALSE NOX_Snsr1_TempFlt ==FALSE P30B4		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Offset Learning At Min Limit - Bank 1 Sensor 2	P11D5	This diagnosis verifies if Post Catalyst NOx Sensor raw signal is affected by an offset	Check if NOx2 signal has an offset by learning the raw value in stable conditions during fuel cut off maneuver. A fault is detected if one of the following conditions is true: 1. Mean of all NOx Sensor readings (where every reading is the mean value of a sampling window) OR 2. Mean of all NOx Sensor readings (where every reading is the mean value of a sampling window)	 < -50.00 ppm > 450.00 ppm	Combustion mode dependent enabling flag Engine is running Engine is not cranking Powertrain relay voltage NOx Sensor Bus relay is commanded ON Post Catalyst NOx Sensor is present in the exhaust Sensor heater is in range: a) (Sensor heater raw resistance - Sensor heater target resistance) / Sensor heater target resistence b) condition a) is fulfilled for time Sensor supply in range Sensor dewpoint is reached Injection small quantity adjustment (SQA) learning is not active EGR measured position Exhaust mass flow is within a range DEF injection is within a range	**NOX_S2_OfstMntrEnblCmbMode** TRUE TRUE > 11.00 V TRUE TRUE < 0.06 % > - 0.06 % > 10.00 sec > 9.90 V TRUE FAD_SQA_LrnET_Enbl ==FALSE < 100.00 % < 70.00 g/s > 10.00 g/s < 500.00 mg/s > -1.00 mg/s	The monitor runs after fuel cut off maneuver, when air mass integral exceeds 260.00 g and Post Catalyst NOx signal is stable for at least 1.00 s. The NOx value used for the monitor is calculated after sampling up to 1.00 sampling windows (each one made up of 12.00 samples), averaging the mean values of every window. Once computed this value, the diagnostic provides a result. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine speed is within a range	< 3,000.00 rpm > 800.00 rpm		
					Post Catalyst NOx Sensor temperature is within a range	< 360.00 °C > -20.00 °C		
					Time after DPF regen modes	> 300.00 s		
					Fuel request is steady state when all the following conditions are verified: a) Fuel request derivative b) Fuel request within a range c) conditions a) and b) are fulfilled for a time	 < 20.00 mm^3/s < 0.10 mm^3 > -1.00 mm^3 > 1.00 s		
					Intake manifold absolute pressure	< 1,000.00 kPa		
					No failure on intake manifold absolute pressure Sensor	MAP_SensorFA==FALSE		
					No electrical failure on NOx2 Sensor	NOX_Snsr2_FltSt ==FALSE		
					No current control failure on NOx2 Sensor	NOX_NOx2_StBitChkFlt ==FALSE		
					No out of range low failure on NOx2 Sensor	NOX_NOx2_OutOfRngLo Flt ==FALSE		
					No out of range high failure on NOx2 Sensor	NOX_NOx2_OutOfRngHi Flt ==FALSE		
					No failure on NOx2	NOX_NOx2_SelfDiagFlt		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Sensor signal plausibility	==FALSE		
					No failure on NOx2 Sensor signal dynamic	NOX_NOx2_DynChkFlt ==FALSE		
					No failure on NOx2 CAN communication	CAN_LostComm_FltN_BusB_NOxSnsr_B ==FALSE		
					No failure on EGR valve actuator	EGR_PstnShtOffReqFA ==FALSE		
					No failure on high pressure fuel rail system	FHP_InjLeakageFA ==FALSE		
					No failure on injectors	FUL_GenericInjSysFlt ==FALSE		
					No fault on any exhaust mass flow model input	EXM_TurbFlowNotValid ==FALSE		
					No failure on air control system	AIC_AirShtOffReq ==FALSE		
					No failure on NOx Sensor Bus relay circuit	SBR_RlyFA==FALSE		
					Upstream SCR temperature is steady state:			
					a) Upstream SCR temperature derivative within a range	< 3.00 °C/s > -10.00 °C/s		
					b) conditions a) is fulfilled for a time	> 120.00 s		
					No failure on Downstream SCR temperature Sensor	NOX_Snsr2_TempFlt ==FALSE		
					No failure on upstream SCR temperature	EGT_TempSCR_UpFlt ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No O2 plausibility in load fault on NOx2 No DTC set:	OXY_NOx2ChkLoadFlt ==FALSE P30B5		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Pump Current Control Circuit	P11D8	This diagnosis verifies Post Catalyst NOx Sensor O2 reference circuit pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 O2 Reference pin (M1, auxiliary pumping current)	open circuit on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Pump Current Control Circuit Low Voltage	P11D9	This diagnosis verifies Post Catalyst NOx Sensor O2 reference circuit pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 O2 Reference pin (M1, auxiliary pumping current)	groundshort on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Pump Current Control Circuit High Voltage	P11DA	This diagnosis verifies Post Catalyst NOx Sensor O2 reference circuit pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 2 O2 Reference pin (M1, auxiliary pumping current)	powershort on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Current Range/ Performance - Bank 1 Sensor 1	P11DB	This diagnosis verifies that Engine Out NOx Sensor embedded current control circuit status is healthy	Check if the NOx1 Sensor embedded stability criteria of Nox/Lambda current control circuit are violated NOx stability flag: (OFF_Time/TOTAL_time) Lambda stability flag: (OFF_Time/TOTAL_time) Note: TOTAL_time= ON_time +OFF_Time	Stability flag for NOx signal is set to OFF if one of the following condition is not fulfilled: a) V2 within an interval of 40mV around its set point b) Delta Ip2 <426nA/10msec c) Delta Ip1 < 2.34 uA aorund its set point Stability flag for Lambda signal is set to OFF if one of the following condition is not fulfilled: a) Delta Ip0 < 300 uA /10 msec b) Delta Ip1 < 2.34 uA around its set point > 1 % > 1 %	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Engine is not cranking Sensor dewpoint is reached Sensor heater is in range: a) (Sensor heater raw resistance - Sensor heater target resistance) / Sensor heater target resistence b) condition a) is fulfilled for time Engine is running No electrical failure on NOx1 Sensor Combustion mode dependent enabling flag Fuel request: a) fuel request derivative is within a range b) condition a) is fulfilled for time	> 11.00 V TRUE FALSE > 9.90 V TRUE TRUE < 0.06 % >- 0.06 % > 10.00 sec TRUE NOX_Snsr1_FltSt ==FALSE **NOX_S1_StBitChkEnblCmbMode** <= 35.00 mm^3/s >= -50.00 mm^3/s > 5.00 sec	NOx stability flag time counter: 2 fails out of 2 samples Lambda stability flag time counter: 2 fails out of 2 samples Task=12.5ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Current Range/ Performance - Bank 1 Sensor 2	P11DC	This diagnosis verifies that Post Catalyst NOx Sensor embedded current control circuit status is healthy	Check if the NOx2 Sensor embedded stability criteria of Nox/Lambda current control circuit are violated NOx stability flag: (OFF_Time/TOTAL_time) Lambda stability flag: (OFF_Time/TOTAL_time) Note: TOTAL_time= ON_time +OFF_Time	Stability flag for NOx signal is set to OFF if one of the following condition is not fulfilled: a) V2 within an interval of 40mV around its set point b) Delta Ip2 <426nA/10msec c) Delta Ip1 < 2.34 uA aorund its set point Stability flag for Lambda signal is set to OFF if one of the following condition is not fulfilled: a) Delta Ip0 < 300 uA /10 msec b) Delta Ip1 < 2.34 uA around its set point > 1 % > 1 %	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Engine is not cranking Sensor dewpoint is reached Sensor heater is in range: a) (Sensor heater raw resistance - Sensor heater target resistance) / Sensor heater target resistence b) condition a) is fulfilled for time Engine is running No electrical failure on NOx2 Sensor Combustion mode dependent enabling flag Fuel request: a) fuel request derivative is within a range b) condition a) is fulfilled for time	> 11.00 V TRUE FALSE > 9.90 V TRUE TRUE < 0.06 % >- 0.06 % > 10.00 sec TRUE NOX_Snsr2_FltSt ==FALSE **NOX_S2_StBitChkEnblCmbMode** <= 35.00 mm^3/s >= -50.00 mm^3/s > 5.00 sec	NOx stability flag time counter: 2 fails out of 2 samples Lambda stability flag time counter: 2 fails out of 2 samples Task=12.5ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Low Reference Circuit	P11FC	This diagnosis verifies Post Catalyst NOx Sensor Low Reference Circuit for Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 Low Reference pin (Ref)	open circuit on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Low Reference Circuit Low Voltage	P11FD	This diagnosis verifies Post Catalyst NOx Sensor Low Reference Circuit for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 Low Reference pin (Ref)	groundshort on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 O2 Low Reference Circuit High Voltage	P11FE	This diagnosis verifies Post Catalyst NOx Sensor Low Reference Circuit for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 2 Low Reference pin (Ref)	powershort on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Supply Circuit	P122B	This monitor checks if the Throttle DC-Motor is correctly supplied	System voltage supply lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Control Circuit Shorted	P122C	This monitor checks if the Throttle commands are shorted one other	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 9 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Position Sensor Exceeded Learning Limit (SENT position sensor)	P122D	This monitor checks if the Throttle position SENT sensor has an offset with respect to the nominal position where the valve does the learning procedure (fully closed)	SENT position raw voltage when the valve is in fully closed position < low threshold OR SENT position raw voltage when the valve is in fully closed position > high threshold OR SENT position raw voltage when the valve is in wide open position < low threshold OR SENT position raw voltage when the valve is in wide open position > high threshold	< 87.80 [%5V] OR > 91.60 [%5V] < 10.00 [%5V] OR > 30.00 [%5V]	Test enabled by calibration Key signal is off Learning procedure at key off in fully closed and/or wide open positions have been successfully completed: - engine coolant temperature - no faults present on coolant temperature sensor - outside air temperature - no faults present on outside air temperature sensor - PT relay supply voltage No faults present on Throttle position sensor, Throttle valve, Throttle position deviation. End Of Trip event has elapsed	== 1.00 >= 30.00 [°C] <= 150.00 [°C] ECT_Sensor_FA == FALSE >= -9.00 [°C] OAT_PtEstFiltFA == FALSE > 10.00 [V] TPS_PstnSnsrCktFlt== FALSE TPS_ActrFA == FALSE TPS_PstnDvtnFA == FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Positive Voltage Control Circuit Shorted to Control Circuit	P1248	This DTC detects a shorted load on Injector 1	Voltage high across low side and High side drivers during on state indicates low side shorted to high side	the time to reach the 2 A threshold of the injector current is shorter than 2 us	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderA and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderA	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Positive Voltage Control Circuit Shorted to Control Circuit	P1249	This DTC detects a shorted load on Injector 2	Voltage high across low side and High side drivers during on state indicates low side shorted to high side	the time to reach the 2 A threshold of the injector current is shorter than 2 us	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderB and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderB	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Positive Voltage Control Circuit Shorted to Control Circuit	P124A	This DTC detects a shorted load on Injector 3	Voltage high across low side and High side drivers during on state indicates low side shorted to high side	the time to reach the 2 A threshold of the injector current is shorter than 2 us	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderH and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderH	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Positive Voltage Control Circuit Shorted to Control Circuit	P124B	This DTC detects a shorted load on Injector 4	Voltage high across low side and High side drivers during on state indicates low side shorted to high side	the time to reach the 2 A threshold of the injector current is shorter than 2 us	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderE and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderE	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Positive Voltage Control Circuit Shorted to Control Circuit	P124C	This DTC detects a shorted load on Injector 5	Voltage high across low side and High side drivers during on state indicates low side shorted to high side	the time to reach the 2 A threshold of the injector current is shorter than 2 us	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderF and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderF	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Positive Voltage Control Circuit Shorted to Control Circuit	P124D	This DTC detects a shorted load on Injector 6	Voltage high across low side and High side drivers during on state indicates low side shorted to high side	the time to reach the 2 A threshold of the injector current is shorter than 2 us	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and FUL_OutEnblCyl_CiEPSR_CylinderG and At least one injection pulse is requested by the application software (FUL_FuelInjectedCyl_CiEPSR_CylinderG	== 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] ==TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Signal Circuit	P1388	This diagnosis verifies Post Second Catalyst NOx Sensor NOx Circuit for Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 NOx-related measurement pin (M2)	open circuit on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Signal Circuit Low Voltage	P1389	This diagnosis verifies Post Second Catalyst NOx Sensor NOx Circuit for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 NOx-related measurement pin (M2)	groundshort on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Signal Circuit High Voltage	P138A	This diagnosis verifies Post Second Catalyst NOx Sensor NOx Circuit for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 3 NOx-related measurement pin (M2)	powershort on M2 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Supply Circuit	P1402	This monitor checks if the HP EGR DC-Motor is correctly supplied	System voltage supply lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Control Circuit Shorted	P1407	This monitor checks if the HP EGR commands are shorted one other	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Current Range/ Performance	P140F	This monitor checks if an excessive current flows through the HP EGR DC-Motor (e.g. shunt circuit between load, HP EGR DC-Motor internal faults, etc).	Current flowing through the H-Bridge higher than a threshold (error information provided by HWIO)	> 6.3 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on HP EGR DC Motor current range/performance H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V] EGR_MtrCurrLimTFTKO ==FALSE	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Supply Circuit	P1419	This monitor checks if the LP EGR DC-Motor is correctly supplied	System voltage supply lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Control Circuit Shorted	P141A	This monitor checks if the LP EGR commands are shorted one other	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Current Range/ Performance	P141B	This monitor checks if an excessive current flows through the LP EGR DC-Motor (e.g. shunt circuit between load, LP EGR DC-Motor internal faults, etc).	Current flowing through the H-Bridge higher than a threshold (error information provided by HWIO)	> 6.3 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on LP EGR DC Motor current range/performance H-Bridge driver is ON Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V] LPE_MtrCurrLimTFTKO ==FALSE	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation B Motor Overtemperature	P141C	This monitor checks if the temperature of the LP EGR DC-Motor increases too much (e.g. LP EGR DC-Motor internal faults, etc).	H-Bridge driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Motor Overtempera ture	P1424	This monitor checks if the temperature of the HP EGR DC-Motor increases too much (e.g. HP EGR DC-Motor internal faults, etc).	H-Bridge driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Intake Air Flow Motor Overtempera ture	P1425	This monitor checks if the temperature of the Throttle DC-Motor increases too much (e.g. Throttle DC-Motor internal faults, etc).	H-Bridge driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EGR Temperature Sensor1 IAT Not Plausible	P1428	The power up temperatue varies too much from reference sensor after long soak	if the power up initial value of the temp sensor varies more than allowed from the reference temp sensor	Temperature Delta from MAT. at powerup > 20 °C	Engine soak (not run) time No P codes	>= 28,800.00 Sec P262B P0111 P0114 P010B P00E9 P117D P017C P017D P017B P117B P117F P117E P117C P0116 P0117 P0118 P111E P0128 P0119	NA	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Closed Loop Particulate Filter Regeneration Control At Limit - Stage 2 Temperature Too Low	P144E	DPF Control Temperature Deviation diagnostic monitors the exhaust gas temperature downstream the 1st ccDOC (EGT2 sensor, configuration "**c1**") or upstream the DPF (EGT3 sensor, configuration "**c2**") to determine whether the temperature deviation between the control setpoint and the temperature read by the sensor is within a prescribed deviation range. Temperature deviation diagnostic shall diagnose a too low temperature, that means a Positive temperature deviation temperature. The diagnosis runs during regeneration mode and when the temperature closed loop is active. The monitoring is divided into 2 logics, in particular the DPF warm up state logic and the DPF steady state logic.	**LowTemperature monitoring (Positive Deviation):** **(c1)** Temperature ccDOC Downstream control setpoint - ccDOC Downstream sensor reading (EGT2) **(c2)** Temperature DPF Upstream control setpoint - DPF Upstream sensor reading (EGT3)	> 100.00 [degC]	Test enabled by calibration flag Regeneration state in warm up DPF Mode DPF temperature closed loop control shall be enabled Battery voltage No fault on exhaust mass flow No Fault on DOC downstream temperature sensor (only SCR forward architectures) No Fault on DPF upstream temperature model (only SCRF architectures) No Fault on DPF upstream temperature sensor (only DPF forward architectures) No Fault on ambient temperature sensor (only SCR forward	1.00 [Boolean] ==TRUE DPF_DPF_St== Warm_Up EGT_DsblCL== Enable temperature Closed loop control [Boolean] > 11.00 [V] EXM_TurbFlowNotValid [Boolean] ==FALSE EGT_SnsrCatDwnFlt [Boolean] ==FALSE EGT_TempDPF_UpFlt [Boolean] ==FALSE EGT_SnsrDPF_UpFlt [Boolean] ==FALSE OAT_PtEstFiltFA [Boolean] ==FALSE	850.00 fail samples out of 1,000.00 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					architectures)			
					No Fault on ambient pressure sensor (only SCR forward architectures)	AAP_AmbientAirPresDfltd [Boolean] ==FALSE AND AAP_AmbPresSnsrTFTKO [Boolean] ==FALSE		
					Combustion mode different from LNT Desox Lean and LNT Engine Protection	==TRUE		
					Temperature deviation monitoring shall be enabled by a boolean flag. The boolean flag shall be the output of a map function of engine speed and fuel request	**EnginePointEnable_DPF_TempDeviation** [Boolean]		
					Exhaust mass flow AND Exhaust mass flow	< 200.00 [g/s] > 8.00 [g/s]		
					Filtered Exhaust mass flow variation (absolute value)	< 100.00 [g/s]		
					Time in which the system is in cut off	<= 30.00 [sec]		
					All the above enabling conditions are met for at	> 150.00 [sec]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					least a timer			
			Low Temperature monitoring (Positive Deviation): **(c1)** Temperature ccDOC Downstream control setpoint - ccDOC Downstream sensor reading (EGT2) **(c2)** Temperature DPF Upstream control setpoint - DPF Upstream sensor reading (EGT3)	> 100.00 [degC]	Test enabled by calibration flag Regeneration state in Steday state DPF Mode DPF temperature closed loop control shall be enabled Battery voltage No fault on exhaust mass flow No Fault on DOC downstream temperature sensor (only SCR forward architectures) No Fault on DPF upstream temperature model (only SCRF architectures) No Fault on DPF upstream temperature sensor (only DPF forward architectures) No Fault on ambient	1.00 [Boolean] ==TRUE DPF_DPF_St== Steady state EGT_DsblCL == Enable temperature Closed loop control [Boolean] > 11.00 [V] EXM_TurbFlowNotValid [Boolean] ==FALSE EGT_SnsrCatDwnFlt [Boolean] ==FALSE EGT_TempDPF_UpFlt [Boolean] ==FALSE EGT_SnsrDPF_UpFlt [Boolean] ==FALSE OAT_PtEstFiltFA	850.00 fail samples out of 1,000.00 samples Function task: 100ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					temperature sensor (only SCR forward architectures)	[Boolean] ==FALSE		
					No Fault on ambient pressure sensor (only SCR forward architectures)	AAP_AmbientAirPresDfltd [Boolean] ==FALSE AND AAP_AmbPresSnsrTFTKO [Boolean] ==FALSE		
					Temperature deviation monitoring shall be enabled by a boolean flag. The boolean flag shall be the output of a map function of engine speed and fuel request	**EnginePointEnable_DPF_TempDeviation** [Boolean]		
					Exhaust mass flow AND Exhaust mass flow	< 200.00 [g/s] > 8.00 [g/s]		
					Filtered Exhaust mass flow variation (absolute value)	< 100.00 [g/s]		
					Time in which the system is in cut off	<= 30.00 [sec]		
					All the above enabling conditions are met for at least a timer	> 5.00 [sec]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Closed Loop Particulate Filter Regeneration Control At Limit - Stage 2 Temperature Too High	P144F	DPF Control Temperature Deviation diagnostic monitors the exhaust gas temperature downstream the 1st ccDOC (EGT2 sensor, configuration "**c1**") or upstream the DPF (EGT3 sensor, configuration "**c2**") to determine whether the temperature deviation between the control setpoint and the temperature read by the sensor is within a prescribed deviation range. Temperature deviation diagnostic shall diagnose a too high temperature, that means a Negative temperature deviation temperature. The diagnosis runs during regeneration mode and when the temperature closed loop is active. The monitoring runs only in DPF steady state logic.	**Hi Temperature monitoring (Negative Deviation):** **(c1)** Temperature ccDOC Downstream control setpoint - ccDOC Downstream sensor reading (EGT2) **(c2)** Temperature DPF Upstream control setpoint - DPF Upstream sensor reading (EGT3)	< -200.00 [degC]	Test shall be enabled by calibratable flag Regeneration state in Steday state DPF Mode DPF temperature closed loop control shall be enabled Battery voltage No fault on exhaust mass flow No Fault on DOC downstream temperature sensor (only SCR forward architectures) No Fault on DPF upstream temperature model (only SCRF architectures) No Fault on DPF upstream temperature	1.00 [Boolean] DPF_DPF_St== Steady state EGT_DsblCL== Enable temperature Closed loop control [Boolean] > 11.00 [V] EXM_TurbFlowNotValid [Boolean] EGT_SnsrCatDwnFlt EGT_TempDPF_UpFlt [Boolean] EGT_SnsrDPF_UpFlt [Boolean]	850.00 fail samples out of 1,000.00 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					sensor (only DPF forward architectures)			
					No Fault on ambient temperature sensor (only SCR forward architectures)	OAT_PtEstFiltFA [Boolean]		
					No Fault on ambient pressure sensor (only SCR forward architectures)	AAP_AmbientAirPresDfltd AND AAP_AmbPresSnsrTFTKO [Boolean]		
					Temperature deviation monitoring shall be enabled by a boolean flag. The boolean flag shall be the output of a map function of engine speed and fuel request	**EnginePointEnable_DPF_TempDeviation** [Boolean]		
					Exhaust mass flow	< 200.00 [g/s]		
					AND Exhaust mass flow	> 8.00 [g/s]		
					Filtered Exhaust mass flow variation (absolute value)	< 100.00 [g/s]		
					Time in which the system	<= 30.00 [sec]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					is in cut off All the above enabling conditions are met for at least a timer	 > 5.00 [sec]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Electrode Supply Circuit Open	P1474	This diagnosis detects an open circuit on the soot sensor electrode supply line	Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Electode supply voltage signal (i.e. measured ADC voltage for electrode current)	< 0.3 V	Soot Sensor Control Unit conditions: Battery Voltage Soot Sensor Electrode Supply Voltage ECU conditions: Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode Fault not active on undervoltage for Soot Sensor Control Unit supply	> 9 V = 45,6V > 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 21.00 consecutive failures OR 40.00 failures out of 80.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Electrode Supply Circuit Low	P1475	This diagnosis detects a short to ground on the soot sensor electrode supply line	Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Electrode supply voltage	U < 41.55 V OR U > 49.72 V	Soot Sensor Control Unit conditions: Battery voltage Soot Sensor Electrode High Voltage Enabled ECU conditions: Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode Fault not active on undervoltage for Soot Sensor Control Unit supply	> 9 V > 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 22.00 consecutive failures OR 42.00 failures out of 84.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Electrode Supply Circuit High	P1476	This diagnosis detects a short to power on the soot sensor electrode supply line	Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Electrode voltage signal (measured ADC voltage for electrode current)	> 4.7 V	Soot Sensor Control Unit conditions: Soot Sensor Electrode Voltage Disabled ECU conditions: Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Fault not active on undervoltage for Soot Sensor Control Unit supply	 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 6.00 consecutive failures OR 15.00 failures out of 20.00 samples 100 ms/sample	Type B, 2 Trips
			Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Electrode supply voltage	> 2 V	Soot Sensor Control Unit conditions: Soot Sensor Electrode Voltage Disabled ECU conditions: Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor	 NOT(SBR_RlyFA) NOT(U02A3)	Time counter: 6.00 consecutive failures OR 15.00 failures out of 20.00 samples 100 ms/sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fault not active on undervoltage for Soot Sensor Control Unit supply	NOT(P24D0)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Temperature Circuit Low Input	P1477	This diagnosis detects a short to ground on the soot sensor temperature signal	Diagnosis executed in Soot Sensor Control Unit: Voltage of Soot Sensor temperature meander (TM) signal	< 0.3 V	Soot Sensor Control Unit conditions: no conditions ECU conditions: Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode Fault not active on undervoltage for Soot Sensor Control Unit supply	> 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 2.00 consecutive failures OR 2.00 failures out of 2.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Temperature Circuit High Input	P1478	This diagnosis detects a short to power or an open circuit on the soot sensor temperature signal	Diagnosis executed in Soot Sensor Control Unit: Voltage of Soot Sensor temperature meander (TM) signal	> 3 V	Soot Sensor Control Unit conditions: no conditions ECU conditions: Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode Fault not active on undervoltage for Soot Sensor Control Unit supply	> 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 2.00 consecutive failures OR 2.00 failures out of 2.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Sensitivity Factor Performance	P1479	This diagnosis detects a soot sensor memory corruption	Soot sensor sensitivity factor is	< -0.25 OR > 0.25	Key is turned on Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor No electrical fault detected on Soot Sensor Fault not active on undervoltage for Soot Sensor Control Unit supply	 > 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(SOT_ElecIFlt) NOT(P24D0)	Time counter: 100.00 failures out of 120.00 samples 1000 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Shunt Circuit High Current	P147B	This diagnosis detects a no more efficient soot sensor	Soot Sensor Electrode raw current	> 6.70 A	Key is turned on		No time debouce	Type B, 2 Trips
					Ignition voltage in range	> 11.00		
					Soot Sensor bus relay is commanded on			
					No electrical fault active on Soot Sensor bus relay	NOT(SBR_RlyFA)		
					No Soot Sensor supply undervoltage detected	NOT(P24D0)		
					No faults of CAN communication loss with Soot Sensor	NOT(U02A3)		
					No electrical fault detected on Soot Sensor	NOT(SOT_EleclFlt)		
					Soot Sensor is in measurement phase			
					Soot Sensor Electrode supply voltage	41.00 V < U < 50.00 V		
					Soot Sensor temperature	200.00 °C < T < 425.00 °C		
					Soot Sensor Electrode current measurement enabled			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Protection Tube Performance	P1488	This diagnosis detects a soot sensor that has been removed from exhaust line or is clogged	Integrated derivative of corrected volumetric flow AND Integrated derivative of effective soot sensor heater voltage (i,e, cumulated heater voltage change)	> 1,750.00 < 5.00 V	Key is turned on Ignition voltage in range Engine in running mode Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor No Soot Sensor supply undervoltage detected No electrical fault detected on Soot Sensor No fault on exhaust gas pressure estimation at sensor location No fault on exhaust gas temperature estimation at sensor location No fault on gas mass flow estimation at sensor location Soot Sensor in protection heating operating state Derivative in volumetric flow	 > 11.00 NOT(SBR_RlyFA) (U02A3) NOT(P24D0) NOT(SOT_ElecIFlt) SOT_ExhPresSootSnsrVld SOT_ExhTempSootSnsrVld SOT_TotExhSootSnsrVld 1.50 < d2V < 300.00	No debounce time	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					for a time	> = 0.10 s		
					At InitCntrlr time since engine off	> 28,800.00 s		
					At InitCntrlr time since engine off is valid	NOT EngineModeNotRunTimer Error		
					The time from the Soot Sensor Heater is controlled in closed loop	> 10.00 s		
					As soon as Soot Sensor is supplied the time since PM sensor heating off (module off plus heating off)	> 28,800.00 s		
					Exhaust gas temperature at Soot Sensor	-20.00 < T < 200.00 °C		
					Environmental pressure	> 75.0 kPa		
					Diagnostic has not yet reported a pass or failure			
					The sign of derivative in volumetric flow does not change for a time	>= 0.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Reference Voltage Circuit	P14A7	This diagnosis verifies Post Second Catalyst NOx Sensor binary reference voltage pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 O2 Binary reference voltage (P+ pin)	open circuit on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:P30B5	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Reference Voltage Circuit Low Voltage	P14A8	This diagnosis verifies Post Second Catalyst NOx Sensor binary reference voltage pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 O2 Binary reference voltage (P+ pin)	groundshort on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Reference Voltage Circuit High Voltage	P14A9	This diagnosis verifies Post Second Catalyst NOx Sensor binary reference voltage pin for Short to Battery	Check if there is an short circuit to power supply on NOx Sensor 3 O2 Binary reference voltage (P+ pin)	powershort on P+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached P30B5No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Signal Circuit	P14AA	This diagnosis verifies Post Second Catalyst NOx Sensor O2 reference circuit pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 O2 Linear pin (P-)	open circuit on P-	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Signal Circuit Low Voltage	P14AB	This diagnosis verifies Post Second Catalyst NOx Sensor linear lambda circuit pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 O2 Linear pin (P-)	groundshort on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Signal Circuit High Voltage	P14AC	This diagnosis verifies Post Second Catalyst NOx Sensor linear lambda circuit pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 3 O2 Linear pin (P-)	powershort on P- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Pump Current Control Circuit	P14AD	This diagnosis verifies Post Second Catalyst NOx Sensor O2 reference circuit pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 O2 Reference pin (M1, auxiliary pumping current)	open circuit on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Pump Current Control Circuit Low Voltage	P14AE	This diagnosis verifies Post Second Catalyst NOx Sensor O2 reference circuit pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 O2 Reference pin (M1, auxiliary pumping current)	groundshort on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Pump Current Control Circuit High Voltage	P14AF	This diagnosis verifies Post Second Catalyst NOx Sensor O2 reference circuit pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 3 O2 Reference pin (M1, auxiliary pumping current)	powershort on M1 pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Low Reference Circuit	P14B0	This diagnosis verifies Post Second Catalyst NOx Sensor Low Reference Circuit for Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 Low Reference pin (Ref)	open circuit on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Low Reference Circuit Low Voltage	P14B1	This diagnosis verifies Post Second Catalyst NOx Sensor Low Reference Circuit for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 Low Reference pin (Ref)	groundshort on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 O2 Low Reference Circuit High Voltage	P14B2	This diagnosis verifies Post Second Catalyst NOx Sensor Low Reference Circuit for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 3 Low Reference pin (Ref)	powershort on Ref pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Ground Circuit	P14B3	This diagnosis verifies Post Second Catalyst NOx Sensor heater ground circuit open	Check if there is an open circuit on NOx Sensor 3 heater reference pin (H-)	open circuit on H- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Ground Circuit High Voltage	P14B4	This diagnosis verifies Post Second Catalyst NOx Sensor heater ground circuit Short to Battery	Check if there is a short circuit to power on NOx Sensor 3 heater reference pin (H-)	powershort on H- pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Offset Learning At Min Limit - Bank 1 Sensor 3	P14D9	This diagnosis verifies if Post Second Catalyst NOx Sensor raw signal is affected by an offset	Check if NOx3 signal has an offset by learning the raw value in stable conditions during fuel cut off maneuver. A fault is detected if one of the following conditions is true: 1. Mean of all NOx sensor readings (where every reading is the mean value of a sampling window) OR 2. Mean of all NOx sensor readings (where every reading is the mean value of a sampling window)	 < -50.00 ppm > 250.00 ppm	Combustion mode dependent enabling flag Engine is running Engine is not cranking Powertrain relay voltage NOx Sensor Bus relay is commanded ON Post Second Catalyst NOx Sensor is present in the exhaust Sensor heater is in range: a) (Sensor heater raw resistance - sensor heater target resistance) / sensor heater target resistence b) condition a) is fulfilled for time Sensor supply in range Sensor dewpoint is reached Injection small quantity adjustment (SQA) learning is not active EGR measured position Exhaust mass flow is within a range DEF injection is within a range	**NOX_S3_OfstMntrEnblCmbMode** TRUE TRUE > 11.00 V TRUE TRUE < 0.06 % > - 0.06 % > 10.00 sec > 9.90 V TRUE FAD_SQA_LrnET_Enbl ==FALSE < 100.00 % < 48.00 g/s > 0.00 g/s < 500.00 mg/s > -1.00 mg/s	The monitor runs after fuel cut off maneuver, when air mass integral exceeds 180.00 g and Post Second Catalyst NOx signal is stable for at least 0.25 s. The NOx value used for the monitor is calculated after sampling up to 1.00 sampling windows (each one made up of 12.00 samples), averaging the mean values of every window. Once computed this value, the diagnostic provides a result. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine speed is within a range	< 3,000.00 rpm > 800.00 rpm		
					Post Second Catalyst NOx sensor temperature is within a range	< 340.00 °C > -20.00 °C		
					Time after DPF regen modes	> 60.00 s		
					Fuel request is steady state when all the following conditions are verified: a) Fuel request derivative b) Fuel request within a range c) conditions a) and b) are fulfilled for a time	 < 20.00 mm^3/s < 0.00 mm^3 > -1.00 mm^3 > 1.00 s		
					Intake manifold absolute pressure	< 1,000.00 kPa		
					No failure on intake manifold absolute pressure sensor	MAP_SensorFA==FALSE		
					No electrical failure on NOx3 sensor	NOX_Snsr3_FltSt ==FALSE		
					No current control failure on NOx3 sensor	NOX_NOx3_StBitChkFlt ==FALSE		
					No out of range low failure on NOx3 sensor	NOX_NOx3_OutOfRngLo Flt ==FALSE		
					No out of range high failure on NOx3 sensor	NOX_NOx3_OutOfRngHi Flt ==FALSE		
					No failure on NOx3	NOX_NOx3_SelfDiagFlt		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					sensor signal plausibility	==FALSE		
					No failure on NOx3 CAN communication	CAN_LostComm_FltN_BusB_NOxSnsr_C ==FALSE		
					No failure on EGR valve actuator	EGR_PstnShtOffReqFA ==FALSE		
					No failure on high pressure fuel rail system	FHP_InjLeakageFA ==FALSE		
					No failure on injectors	FUL_GenericInjSysFlt ==FALSE		
					No fault on any exhaust mass flow model input	EXM_TurbFlowNotValid ==FALSE		
					No failure on air control system	AIC_AirShtOffReq ==FALSE		
					No failure on NOx Sensor Bus relay circuit	SBR_RlyFA==FALSE		
					Upstream UF-SCR temperature is steady state:			
					a) Upstream UF-SCR temperature derivative within a range	< 3.00 °C/s > -10.00 °C/s		
					b) conditions a) is fulfilled for a time	> 120.00 s		
					No failure on Downstream UF-SCR temperature sensor	NOX_Snsr3_TempFlt ==FALSE		
					No failure on Upstream UF-SCR temperature	EGT_TempSCR_UpFlt ==FALSE		
					No O2 plausibility in load fault on NOx3	OXY_NOx3ChkLoadFlt ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No DTC set:	P30D5		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Current Range/ Performance - Bank 1 Sensor 3	P14DA	This diagnosis verifies that Post Second Catalyst NOx Sensor embedded current control circuit status is healthy	Check if the NOx3 sensor embedded stability criteria of Nox/Lambda current control circuit are violated NOx stability flag: (OFF_Time/TOTAL_time) Lambda stability flag: (OFF_Time/TOTAL_time) Note: TOTAL_time= ON_time +OFF_Time	Stability flag for NOx signal is set to OFF if one of the following condition is not fulfilled: a) V2 within an interval of 40mV around its set point b) Delta Ip2 <426nA/10msec c) Delta Ip1 < 2.34 uA aorund its set point Stability flag for Lambda signal is set to OFF if one of the following condition is not fulfilled: a) Delta Ip0 < 300 uA /10 msec b) Delta Ip1 < 2.34 uA around its set point > 1 % > 1 %	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Engine is not cranking Sensor dewpoint is reached Sensor heater is in range: a) (Sensor heater raw resistance - sensor heater target resistance) / sensor heater target resistence b) condition a) is fulfilled for time Engine is running No electrical failure on NOx2 sensor Combustion mode dependent enabling flag Fuel request: a) fuel request derivative is within a range b) condition a) is fulfilled for time	> 11.00 V TRUE FALSE > 9.90 V TRUE TRUE < 0.06 % >- 0.06 % > 10.00 sec TRUE NOX_Snsr3_FltSt ==FALSE **NOX_S3_StBitChkEnblCmbMode** <= 35.00 mm^3/s >= -50.00 mm^3/s > 5.00 sec	NOx stability flag time counter: 2 fails out of 2 samples Lambda stability flag time counter: 2 fails out of 2 samples Task=12.5ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Supply Circuit (Single and Two stage VGT DC Motor)	P169E	This monitor checks if the VGT DC-Motor is correctly supplied	System voltage supply lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Control Circuit Shorted (Single and Two stage VGT DC Motor)	P169F	This monitor checks if the VGT commands are shorted one other	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Current Range/ Performance (Single and Two stage VGT DC Motor)	P16FA	This monitor checks if an excessive current flows through the VGT DC-Motor (e.g. shunt circuit between load, VGTDC-Motor internal faults, etc).	Current flowing through the H-Bridge higher than a threshold (error information provided by HWIO)	> 6.3 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Motor Overtemperature (Single and Two stage VGT DC Motor)	P16FC	This monitor checks if the temperature of the VGT DC-Motor increases too much (e.g. VGT DC-Motor internal faults, etc).	H-Bridge driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Efficiency Below Threshold Bank 1 - (EWMA filter used)	P2002	This diagnosis detects a cracked Diesel Particulate FIlter	{The predicted soot sensor filtered by using EWMA filter is} OR {The predicted soot sensor filtered by using EWMA filter is AND - DPF Efficiency Below Threshold Bank 1 previously detected (TRUE -> fault active) }	< 1.13 < 1.13 DPF_DPF_EffMontrFA ===TRUE	Test enabled by calibration Ignition voltage in range for a time Engine running or engine cranking or in auto-stop phase No faults on soot sensor and faults which inhibit sensor to stay in measurement DPF soot loading (ranked model) Engine out soot model realiable Note: the not reliability shall be verified for 1 s before to be declared No faults on downstream DPF temperature sensor or model No faults on downstream DPF mass airflow No faults on engine out soot model	1.00 ==TRUE > 0.00 [s] ==TRUE SOT_SootSnsrFlt ==FALSE > -1.00 [%] EXM_PM_TurbFlowNotRlb ==FALSE SOT_ExhTempSootSnsrVld ==TRUE SOT_TotExhSootSnsrVld ==TRUE SOT_PM_DPF_UpFlt ==FALSE	Test per Trip: 1. If Fast Initial Response (FIR) mode is active then 2.00 tests per trip are allowed. If Rapid Response (RR) mode is active then 2.00 tests per trip are allowed. The signal for the monitor check is filtered by means of a first-order filter. The filter step change can assume the following values: - 0.80 if FIR is active - 0.50 if RR is active - 0.25 if neither FIR nor RR are active. Initial filter value: - 1.19 when FIR is activated - 1.19 when RR is activated	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Ambient temperature	> -20.00 [°C]		
					During sensor measurement phase, Number of Autostop events	< 20.00 [Cnt]		
					During sensor measurement phase, Duration of Autostop phase	< 200.00 [s]		
					During sensor measurement phase, no heavy transient manoeuvers detected , i.e. the maximum fuel request during a transient manoeuver is	<= 1,000.00 [mm^3]		
					EWMA filter is enabled AND number of diagnostic run for driving cycle is	1.00 ==TRUE < 1 (when FIR and RR are not active) < 1.00 (when FIR is active) < 1.00 (when RR is active)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Stuck Closed (Swirl DC Motor)	P2006	This monitor detects the Swirl flaps mechanically stuck in a certain position different from their defaulted position (fully open) when the actuator is no longer driven (missing defaulted position)	Position after P20F8 has set > threshold	> 50.00 [%]	P20F8 is already set Waiting time after driver shut off > minimum threshold (needed for the spring to drive the valve in its defaulted position) Swirl position closed loop control active (no faults present on Swirl position sensor, Swirl vanes)	 > 2.00 [s] SWC_PstnSnsrFA ==FALSE SWC_ActrFA ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: 6.25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Control Circuit (Swirl DC Motor)	P2008	This monitor checks if the DC-Motor Swirl commands are in open circuit	Load resistance higher than a threshold (error information provided by HWIO)	> 200 [kOhm]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is OFF HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Performance (Swirl DC Motor)	P200A	This monitor checks if the Swirl position SENT sensor has an offset with respect to the nominal positions where the flaps do the learning procedure (fully closed and/or fully open) and if the valve is not excessively slow	SENT position raw voltage when the valve is in fully closed position < low threshold OR SENT position raw voltage when the valve is in fully closed position > high threshold OR SENT position raw voltage when the valve is in wide open position < low threshold OR SENT position raw voltage when the valve is in wide open position > high threshold	< 6.00 [%5V] OR > 16.50 [%5V] OR < 84.25 [%5V] OR > 91.33 [%5V]	Test enabled by calibration Key signal is off Learning procedure at key off in fully closed and/or wide open positions have been successfully completed: - engine coolant temperature - no faults present on coolant temperature sensor - outside air temperature - no faults present on outside air temperature sensor - PT relay supply voltage No faults present on Swirl position sensor, Swirl valve, Swirl position deviation. End Of Trip event has elapsed	== 1.00 >= 30.00 [°C] <= 150.00 [°C] ECT_Sensor_FA ==FALSE >= -40.00 [°C] OAT_PtEstFiltFA ==FALSE >= 9.50 [V] SWC_PstnSnsrFA ==FALSE SWC_ActrFA==FALSE SWC_PstnDvtnFA ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			response time in closing direction > high threshold OR response time in opening direction > high threshold OR total time needed to complete either closing or opening phase of the slow response test >= high threshold	> 0.50 [s] OR > 0.50 [s] > 10.00 [s]	Test enabled by calibration Key signal is off Slow response procedure at key off in fully closed and/or wide open positions have been successfully completed: - engine coolant temperature - no faults present on coolant temperature sensor - outside air temperature - no faults present on outside air temperature sensor - PT relay supply voltage No faults present on Swirl position sensor, Swirl valve, Swirl position deviation. End Of Trip event has elapsed	== 1.00 >= 30.00 [°C] <= 150.00 [°C] ECT_Sensor_FA ==FALSE >= -40.00 [°C] OAT_PtEstFiltFA ==FALSE >= 9.50 [V] SWC_PstnSnsrFA ==FALSE SWC_ActrFA==FALSE SWC_PstnDvtnFA ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Over Temperature Bank (DOC_UI_S DPF_uSCR_ ROC)(EGT3)	P200C	This diagnosis verify if the exahust gas temperature on DPF Downstream (EGT_DPF_Dwn) is above its maximum allowed temperature	**Excursion Event monitoring:** DPF Downstream Exhaust gas temperature	***In Regeneration mode:*** > 850.00 [°C] **In Normal mode:** > 850.00 [°C]	Test enabled by calibration (TRUE--> enable FALSE --> disable) and with Battery voltage and with Engine running and with No fault on DPF Downstream Temperature sensor	1.00 [Boolean] > 11.00 [V] == TRUE [Boolean] EGT_SnsrDPF_DwnFlt [Boolean]	**In Normal mode:** 300.00 fail samples out of 450.00 samples **In Regeneration mode:** 300.00 fail samples out of 450.00 samples Function task: 100ms	Type A, 1 Trips
			Extreme Event monitoring: DPF Downstream Exhaust gas temperature	> 950.00 [°C]	Test enabled by calibration (TRUE--> enable FALSE --> disable) and with Battery voltage and with Engine running and with	1.00 [Boolean] > 11.00 [V] == TRUE [Boolean]	50.00 fail samples out of 70.00 samples Function task: 100ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No fault on DPF Downstream Temperature sensor	EGT_SnsrDPF_DwnFlt [Boolean]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Circuit High Voltage (Swirl DC Motor)	P2010	This monitor checks if the DC-Motor Swirl commands are shorted to power supply	Current flowing through the H-Bridge switches higher than a threshold (error information provided by HWIO)	> 8 [A]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range H-Bridge driver is ON HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Position Sensor Circuit Low (SENT position sensor)	P2016	This monitor checks if the Swirl SENT position sensor is out of electrical range low	SENT position raw voltage < low threshold	< 1.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on Swirl SENT communication	== 1.00 > 11.00 [V] SWC_SENT_LossComm Flt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Position Sensor Circuit High (SENT position sensor)	P2017	This monitor checks if the Swirl SENT position sensor is out of electrical range high	SENT position raw voltage > high threshold	> 99.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on Swirl SENT communication	== 1.00 > 11.00 [V] SWC_SENT_LossComm Flt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Supply Voltage Low (Swirl DC Motor)	P201B	This monitor checks if the Swirl DC-Motor is correctly supplied	System voltage supply lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 2 out of range monitoring Low	P2032	This monitor has the purpose of warning the system/driver that an electrical problem on EGT 2 sensor is present. Failure mode: Out Of Range Low (short circuit to ground) The monitor compares the EGT raw value (resistance value) with a minimum threshold; if this threshold is overcome, a OOR Low error is detected.	The monitor compares the EGT 2 raw value (resistance value) with a minimum threshold; if this threshold is overcome, a OOR Low error is detected.	< 40.00 [Ohm]	Monitor enabled by dedicated calibration AND Engine cranking AND Supply voltage in range AND Ignition run crank active AND Diagnostic system reset status	1 [Boolean] == FALSE == TRUE == TRUE == FALSE	10 fail samples over 20 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 2 out of range monitoring High	P2033	This monitor has the purpose of warning the system/driver that an electrical problem on EGT 2 sensor is present. Failure modes: Out Of Range High (open circuit, short circuit to supply, broken wiring) The monitor compares the EGT raw value (resistance value) with a maximum threshold; if this threshold is overcome, a OOR High error is detected.	The monitor compares the EGT 2 raw value (resistance value) with a maximum threshold; if this threshold is overcome, a OOR High error is detected.	> 400,000.00 [Ohm]	Monitor enabled by dedicated calibration AND Engine cranking AND Supply voltage in range AND Ignition run crank active AND Diagnostic system reset status	1 [Boolean] == FALSE == TRUE == TRUE == FALSE	10 fail samples over 20 samples Function task: 100ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 1 stuck in range monitoring	P2080	This monitor has the purpose of warning the system/driver that EGT 1 sensor behavior is not plausible in a way that the signal coming from the sensor is stuck when expected to change. Failure modes:sensor internal malfunctions (stuck output) The difference between the maximum EGT value and the EGT sensor signal (converted raw signal) is lower than an expected temperature variation for a certain observation time, once a minimum amount of fuel has been injected. The following parameters are evaluated starting from the read converted raw temperature value, through calibratable maps: - Observation time window - Expected temperature variation - Minimum amount of injected fuel	The difference between maximum EGT 1 value and EGT 1 sensor signal is lower than an expected temperature variation for a certain observation time, once a minimum amount of fuel has been injected.	**EGT1 Stuck Temperature <=Variation** [°C] **EGT1 Stuck Wait >Time** [s] **EGT1 Fuel request >integral**	Monitor enabled by dedicated calibration AND Diagnostic system reset status AND Engine running AND No faults on EGT1 sensor (electrical and plausibility in and logic) AND Minimum elapsed time in engine-off phase AND Engine not running error flag AND	1 [Boolean] ==FALSE == TRUE EGT_ExhGas1_CktTFTKO AND EGT_ExhGas1_CktFA AND EGT_ExhGas1_RatTFTKO AND EGT_ExhGas1_RatFA AND EGT_ExhGas1_QckChgFA AND EGT_ExhGas1_QckChgTFTKO > 10,800 [s] ==FALSE	No debounce	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Supply voltage in range	> 11.00 [V]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 1 quick change monitoring	P2081	This function has the purpose of warning the system/driver that EGT 1 sensor signal is varying too fast with respect to the expected signal dynamic. Failure modes: - Sensor internal malfunctions - Wiring harness deterioration - Connectors electrical issues The monitor compares EGT 1 sensor signal (converted raw value) with two calibratable thresholds (minimum and maximum ones). Thresholds are dynamically evaluated by the SW.	The monitor compares EGT 1 sensor signal with two calibratable thresholds.Thresholds are dynamically evaluated by the SW as: 1) Maximum value between the last valid EGT temperature value + resolution error and a value obtained considering maximum calibratable value that can be read by the sensor, last valid EGT temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant 2) Minimum value between the last valid EGT temperature value - resolution error and a value obtained considering minimum calibratable value that can be read by the sensor, last valid EGT temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant	**EGT ExhGas1** > **QckChgMaxThrsh**[° C] **EGT ExhGas1** < **QckChgMinThrsh**[° C]	Monitor enabled by dedicated calibration AND Ignition run crank active AND Engine cranking AND Supply voltage in range AND No electrical faults affecting the sensor AND Punctual electrical errors affecting the sensor	1 [Boolean] ==TRUE ==FALSE > 11.00 [V] EGT_ExhGas1_CktFA AND EGT_ExhGas1_CktTFTKO ==FALSE	20 fail samples out of 30 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 2 stuck in range monitoring	P2084	This monitor has the purpose of warning the system/driver that EGT 2 sensor behavior is not plausible in a way that the signal coming from the sensor is stuck when expected to change. Failure modes:sensor internal malfunctions (stuck output) The difference between the maximum EGT value and the EGT sensor signal (converted raw signal) is lower than an expected temperature variation for a certain observation time, once a minimum amount of fuel has been injected. The following parameters are evaluated starting from the read converted raw temperature value, through calibratable maps: - Observation time window - Expected temperature variation - Minimum amount of injected fuel	The difference between maximum EGT 2 value and EGT 2 sensor signal is lower than an expected temperature variation for a certain observation time, once a minimum amount of fuel has been injected.	**EGT2 Stuck Temperature <=Variation** [°C] **EGT2 Stuck Wait >Time** [s] **EGT2 Fuel request >integral**	Monitor enabled by dedicated calibration AND Diagnostic system reset status AND Engine running AND No faults on EGT1 sensor (electrical and plausibility in and logic) AND Minimum elapsed time in engine-off phase AND Engine not running error flag AND	1 [Boolean] ==FALSE == TRUE EGT_ExhGas2_CktTFTKO AND EGT_ExhGas2_CktFA AND EGT_ExhGas2_RatTFTKO AND EGT_ExhGas2_RatFA AND EGT_ExhGas2_QckChgFA AND EGT_ExhGas2_QckChgTFTKO > 10,800 [s] ==FALSE	No debounce	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Supply voltage in range	> 11.00 [V]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 2 quick change monitoring	P2085	This function has the purpose of warning the system/driver that EGT 2 sensor signal is varying too fast with respect to the expected signal dynamic. Failure modes: - Sensor internal malfunctions - Wiring harness deterioration - Connectors electrical issues The monitor compares EGT 2 sensor signal (converted raw value) with two calibratable thresholds (minimum and maximum ones). Thresholds are dynamically evaluated by the SW.	The monitor compares EGT 2 sensor signal with two calibratable thresholds.Thresholds are dynamically evaluated by the SW as: 1) Maximum value between the last valid EGT temperature value + resolution error and a value obtained considering maximum calibratable value that can be read by the sensor, last valid EGT temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant 2) Minimum value between the last valid EGT temperature value - resolution error and a value obtained considering minimum calibratable value that can be read by the sensor, last valid EGT temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant	**EGT ExhGas2** > **QckChgMaxThrsh**[° C] **EGT ExhGas2** < **QckChgMinThrsh**[° C]	Monitor enabled by dedicated calibration AND Ignition run crank active AND Engine cranking AND Supply voltage in range AND No electrical faults affecting the sensor AND Punctual electrical errors affecting the sensor	1 [Boolean] ==TRUE ==FALSE > 11.00 [V] EGT_ExhGas2_CktFA AND EGT_ExhGas2_CktTFTKO ==FALSE	20 fail samples out of 30 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Manifold Runner Control Circuit Performance (Swirl DC Motor)	P20F8	This monitor detects an obstruction on the actuator (obstruction found during the flaps opening or closing) checking the setpoint position against the position measured by the Swirl Position Sensor	Absolute value of position tracking error (setpoint position - measured position)	> 10.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Swirl position closed loop control active (no faults present on Swirl position sensor, Swirl vanes, Swirl position control deviation) Swirl position setpoint in steady state conditions for minimum time Engine coolant temperature higher or equal to minimum threshold OR Engine cooling system target temperature reached (thermostat opening) No faults present on engine coolant temperature sensor Outside air temperature higher or equal to minimum threshold No faults present on outside airtemperature	== 1.00 > 11.00 [V] SWC_PstnSnsrFA ==FALSE SWC_ActrFA==FALSE SWC_PstnDvtnFA ==FALSE > -100.00 [%/s] < 100.00 [%/s] for >= 0.50 [s] >= 30.00 [°C] ECT_Sensor_FA ==FALSE >= -20.00 [°C] OAT_PtEstFiltFA ==FALSE	960.00 fail counts out of 1,200.00 sample counts Function task: 6.25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					sensor No mechanical stop soft approach in progress No anti-sticking procedure in progress			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Positive Voltage Control Circuit Group 1 Low Voltage	P2147	This DTC detects a short circuit to ground of the high side driver circuit of the Bank 1 (injector 1 and 4)	Voltage high across High Side Driver of bank 1 (injector 1 and 4) during On state indicates short to ground	impedence between HS pin of injector 1 and controller ground <= 0.5 [Ohm] OR impedence between HS pin of injector 4 and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and (FUL_OutEnblCyl_CiEPSR_CylinderA OR FUL_OutEnblCyl_CiEPSR_CylinderE) and (FUL_FuelInjectedCyl_CiEPSR_CylinderA OR FUL_FuelInjectedCyl_CiEPSR_CylinderE)	= 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == 0 [Boolean] == TRUE); == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Positive Voltage Control Circuit Group 1 High Voltage	P2148	This DTC detects a short circuit to high voltage of high side driver circuit of the Bank 1 (injector 1 and 4)	Voltage low across High side drive of bank 1 (injector 1 and 4) during off state indicates short to power	impedence between HS pin of injector 1 and controller power <= 0.5 [Ohm] OR impedence between HS pin of injector 4 and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and (FUL_OutEnblCyl_CiEPSR_CylinderA OR FUL_OutEnblCyl_CiEPSR_CylinderE) and (FUL_FuelInjectedCyl_CiEPSR_CylinderA OR FUL_FuelInjectedCyl_CiEPSR_CylinderE)	= 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == 0 [Boolean] == TRUE); == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Positive Voltage Control Circuit Group 2 Low Voltage	P2150	This DTC detects a short circuit to ground of the high side driver circuit of the Bank 2 (injector 2 and 5)	Voltage high across High Side Driver of bank 2 (injector 2 and 5) during On state indicates short to ground	impedence between HS pin of injector 2 and controller ground <= 0.5 [Ohm] OR impedence between HS pin of injector 5 and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and (FUL_OutEnblCyl_CiEPSR_CylinderB OR FUL_OutEnblCyl_CiEPSR_CylinderF) and (FUL_FuelInjectedCyl_CiEPSR_CylinderB OR FUL_FuelInjectedCyl_CiEPSR_CylinderF)	= 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == 0 [Boolean] == TRUE); == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Positive Voltage Control Circuit Group 2 High Voltage	P2151	This DTC detects a short circuit to high voltage of high side driver circuit of the Bank 2 (injector 2 and 5)	Voltage low across High side drive of bank 2 (injector 2 and 5) during off state indicates short to power	impedence between HS pin of injector 2 and controller power <= 0.5 [Ohm] OR impedence between HS pin of injector 5 and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and (FUL_OutEnblCyl_CiEPSR_CylinderB OR FUL_OutEnblCyl_CiEPSR_CylinderF) and (FUL_FuelInjectedCyl_CiEPSR_CylinderB OR FUL_FuelInjectedCyl_CiEPSR_CylinderF)	= 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == 0 [Boolean] == TRUE); == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Positive Voltage Control Circuit Group 3 Low Voltage	P2153	This DTC detects a short circuit to ground of the high side driver circuit of the Bank 3 (injector 6 and 7)	Voltage high across High Side Driver of bank 3 (injector 6 and 7) during On state indicates short to ground	impedence between HS pin of injector 6 and controller ground <= 0.5 [Ohm] OR impedence between HS pin of injector 7 and controller ground <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and (FUL_OutEnblCyl_CiEPSR_CylinderG OR FUL_OutEnblCyl_CiEPSR_CylinderC) and (FUL_FuelInjectedCyl_CiEPSR_CylinderG OR FUL_FuelInjectedCyl_CiEPSR_CylinderC)	= 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == 0 [Boolean] == TRUE); == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector Positive Voltage Control Circuit Group 3 High Voltage	P2154	This DTC detects a short circuit to high voltage of high side driver circuit of the Bank 3 (injector 6 and 7)	Voltage low across High side drive of bank 3 (injector 6 and 7) during off state indicates short to power	impedence between HS pin of injector 6 and controller power <= 0.5 [Ohm] OR impedence between HS pin of injector 7 and controller power <= 0.5 [Ohm]	Test enabled by calibration; and Battery voltage and Key ON and Engine is not cranking and Engine Running and (FUL_OutEnblCyl_CiEPSR_CylinderG OR FUL_OutEnblCyl_CiEPSR_CylinderC) and (FUL_FuelInjectedCyl_CiEPSR_CylinderG OR FUL_FuelInjectedCyl_CiEPSR_CylinderC)	= 1 [Boolean] > 11.00 [V] - - >= 1.00 [s] == 0 [Boolean] == 0 [Boolean] == TRUE); == TRUE);	3 failures out of 6 samples 100 ms/sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Circuit Low Bank 1 Sensor 1	P2202	This diagnosis verifies Engine Out NOx sensor read out of range low	Check if the NOx1 sensor NOx concentration raw read is out of lower range: NOx raw read	< -90 ppm	Fuel injection quantity request Powertrain relay voltage NOx Sensor Bus relay is commanded ON No failure on NOx1 CAN communication Sensor supply in range Sensor dewpoint is reached No current control failure on NOx1 sensor No electrical failure on NOx1 sensor Combustion mode dependent enabling flag	> -1 mm^3 > 11.00 V TRUE CAN_LostComm_FltN_BusB_NOxSnsr_A > 9.90 V TRUE NOX_NOx1_StBitChkFlt ==FALSE NOX_Snsr1_ElecFA ==FALSE **NOX_S1_OutRngMinCmbMode**	Time counter: 100 fails out of 200 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Circuit High Bank 1 Sensor 1	P2203	This diagnosis verifies Engine Out NOx Sensor read out of range high	Check if the NOx1 Sensor NOx concentration raw read is out of higher range: NOx raw read	 > 2,990 ppm	Powertrain relay voltage NOx Sensor Bus relay is commanded ON No failure on NOx1 CAN communication Sensor supply in range Sensor dewpoint is reached No current control failure on NOx1 Sensor No electrical failure on NOx1 Sensor Combustion mode dependent enabling flag Engine running for a time longer than	> 11.00 V TRUE CAN_LostComm_FltN_BusB_NOxSnsr_A > 9.90 V TRUE NOX_NOx1_StBitChkFlt ==FALSE NOX_Snsr1_FltSt ==FALSE **NOX_S1_OutRngMaxCmbMode** 0.00 s	Time counter: 120 fails out of 240 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Control Circuit	P2205	This diagnosis verifies Engine Out NOx Sensor Heater Supply pin Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 Heater Supply pin (H+)	open circuit on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Control Circuit Low Voltage	P2206	This diagnosis verifies Engine Out NOx Sensor Heater Supply pin for Short to Ground	Check if there is an short circuit to ground on NOx Sensor 1 Heater Supply pin (H+)	groundshort on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Control Circuit High Voltage	P2207	This diagnosis verifies Engine Out NOx Sensor Heater Supply pin for Short to Battery	Check if there is an short circuit to power supply on NOx Sensor 1 Heater Supply pin (H+)	powershort on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Sense Circuit	P2208	This diagnosis verifies Engine Out NOx Sensor Heater sense resistance measurement pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 1 Heater Sense pin (HTemp)	open circuit on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Heater Sense Circuit Range/ Performance Bank 1 Sensor 1	P2209	This diagnosis verifies if the Engine Out NOx Sensor Heater raw resistance is in range	This diagnosis verifies if the Engine Out NOx Sensor Heater raw resistance is out of speficied range: (Sensor heater raw resistance - Sensor heater target resistance) / Sensor heater target resistence	> 0.06 <- 0.06	Powertrain relay voltage No loss of communcation with Engine Out Nox Sensor No plausibility failure on NOx signal from NOx Sensor No offset failure on NOx signal from NOx Sensor No increasing dynamic failure on NOx signal coming from NOx Sensor No decreasing dynamic failure on NOx signal coming from NOx Sensor No circuit failure on NOx Sensor No out of range high failulre on NOx Signal No out of range low failulre on NOx Signal No DTC set: No failure on NOx Sensor Bus relay circuit NOx Sensor Bus relay is commanded ON Delay timer once sensor	> 11.00 V CAN_LostComm_FltN_BusB_NOxSnsr_A ==FALSE NOX_NOx1_NOxPlausFlt ==FALSE NOX_NOx1_OfstMontrFlt ==FALSE NOX_NOx1_IncrDynChkFlt ==FALSE NOX_NOx1_DecrDynChkFlt ==FALSE NOX_NOx1_StBitChkFlt ==FALSE NOX_NOx1_OutOfRngHiFlt ==FALSE NOX_NOx1_OutOfRngLoFlt ==FALSE P30B4 SBR_RlyFA==FALSE TRUE > 45 sec	Time counter: 125 fails out of 250 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					supply is in range (> 10.8 V) Delay timer once sensor dewpoint is reached Delay timer once engine is overrun Delay timer once DPF combustion mode is not active	 > 180 sec > 200 sec 30 sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Supply Voltage Circuit Bank 1 Sensor 1	P220A	This diagnosis verifies if the supply voltage of the Engine Out Nox Sensor is out of range	Check if NOx Sensor 1 supply voltage status is out of range	Sensor supply voltage < 9.90 V	Engine is running Powertrain relay voltage NOx Sensor Bus relay is commanded ON a) NOx Sensor Dewpoint is reached b) condition a) shall be fulfilled for time CAN_LostComm_FltN_BusB_NOxSnsr_A No DTC active:	TRUE > 11.00 V TRUE TRUE > 0 sec FALSE P30B4	Time counter: 125 fails out of 250 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Supply Voltage Circuit Bank 1 Sensor 2	P220B	This diagnosis verifies if the supply voltage of the Post Catalyst NOx Sensor is out of range	Check if NOxSensor 2 supply voltage status is out of range	Sensor supply voltage < 9.90 V	Engine is running Powertrain relay voltage NOx Sensor Bus relay is commanded ON a) NOx Sensor Dewpoint is reached b) condition a) shall be fulfilled for time CAN_LostComm_FltN_BusB_NOxSnsr_B No DTC active:	TRUE > 11.00 V TRUE TRUE > 0 sec FALSE P30B5	Time counter: 125 fails out of 250 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Sense Circuit Low Voltage	P2210	This diagnosis verifies Engine Out NOx Sensor Heater sense resistance measurement pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 1 Heater Sense pin (HTemp)	groundshort on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 1 Heater Sense Circuit High Voltage	P2211	This diagnosis verifies Engine Out NOx Sensor Heater sense resistance measurement pin for Short to Battery	Check if there is a short circuit to power supply NOx Sensor 1 Heater Sense pin (HTemp)	powershort on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_A Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B4	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Filter Deteriorated/ Missing Substrate Bank 1	P226D	Low Flow Resistance monitoring detects a Diesel Particulate Filter removed or broken or a Diesel Particulate Filer pressure sensor pipe disconnected, clogged, or blocked	Filtered Flow resistance (DPF_ResistFlowFltd)	< **Flow Resistance Too Low Threshold** [kPa/(l/s)]	Test enabled by calibration	1.00 ==TRUE	75.00 failures over 150.00 samples	Type A, 1 Trips
					No fault on DPF pressure sensor (electrical, rationality and offset)	EGP_DiffPresSnsrFlt ==FALSE	Function task: 100 ms	
					No fault on upstream DPF temperature estimated (model)	EGT_TempDPF_UpFlt ==FALSE		
					No fault on air flow meter	MAF_MAF_SnsrFA ==FALSE AND MAF_MAF_SnsrTFTKO ==FALSE		
					No fault on atmospheric pressure sensor	AmbPresDfltdStatus = CeAAPR_e_AmbPresNotDfltd		
					DPF status in soot loading phase (no regeneration ongoing)	DPF_DPF_St == CeDPFR_e_SootLoading		
					Engine speed	> 500.00 [rpm]		
					No fault on exhaust mass flow estimation	EXF_TotExhDPF_UpFA ==FALSE		
					Exhaust gas volume flow greater than a	> 78.00 [l/s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					calibrateable threshold for more than a calibratable time	for > 5.00 [s]		
					Soot trapped in the DPF	> -1.00 [Pct] AND < 400.00 [Pct]		
					Exhaust gas temperature at DPF inlet is between two thresholds for a minimum calibrateable time	> 200.00 [DegC] AND < 700.00 [DegC] for > 45.00 [s]		
					Engine Coolant Temperature OR OBD Coolant Enable Criteria	> -256.00 [DegC] ==TRUE		
					Ambient Temperature	> -20.00 [DegC]		
					Distance covered since last regeneration	> -1.00 [km]		
					Correction of CCB model	< 100.00 [%]		
					The fuel request is between two thresholds for a minimum calibrateable time	> **Lo_FR_MontrEnblLoThrsh** [mm^3] AND < **Lo_FR_MontrEnblHiThrsh**		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Pipe Icing Risk Low	[mm^3] for > 0.00 [s] ==TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Out of Range During Deceleration Bank 1 Sensor 1	P2297	This DTC aims to detect a drift of measured O2 value (A) from an estimated concentration (B) when the latter can be considered stable during overrun condition.	EWMA filtered error (A - B) in overrun condition is out of plausible range	> 4.00 [%] < -3.25 [%]	Engine running System voltage in range Sensor is fully operative No SQA learning is active Enabled in combustion mode No Exhaust Brake active i.e. intake manifold pressure No pending or confirmed DTCs	 > 11.00 [V] OXY_NOx1_O2_RawNotRlb == FALSE FAD_SQA_LrnET_Enbl == FALSE refer to supporting table (**KaOXYD_b_NOx1OvrnChkCmbModeEnbl**) < 350.00 [kPa] NOX_Snsr1_NotVld NOX_Snsr1_PresFlt OXY_O2_NOx1PlausMdlFlt OXY_NOx1SignRngChkFlt FHP_InjLeakageFA EGR_PstnShtOffReqFA (MAF_MAF_SnsrFA AND MAF_MAF_SnsrTFTKO) (MAP_SensorFA AND	Once per trip Note: if EWMA Fast Initial Response is active OR EWMA Rapid Response is active than multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						MAP_SensorTFTKO)		
					Stable fuel cut-off condition has been reached i.e. following conditions are met for a calibrateable time:	> 3.50 [s]		
					a. Engine speed in operating range	> 600 [rpm] < 3,000 [rpm]		
					b. EGR position	< 60.00 [%]		
					c. No fuel injected			
					d. Air mass per cylinder in operating range	> 400.00 [mg] < 1,500.00 [mg]		
					Estimated O2 concentration stable i.e. difference between initial and actual value	< 0.20 [%]		
					Air mass flown since fuel cut-off condition	> 0.12 [g]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Circuit Low Bank 1 Sensor 2	P22A0	This diagnosis verifies Post Catalyst NOx Sensor read out of range low	Check if the NOx2 Sensor NOx concentration raw read is out of lower range: NOx raw read	< -90 ppm	Fuel injection quantity request Powertrain relay voltage NOx Sensor Bus relay is commanded ON No failure on NOx2 CAN communication Sensor supply in range Sensor dewpoint is reached No current control failure on NOx2 Sensor No electrical failure on NOx2 Sensor Combustion mode dependent enabling flag No O2 plausibility in load fault on NOx2	> -1 mm^3 > 11.00 V TRUE CAN_LostComm_FltN_BusB_NOxSnsr_B > 9.90 V TRUE NOX_NOx2_StBitChkFlt ==FALSE NOX_Snsr2_FltSt ==FALSE **NOX_S2_OutRngMinCmbMode** OXY_NOx2ChkLoadFlt ==FALSE	Time counter: 100 fails out of 200 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Circuit High Bank 1 Sensor 2	P22A1	This diagnosis verifies Post Catalyst NOx Sensor read out of range high	Check if the NOx1 Sensor NOx concentration raw read is out of higher range: NOx raw read	 > 2,990 ppm	Powertrain relay voltage NOx Sensor Bus relay is commanded ON No failure on NOx2 CAN communication Sensor supply in range Sensor dewpoint is reached No current control failure on NOx2 Sensor No electrical failure on NOx2 Sensor Combustion mode dependent enabling flag No O2 plausibility in load fault on NOx2	> 11.00 V TRUE CAN_LostComm_FltN_BusB_NOxSnsr_B > 9.90 V TRUE NOX_NOx2_StBitChkFlt ==FALSE NOX_Snsr2_FltSt ==FALSE **NOX_S2_OutRngMaxCmbMode** OXY_NOx2ChkLoadFlt ==FALSE	Time counter: 360 fails out of 720 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Control Circuit	P22A3	This diagnosis verifies Post Catalyst NOx Sensor Heater Supply pin Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 Heater Supply pin (H+)	open circuit on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Control Circuit Low Voltage	P22A4	This diagnosis verifies Post Catalyst NOx Sensor Heater Supply pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 Heater Supply pin (H+)	groundshort on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Control Circuit High Voltage	P22A5	This diagnosis verifies Post Catalyst NOx Sensor Heater Supply pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 2 Heater Supply pin (H+)	powershort on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Sense Circuit	P22A6	This diagnosis verifies Post Catalyst NOx Sensor Heater sense resistance measurement pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 2 Heater Sense pin (HTemp)	open circuit on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Heater Sense Circuit Range/ Performance Bank 1 Sensor 2	P22A7	This diagnosis verifies if the Post Catalyst NOx Sensor Heater raw resistance is in range	This diagnosis verifies if the Post Catalyst NOx Sensor Heater raw resistance is out of speficied range: (Sensor heater raw resistance - Sensor heater target resistance) / Sensor heater target resistence	< 0.06 >- 0.06	Powertrain relay voltage No loss of communcation with Nox2 Sensor No offset failure on NOx signal from NOx Sensor No circuit failure on NOx Sensor No out of range high failulre on NOx Signal No out of range low failulre on NOx Signal No DTC set: No failure on NOx Sensor Bus relay circuit NOx Sensor Bus relay is commanded ON Delay timer once Sensor supplyisin range (> 10.8 V) Delay timer once Sensor dewpoint is reached Delay timer once engine is overrun Delay timer once DPF combustion mode is not active	> 11.00 V CAN_LostComm_FltN_BusB_NOxSnsr_B ==FALSE NOX_NOx2_OfstMontrFlt ==FALSE NOX_NOx2_StBitChkFlt ==FALSE NOX_NOx2_OutOfRngHiFlt ==FALSE NOX_NOx2_OutOfRngLoFlt ==FALSE P30B5 SBR_RlyFA==FALSE TRUE > 45 sec > 180 sec > 200 sec 30 sec	Time counter: 125 fails out of 250 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Sense Low Voltage	P22A8	This diagnosis verifies Post Catalyst NOx Sensor Heater sense resistance measurement pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 2 Heater Sense pin (HTemp)	groundshort on HTemp	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 2 Heater Sense High Voltage	P22A9	This diagnosis verifies Post Catalyst NOx Sensor Heater sense resistance measurement pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 2 Heater Sense (HTemp)	powershort on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_B Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30B5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting Sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit Low Bank 1 Sensor 2	P22B6	This DTC detects if O2 signal is lower than physical minimum value.	O2 signal lower than a minimum value	< -8.00 [%]	Engine running System voltage in range Sensor is fully operative Enabled in combustion mode No pending or confirmed DTC	 > 11.00 [V] OXY_NOx2_O2_RawNotRlb == FALSE refer to supporting table **KaOXYD_b_NOx2SigRn** (**gEnblCmbMode**) NOX_Snsr2_NotVld	Time counter: 100 failures out of 200 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit High Bank 1 Sensor 2	P22B7	This DTC detects if O2 signal is higher than physical maximum value	O2 signal higher than a maximum value	> 27.00 [%]	Engine running System voltage in range Sensor is fully operative Exhaust gas pressure No Exhaust Brake active i.e. intake manifold pressure No pending or confirmed DTCs		Time counter: 100 failures out of 200 samples. Time task 25 [ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Performance - Sensing Element Bank 1 Sensor 2	P22FE	This diagnosis verifies the Post Catalyst NOx Sensor sensing cells integrity during afterrun	Check if there is any clogging in the Post Catalyst NOx Sensor measurement cavities that could result in reduced NOx-sensitivity. The Sensor internal operating current set-points are changed such way, that the O2 concentration in 2nd Sensor cavity is around 1000ppm. One test result is measured in fresh Sensor state (at supplier plant) and stored in the Sensor E2prom as diagnosis reference value. The diagnosis result is the ratio of current diagnosis value/reference value. The diagnosis result is processed with EWMA logic.	> 125 % OR < 75 %	No electrical failure on NOx2 Sensor No out of range low failure on NOx2 Sensor No out of range high failure on NOx2 Sensor No failure on NOx2 CAN communication No offset failure on NOx2 Sensor No DTC active: No failure on NOx1 Sensor No failure on O2 from NOx1 plausibility diagnostics No failure on SCR system No failure on downstream SCR HC model inputs No failure on crank Sensor No failure on exhaust temperature Sensor (downstream SCR)	NOX_Snsr2_ElecFA ==FALSE NOX_NOx2_OutOfRngLo Flt ==FALSE NOX_NOx2_OutOfRngHi Flt ==FALSE CAN_LostComm_FltN_Bu sB_NOxSnsr_B ==FALSE NOX_NOx2_OfstMontrFlt ==FALSE P30B5 NOX_Snsr1_NOx_Flt ==FALSE OXY_NOx1_O2_Flt ==FALSE EXF_TotExhSCR_UpFlt ==FALSE SCR_HC_SCR_DwnFlt ==FALSE CrankSensor_FA ==FALSE EGT_TempSCR_DwnFlt ==FALSE HCI_GenericShtOffReq	Test per trip: 1 If Fast Initial Response EWMA is active then 2 test per trip are allowed If Fast Initial Response EWMA is active then 4 test per trip are allowed Task=500ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No failure on HC injector No failure on Vehicle Speed Sensor No failure on NOx2 dynamic check No failure on any input of SCR chemical model No current control failure on NOx2 Sensor No failure on O2 from NOx2 plausibility diagnostics No failure on NOx Sensor Bus relay circuit Powertrain relay voltage NOx2 sensor supply in range NOx2 sensor dewpoint is reached (NOx2 Sensor heater raw resistance - NOx2 Sensor heater target resistance) / NOx2 Sensor heater target resistence a)combustion mode dependent enabling flag b) condition a) is fulfilled for time	==FALSE VehicleSpeedSensor_FA ==FALSE NOX_NOx2_DynChkFlt ==FALSE SCR_ChemicalMdlFlt ==FALSE NOX_NOx2_StBitChkFlt ==FALSE OXY_NOx2_O2_Flt ==FALSE SBR_RlyFA==FALSE > 11.00 V > 9.90 V TRUE < 0.06 % >- 0.06 % **NOX_NOx2SelfTstEnblCmbMode** > 50 sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					c) engine speed	> 0 rpm < 1,500 rpm		
					d) condition c) is fulfilled for time	> 1 sec		
					e) After injection pulse is not used for time	> 1 sec		
					f) exhaust temperature Sensor (downstream SCR)	> -20 °C < 400 °C		
					g) exhaust mass flow	< 20 g/s		
					h) NH3 concentration	< 800 ppm		
					j) conditions f) g) h) are fulfilled for time	> 5 sec		
					k) O2 concentration from NOx1	> 10 %		
					i) NOx concentration from NOx1	< 1,000 ppm		
					l) conditions k) i) are fulfilled for time	> 0 sec		
					m) duty cycle applied to the HC injector driver	< 1 %		
					n) condition m) is fulfilled for time	> 5 sec		
					o) time between key off and last overrun	> 15 sec		
					p) time between key off and last DPF regen	> 10 sec		
						< 800 rpm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					q) engine speed in idle range	< 20 mm^3		
					r) fuel request in idle range	< 1,800 sec		
					s) conditions q) r) is fulfillled for time			
					t) timer of condition s) is reset if one of the following condition is fulfilled (idle off recognition - t) conditions):	> -20 °C		
					t.1) exhaust temperature (downstream SCR)	> 5 sec		
					t.2) condition t.1) is fulfilled for time (once idle has been detected)	> 5 mph > 5 sec		
					t.3) vehicle speed			
					t.4) condition t.3) is fulfilled for time (once idle has been detected)	> 30 g/sec > 5 sec		
					t.5) exhaust mass flow			
					t.6) condition t.5) is fulfilled for time (once idle has been detected)	< 5 g/s		
					u) HC mass flow (SCR downstream)			
					Once u) condition is fulfilled the following additional u.x) conditions shall be fulfilled to enable	> -20 g/s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					the monitor (AND logic) u.1) exhaust temperature (downstream SCR) u.2) condition u.1) is fulfilled for time (once condition u) has been detected) u.3) vehicle speed u.4) condition u.3) is fulfilled for time (once condition u) has been detected) u.5) exhaust mass flow u.6) condition u.5) is fulfilled for time (once condition u) has been detected) v) deceleration before keyoff. w) condition v) could be ignored if idle engine condition w.x) is fulfilled w.1) engine speed in idle range w.2) condition w.1) fulfilled for time Once all conditions above are fulfilled during the driving cycle, ECM requires diagnostic test	> 22 sec >= 5 mph > 10 sec > 22 g/s > 5 sec < 4.00 m/s < 5.00 rpm < 10.00 rpm > 8.00 s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					execution at key off			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Differential Pressure Sensor Circuit High Voltage	P2381	This monitor checks if the LP EGR differential pressure sensor is out of electrical range high	LP EGR differential pressure raw voltage value > high threshold	> 98.00 [%]	Test enabled by calibration Diagnostic system enabled (no clear code or EOT in progress) System out of the cranking phase PT relay supply voltage in range	== 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Differential Pressure Sensor Circuit Low Voltage	P2382	This monitor checks if the LP EGR differential pressure sensor is out of electrical range low	LP EGR differential pressure raw voltage value < low threshold	< 2.00 [%]	Test enabled by calibration Diagnostic system enabled (no clear code or EOT in progress) System out of the cranking phase PT relay supply voltage in range	== 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Differential Pressure Sensor Performance	P2383	This monitor checks if the LP EGR differential pressure sensor readings are plausible at key off	|Average reading value over a calibrateable number of raw samples| > threshold	> 6.00 [%]	Test enabled by calibration Diagnostic system enabled (no clear code or EOT in progress) PT relay supply voltage in range No electrical faults on LP EGR differential pressure sensor No intermittent fault on LP EGR differential pressure sensor LP EGR differential pressure sensor offset learning successfully completed: - number of read samples >= threshold; - no missing default position active on exhaust throttle valve; - no faults present on LP EGR position sensor, LP EGR valve, LP EGR position control deviation;	== 1.00 > 11.00 [V] LPE_PresSnsrCktHiFA ==FALSE AND LPE_PresSnsrCktLoFA ==FALSE LPE_PresSnsrIntFA ==FALSE >= 50.00 LEV_DfltPstnNotRchdFlt ==FALSE LPE_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					- no electrical faults on LP EGR differential pressure sensor; - no intermittent fault on LP EGR differential pressure sensor. End Of Trip event has elapsed	LPE_PresSnsrCktHiFA ==FALSE AND LPE_PresSnsrCktLoFA ==FALSE LPE_PresSnsrIntFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation Differential Pressure Sensor Circuit Intermittent	P2384	This monitor checks the LP EGR differential pressure sensor for too fast changes in the pressure values	|Difference between two consecutive raw readings| > threshold	> 10.00 [%]	Test enabled by calibration Diagnostic system enabled (no clear code or EOT in progress) System out of the cranking phase Ignition run crank active PT relay supply voltage in range No electrical faults on LP EGR differential pressure sensor	== 1.00 > 11.00 [V] LPE_PresSnsrCktHiFA ==FALSE AND LPE_PresSnsrCktLoFA ==FALSE	960.00 fail counts out of 1,200.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Circuit Low Bank 1 Sensor 3	P23AE	This diagnosis verifies Post Second Catalyst NOx Sensor read out of range low	Check if the NOx3 sensor NOx concentration raw read is out of lower range: NOx raw read	< -90 ppm	Fuel injection quantity request Powertrain relay voltage NOx Sensor Bus relay is commanded ON No failure on NOx3 CAN communication Sensor supply in range Sensor dewpoint is reached No current control failure on NOx3 sensor No electrical failure on NOx3 sensor Combustion mode dependent enabling flag No O2 plausibility in load fault on NOx3	> -1 mm^3 > 11.00 V TRUE CAN_LostComm_FltN_BusB_NOxSnsr_C > 9.90 V TRUE NOX_NOx3_StBitChkFlt ==FALSE NOX_Snsr3_FltSt ==FALSE **NOX_S3_OutRngMinCmbMode** OXY_NOx3ChkLoadFlt ==FALSE	Time counter: 100 fails out of 200 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Circuit High Bank 1 Sensor 3	P23AF	This diagnosis verifies Post Second Catalyst NOx Sensor read out of range high	Check if the NOx3 sensor NOx concentration raw read is out of higher range: NOx raw read	 > 2,990 ppm	Powertrain relay voltage NOx Sensor Bus relay is commanded ON No failure on NOx2 CAN communication Sensor supply in range Sensor dewpoint is reached No current control failure on NOx3 sensor No electrical failure on NOx3 sensor Combustion mode dependent enabling flag No O2 plausibility in load fault on NOx3	> 11.00 V TRUE CAN_LostComm_FltN_BusB_NOxSnsr_C > 9.90 V TRUE NOX_NOx3_StBitChkFlt ==FALSE NOX_Snsr3_FltSt ==FALSE **NOX_S3_OutRngMaxCmbMode** OXY_NOx3ChkLoadFlt ==FALSE	Time counter: 120 fails out of 240 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Control Circuit	P23B1	This diagnosis verifies Post Second Catalyst NOx Sensor Heater Supply pin Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 Heater Supply pin (H+)	open circuit on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Control Circuit Low Voltage	P23B2	This diagnosis verifies Post Second Catalyst NOx Sensor Heater Supply pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 Heater Supply pin (H+)	groundshort on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Control Circuit High Voltage	P23B3	This diagnosis verifies Post Second Catalyst NOx Sensor Heater Supply pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 3 Heater Supply pin (H+)	powershort on H+ pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Sense Circuit	P23B4	This diagnosis verifies Post Second Catalyst NOx Sensor Heater sense resistance measurement pin for Open Load Circuit	Check if there is an open circuit on NOx Sensor 3 Heater Sense pin (HTemp)	open circuit on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range No DTC active:	> 11.00 V TRUE FALSE > 9.90 V P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Heater Sense Circuit Range/ Performance Bank 1 Sensor 3	P23B5	This diagnosis verifies if the Post Second Catalyst NOx Sensor Heater raw resistance is in range	This diagnosis verifies if the Downstream NOx sensor Heater raw resistance is out of speficied range: (Sensor heater raw resistance - sensor heater target resistance) / sensor heater target resistence	< 0.06 >- 0.06	Powertrain relay voltage No loss of communcation with Nox2 Sensor No offset failure on NOx signal from NOx Sensor No circuit failure on NOx Sensor No out of range high failulre on NOx Signal No out of range low failulre on NOx Signal No DTC set: No failure on NOx Sensor Bus relay circuit NOx Sensor Bus relay is commanded ON Delay timer once sensor supplyisin range (> 10.8V) Delay timer once sensor dewpoint is reached Delay timer once engine is overrun Delay timer once DPF combustion mode is not active	> 11.00 V CAN_LostComm_FltN_BusB_NOxSnsr_C ==FALSE NOX_NOx3_OfstMontrFlt ==FALSE NOX_NOx3_StBitChkFlt ==FALSE NOX_NOx3_OutOfRngHiFlt ==FALSE NOX_NOx3_OutOfRngLoFlt ==FALSE P30D5 SBR_RlyFA==FALSE TRUE > 200 sec > 200 sec > 200 sec 200 sec	Time counter: 125 fails out of 250 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Supply Voltage Circuit Bank 1 Sensor 3	P23B6	This diagnosis verifies if the supply voltage of the Post Second Catalyst Nox Sensor is out of range	Check if NOxSensor 3 supply voltage status is out of range	Sensor supply voltage < 9.90 V	NOx sensor is Gen3.0 Engine is running Powertrain relay voltage NOx Sensor Bus relay is commanded ON a) NOx sensor Dewpoint is reached b) condition a) shall be fulfilled for time CAN_LostComm_FltN_BusB_NOxSnsr_C No DTC active:	TRUE TRUE > 11.00 V TRUE TRUE > 0 sec FALSE P30B5	Time counter: 125 fails out of 250 samples Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Sense Low Voltage	P23B8	This diagnosis verifies Post Second Catalyst NOx Sensor Heater sense resistance measurement pin for Short to Ground	Check if there is a short circuit to ground on NOx Sensor 3 Heater Sense pin (HTemp)	groundshort on HTemp	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor 3 Heater Sense High Voltage	P23B9	This diagnosis verifies Post Second Catalyst NOx Sensor Heater sense resistance measurement pin for Short to Battery	Check if there is a short circuit to power supply on NOx Sensor 3 Heater Sense (HTemp)	powershort on HTemp pin	Powertrain relay voltage NOx Sensor Bus relay is commanded ON CAN_LostComm_FltN_BusB_NOxSnsr_C Sensor supply in range Sensor dewpoint is reached No DTC active:	> 11.00 V TRUE FALSE > 9.90 V TRUE P30D5	Time counter: 20 fails out of 40 samples Continental NOx Sensors Gen 3.5 include an internal 1.5s debouncing time for electrical fault reporting needed to pinpoint the specific failure affecting sensor wires. Task=25ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
NOx Sensor Performance - Sensing Element Bank 1 Sensor 3	P23C1	This diagnosis verifies the Post Second Catalyst NOx Sensor sensing cells integrity during afterrun	Check if there is any clogging in the Post Second Catalyst NOx sensor measurement cavities that could result in reduced NOx-sensitivity. The sensor internal operating current set-points are changed such way, that the O2 concentration in 2nd sensor cavity increases to a target value. One test result is measured in fresh sensor state (at supplier plant) and stored in the sensor E2prom as diagnosis reference value. The diagnosis result is the ratio of current diagnosis value/reference value. The diagnosis result is processed with EWMA logic.	> 125 % OR < 75 %	No electrical failure on NOx3 sensor No out of range low failure on NOx3 sensor No out of range high failure on NOx3 sensor No offset failure on NOx3 Sensor No DTC set: No failure on NOx3 CAN communication No failure on NOx1 sensor No failure on O2 from NOx1 plausibility diagnostics No failure on UF-SCR system No failure on downstream UF-SCR HC model inputs No failure on crank sensor No failure on exhaust temperature sensor (downstream UF-SCR) No failure on HC injector	NOX_Snsr3_ElecFA ==FALSE NOX_NOx3_OutOfRngLo Flt ==FALSE NOX_NOx3_OutOfRngHi Flt ==FALSE NOX_NOx3_OfstMontrFlt ==FALSE P30D5 CAN_LostComm_FltN_Bu sB_NOxSnsr_C ==FALSE NOX_Snsr1_FltSt ==FALSE OXY_NOx1_O2_Flt ==FALSE EXF_TotExhSCR_UpFlt ==FALSE SCR_HC_SCR_DwnFlt ==FALSE CrankSensor_FA ==FALSE EGT_TempSCR_DwnFlt ==FALSE HCI_GenericShtOffReq	Test per trip: 1 If Fast Initial Response EWMA is active then 2 test per trip are allowed If Fast Initial Response EWMA is active then 4 test per trip are allowed Time = 500ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						==FALSE		
					No failure on Vehicle Speed sensor	VehicleSpeedSensor_FA ==FALSE		
					No failure on any input of UF-SCR chemical model	SCR_ChemicalMdlFlt ==FALSE		
					No current control failure on NOx3 sensor	NOX_NOx3_StBitChkFlt ==FALSE		
					No failure on O2 from NOx3 plausibility diagnostics	OXY_NOx3_O2_Flt ==FALSE		
					No failure on NOx Sensor Bus relay circuit	SBR_RlyFA==FALSE		
					Powertrain relay voltage	> 11.00 V		
					NOx3 sensor supply in range	> 9.90 V		
					NOx3 sensor dewpoint is reached	TRUE		
					(NOx3 Sensor heater raw resistance - NOx3 sensor heater target resistance) / NOx3 sensor heater target resistence	< 0.06 % >- 0.06 %		
					a)combustion mode dependent enabling flag	**NOX_NOx3SelfTstEnblCmbMode**		
					b) condition a) is fulfilled for time	> 5 sec		
					c) engine speed	> 0 rpm < 1,500 rpm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					d) condition c) is fulfilled for time	> 1 sec		
					e) After injection pulse is not used for time	> 1 sec		
					f) exhaust temperature sensor (downstream UF-SCR)	> -20 °C < 400 °C		
					g) exhaust mass flow	< 20 g/s		
					h) NH3 concentration	< 600 ppm		
					j) conditions f) g) h) are fulfilled for time	> 5 sec		
					k) O2 concentration from NOx1	> 2 %		
					i) NOx concentration from NOx1	< 600 ppm		
					l) conditions k) i) are fulfilled for time	> 0.00 sec		
					m) duty cycle applied to the HC injector driver	< 1 %		
					n) condition m) is fulfilled for time	> 5 sec		
					o) time between key off and last overrun	> 15 sec		
					p) time between key off and last DPF regen	> 10 sec		
					q) engine speed in idle range	< 800 rpm		
					r) fuel request in idle	< 20 mm^3		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range			
					s) conditions q) r) is fulfillled for time	< 1,800 sec		
					t) timer of condition s) is reset if one of the following condition is fulfilled (idle off recognition - t) conditions):			
					t.1) exhaust temperature (downstream UF-SCR)	> -20 °C		
					t.2) condition t.1) is fulfilled for time (once idle has been detected)	> 5 sec		
					t.3) vehicle speed	> 5 mph		
					t.4) condition t.3) is fulfilled for time (once idle has been detected)	> 5 sec		
					t.5) exhaust mass flow	> 30 g/sec		
					t.6) condition t.5) is fulfilled for time (once idle has been detected)	> 5 sec		
					u) HC mass flow (UF-SCR downstream)	< 20 g/s		
					Once u) condition is fulfilled the following additional u.x) conditions shall be fulfilled to enable the monitor (AND logic)			
					u.1) exhaust temperature (downstream UF-SCR)	> -20 g/s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					u.2) condition u.1) is fulfilled for time (once condition u) has been detected)	> 20 sec		
					u.3) vehicle speed	> 5 mph		
					u.4) condition u.3) is fulfilled for time (once condition u) has been detected)	> 10 sec		
					u.5) exhaust mass flow	> 18 g/s		
					u.6) condition u.5) is fulfilled for time (once condition u) has been detected)	> 5 sec		
					v) deceleration before keyoff	< 4.00 m/s^2		
					w) condition v) could be ignored if idle engine condition w.x) is fulfilled			
					w.1) engine speed in idle range	< 5.00 rpm < 10.00 rpm		
					w.2) condition w.1) fulfilled for time	> 15.00 s		
					Once all conditions above are fulfilled during the driving cycle, ECM requires diagnostic test execution at key off			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Gas Recirculation (EGR) 2 Cooling System Performance	P241F	This monitor checks the LP EGR Cooler efficiency deterioration, that would cause vehicle's emissions to exceed specific emission levels.	LP EGR Cooler Efficiency (averaged over a calibration cumulative transient time) is compared with a threshold. LP EGR Cooler efficiency is computed as the ratio between (LP EGR cooler upstream temperature - LP EGR cooler downstream temperature) and (LP EGR cooler upstream temperature - LP EGR cooler inlet coolant temperature). Each sample of the computed LP EGR Cooler Efficiency (before the average) is corrected by an offset depending on the LP EGR flow.	< 50.00 [%] **P241F: Efficiency Offset** [%]	Calibration on diagnostic enabling PT Relay voltage in range Engine is running or cranking Difference between LP EGR cooler upstream temperature and LPE cooler inlet coolant temperature Ambient Temperature Ambient pressure Air Control is Active Engine Coolant Temperature (OR OBD Coolant Enable Criteria), AND Engine Coolant Temperature LP EGR flow (filtered) in range, with hysteresis on	1.00 ==TRUE Powertrain relay voltage > 11.00 [V] ==TRUE > 120.00 [°C] < 300.00 [°C] >= -20.00 [°C] >= 69.60 [kPa] Refer to "Air Control Active" Free Form > 60.00 [°C] ==TRUE < 130.00 [°C] > 5.00 [g/s] (ENABLE) < 2.00 [g/s] (DISABLE)	Test executed after 200.00 samples are collected and their average is computed functional task 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					the minimum threshold	< 40.00 [g/s]		
					for a time	>= 12.00 [s]		
					LP EGR flow estimation is valid	LPE_VlvTotFlowNotVld ==FALSE		
					Engine speed in range	< 3,000.00 [rpm] > 1,050.00 [rpm]		
					Estimated LP EGR cooler inlet coolant flow	> 8.00 [l/min]		
					LP EGR cooler inlet coolant flow estimation is valid	CECR_SystemFlowEstimate_FA ==FALSE		
					No fault on LP EGR cooler upstream temperature sensor	EGT_SnsrDPF_DwnFA ==FALSE		
					No fault on LP EGR cooler downstream temperature sensor	LPE_TempSnsrFA ==FALSE		
					No fault on LP EGR cooler inlet coolant temperature sensor	EECR_LPE_InletCoolant_FA ==FALSE		
					No fault on Ambient Temperature sensor			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No fault on ambient pressure sensor No fault on engine coolant temperature sensor No fault on engine speed No fault on LP EGR valve	OAT_PtEstFiltFA ==FALSE AAP_AmbientAirPresDfltd ==FALSE ECT_Sensor_FA ==FALSE CrankSensor_FA ==FALSE LPE_PstnShtOffReq ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 3 stuck in range monitoring	P242B	This monitor has the purpose of warning the system/driver that EGT 3 sensor behavior is not plausible in a way that the signal coming from the sensor is stuck when expected to change. Failure modes:sensor internal malfunctions (stuck output) The difference between the maximum EGT value and the EGT sensor signal (converted raw signal) is lower than an expected temperature variation for a certain observation time, once a minimum amount of fuel has been injected. The following parameters are evaluated starting from the read converted raw temperature value, through calibratable maps: - Observation time window - Expected temperature variation - Minimum amount of injected fuel	The difference between maximum EGT 2 value and EGT 2 sensor signal is lower than an expected temperature variation for a certain observation time, once a minimum amount of fuel has been injected.	**EGT3 Stuck Temperature <=Variation** [°C] **EGT3 Stuck Wait >Time** [s] **EGT3 Fuel request >integral**	Monitor enabled by dedicated calibration AND Diagnostic system reset status AND Engine running AND No faults on EGT1 sensor (electrical and plausibility in and logic) AND Minimum elapsed time in engine-off phase AND Engine not running error flag AND	1 [Boolean] ==FALSE == TRUE EGT_ExhGas3_CktTFTKO AND EGT_ExhGas3_CktFA AND EGT_ExhGas3_RatTFTKO AND EGT_ExhGas3_RatFA AND EGT_ExhGas3_QckChgFA AND EGT_ExhGas3_QckChgTFTKO > 10,800 [s] ==FALSE	No debounce	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Supply voltage in range	> 11.00 [V]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 3 out of range monitoring Low	P242C	This monitor has the purpose of warning the system/driver that an electrical problem on EGT 3 sensor is present. Failure mode: Out Of Range Low (short circuit to ground) The monitor compares the EGT raw value (resistance value) with a minimum threshold; if this threshold is overcome, a OOR Low error is detected.	The monitor compares the EGT 3 raw value (resistance value) with a minimum threshold; if this threshold is overcome, a OOR Low error is detected.	< 40.00 [Ohm]	Monitor enabled by dedicated calibration AND Engine cranking AND Supply voltage in range AND Ignition run crank active AND Diagnostic system reset status	1 [Boolean] == FALSE == TRUE == TRUE == FALSE	10 fail samples over 20 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 3 out of range monitoring High	P242D	This monitor has the purpose of warning the system/driver that an electrical problem on EGT 3 sensor is present. Failure modes: Out Of Range High (open circuit, short circuit to supply, broken wiring) The monitor compares the EGT raw value (resistance value) with a maximum threshold; if this threshold is overcome, a OOR High error is detected.	The monitor compares the EGT 3 raw value (resistance value) with a maximum threshold; if this threshold is overcome, a OOR High error is detected.	> 400,000.00 [Ohm]	Monitor enabled by dedicated calibration AND Engine cranking AND Supply voltage in range AND Ignition run crank active AND Diagnostic system reset status	1 [Boolean] == FALSE == TRUE == TRUE == FALSE	10 fail samples over 20 samples Function task: 100ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust gas temperature sensor (EGT) 3 quick change monitoring	P242E	This function has the purpose of warning the system/driver that EGT 3 sensor signal is varying too fast with respect to the expected signal dynamic. Failure modes: - Sensor internal malfunctions - Wiring harness deterioration - Connectors electrical issues The monitor compares EGT 3 sensor signal (converted raw value) with two calibratable thresholds (minimum and maximum ones). Thresholds are dynamically evaluated by the SW.	The monitor compares EGT 3 sensor signal with two calibratable thresholds.Thresholds are dynamically evaluated by the SW as: 1) Maximum value between the last valid EGT temperature value + resolution error and a value obtained considering maximum calibratable value that can be read by the sensor, last valid EGT temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant 2) Minimum value between the last valid EGT temperature value - resolution error and a value obtained considering minimum calibratable value that can be read by the sensor, last valid EGT temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant	**EGT ExhGas3** > **QckChgMaxThrsh**[° C] **EGT ExhGas3** < **QckChgMinThrsh**[° C]	Monitor enabled by dedicated calibration AND Ignition run crank active AND Engine cranking AND Supply voltage in range AND No electrical faults affecting the sensor AND Punctual electrical errors affecting the sensor	1 [Boolean] ==TRUE ==FALSE > 11.00 [V] EGT_ExhGas3_CktFA AND EGT_ExhGas3_CktTFTKO ==FALSE	20 fail samples out of 30 samples Function task: 100ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Differential Pressure Too Low	P244A	This diagnostic detects a DPF pressure sensor pipe disconnected or clogged or blocked or a removed Diesel Particulate Filter	Measured DPF absolute pressure	< **Exhaust Gas Pressure Too Low Threshold** [kPa]	Test enabled by calibration No error on relative-to-ambient pressure sensor (electrical, rationality and offset) No error on air flow meter No error on atmospheric pressure sensor Exhaust gas volume flow Engine speed Engine coolant temperature OR OBD Coolant Enable Criteria Pipe Icing Risk Low	1.00 ==TRUE EGP_DiffPresSnsrFlt ==FALSE MAF_MAF_SnsrFA ==FALSE AND MAF_MAF_SnsrTFTKO ==FALSE AmbPresDfltdStatus= CeAAPR_e_AmbPresNot Dfltd > 120.00 [l/s] > 1,000.00 [rpm] > -40.00 [°C] OR == TRUE == TRUE	60.00 failures over 80.00 samples Function task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Differential Pressure Too High	P244B	This diagnostic detects a clogged DPF.	In case the calibratable value is set to true than the average calculation ration, function of pressure sensor and exhaust flow calculated in a calibratable window 100.00 else the average calculation ration, function of pressure sensor and exhaust flow calculated in a calibratable window 100.00	1.00 >the average threshold calculation value function of soot load and temperature sensor >**TooHiThreshold**	Test enabled by calibration AND Engine mode run AND No fault on Upstream Exhaust Gas Temperature AND No Fault on EGP Sensor AND No fault on Exhaust mass flow AND Soot load model valid AND Upstream Exhaust Gas Temperature inside a calibratable range with hysteresis AND Exhaust throttle valve measured position with hysteresis Soot Load value inside a calibratable threshold with hysteresis Exhaust mass Flow with hysteresis	1.00 ==TRUE ==TRUE EGT_TempDPF_UpFlt EGP_DiffPresSnsrFlt EXF_TotExhaustFlt ==TRUE 500.00 > 200.00 0.00 < 12.00 > 0.00 0.00 < 90.00 > 0.00 1.00 > 15.00 5.00	Function task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Catalyst Temperature Too Low During Regeneration	P244C	This diagnosis detects an Injector or a catalyst that is malfunctioning or losses in the exhaust gas system	The DTC is set when: Counter of subsequent Interrupted regeneration The interrupted regeneration counter increases only when the interruption is caused by: - Regeneration process interrupted due to maximum regeneration time elapsed. Time allowed to complete DPF regeneration is expired (according to regeneration mission profile) OR - Post injection pulses not enabled in time. Time to release POST injection is expired (according to regeneration mission profile) OR - Regeneration Steady phase not entered in time. Time to reach DPF regeneration steady state condition is expired (according to regeneration mission profile)	> 0.00 [Cnt] > **Maximum allowed time to complete regeneration** [s] > **Maximum allowed time to release post injections for regeneration** [s] > **Maximum allowed time to reach steady state for regeneration** [s]	Test enabled by calibration	1.00 ==TRUE	No time required, i.e. as soon as the malfunction criteria is satisfied Function task: 100 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			The counter is reset when a successful DPF regeneration occurs					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate filter pressure sensor offset monitoring	P2452	This monitor verifies if the pressure at the particulate filter inlet, measured at the beginning of the driving cycle in engine is not running conditions, is too high (sensor offset out of specification)	A fault is detected once the calculated differential pressure sensor offset exceeds a maximum allowed threshold	> 2 [%]	Monitor enabled by dedicated calibration AND Key on condition AND Minimum time elapsed after the switch to key on phases is passed AND Engine movement detection AND Minimum elapsed time, after the minimum engine not running time in key on, is passed AND Minimum elapsed time in engine not running mode is passed AND Faults affecting the engine off timer AND No electrical, rationality or quick change faults affecting the sensor	1 [Boolean] ==TRUE > 0.02 [sec] ==FALSE == 13.00 [cnt] (13.00 *12.5 ms gives the learning duration) > 21,600.00 [sec] ==FALSE EGP_DiffPresQckChgFlt AND EGP_DiffPresSnsrCktFlt	No debounce Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						AND EGP_DiffPresSnsrRatFlt		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate filter pressure sensor plausibility monitoring	P2453	Case1 (rationality monitor): this monitor is aimed to report failures affecting the differential pressure sensor causing signal variation during almost stationary phases, detecting flow resistance changes when it is expected to be almost constant; this is done by comparing the flow resistance with its filtered component. Case2 (stuck in range): this monitor detects a stucked signal, reporting a failure if the signal does not change whhen it is supposed to (during transition phases)	|Filtered flow resistance – Initial flow resistance| higher than a threshold	> 0.30 [KPa*s/m^3]	Monitor enabled by dedicated calibration AND Engine cranking AND Key on condition AND Supply voltage in range AND No electrical, offset, quick change and stuck in range/rationality faults affecting the sensor AND No fault on air flow meter in and logic AND No fault on DPF Upstream temperature sensor (in case a sensor is present) OR on the DPS Upstream temperature modeled signal AND	0 [Boolean] ==FALSE ==TRUE > 11.00 [V] EGP_DiffPresOfstTFTKO AND EGP_DiffPresQckChgFlt AND EGP_DiffPresSnsrCktFlt AND EGP_DiffPresStkFltPresent MAF_SensorFA AND MAF_SensorTFTKO EGT_SnsrDPF_UpFlt OR EGT_TempDPF_UpFlt	5 fail samples out of 10 samples Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					System in stationary conditions: Variation below: - Fuel request variation AND - Engine speed variation AND - Air mass quantity per cylinder variation For a minimum period AND Air mass quantity per cylinder AND Flow resistance calculation deactivation	 <= 1.00 [mm^3] <= 10.00 [rpm] <= 10.00 [mg] > 3.00 [Cnt] (3.00 *12.5 ms gives the learning duration) > 0.00 [mg] ==FALSE		
			Differential pressure variation lower than expected	<= 0.15 [%]	Monitor enabled by dedicated calibration AND Engine movement detection AND No electrical, plausibility, offset and quick change faults affecting the sensors AND Engine speed variation	1 [Boolean] == TRUE EGP_DiffPresOfstTFTKO AND EGP_DiffPresQckChgFlt AND EGP_DiffPresSnsrCktFlt AND EGP_DiffPresStkFltPresent > 200.00 [rpm/s]	21 fail samples out of 30 samples Function task: 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND Fuel quantity variation	 > 10.00 [l/s]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate filter pressure sensor out of range monitoring Low	P2454	This monitor refers to electrical fails on the differential pressure sensor, covering the out of range low. The monitor compares the raw differential pressure signal with a minimum threshold. If this threshold is overcome, a short circuit to GND is detected.	Signal voltage raw value is compared to the voltage clamp value reported on the sensor datasheet, referring to a short to ground; a fault is detected when the value is lower than a certain threhsold.	< 3.00 [%]	Monitor enabled by dedicated calibration AND Engine cranking phase AND Key on condition AND Supply voltage in range	1 [Boolean] == FALSE ==TRUE > 11.00 [V]	80 fail samples out of 160 samples Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate filter pressure sensor out of range monitoring High	P2455	This monitor refers to electrical fails on the differential pressure sensor, covering the out of range high. The monitor compares the raw differential pressure signal with a maximum threshold. If this threshold is overcome, an open circuit or a short circuit to battery is detected.	Signal raw value is compared to the voltage clamp value reported on the sensor datasheet, referring to a open circuit or a short to battery; a fault is detected when the value exceeds a certain threhsold.	> 97.00 [%]	Monitor enabled by dedicated calibration AND Engine cranking phase AND Key on condition AND Supply voltage in range	1 [Boolean] == FALSE ==TRUE > 11.00 [V]	80 fail samples out of 160 samples Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate filter pressure sensor quick change monitoring	P2456	This monitor checks if the raw signal variation is too high, comparing consecutive samples diffeerence with a threshold	Difference between two subsequent differential pressure raw signal samples exceeds a certain threshold	> 20.00 [%]	Monitor enabled by dedicated calibration AND Engine cranking phase AND Key on condition AND Supply voltage in range AND Electrical errors flags (out of range high/low) AND No electrical fault on exhaust gas pressure sensor (out of range high/ low)	1 [Boolean] == FALSE == TRUE > 11.00 [V] ==FALSE EGP_DiffPresSnsrCktFlt	36 fail samples out of 240 samples Function task: 12.5 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Regeneratio n Frequency	P2459	This diagnostic detects a too high DPF regeneration frequency due to inefficient combustion, inefficient regeneration, soot overestimated by models or leaks in the exhaust or the intake line. When a new regeneration is started, the diagnostic computes a ratio between the soot level estimated by the model that has triggered the regeneration and the soot level estimated by the Nominal Engine Out soot model, which gives information about the expected soot level in the DPF. If the ratio is greater than a threshold, the diagnostic will report a fail. In case the regeneration is started based on miles travelled or time passed since last regeneration, the diagnostic will always report a pass. The test results can be optionally filtered by an EWMA filter.	When the regeneration is started by a soot model, the ratio between the soot level from that model and the soot level estimated by the Nominal Engine Out model is calculated. Monitor configuration: *EWMA Enable* = 1.00 **a)** In case of EWMA filter not enabled (*EWMA Enable* == 0), the calculated ratio is **b)** In case of EWMA filter enabled (*EWMA Enable* == 1), the calculated ratio is OR, if a P2459 fault is already active, the calculated ratio is	 >= 5.07 >= 5.08 >= 5.08	Test enabled by calibration A new DPF regeneration is started At least one successful regeneration has already occurred The previous regeneration was completed successfully The regeneration is requested at service Just before the new regeneration is started, Delta Pressure (Δp) soot model was valid for a time (*) Delta Pressure (Δp) plus Configurable Correction Block (CCB) soot model was valid for a fraction of the soot loading time (*) The Nominal Engine Out soot model was valid for a fraction of the soot loading time (**)	1.00 == TRUE == TRUE == TRUE == FALSE >= 0.00 s > 0.49 > 0.49	No time required, the malfunction criteria are evaluated as soon as a new DPF regeneration is started. Function task: 100 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Run/crank voltage Extreme transient engine operation was not detected, i.e. the delta fuel request during the soot loading time was (*) *Condition is ignored if the regeneration is not triggered by this model* (**) *Condition is ignored if the regeneration is started based on miles or time since last regeneration*	> 11.00 V < 100.00 mm3/s		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Soot Accumulation	P2463	This diagnostic detects a clogged DPF needing to be regeneration at service	Soot model based on Delta pressure measure plus configurable correction block (CCB)	> 130.00 [Pct]	Test enabled by calibration	1.00 ==TRUE	120.00 failures over 150.00 samples	Type A, 1 Trips
					No fault on DPF pressure sensor (electrical, rationality and offset)	EGP_DiffPresSnsrFlt ==FALSE	function task: 100 ms	
					No fault on downstream catalyst temperature sensor (electrical and rationality) with the exception of the fault on ANDR ADC	EGT_SnsrCatDwnFlt ==FALSE (if TRUE, then ANDR FA ==TRUE)		
					No fault on air flow meter	MAF_MAF_SnsrFA ==FALSE AND MAF_MAF_SnsrTFTKO ==FALSE		
					No fault on atmospheric pressure sensor	AmbPresDfltdStatus = CeAAPR_e_AmbPresNotDfltd		
					DPF status in sootloading phase (no regeneration ongoing)	DPF_DPF_St == CeDPFR_e_SootLoading		
					Engine speed	> 500.00 [rpm]		
					No fault on exhaust mass flow estimation	EXF_TotExhDPF_UpFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Exhaust gas volume flow greater than a calibrateable threshold for more than a calibratable time	> 32.00 [l/s] for > 2.00 [s]		
					Exhaust gas temperature at DPF inlet is between two thresholds for a minimum calibrateable time	> 0.00 [DegC] AND < 700.00 [DegC] for > 0.00 [s]		
					Engine Coolant Temperature OR OBD Coolant Enable Criteria	> 0.00 [DegC] ==TRUE		
					Ambient Temperature	> -40.00 [DegC]		
					Soot model based on Delta Pressure plus configurable correction block (CCB) is valid for a time	> = 0.10 % of the soot loading		
					Soot model based on Delta Pressure is always valid for a time	>= 5.00 s		
					Distance since last completed regeneration	> -1.00 km		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Filter Restriction - Ash Accumulation	P24A4	This diagnostic detects a clogged DPF that has to be replaced	Soot model based on Delta pressure measure plus configurable correction block (CCB)	> 300.00 [Pct]	Test enabled by calibration	1.00 ==TRUE	20.00 failures over 30.00 samples	Type A, 1 Trips
					No fault on DPF pressure sensor (electrical, rationality and offset)	EGP_DiffPresSnsrFlt ==FALSE	function task: 100 ms	
					No fault on downstream catalyst temperature sensor (electrical and rationality) with the exception of the fault on ANDR ADC	EGT_SnsrCatDwnFlt ==FALSE (if TRUE, then ANDR FA ==TRUE)		
					No fault on air flow meter	MAF_MAF_SnsrFA ==FALSE AND MAF_MAF_SnsrTFTKO ==FALSE		
					No fault on atmospheric pressure sensor	AmbPresDfltdStatus = CeAAPR_e_AmbPresNotDfltd		
					DPF status in soot loading phase (no regeneration ongoing)	DPF_DPF_St == CeDPFR_e_SootLoading		
					Engine speed	> 500.00 [rpm]		
					No fault on exhaust mass flow estimation	EXF_TotExhDPF_UpFA ==FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Exhaust gas volume flow greater than a calibrateable threshold for more than a calibratable time	> 32.00 [l/s] for > 2.00 [s]		
					Exhaust gas temperature at DPF inlet is between two thresholds for a minimum calibrateable time	> 0.00 [DegC] AND < 700.00 [DegC] for > 0.00 [s]		
					Engine Coolant Temperature OR OBD Coolant Enable Criteria	> 0.00 [DegC] ==TRUE		
					Ambient Temperature	> -40.00 [DegC]		
					Soot model based on Delta Pressure plus configurable correction block (CCB) is valid for a time	> = 0.10 % of the soot loading		
					Soot model based on Delta Pressure is always valid for a time	>= 5.00 s		
					Distance since last completed regeneration	> -1.00 km		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Circuit Low	P24B0	This diagnosis detects an open circuit on the soot sensor electrode signal or a cracked electrode	Soot Sensor Electrode raw current 1 AND Soot Soot Electrode raw current measured at setpoint temperature 1 - Soot Soot Electrode raw current measured at setpoint temperature 2	< 2.00 A < 0.09 A	Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Fault not active on undervoltage for Soot Sensor Control Unit supply No Electrical faults present on Soot Sensor Soot Sensor is in regeneration phase Soot Sensor temperature Soot Sensor Electrode current measurement enabled	> 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0) NOT(SOT_ElecIFlt) 560.00 < T < 800.00 °C	No time debounce	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Circuit High	P24B1	This diagnosis detects a short to power the soot sensor electrode signal	Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Electrode supply voltage (measured ADC voltage for electrode current)	> 4.1 V	Soot Sensor Control Unit conditions: no conditions ECU conditions: Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode Fault not active on undervoltage for Soot Sensor Control Unit supply Soot sensor is not in regeneration status	> 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 10.00 consecutive failures OR 18.00 failures out of 36.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Heater Control Circuit/Open	P24B3	This diagnosis detects an open circuit on the soot sensor heater line	Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Heater current	I < 0.5 A OR I > 15 A	Soot Sensor Control Unit conditions: Soot Sensor Heater Commanded on, i.e., heater duty cycle No Heater failures detected in the Sensor Control Unit ECU conditions: Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Fault not active on undervoltage for Soot Sensor Control Unit supply	> 0 % NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 20.00 consecutive failures OR 38.00 failures out of 76.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Heater Control Circuit Low	P24B5	This diagnosis detects a short to ground on the soot sensor heater line	Diagnosis executed in Sensor Control Unit: Soot Sensor Heater current	I < 0.5 A OR I > 15 A	Soot Sensor Control Unit conditions: Soot Sensor Heater Commanded on, i.e., heater duty cycle No Soot Sensor Heater failures detected in the Sensor Control Unit ECU conditions: Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Fault not active on undervoltage for Soot Sensor Control Unit supply	> 0 % NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 20.00 consecutive failures OR 38.00 failures out of 76.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Heater Control Circuit High	P24B6	This diagnosis detects a short to power on the soot sensor heater line	Diagnosis executed in Soot Sensor Control Unit: Soot Sensor Heater current OR Soot Sensor Heater switch output (off state) OR Soot Sensor Heater switch input (off state)	 > 0.2 A = 1 (for one of the last 5 measurements) = 1 (for one of the last 5 measurements)	Soot Sensor Control Unit conditions: Soot Sensor Heater Off ECU conditions: Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode Fault not active on undervoltage for Soot Sensor Control Unit supply	 > 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(P24D0)	Time counter: 10.00 consecutive failures OR 18.00 failures out of 36.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Diesel Particulate Matter Sensor Temperature Circuit Performance	P24C7	This diagnosis detects a soot sensor removed from the exhaust line, a soot sensor temperature sensor damaged or a possible parassitic resistance on the wiring harness between the soot sensor heater and the soot sensor control unit.	The absolute value of the difference between the Soot Sensor Electrode and the electrode temperature model	> 100.00 °C	Key is turned on Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Engine in running mode No electrical fault detected on Soot Sensor Soot Sensor heater is not commanded Soot Sensor is in measurement operating status Exhaust gas temperature model is valid	 > 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(SOT_ElecIFlt) SOT_ExhTempSootSnsrVld AND SOT_TotExhSootSnsrVld AND NOT(OAT_PtEstFiltFA) AND AmbPresDfltdStatus = CeAAPR_e_AmbPresNotDfltd AND NOT (VehicleSpeedSensor_FA	Time counter: 250.00 failures out of 255.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						)		
					Exhaust gas temperature model is reliable, i.e.:			
						> 60.00 kPa		
					(Ambient air pressure	> -20.00 °C		
						> 35.00 mg/s		
					Ambient air temperature	> 300.00 s		
						OR		
					Exhaust gas volumetric flow at soot sensor)	> 100.00 ° C		
						> 0.00 °C		
					Time after sensor regeneration	NOT(P30BC)		
					Temperature estimated by the sensor probe temperature model - Electrode temperature			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Temperature estimated by the sensor probe temperature model - Outside air temperature Transmission fault with sensor control unit not present			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Supply Voltage Circuit Low	P24D0	This diagnosis detects a short to ground of the soot sensor voltage supply line	Soot Sensor Control Unit supply voltage	< 9.00 V	Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor Key is turned on Engine not in cranking mode (The sensor is in regneration phase OR the time from a regeneration request)	> 11.00 NOT(SBR_RlyFA) NOT(U02A3) > 90.00	Time counter: 5.00 consecutive failures OR 8.00 failures out of 16.00 samples 100 ms/sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Particulate Matter Sensor Regeneratio n Incomplete	P24D1	This diagnosis detects a degradation of the soot sensor heater	the Soot Sensor Electrode Temperature is during the steady state soot sensor regeneration, for a consecutively time	<= (785.00 - 10.00)°C < 43.00 s	Key is turned on Ignition voltage in range Soot Sensor bus relay is commanded on No electrical fault active on Soot Sensor bus relay No faults of CAN communication loss with Soot Sensor No electrical fault detected on Soot Sensor Volumetric flow estimation is valid The power ratio timer the power ratio timer increments during the steady state of soot sensor regeneration, when the ratio between power demand and power available is (Soot sensor transitioned from regeneration to	 > 11.00 NOT(SBR_RlyFA) NOT(U02A3) NOT(SOT_ElecIFlt) SOT_TotExhSootSnsrVld AND SOT_ExhTempSootSnsrVld AND SOT_ExhPresSootSnsrVld < 5.00 s 0.00 <= r <= 1.00	no debouncing time	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					measurement status OR the time of soot sensor steady state regeneration is) Transmission fault with sensor control unit not present	 >= 45.00 s NOT(P30BC)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Position Sensor Circuit Low (SENT position sensor)	P2564	This monitor checks if the VGT SENT position sensor is out of electrical range low	SENTposition raw voltage < low threshold	< 1.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on VGT SENT out of range and SENT performance	== 1.00 > 11.00 [V] VGT_SENT_OOR_Flt ==FALSE VGT_SENT_PerfFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Position Sensor Circuit High (SENT position sensor)	P2565	This monitor checks if the VGT SENT position sensor is out of electrical range high	SENTposition raw voltage > high threshold	> 99.00 [%]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range No faults present on VGT SENT out of range and SENT performance	== 1.00 > 11.00 [V] VGT_SENT_OOR_Flt ==FALSE VGT_SENT_PerfFlt ==FALSE	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger VGT A Stuck Closed (Single and Two stage VGT DC Motor)	P2599	This monitor detects the VGT vanes mechanically stuck in a certain position different from their defaulted position (fully open) when the actuator is no longer driven (missing defaulted position)	Position after P0046 has set > threshold	> 25.00 [%]	P0046 is already set Waiting time after driver shut off > minimum threshold (needed for the spring to drive the valve in its defaulted position) VGT position closed loop control active (no faults present on VGT position sensor, VGT vanes, VGT position control deviation)	 > 2.00 [s] VGT_PstnSnsrFA ==FALSE VGT_ActCktFA==FALSE VGT_PstnCntrlFA ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit Low Bank 1 Sensor 1	P2627	This DTC detects if O2 signal is lower than physical minimum value.	O2 signal lower than a minimum value	< -8.00 [%]	Engine running System voltage in range Sensor is fully operative Enabled in combustion mode No pending or confirmed DTC	 > 11.00 [V] OXY_NOx1_O2_RawNotRlb == FALSE refer to supporting table **KaOXYD_b_NOx1SigRn** (**gEnblCmbMode**) NOX_Snsr1_NotVld	Time counter: 100 failures out of 200 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit High Bank 1 Sensor 1	P2628	This DTC detects if O2 signal is higher than physical maximum value.	O2 signal higher than a maximum value	> 27.00 [%]	Engine running System voltage in range Sensor is fully operative Exhaust gas pressure No Exhaust Brake active i.e. intake manifold pressure No pending or confirmed DTCs	 > 11.00 [V] OXY_NOx1_O2_RawNotRlb == FALSE < 500.00 [kPa] < 200.00 [kPa] NOX_Snsr1_NotVld NOX_Snsr1_PresFlt (MAP_SensorFA AND MAP_SensorTFTKO)	Time counter: 100 failures out of 200 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 1 Injector Data Incompatible	P268C	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 1 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 1 EIA code not written via DID (DID $60).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 2 Injector Data Incompatible	P268D	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 2 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 2 EIA code not written via DID (DID $61).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 3 Injector Data Incompatible	P268E	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 3 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 3 EIA code not written via DID (DID $62).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 4 Injector Data Incompatible	P268F	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 4 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 4 EIA code not written via DID (DID $63).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 5 Injector Data Incompatible	P2690	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 5 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 5 EIA code not written via DID (DID $64).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 6 Injector Data Incompatible	P2691	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 6 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 6 EIA code not written via DID (DID $65).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 7 Injector Data Incompatible	P2692	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 7 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 7 EIA code not written via DID (DID $66).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cylinder 8 Injector Data Incompatible	P2693	This DTC detects if the EIA (End of line Injector Adjustment) code for cylinder 8 has not been programmed. The diagnostic shall report test pass if the EIA code has been succesfully programmed, otherwise only report test fail if the MEC (Manufacturing Enable Counter) is zero.	Cylinder 8 EIA code not written via DID (DID $67).	N/A	Ignition ON Diagnosis enabled via calibration Manufacturer Enable Counter (MEC) == 0	1.00 [Boolean]	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Too High Bank 1	P28F7	This monitor checks if exhaust gas pressure is too high due to ETV wrong position (e.g. ETV broken linkage, between top and bottom valve shafts, and valve is stuck closed)	Measured LPE delta pressure	> 80.00 [kPa]	Test enabled by calibration Engine running and out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) Requested torque No fault on LPE delta pressure sensor	== 1.00 > 11.00 [V] > **P28F7: mimimum torque request** [Nm] LPE_PresSnsrFA	960.00 fail counts out of 1,200.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Range/ Performance Bank 1 Sensor 1	P2A00	This DTC aims to detect a drift of measured O2 value (A) from an estimated concentration (B) when the latter can be considered stable during full load condition.	EWMA filtered error (A - B) in full load condition is out of plausible range	> 5.20 [%] < -3.25 [%]	Engine running System voltage in range Sensor is fully operative Enabled in combustion mode (No After injection release AND Boolean Flag used to enable After injection status is TRUE) No pending or confirmed DTCs Stable fuel cut-off condition has been reached i.e. following	 > 11.00 [V] OXY_NOx1_O2_RawNotRlb == FALSE refer to supporting table (**KaOXYD_b_NOx1LoadChkCmbModeEnbl**) 0 [boolean] NOX_Snsr1_NotVld NOX_Snsr1_PresFlt OXY_NOx1SignRngChkFlt OXY_O2_NOx1PlausMdlFlt FHP_InjLeakageFA (MAF_MAF_SnsrFA AND MAF_MAF_SnsrTFTKO) EGR_VlvTotFlowNotValid	Once per trip Note: if EWMA Fast Initial Response is active OR EWMA Rapid Response is active than multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					conditions are met for a calibrateable time:	> 1.00 [s]		
					a. Engine speed in operating range	> 1,000 [rpm] < 2,000 [rpm]		
					b. EGR mass flow	< 1,000.00 [mg]		
					c. Injected fuel quantity in operating range	> 10.00 [mm^3] < 50.00 [mm^3]		
					d. Air mass per cylinder in operating range	> 400.00 [mg] < 1,500.00 [mg]		
					Estimated O2 concentration stable i.e. difference between initial and actual value	< 0.20 [%]		
					Air mass flown since fuel cut-off condition	> 0.10 [g]		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Range/ Performance Bank 1 Sensor 2	P2A01	This DTC aims to detect a drift of Sensor 2 O2 measured value (A) from Sensor 1 O2 measured value (B) when the latter can be considered stable during full load condition.	EWMA filtered error (A - B) in full load condition is out of plausible range	> 6.00 [%] < -6.00 [%]	Engine running System voltage in range Sensor is fully operative Sensor 1 is fully operative No pending or confirmed DTCs DTC P2A00 is running Air mass flown since P2A00 enabled Air mass flown since P2A00 disabled	 > 11.00 [V] OXY_O2_NOx2_PresCmpNotRlb == FALSE OXY_O2_NOx1_PresCmpNotRlb == FALSE NOX_Snsr2_NotVld NOX_Snsr2_PresFlt OXY_NOx2SignRngChkFlt OXY_NOx1_O2_Flt (MAF_SensorFA AND MAF_SensorTFTKO) (see P2A00 Fault code) > 0.10 [g] > 2.00 [g]	EWMA filtering: multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Circuit Range/ Performance Bank 1 Sensor 3	P2A02	This DTC aims to detect a drift of Sensor 3 O2 measured value (A) from Sensor 2 O2 measured value (B) when the latter can be considered stable during full load condition.	EWMA filtered error (A - B) in full load condition is out of plausible range	> 10.00 [%] < -10.00 [%]	Engine running System voltage in range Sensor is fully operative Sensor 2 is fully operative No pending or confirmed DTCs DTC P2A01 is running Air mass flown since P2A01 enabled Air mass flown since P2A01 disabled	 > 11.00 [V] OXY_O2_NOx3_PresCmpNotRlb == FALSE OXY_O2_NOx2_PresCmpNotRlb == FALSE NOX_Snsr3_NotVld NOX_Snsr3_PresFlt OXY_NOx3SignRngChkFlt OXY_NOx1_O2_Flt (MAF_SensorFA AND MAF_SensorTFTKO) (see P2A01 Fault code) > 0.05 [g] > 5.00 [g]	EWMA filtering: multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Position Exceeded Learning Limit (SENT position sensor)	P2B97	This monitor checks if the ETV SENT position sensor has an offset with respect to the nominal positions where the valve does the learning procedure (fully closed and/or fully open)	SENT position raw voltage when the valve is in fully closed position < low threshold OR SENT position raw voltage when the valve is in fully closed position > high threshold OR SENT position raw voltage when the valve is in wide open position < low threshold OR SENT position raw voltage when the valve is in wide open position > high threshold	< 6.00 [%5V] OR > 14.50 [%5V] OR < 73.00 [%5V] OR > 93.00 [%5V]	Test enabled by calibration Key signal is off Learning procedure at key off in fully closed and/or wide open positions have been successfully completed: - engine coolant temperature in range; - no faults present on engine coolant temperature sensor; - outside air temperature above a threshold; - no faults present on outside air temperature sensor. Position control in closed loop: battery voltage above a threshold No faults present on ETV position sensor, ETV valve, ETV position control deviation End Of Trip event has elapsed	== 1.00 >= 30.00 [°C] <= 150.00 [°C] ECT_Sensor_FA ==FALSE >= -40.00 [°C] OAT_PtEstFiltFA ==FALSE >= 9.50 [V] LEV_PstnShtOffReq ==FALSE	No debounce is present: DTC sets as soon as the error is present Function task: at key off	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Diagnostic system enabled (no clear code or EOT in progress)			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Supply Circuit	P2B98	This monitor checks if the ETV DC-Motor is correctly supplied	System voltage supply lower than a threshold (error information provided by HWIO)	< 6 [V]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Pressure Control Valve "A" Motor Overtempera ture	P2B99	This monitor checks if the temperature of the ETV DC-Motor increases too much (e.g. ETV DC-Motor internal faults, etc).	H-Bridge driver temperature higher than a threshold (error information provided by HWIO)	> 170 [°C]	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress) HWIO error status different from INDETERMINATE status	== 1.00 > 11.00 [V]	240.00 fail counts out of 300.00 sample counts Function task: 12.5 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit Low Bank 1 Sensor 3	P2C63	This DTC detects if O2 signal is lower than physical minimum value.	O2 signal lower than a minimum value	< -8.00 [%]	Engine running System voltage in range Sensor is fully operative Enabled in combustion mode No pending or confirmed DTC	 > 11.00 [V] OXY_NOx3_O2_RawNotRlb == FALSE refer to supporting table **KaOXYD_b_NOx3_SigR**(**ngEnblCmbMode**) NOX_Snsr3_NotVld	Time counter: 100 failures out of 200 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Pumping Current Trim Circuit High Bank 1 Sensor 3	P2C64	This DTC detects if O2 signal is higher than physical maximum value	O2 signal higher than a minimum value	> 27.00 [%]	Engine running System voltage in range Sensor is fully operative Enabled in combustion mode No pending or confirmed DTC	 > 11.00 [V] OXY_NOx3_O2_RawNotRlb == FALSE refer to supporting table **KaOXYD_b_NOx3_SigR**(**ngEnblCmbMode**) NOX_Snsr3_NotVld	Time counter: 100 failures out of 200 samples. Time task 25[ms]	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Intake Manifold Runner Position Sensor	U064F	This monitor checks if the Swirl SENT position sensor protocol has performance problems	Swirl SENT position internal fault indication (message error) OR (Swirl SENT position refresh time (age error) AND (Swirl SENT position protocol status OR Swirl SENT position protocol status OR A new Swirl SENT message has been received))	== TRUE > 6.25 [ms] == STEADY HIGH == STEADY LOW	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range	== 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Exhaust Pressure Control Valve "A" Sensor	U0650	This monitor checks if the ETV SENT position sensor protocol is out of range low, out of range high or has performance problems	(HWIO counter of valid ETV SENT position indications no longer updated > threshold (age error = TRUE) AND HWIO ETV SENT position protocol status) OR (HWIO time counter since last valid ETV SENT position was transmitted > threshold (age error = TRUE) AND HWIO ETV SENT position protocol status) OR (HWIO message fault on ETV SENT position = TRUE OR	> 6.25 [ms] AND ==STEADY LOW > 6.25 [ms] AND ==STEADY HIGH message error==TRUE OR	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress)	== 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(number of ETV SENT position counters has been updated AND HWIO time counter since last valid ETV SENT position was transmitted > threshold (age error = TRUE)))	---------- AND > 6.25 [ms]				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With EGR Sensor "A"	U0651	This monitor checks if the HP EGR SENT position sensor protocol is out of range low, out of range high orl has performance problems	(HWIO counter of valid HP EGR SENT position indications no longer updated > threshold (age error = TRUE) AND HWIO HP EGR SENT position protocol status) OR (HWIO time counter since last valid HP EGR SENT position was transmitted > threshold (age error = TRUE) AND HWIO HP EGR SENT position protocol status) OR (HWIO message fault on HP EGR SENT position == TRUE OR	> 6.25 [ms] AND ==STEADY LOW > 6.25 [ms] AND ==STEADY HIGH message error==TRUE OR	Test enabled by calibration SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress)	== 1.00 == 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(number of HP EGR SENT position counters has been updated AND HWIO time counter since last valid HP EGR SENT position was transmitted > threshold (age error = TRUE)))	---------- AND > 6.25 [ms]				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With EGR Sensor "C"	U0653	This monitor checks if the LP EGR SENT position sensor protocol is out of range low, out of range high or has performance problems	(HWIO counter of valid LP EGR SENT position indications no longer updated > threshold (age error = TRUE) AND HWIO LP EGR SENT position protocol status) OR (HWIO time counter since last valid LP EGR SENT position was transmitted > threshold (age error = TRUE) AND HWIO LP EGR SENT position protocol status) OR (HWIO message fault on LP EGR SENT position = TRUE OR	> 6.25 [ms] AND ==STEADY LOW > 6.25 [ms] AND ==STEADY HIGH message error==TRUE OR	Test enabled by calibration SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress)	== 1.00 == 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(number of LP EGR SENT position counters has been updated AND HWIO time counter since last valid LP EGR SENT position was transmitted > threshold (age error = TRUE)))	---------- AND > 6.25 [ms]				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Diesel Intake Air Flow "A" Position Sensor	U0654	This monitor checks if the Throttle position sensor protocol is out of range low, out of range high or has performance problems	(HWIO counter of valid Throttle SENT position indications no longer updated > threshold (age error = TRUE) AND HWIO Throttle SENT position protocol status) OR (HWIO time counter since last valid Throttle SENT position was transmitted > threshold (age error = TRUE) AND HWIO Throttle SENT position protocol status) OR (HWIO message fault on Throttle SENT position == TRUE OR	 > 6.25 [ms] AND == STEADY LOW > 6.25 [ms] AND == STEADY HIGH message error==TRUE OR	Test enabled by calibration System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress)	== 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(number of Throttle SENT position counters has been updated AND HWIO time counter since last valid Throttle SENT position was transmitted > threshold (age error = TRUE)))	---------- AND > 6.25 [ms]				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Turbocharger/ Supercharger Boost Control "A" Position Sensor	U0656	This monitor checks if the VGT position sensor protocol is out of range low, out of range high or has performance problems	(HWIO counter of valid VGT SENT position indications no longer updated > threshold (age error = TRUE) AND HWIO VGT SENT position protocol status) OR (HWIO time counter since last valid VGT SENT position was transmitted > threshold (age error = TRUE) AND HWIO VGT SENT position protocol status) OR (HWIO message fault on VGT SENT position == TRUE OR	 > 6.25 [ms] AND == STEADY LOW > 6.25 [ms] AND == STEADY HIGH message error==TRUE OR	Test enabled by calibration VGT SENT position sensor present System out of the cranking phase PT relay supply voltage in range Diagnostic system enabled (no clear code or EOT in progress)	== 1.00 == 1.00 > 11.00 [V]	480.00 fail counts out of 600.00 sample counts Function task: 6.25 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(number of VGT SENT position counters has been updated AND HWIO time counter since last valid VGT SENT position was transmitted > threshold (age error = TRUE)))	---------- AND > 6.25 [ms]				

Initial Supporting table - DPF_CCB_SootThrsh

Description:

y/x	1,000	1,500	2,000	2,250	2,500	3,000	3,500	4,000	4,500
0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_EffRgnHysHi

Description:

y/x	5	10	15	20	25	30	35	40	45	50	60	70	90	110	130
0	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
5	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
10	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
15	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
20	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
25	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
30	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
40	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
50	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
60	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
70	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
75	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
80	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
85	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
90	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
95	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
100	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
105	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
110	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530

Initial Supporting table - DPF_EffRgnHysLo

Description:

y/x	5	10	15	20	25	30	35	40	45	50	60	70	90	110	130
0	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
5	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
10	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
15	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
20	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
25	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
30	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
40	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
50	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
60	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
70	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
75	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
80	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
85	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
90	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
95	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
100	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
105	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
110	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520

Initial Supporting table - DPF_ResistFlowDsblHi

- -

Description:

y/x	600	800	1,200	1,600	2,000	2,400	2,800	3,200
1	130	130	130	130	130	130	130	130

Initial Supporting table - DPF_ResistFlowDsblLo

Description:

y/x	600	800	1,200	1,600	2,000	2,400	2,800	3,200
1	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_SootThrshCrtn

Description:

y/x	0	20	40	60	80	100	120	140
1	0	0	0	0	0	0	0	0

Initial Supporting table - EGT_FuelReqHysHiThrsh_DPF

Description:

y/x	1,000	1,100	1,500	2,500	3,000	3,500	4,000	5,000
1	-5	-5	-5	-5	-5	-5	-5	5

Initial Supporting table - EGT_FuelReqHysLoThrsh_DPF

Description:

y/x	1,000	1,100	1,500	2,500	3,000	3,500	4,000	5,000
1	-5	-5	-5	-5	-5	-5	-5	5

Initial Supporting table - EGT_FuelReqMaxThreshold

Description:

y/x	950	1,000	1,750	2,500	3,000	3,500	4,000	4,500
1	50	50	60	60	60	30	0	0

Initial Supporting table - EGT1 DynChk EngPtEnbl

Description: Contains the engine speed and fuel rate enablments for EGT1 Dynamic Check.

y/x	0.0	21.0	22.0	40.0	60.0	80.0	120.0
899.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
900.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
1,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,000.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
3,200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - EGT1 Fuel request integral

Description:

y/x	-40	-20	0	25	50	75	100	127
1	397,440	388,800	337,152	238,560	230,720	223,440	216,160	207,760

Initial Supporting table - EGT1 Stuck Temperature Variation

Description:

y/x	-40	-8	24	56	88	120	149	150
1	190	158	126	94	62	30	1	0

Initial Supporting table - EGT1 Stuck Wait Time

Description:

y/x	-40	-8	24	56	88	120	149	150
1	460	443	426	409	392	375	359	32,768

Initial Supporting table - EGT2 Fuel request integral

Description:

y/x	-40	-20	0	25	50	75	100	127
1	488,160	476,064	411,648	290,080	280,000	269,920	259,840	249,200

Initial Supporting table - EGT2 Stuck Temperature Variation

Description:

y/x	-40	-8	24	56	88	120	149	150
1	190	158	126	94	62	30	1	0

Initial Supporting table - EGT2 Stuck Wait Time

Description:

y/x	-40	-8	24	56	88	120	149	150
1	565	542	519	496	473	450	429	32,768

Initial Supporting table - EGT3 DynChk EngPtEnbl

Description: Contains the engine speed and fuel rate enablments for EGT3 Dynamic Check.

y/x	0.0	21.0	22.0	40.0	60.0	80.0	120.0
899.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
900.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
1,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,000.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
3,200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - EGT3 Fuel request integral

Description:

y/x	-40	-20	0	25	50	75	100	127
1	524,280	524,280	524,280	368,480	347,200	325,920	305,200	282,240

Initial Supporting table - EGT3 Stuck Temperature Variation

Description:

y/x	-40	-8	24	56	88	120	149	150
1	190	158	126	94	62	30	1	0

Initial Supporting table - EGT3 Stuck Wait Time

Description:

y/x	-40	-8	24	56	88	120	149	150
1	606	606	659	611	563	515	471	32,768

Initial Supporting table - EnginePointEnable_DPF_TempDeviation

Description:

y/x	900	1,000	2,000	2,500	3,000	3,010	4,000	4,200
0	0	0	0	0	0	0	0	0
5	0	1	1	1	1	1	1	1
10	0	1	1	1	1	1	1	1
15	0	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1
61	1	1	1	1	1	1	1	1

Initial Supporting table - KaFADC_b_CB_EnblCMBR

Description: Specifies, for the specific combustion mode, if enable or not CB

KaFADC_b_CB_EnblCMBR - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0
KaFADC_b_CB_EnblCMBR - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0
KaFADC_b_CB_EnblCMBR - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0
KaFADC_b_CB_EnblCMBR - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	0	0	

Initial Supporting table - KaFADC_b_SQC_CWA_EnblLink

Description: Engine speed ranges to be learned with CWA before give a positive report to Zero Torque Coordinator.

y/x	0	1	2	3	4	5
1	0	0	0	0	0	0

Initial Supporting table - KaFADC_n_CB_EngSpdRngThrsh2

Description: Threshold 2 for engine speed range detection in the Cylinder Balancing (driveline-group dependent) [rpm]

Value Units: rpm

KaFADC_n_CB_EngSpdRngThrsh2 - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100

KaFADC_n_CB_EngSpdRngThrsh2 - Part 2

y/x	11	12	13	14	15	16	17	18	19	20	
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	

Initial Supporting table - KaFADC_n_CB_EngSpdRngThrsh3

Description: Threshold 3 for engine speed range detection in the Cylinder Balancing (driveline-group dependent) [rpm].

Value Units: rpm

KaFADC_n_CB_EngSpdRngThrsh3 - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100

KaFADC_n_CB_EngSpdRngThrsh3 - Part 2

y/x	11	12	13	14	15	16	17	18	19	20	
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	

Initial Supporting table - KaFADC_n_DFSA_EngSpdThrsh

Description: Threshold to evaluate the engine speed steady state, as function of the engaged gear

Value Units: rpm

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	3	3	3	3	3	3	3	3	3	3

Initial Supporting table - KaFADC_n_FSA_EngSpdThrsh

Description: Threshold to evaluate the engine speed steady state, as function of the engaged gear

Value Units: rpm

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - KaFADC_n_SQC_HiThrshDelt

Description: Engine speed high threshold [rpm] delta for SQC actuators enable function of driveline group

Value Units: rpm

KaFADC_n_SQC_HiThrshDelt - Part 1				
y/x	CeFADR_e_CWA_DrvInGrpNotAlwd	CeFADR_e_CWA_DrivelineGrp1	CeFADR_e_CWA_DrivelineGrp2	CeFADR_e_CWA_DrivelineGrp3
1	100	100	100	100
KaFADC_n_SQC_HiThrshDelt - Part 2				
y/x	CeFADR_e_CWA_DrivelineGrp4	CeFADR_e_CWA_DrivelineGrp5	CeFADR_e_CWA_DrivelineGrp6	CeFADR_e_CWA_DrivelineGrp7
1	100	100	100	100
KaFADC_n_SQC_HiThrshDelt - Part 3				
y/x	CeFADR_e_CWA_DrivelineGrp8	CeFADR_e_CWA_DrivelineGrp9	CeFADR_e_CWA_DrivelineGrp10	
1	100	100	100	

Initial Supporting table - KaFADC_p_SQA_LrnDelt

Description: Delta Rail Pressure allowed to enable SQA learning [MPa] function of nominal rail pressure setpoint defined for SQA.

Value Units: Mpa

y/x	0	1	2	3	4
1	3	3	3	3	3

Initial Supporting table - KaFADC_t_SQA_MaxAdptDeltET[us]

Description: Upper Energizing time limit for SQA [us] max authority function of rail pressure levels defined for SQA.

Value Units: us

y/x	0	1	2	3	4
1	230	121	91	74	20

Initial Supporting table - KaFADC_t_SQA_MinAdptDeltET[us]

Description: Lower Energizing time limit for SQA max authority [us] function of rail pressure levels defined for SQA.

Value Units: us

y/x	0	1	2	3	4
1	-163	-85	-77	-62	-20

Initial Supporting table - KaOXYD_b_NOx1LoadChkCmbModeEnbl

Description: This array indicates what are the combustion mode in which Plausibility Diagnosis in Full Load condition is enabled

KaOXYD_b_NOx1LoadChkCmbModeEnbl - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	1	0	0	0
KaOXYD_b_NOx1LoadChkCmbModeEnbl - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	0	0	0	0
KaOXYD_b_NOx1LoadChkCmbModeEnbl - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	0	0	0	0
KaOXYD_b_NOx1LoadChkCmbModeEnbl - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	0	0	0	0
KaOXYD_b_NOx1LoadChkCmbModeEnbl - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	

Initial Supporting table - KaOXYD_b_NOx1OvrnChkCmbModeEnbl

Description: This array indicates what are the combustion mode in which Plausibility Diagnosis in Overrun condition is enabled

KaOXYD_b_NOx1OvrnChkCmbModeEnbl - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	1	0	0	0
KaOXYD_b_NOx1OvrnChkCmbModeEnbl - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	0	0	0	0
KaOXYD_b_NOx1OvrnChkCmbModeEnbl - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	0	0	0	0
KaOXYD_b_NOx1OvrnChkCmbModeEnbl - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	0	0	0	0
KaOXYD_b_NOx1OvrnChkCmbModeEnbl - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	

Initial Supporting table - KaOXYD_b_NOx1SigRngEnblCmbMode

Description: This array indicates what are the combustion mode in which Signal Range Diagnosis is enabled

KaOXYD_b_NOx1SigRngEnblCmbMode - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	1	0	0	0
KaOXYD_b_NOx1SigRngEnblCmbMode - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	0	0	0	0
KaOXYD_b_NOx1SigRngEnblCmbMode - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	0	0	0	0
KaOXYD_b_NOx1SigRngEnblCmbMode - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	0	0	0	0
KaOXYD_b_NOx1SigRngEnblCmbMode - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	

Initial Supporting table - KaOXYD_b_NOx2SigRngEnblCmbMode

Description: This array indicates what are the combustion mode in which Signal Range Diagnosis is enabled

KaOXYD_b_NOx2SigRngEnblCmbMode - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	1	0	0	0
KaOXYD_b_NOx2SigRngEnblCmbMode - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	0	0	0	0
KaOXYD_b_NOx2SigRngEnblCmbMode - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	0	0	0	0
KaOXYD_b_NOx2SigRngEnblCmbMode - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	0	0	0	0
KaOXYD_b_NOx2SigRngEnblCmbMode - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	

Initial Supporting table - KtFADC_p_SQA_MAP_HiThrsh

Description: Manifold Air Pressure High Threshold [kPa] to disable SQA Strategy function on Rail Pressure levels defined for SQA

Value Units: kPa

y/x	1,000	1,200	1,400	1,600	1,800
1	200	200	200	200	200

Initial Supporting table - KtFADC_V_CB_HiThrshFuelQnty

Description: Injected quantity high threshold to enable Cylinder Balancing control [mm^3]

Value Units: mm^3

y/x	600	700	750	800	850	900	950	1,000	1,100	1,200	1,350	1,500
1	20	20	20	20	20	20	20	20	25	25	25	30

Initial Supporting table - KtFADC_V_FSA_FuelMax

Description: Map used to define FSA maximum authority

Value Units: mm^3

y/x	5	10	20	30	40	50	60	70	80	90
1,000	9	10	9	12	14	16	18	20	22	23
1,250	10	11	10	12	14	16	18	20	22	24
1,500	10	11	10	12	14	16	19	21	23	24
1,750	10	11	10	12	14	17	19	21	23	24
2,000	10	11	10	12	14	17	19	21	23	25
2,250	10	11	10	12	15	17	19	21	23	25
2,500	10	11	10	12	15	17	19	21	23	25
2,750	10	11	10	12	15	17	20	21	23	25
3,000	10	11	10	13	15	17	20	21	23	24
3,250	10	11	10	13	15	17	19	21	23	24

Initial Supporting table - KtFADC_V_FSA_FuelMin

Description: Map used to define FSA minimum authority

Value Units: mm^3

y/x	5	10	20	30	40	50	60	70	80	90
1,000	-9	-10	-9	-12	-14	-16	-18	-20	-22	-23
1,250	-10	-11	-10	-12	-14	-16	-18	-20	-22	-24
1,500	-10	-11	-10	-12	-14	-16	-19	-21	-23	-24
1,750	-10	-11	-10	-12	-14	-17	-19	-21	-23	-24
2,000	-10	-11	-10	-12	-14	-17	-19	-21	-23	-25
2,250	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,500	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,750	-10	-11	-10	-12	-15	-17	-20	-21	-23	-25
3,000	-10	-11	-10	-13	-15	-17	-20	-21	-23	-24
3,250	-10	-11	-10	-13	-15	-17	-19	-21	-23	-24

Initial Supporting table - KtFADC_V_FSA_MaxFuelFall

Description: Upper bound of fuel quantity range to enable the FSA learning phase depending on the engine speed

Value Units: mm^3

y/x	510	511	1,000	1,600	1,800	2,000	2,400	3,200	3,600	4,000
1	80	80	80	80	80	80	80	80	80	80

Initial Supporting table - KtFADD_p_XSQA_MAP_HiThrsh

Description: Manifold Air Pressure High Threshold [kPa] to disable SQA Emission Correlated Monitoring function on Rail Pressure levels defined for SQA

Value Units: kPa

y/x	1,000	1,200	1,400	1,600	1,800
1	200	200	200	200	200

Initial Supporting table - KtFADD_Pct_SSQA_InjSuspConfLvl

Description: Calibration table to define the suspicious confidence level [%] function of current last raw Delta Energizing Time [us] and previous one [us]

Value Units: %

y/x	-100	-80	-51	-50	-40	0	40	50	51	80	100
-100	0	0	0	0	0	0	0	0	0	0	0
-51	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	100	100	100	100	100	0	0	0
-40	0	0	0	100	100	100	100	100	0	0	0
0	0	0	0	100	100	100	100	100	0	0	0
40	0	0	0	100	100	100	100	100	0	0	0
52	0	0	0	100	100	100	100	100	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - NOX_NOx2SelfTstEnblCmbMode

Description: Combustion mode dependent diag enable for Post Catalyst NOx Sensor selt-test monitoring

NOX_NOx2SelfTstEnblCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0
NOX_NOx2SelfTstEnblCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0
NOX_NOx2SelfTstEnblCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0
NOX_NOx2SelfTstEnblCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S1_OfstMntrEnblCmbMode

Description:

NOX_S1_OfstMntrEnblCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S1_OfstMntrEnblCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S1_OfstMntrEnblCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S1_OfstMntrEnblCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S1_OutRngMaxCmbMode

Description: Combustion mode dependent diag enable for Engine Out NOx Sensor OOR high monitor

NOX_S1_OutRngMaxCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0

NOX_S1_OutRngMaxCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S1_OutRngMaxCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	1	1	0	0	0

NOX_S1_OutRngMaxCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	1	1	

Initial Supporting table - NOX_S1_OutRngMinCmbMode

Description: Combustion mode dependent diag enable for Engine Out NOx Sensor OOR low monitor

NOX_S1_OutRngMinCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0
NOX_S1_OutRngMinCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0
NOX_S1_OutRngMinCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	1	1	0	0	0
NOX_S1_OutRngMinCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	1	1	

Initial Supporting table - NOX_S1_PlausChkEnblCmbMode

Description: Combustion mode dependent diag enable for Engine Out NOx Sensor plausibility

NOX_S1_PlausChkEnblCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S1_PlausChkEnblCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	0	0	0

NOX_S1_PlausChkEnblCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S1_PlausChkEnblCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S1_StBitChkEnblCmbMode

Description: Combustion mode dependent diag enable for Engine Out NOx Sensor stability monitor

NOX_S1_StBitChkEnblCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S1_StBitChkEnblCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S1_StBitChkEnblCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S1_StBitChkEnblCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S2_OfstMntrEnblCmbMode

Description:

NOX_S2_OfstMntrEnblCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S2_OfstMntrEnblCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S2_OfstMntrEnblCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S2_OfstMntrEnblCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S2_OutRngMaxCmbMode

Description: Combustion mode dependent diag enable for Post Catalyst NOx Sensor OOR high monitor

NOX_S2_OutRngMaxCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0

NOX_S2_OutRngMaxCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S2_OutRngMaxCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	1	1	0	0	0

NOX_S2_OutRngMaxCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	1	1	

Initial Supporting table - NOX_S2_OutRngMinCmbMode

Description: Combustion mode dependent diag enable for Post Catalyst NOx Sensor OOR low monitor

NOX_S2_OutRngMinCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0
NOX_S2_OutRngMinCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0
NOX_S2_OutRngMinCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	1	1	0	0	0
NOX_S2_OutRngMinCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	1	1	

Initial Supporting table - NOX_S2_StBitChkEnblCmbMode

Description: Combustion mode dependent diag enable for Post Catalyst NOx Sensor stability monitor

NOX_S2_StBitChkEnblCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S2_StBitChkEnblCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S2_StBitChkEnblCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S2_StBitChkEnblCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P0106, P2227, P227B, P00C7: Maximum pressure difference

Description: Maximum delta pressure allowed between the three pressure sensors without setting the fault. It is function of the measured air flow.

y/x	5	10	15	16	25	30	35	40
1	13	13	20	22	35	53	70	128

Initial Supporting table - UP Stream Stk Temp Vrtn

Description: Minimum temperature movement to pass the stuck diagnostic.

Value Units: Minimum temperature movement (degC)
X Unit: Upstream Temp sensor temp (degC)

y/x	-40	0	20	40	60	80	100	120
1	3	4	5	5	5	4	3	2

Initial Supporting table - AIC_AirCntrlShtOffActn: ECT Too Low Hysteresis High Threshold for DPF

Description: Hysteresis high threshold for engine coolant temperature too low shut off condition evaluation during DPF combustion modes and SCR service warm up combustion mode. It is function of outside air temperature.

Value Units: °C
X Unit: °C

y/x	-20	-12	-7	0	15	30
1	40	30	25	25	25	25

Initial Supporting table - AIC_AirCntrlShtOffActn: ECT Too Low Hysteresis High Threshold for others

Description: Hysteresis high threshold for engine coolant temperature too low shut off condition evaluation. It is function of outside air temperature.

Value Units: °C
X Unit: °C

y/x	-20	-12	-7	0	15	30
1	68	28	-10	-10	-10	-10

Initial Supporting table - AIC_AirCntrlShtOffActn: ECT Too Low Hysteresis Low Threshold for DPF

Description: Hysteresis low threshold for engine coolant temperature too low shut off condition evaluation during DPF combustion modes and SCR service warm up combustion mode. It is function of outside air temperature.

Value Units: °C
X Unit: °C

y/x	-20	-12	-7	0	15	30
1	38	28	22	22	22	22

Initial Supporting table - AIC_AirCntrlShtOffActn: ECT Too Low Hysteresis Low Threshold for others

Description: Hysteresis low threshold for engine coolant temperature too low shut off condition evaluation. It is function of outside air temperature.

Value Units: °C
X Unit: °C

y/x	-20	-12	-7	0	15	30
1	65	25	-13	-13	-13	-13

Initial Supporting table - AIC_AirCntrlShtOffActn: Fuel High Threshold for D1 and D3

Description: Hysteresis high threshold for large injected fuel shut off condition evaluation during D1 and D3 combustion modes. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	600	1,200	2,000	2,600	3,200	3,800	4,400	5,000
1	26	26	26	26	26	26	26	26

Initial Supporting table - AIC_AirCntrlShtOffActn: Fuel High Threshold for D4

Description: Hysteresis high threshold for large injected fuel shut off condition evaluation during D4 combustion mode. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	600	1,200	2,000	2,600	3,200	3,800	4,400	5,000
1	66	66	66	46	46	46	46	46

Initial Supporting table - AIC_AirCntrlShtOffActn: Fuel Low Threshold for D1 and D3

Description: Hysteresis low threshold for large injected fuel shut off condition evaluation during D1 and D3 combustion modes. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	600	1,200	2,000	2,600	3,200	3,800	4,400	5,000
1	23	23	23	23	23	23	23	23

Initial Supporting table - AIC_AirCntrlShtOffActn: Fuel Low Threshold for D4

Description: Hysteresis low threshold for large injected fuel shut off condition evaluation during D4 combustion mode. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	600	1,200	2,000	2,600	3,200	3,800	4,400	5,000
1	63	63	63	43	43	43	43	43

Initial Supporting table - AIC_BstCntrlCL: Fuel Request On Threshold for C2

Description: Fuel threshold above which the pressure closed loop control is enabled in C2 mode. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	70	40	25	12	12	12	12	12	12	15	15	15	15

Initial Supporting table - AIC_BstCntrlCL: Fuel Request On Threshold for D1 and D3

Description: Fuel threshold above which the pressure closed loop control is enabled in D1 and D3 modes. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	26	26	26	26	26	26	26	26	26	26	26	26	26

Initial Supporting table - AIC_BstCntrlCL: Fuel Request On Threshold for D4

Description: Fuel threshold above which the pressure closed loop control is enabled in D4 mode. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	60	60	60	56	56	46	46	46	46	46	46	46	46

Initial Supporting table - AIC_BstCntrlCL: Fuel Request On Threshold for others

Description: Fuel threshold above which the pressure closed loop control is enabled. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	70	40	25	12	12	12	12	12	12	15	15	15	15

Initial Supporting table - AIC_BstCntrlCL: Fuel Request On Threshold for V3

Description: Fuel threshold above which the pressure closed loop control is enabled in V3 mode. It is function of engine speed.

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	15	15	15	15	15	15	15	15	15	15	15	15	15

Initial Supporting table - AIC_BstCntrlCL: On Threshold for V1

Description: Threshold above which the pressure closed loop control is enabled in V1 mode. It is function of engine speed.

Value Units: composite
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000

Initial Supporting table - AIC_BstCntrlCL: On Threshold for V2

Description: Threshold above which the pressure closed loop control is enabled in V2 mode. It is function of engine speed.

Value Units: composite
X Unit: rpm

y/x	950	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,750	4,000
1	25	15	12	12	12	12	12	12	12	15	15	15	15

Initial Supporting table - AirCntrlTrnstnEnd: Timer threshold

Description: Timer threshold after which an air control transition is considered as ended. It is function of engine speed.

Value Units: s
X Unit: rpm

y/x	600	900	1,200	1,500	1,800	2,100	2,400	2,700	3,000
1	1	1	1	1	1	1	1	1	1

Initial Supporting table - Ambient correction on distance

Description: Ambient pressure correction for threshold on Distance covered since last regeneration

y/x	70	72	80	90	92	100
1	1	1	1	1	1	1

Initial Supporting table - Ambient correction on time

Description: Ambient pressure correction for threshold on time spent since last regeneration

y/x	70	72	80	90	92	100
1	1	1	1	1	1	1

Initial Supporting table - ColdMontrCombModeEnbl

Description: Boolean array that has the task of enabling or freezing the catalyst Cold Start Monitor. Each ordered element indicates, respectively, if the current combustion mode shall enable (if TRUE) or freeze (if FALSE) the Monitor.

X Unit: combustion mode identifier
Y Units: Boolean

ColdMontrCombModeEnbl - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	0	0	0	0	0
ColdMontrCombModeEnbl - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	0	0
ColdMontrCombModeEnbl - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0
ColdMontrCombModeEnbl - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - Distance since last regeneration

Description: Base value to trigger regeneration for distance covered since last regeneration, function of regeneration priority

Distance since last regeneration - Part 1

y/x	CeDPFC_e_RgnPriority_0	CeDPFC_e_RgnPriority_1	CeDPFC_e_RgnPriority_2	CeDPFC_e_RgnPriority_3	CeDPFC_e_RgnPriority_4	CeDPFC_e_RgnPriority_5
1	1,000	1,000	1,000	1,000	1,000	1,000

Distance since last regeneration - Part 2

y/x	CeDPFC_e_RgnPriority_6	CeDPFC_e_RgnPriority_7	CeDPFC_e_RgnPriority_8	CeDPFC_e_RgnPriority_9	CeDPFC_e_RgnPriority_10	CeDPFC_e_RgnPriority_11
1	1,000	1,000	1,000	1,000	1,000	1,000

Distance since last regeneration - Part 3

y/x	CeDPFC_e_RgnPriority_12	CeDPFC_e_RgnPriority_13	CeDPFC_e_RgnPriority_14	CeDPFC_e_RgnPriority_15	CeDPFC_e_RgnPriority_16	
1	1,000	1,000	1,000	1,000	1,000	

Initial Supporting table - DPF Load correction on distance

Description: Map of DPF Load correction for threshold on distance covered since last regeneration

y/x	20	40	50	70	75	80	90	95
1	1	1	1	1	1	1	1	1

Initial Supporting table - DPF Load correction on time

Description: Map of DPF Load correction for threshold on time spent since last regeneration

y/x	20	40	50	70	75	80	90	95
1	1	1	1	1	1	1	1	1

Initial Supporting table - DPF_CCB_SootThrsh

Description: Soot threshold in CCB ON check, function of engine speed and requested fuel

Value Units: % Soot
X Unit: rpm
Y Units: mm^3

y/x	1,000	1,500	2,000	2,250	2,500	3,000	3,500	4,000	4,500
0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_EffRgnHysHi

Description: Table of hysteresis High minimum DPF temperature which provides effective regeneration, function of exhaust gas mass flow (x axis) and percentage of ideal regeneration achieved (y axis)

Value Units: °C
X Unit: g/s
Y Units: %

y/x	5	10	15	20	25	30	35	40	45	50	60	70	90	110	130
0	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
5	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
10	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
15	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
20	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
25	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
30	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
40	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
50	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
60	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
70	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
75	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
80	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
85	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
90	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
95	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
100	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
105	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
110	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530

Initial Supporting table - DPF_EffRgnHysLo

Description: Table of hysteresis Low minimum DPF temperature which provides effective regeneration, function of exhaust gas mass flow (x axis) and percentage of ideal regeneration achieved (y axis)

Value Units: °C
X Unit: g/s
Y Units: %

y/x	5	10	15	20	25	30	35	40	45	50	60	70	90	110	130
0	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
5	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
10	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
15	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
20	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
25	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
30	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
40	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
50	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
60	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
70	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
75	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
80	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
85	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
90	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
95	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
100	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
105	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
110	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520

Initial Supporting table - DPF_ResistFlowDsblHi

Description: Maximum fuel quantity threshold to permit resistive flow calculations, function of engine speed

Value Units: mm^3
X Unit: rpm

y/x	600	800	1,200	1,600	2,000	2,400	2,800	3,200
1	130	130	130	130	130	130	130	130

Initial Supporting table - DPF_ResistFlowDsblLo

Description: Minimum fuel quantity threshold to permit resistive flow calculations, function of engine speed

Value Units: mm^3
X Unit: rpm

y/x	600	800	1,200	1,600	2,000	2,400	2,800	3,200
1	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_SootThrshCrtn

Description: Soot threshold correction based on soot value in CCB.

Value Units: [0, 4]
X Unit: % Soot

y/x	0	20	40	60	80	100	120	140
1	0	0	0	0	0	0	0	0

Initial Supporting table - EGT ExhGas1 QckChgMaxThrsh

Description: Maximum value between the last valid EGT1 temperature value + resolution error and a value obtained considering maximum calibratable value that can be read by the sensor, last valid EGT1 temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant

y/x	1
1	1,000

Initial Supporting table - EGT ExhGas1 QckChgMinThrsh

Description: Minimum value between the last valid EGT1 temperature value - resolution error and a value obtained considering minimum calibratable value that can be read by the sensor, last valid EGT1 temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant

y/x	1
1	-40

Initial Supporting table - EGT ExhGas2 QckChgMaxThrsh

Description: Maximum value between the last valid EGT2 temperature value + resolution error and a value obtained considering maximum calibratable value that can be read by the sensor, last valid EGT2 temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant

y/x	1
1	1,000

Initial Supporting table - EGT ExhGas2 QckChgMinThrsh

Description: Minimum value between the last valid EGT2 temperature value - resolution error and a value obtained considering minimum calibratable value that can be read by the sensor, last valid EGT2 temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant

y/x	1
1	-40

Initial Supporting table - EGT ExhGas3 QckChgMaxThrsh

Description: Maximum value between the last valid EGT3 temperature value + resolution error and a value obtained considering maximum calibratable value that can be read by the sensor, last valid EGT3 temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant

y/x	1
1	1,000

Initial Supporting table - EGT ExhGas3 QckChgMinThrsh

Description: Minimum value between the last valid EGT3 temperature value - resolution error and a value obtained considering minimum calibratable value that can be read by the sensor, last valid EGT3 temperature value and a weight coefficient function of the current amount of samples detected as failed by the monitor and the calibratable sensor time constant

y/x	1
1	-40

Initial Supporting table - EGT_FuelReqHysHiThrsh_DPF

Description: Injected fuel higher hysteresis threshold, function of engine speed

Value Units: mm^3
X Unit: rpm

y/x	1,000	1,100	1,500	2,500	3,000	3,500	4,000	5,000
1	-5	-5	-5	-5	-5	-5	-5	5

Initial Supporting table - EGT_FuelReqHysLoThrsh_DPF

Description: Injected fuel lower hysteresis threshold, function of engine speed

Value Units: mm^3
X Unit: rpm

y/x	1,000	1,100	1,500	2,500	3,000	3,500	4,000	5,000
1	-5	-5	-5	-5	-5	-5	-5	5

Initial Supporting table - EGT_FuelReqMaxThreshold

Description: Maximum Fuel Request threshold for Catalyst Inlet Temperature Control enabling conditions

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,750	2,500	3,000	3,500	4,000	4,500
1	50	50	60	60	60	30	0	0

Initial Supporting table - EGT_FuelReqMinThreshold

Description: Minimum Fuel Request threshold for Catalyst Inlet Temperature Control enabling conditions

Value Units: mm^3
X Unit: rpm

y/x	950	1,000	1,750	2,500	3,000	3,500	4,000	4,500
1	0	0	0	0	0	0	0	0

Initial Supporting table - EnginePointEnable_DPF_TempDeviation

Description: Map to enable DPF Control Temperature Deviation monitoring, function of engine speed and desired fuel.

Value Units: [Boolean]
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	2,000	2,500	3,000	3,010	4,000	4,200
0	0	0	0	0	0	0	0	0
5	0	1	1	1	1	1	1	1
10	0	1	1	1	1	1	1	1
15	0	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1
61	1	1	1	1	1	1	1	1

Initial Supporting table - Exhaust Gas Pressure Too Low Threshold

Description: Diagnostic threshold for the exhaust gas pressure too low monitoring, function of the exhaust gas flow and of the soot trapped in the DPF

y/x	10	20	60	100	140	200	200	200
40	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0

Initial Supporting table - Flow Resistance Too Low Threshold

Description: Diagnostic threshold for the flow resistance too low monitoring, function of the soot trapped in the DPF.

y/x	10	20	60	100	140	200	200	200
1	0	0	0	0	0	0	0	0

Initial Supporting table - K_EffExhFlowCond

Description: Enablement table, function of exhaust flow and SCR average temperature [boolean] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: boolean
X Unit: °C
Y Units: g/s

y/x	200	210	220	230	240	250	260	270	290	310	330	350	360	380	400
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
20	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
30	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
40	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
50	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
60	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
65	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
70	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
75	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
80	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
90	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
100	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - K_EffExhFlowCond_SCR2

Description: Enablement table, function of exhaust flow upstream SCR2 and SCR2 average temperature [boolean] for SCR2 monitoring (P2C7A)

Value Units: boolean
X Unit: °C
Y Units: g/s

y/x	190	210	220	240	260	270	280	290	300	310	320	340	360	380	400
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
20	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
25	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
30	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
40	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
50	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
60	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
70	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
80	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
90	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - KaFADC_n_SQC_HysThrsh

Description: Engine speed hysteresis function of driveline group for SQC enable.

KaFADC_n_SQC_HysThrsh - Part 1			
y/x	CeFADR_e_CWA_DrvlnGrpNotAlwd	CeFADR_e_CWA_DrivelineGrp1	CeFADR_e_CWA_DrivelineGrp2
1	10	10	10
KaFADC_n_SQC_HysThrsh - Part 2			
y/x	CeFADR_e_CWA_DrivelineGrp3	CeFADR_e_CWA_DrivelineGrp4	CeFADR_e_CWA_DrivelineGrp5
1	10	10	10
KaFADC_n_SQC_HysThrsh - Part 3			
y/x	CeFADR_e_CWA_DrivelineGrp6	CeFADR_e_CWA_DrivelineGrp7	CeFADR_e_CWA_DrivelineGrp8
1	10	10	10
KaFADC_n_SQC_HysThrsh - Part 4			
y/x	CeFADR_e_CWA_DrivelineGrp9	CeFADR_e_CWA_DrivelineGrp10	
1	10	10	

Initial Supporting table - KaOXYD_b_NOx3_SigRngEnblCmbMode

Description: This array indicates what are the combustion mode in which Signal Range Diagnosis is enabled

KaOXYD_b_NOx3_SigRngEnblCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

KaOXYD_b_NOx3_SigRngEnblCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	0	0	0

KaOXYD_b_NOx3_SigRngEnblCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

KaOXYD_b_NOx3_SigRngEnblCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - Lo_FR_MontrEnblHiThrsh

Description: High enabling threshold on the requested fuel for the flow resistance too low monitoring, function of engine speed.

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	5,000
1	100	100	100	100	100	100	100	100

Initial Supporting table - Lo_FR_MontrEnblLoThrsh

Description: Low enabling threshold on the requested fuel for the flow resistance too low monitoring, function of engine speed.

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	5,000
1	1	1	1	1	1	1	1	1

Initial Supporting table - m_NH3_StrgDevErrMax_SCR2

Description: Upper boundary of SCR2 NH3 storage deviation error [g] (difference between SCR2 estimated storage and its set-point) for SCR2 monitoring (P2C7A)

Value Units: g
X Unit: °C

y/x	220	250	280	300	320	340	360	380
1	0	0	0	0	0	0	0	0

Initial Supporting table - m_NH3_StrgDevErrMaxThrsh

Description: Upper boundary of NH3 storage deviation error [g] (difference between SCR2 estimated storage and its set-point) for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: g
X Unit: °C

y/x	200	220	250	280	300	320	350	380
1	0	0	0	0	0	0	0	0

Initial Supporting table - m_NH3_StrgDevErrMin_SCR2

Description: Lower boundary of SCR2 NH3 storage deviation error [g] (difference between SCR2 estimated storage and its set-point) for SCR2 monitoring (P2C7A)

Value Units: g
X Unit: °C

y/x	220	250	280	300	320	340	360	380
1	-1	-1	-1	-1	-1	-1	-1	-1

Initial Supporting table - m_NH3_StrgDevErrMinThrsh

Description: Lower boundary of NH3 storage deviation error [g] (difference between SCR estimated storage and its set-point) for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: g
X Unit: °C

y/x	200	220	250	280	300	320	350	380
1	0	0	0	0	0	0	0	0

Initial Supporting table - m_NH3_StrgMax_SCR2

Description: Upper boundary of SCR2 estimated NH3 storage [g] for SCR2 monitoring (P2C7A)

Value Units: g
X Unit: °C
Y Units: g/s

y/x	10	20	30	40	50	60	80	100
220	2	2	2	2	2	2	1	1
250	1	1	1	1	1	1	1	1
280	1	1	1	1	1	1	1	1
300	1	1	1	1	1	1	1	1
320	1	1	1	1	1	1	1	1
340	1	1	1	1	1	1	1	1
360	1	1	1	1	1	1	1	1
380	1	1	1	1	1	1	1	1
400	1	1	1	1	1	1	1	1

Initial Supporting table - m_NH3_StrgMaxAge_SCR2

Description: Upper boundary of SCR2 estimated NH3 storage [g] for SCR2 monitoring (P2C7A) when SCR2 catalyst is aged

Value Units: g
X Unit: °C
Y Units: g/s

y/x	10	20	30	40	50	60	80	100
220	2	2	2	2	2	2	1	1
250	1	1	1	1	1	1	1	1
280	1	1	1	1	1	1	1	1
300	1	1	1	1	1	1	1	1
320	1	1	1	1	1	1	1	1
340	1	1	1	1	1	1	1	1
360	1	1	1	1	1	1	1	1
380	1	1	1	1	1	1	1	1
400	1	1	1	1	1	1	1	1

Initial Supporting table - m_NH3_StrgMaxThrsh

Description: Upper boundary of estimated NH3 storage [g] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: g
X Unit: °C

y/x	200	220	250	280	300	320	350	380
1	2	2	2	2	2	2	2	2

Initial Supporting table - m_NH3_StrgMin_SCR2

Description: Lower boundary of SCR2 estimated NH3 storage [g] for SCR2 monitoring (P2C7A)

Value Units: g
X Unit: °C

y/x	220	250	280	300	320	340	360	380
1	0	0	0	0	0	0	0	0

Initial Supporting table - m_NH3_StrgMinThrsh

Description: Lower boundary of estimated NH3 storage [g] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: g
X Unit: °C

y/x	200	220	250	280	300	320	350	380
1	0	0	0	0	0	0	0	0

Initial Supporting table - m_SlipNOxIntglThrsh_SCR2

Description: NOx integral threshold [mg] to enable SCR2 slip condition based on SCR2 average temperature for SCR2 monitoring (P2C7A)

Value Units: mg
X Unit: °C

y/x	220	270	320	370
1	1,700	1,700	1,700	1,700

Initial Supporting table - Maximum allowed time to complete regeneration

Description: Time allowed to complete DPF regeneration, function of mission profile.

Maximum allowed time to complete regeneration - Part 1

y/x	CeDPFR_e_MisProf0	CeDPFR_e_MisProf1	CeDPFR_e_MisProf2	CeDPFR_e_MisProf3	CeDPFR_e_MisProf4	CeDPFR_e_MisProf5	CeDPFR_e_MisProf6
1	3,600	3,600	3,600	3,600	3,600	3,600	3,600

Maximum allowed time to complete regeneration - Part 2

y/x	CeDPFR_e_MisProf7	CeDPFR_e_MisProf8	CeDPFR_e_MisProf9	CeDPFR_e_MisProf10	CeDPFR_e_MisProf11	CeDPFR_e_MisProf12	CeDPFR_e_MisProf13
1	3,600	3,600	3,600	3,600	3,600	3,600	3,600

Maximum allowed time to complete regeneration - Part 3

y/x	CeDPFR_e_MisProf14	CeDPFR_e_MisProf15	CeDPFR_e_MisProf16	CeDPFR_e_MisProf17 Srv	CeDPFR_e_MisProf18 Rec		
1	3,600	3,600	3,600	3,600	3,600		

Initial Supporting table - Maximum allowed time to reach steady state for regeneration

Description: Time to reach DPF regeneration steady state condition, function of mission profile.

Maximum allowed time to reach steady state for regeneration - Part 1

y/x	CeDPFR_e_MisProf0	CeDPFR_e_MisProf1	CeDPFR_e_MisProf2	CeDPFR_e_MisProf3	CeDPFR_e_MisProf4	CeDPFR_e_MisProf5	CeDPFR_e_MisProf6
1	2,200	2,200	2,200	2,200	2,200	2,200	2,200

Maximum allowed time to reach steady state for regeneration - Part 2

y/x	CeDPFR_e_MisProf7	CeDPFR_e_MisProf8	CeDPFR_e_MisProf9	CeDPFR_e_MisProf10	CeDPFR_e_MisProf11	CeDPFR_e_MisProf12	CeDPFR_e_MisProf13
1	2,200	2,200	2,200	2,200	2,200	2,200	2,200

Maximum allowed time to reach steady state for regeneration - Part 3

y/x	CeDPFR_e_MisProf14	CeDPFR_e_MisProf15	CeDPFR_e_MisProf16	CeDPFR_e_MisProf17 Srv	CeDPFR_e_MisProf18 Rec		
1	2,200	2,200	2,200	2,200	2,200		

Initial Supporting table - Maximum allowed time to release post injections for regeneration

Description: Time to release POST injection, function of mission profile.

Maximum allowed time to release post injections for regeneration - Part 1

y/x	CeDPFR_e_MisProf0	CeDPFR_e_MisProf1	CeDPFR_e_MisProf2	CeDPFR_e_MisProf3	CeDPFR_e_MisProf4	CeDPFR_e_MisProf5	CeDPFR_e_MisProf6
1	3,600	3,600	3,600	3,600	3,600	3,600	3,600

Maximum allowed time to release post injections for regeneration - Part 2

y/x	CeDPFR_e_MisProf7	CeDPFR_e_MisProf8	CeDPFR_e_MisProf9	CeDPFR_e_MisProf10	CeDPFR_e_MisProf11	CeDPFR_e_MisProf12	CeDPFR_e_MisProf13
1	3,600	3,600	3,600	3,600	3,600	3,600	3,600

Maximum allowed time to release post injections for regeneration - Part 3

y/x	CeDPFR_e_MisProf14	CeDPFR_e_MisProf15	CeDPFR_e_MisProf16	CeDPFR_e_MisProf17 Srv	CeDPFR_e_MisProf18 Rec		
1	3,600	3,600	3,600	1,200	3,600		

Initial Supporting table - Mission profile correction on distance

Description: Curve of Mission profile dependent correction for threshold on distance covered since last regeneration

Mission profile correction on distance - Part 1

y/x	CeDPFR_e_MisProf0	CeDPFR_e_MisProf1	CeDPFR_e_MisProf2	CeDPFR_e_MisProf3	CeDPFR_e_MisProf4	CeDPFR_e_MisProf5	CeDPFR_e_MisProf6
1	1	1	1	1	1	1	1

Mission profile correction on distance - Part 2

y/x	CeDPFR_e_MisProf7	CeDPFR_e_MisProf8	CeDPFR_e_MisProf9	CeDPFR_e_MisProf10	CeDPFR_e_MisProf11	CeDPFR_e_MisProf12	CeDPFR_e_MisProf13
1	1	1	1	1	1	1	1

Mission profile correction on distance - Part 3

y/x	CeDPFR_e_MisProf14	CeDPFR_e_MisProf15	CeDPFR_e_MisProf16	CeDPFR_e_MisProf17 Srv	CeDPFR_e_MisProf18 Rec		
1	1	1	1	1	1		

Initial Supporting table - Mission profile correction on time

Description: Curve of Mission profile dependent correction for threshold on time spent since last regeneration

Mission profile correction on time - Part 1

y/x	CeDPFR_e_MisProf0	CeDPFR_e_MisProf1	CeDPFR_e_MisProf2	CeDPFR_e_MisProf3	CeDPFR_e_MisProf4	CeDPFR_e_MisProf5	CeDPFR_e_MisProf6
1	1	1	1	1	1	1	1

Mission profile correction on time - Part 2

y/x	CeDPFR_e_MisProf7	CeDPFR_e_MisProf8	CeDPFR_e_MisProf9	CeDPFR_e_MisProf10	CeDPFR_e_MisProf11	CeDPFR_e_MisProf12	CeDPFR_e_MisProf13
1	1	1	1	1	1	1	1

Mission profile correction on time - Part 3

y/x	CeDPFR_e_MisProf14	CeDPFR_e_MisProf15	CeDPFR_e_MisProf16	CeDPFR_e_MisProf17 Srv	CeDPFR_e_MisProf18 Rec		
1	1	1	1	1	1		

Initial Supporting table - NOX_NOx3SelfTstEnblCmbMode

Description:

NOX_NOx3SelfTstEnblCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_NOx3SelfTstEnblCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_NOx3SelfTstEnblCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_NOx3SelfTstEnblCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S3_OfstMntrEnblCmbMode

Description:

NOX_S3_OfstMntrEnblCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S3_OfstMntrEnblCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S3_OfstMntrEnblCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S3_OfstMntrEnblCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - NOX_S3_OutRngMaxCmbMode

Description:

NOX_S3_OutRngMaxCmbMode - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0

NOX_S3_OutRngMaxCmbMode - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S3_OutRngMaxCmbMode - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	1	1	0	0	0

NOX_S3_OutRngMaxCmbMode - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	1	1	

Initial Supporting table - NOX_S3_OutRngMinCmbMode

Description:

NOX_S3_OutRngMinCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0

NOX_S3_OutRngMinCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S3_OutRngMinCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	1	1	0	0	0

NOX_S3_OutRngMinCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	1	1	

Initial Supporting table - NOX_S3_StBitChkEnblCmbMode

Description:

NOX_S3_StBitChkEnblCmbMode - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

NOX_S3_StBitChkEnblCmbMode - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

NOX_S3_StBitChkEnblCmbMode - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

NOX_S3_StBitChkEnblCmbMode - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P0087 Minimum rail pressure

Description: Minimum rail pressure threshold (MPa) as function of engine speed (rpm).

Value Units: MPa
X Unit: rpm

y/x	450	500	650	660	800	1,000	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,200	4,400	4,800
1	0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Initial Supporting table - P0089 Maximum rail pressure with MU

Description: Maximum rail pressure threshold (MPa) when pressure is governed by Metering Unit as function of engine speed (rpm).

Value Units: MPa
X Unit: rpm

y/x	0	1,333	5,067	6,400
1	68	268	268	118

Initial Supporting table - P0128 Maximum Acculated Energy - Primary

Description: KtETHD_E_EOR_WrmUpEnrgyLimTest0

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-10.0	-5.0	10.0	25.0	35.0	40.0	57.0
1.0	10,880.0	10,305.0	8,580.0	6,855.0	5,705.0	5,130.0	3,175.0

Initial Supporting table - P0128 Maximum Acculated Energy - Secondary

Description: KtETHD_E_EOR_WrmUpEnrgyLimTest1

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-10.0	-5.0	10.0	25.0	35.0	40.0	57.0
1.0	12,545.1	11,819.4	9,642.3	7,465.2	6,013.8	5,288.1	2,820.8

Initial Supporting table - P0128 Maximum Acculated Energy - Tertiary

Description: KtETHD_E_EOR_WrmUpEnrgyLimTest2

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum ECT for the key cycle (°C)

y/x	-10.0	-5.0	10.0	25.0	35.0	40.0	57.0
1.0	12,545.1	11,819.4	9,642.3	7,465.2	6,013.8	5,288.1	2,820.8

Initial Supporting table - P017B Maximum Accumulated Energy - Primary

Description: KtETHD_E_CMR_WrmUpEnrgyLimTest0

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum cylinder head metal for the key cycle (°C)

y/x	-10.0	-5.0	10.0	25.0	35.0	40.0	57.0
1.0	10,880.0	10,305.0	8,580.0	6,855.0	5,705.0	5,130.0	3,175.0

Initial Supporting table - P017B Maximum Accumulated Energy - Secondary

Description: KtETHD_E_CMR_WrmUpEnrgyLimTest1

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum cylinder head metal for the key cycle (°C)

y/x	-10.0	-5.0	10.0	25.0	35.0	40.0	57.0
1.0	12,545.1	11,819.4	9,642.3	7,465.2	6,013.8	5,288.1	2,820.8

Initial Supporting table - P017B Maximum Accumulated Energy - Tertiary

Description: KtETHD_E_CMR_WrmUpEnrgyLimTest2

Value Units: Cooling system energy failure threshold (kJ)
X Unit: Minimum cylinder head metal for the key cycle (°C)

y/x	-10.0	-5.0	10.0	25.0	35.0	40.0	57.0
1.0	12,545.1	11,819.4	9,642.3	7,465.2	6,013.8	5,288.1	2,820.8

Initial Supporting table - P0181 Fuel Temperature Sensor Reference

Description: Defines which sensor is used as reference for check plausibility of fuel temperature sensor.
(CeFTSR_e_ECT_Snsr = Engine coolant temperature, CeFTSR_e_DPF_SnsrUp = Exhaust gas temperature measured upstream the DPF, CeFTSR_e_DPF_SnsrDwn = Exhaust gas temperature measured downstream the DPF.

Value Units: -

y/x	1
1	CeFTSR_e_DPF_SnsrDwn

Initial Supporting table - P01F0 - Heat To Coolant Min 2D

Description: KtETHD_P_CDD_HeatToCoolantMin

Value Units: Indicated Power (kW)
X Unit: Firing Fraction
Y Units: Ambient temperature (°C)

y/x	0.00	0.25	0.50	0.67	1.00
-10.0	10.2	10.2	10.2	10.2	10.2
0.0	9.0	9.0	9.0	9.0	9.0
10.0	8.5	8.5	8.5	8.5	8.5
20.0	5.0	5.0	5.0	5.0	5.0
30.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - P0234, P0299: Boost pressure control deviation enabling

Description: Calibration map for the enabling of boost pressure control deviation monitoring, function of combustion mode.

Value Units: boolean

P0234, P0299: Boost pressure control deviation enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P0234, P0299: Boost pressure control deviation enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P0234, P0299: Boost pressure control deviation enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P0234, P0299: Boost pressure control deviation enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P0234, P2263: Overboost barometric correction

Description: Ambient air pressure multiplicative correction to the base threshold for overboost monitoring. It is function of ambient air pressure (Y axis) and desired boost pressure (X axis).

Value Units: const [-8, 8]
X Unit: kPa
Y Units: kPa

y/x	215	221	227	233	239	245	251	257	264	269	276	282	288	294	300
63	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
84	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
96	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P0234: Maximum boost pressure for overboost monitor enabling

Description: Maximum desired boost pressure below which the overboost deviation monitoring is enabled. This map is function of ambient air pressure.

Value Units: kPa
X Unit: kPa

y/x	63	84	96	100
1	290	290	300	300

Initial Supporting table - P0234: Minimum boost pressure for overboost monitor enabling

Description: Minimum desired boost pressure above which the overboost deviation monitoring is enabled. This map is function of ambient air pressure.

Value Units: kPa
X Unit: kPa

y/x	63	84	96	100
1	216	216	250	250

Initial Supporting table - P0234: Negative boost deviation threshold (throttle control active)

Description: Boost pressure deviation threshold for the negative boost pressure control deviation monitor when the throttle control is active. It identifies an overboost faulty condition. It is function of engine speed (Y axis) and desired boost pressure (X axis).

Value Units: kPa
X Unit: kPa
Y Units: rpm

y/x	215	221	227	233	239	245	251	257	264	269	276	282	288	294	300
2,500	-14	-14	-14	-15	-16	-17	-18	-22	-24	-24	-22	-21	-22	-22	-22
2,667	-14	-14	-14	-15	-16	-17	-19	-22	-24	-24	-23	-23	-23	-23	-22
2,833	-14	-14	-14	-15	-16	-19	-22	-23	-24	-24	-23	-24	-24	-24	-22
3,000	-16	-17	-17	-15	-16	-19	-23	-24	-25	-25	-23	-24	-24	-24	-22
3,167	-17	-17	-17	-17	-18	-21	-24	-25	-25	-25	-23	-24	-24	-23	-22
3,333	-17	-17	-17	-17	-19	-21	-24	-26	-25	-25	-23	-23	-23	-23	-22
3,500	-18	-18	-18	-18	-20	-22	-25	-26	-25	-25	-22	-23	-23	-22	-22
3,667	-18	-18	-19	-19	-21	-24	-25	-26	-25	-25	-22	-22	-22	-22	-22
3,833	-18	-19	-19	-20	-23	-25	-27	-27	-25	-25	-22	-22	-22	-22	-22
4,000	-19	-19	-20	-20	-24	-26	-28	-28	-26	-25	-22	-22	-22	-22	-22

Initial Supporting table - P0234: Negative boost deviation threshold (throttle control not active)

Description: Boost pressure deviation threshold for the negative boost pressure control deviation monitor when the throttle control is not active. It identifies an overboost faulty condition. It is function of engine speed (Y axis) and desired boost pressure (X axis).

Value Units: kPa
X Unit: kPa
Y Units: rpm

y/x	215	221	227	233	239	245	251	257	264	269	276	282	288	294	300
2,500	-14	-14	-14	-15	-16	-17	-18	-22	-24	-24	-22	-21	-22	-22	-22
2,667	-14	-14	-14	-15	-16	-17	-19	-22	-24	-24	-23	-23	-23	-23	-22
2,833	-14	-14	-14	-15	-16	-19	-22	-23	-24	-24	-23	-24	-24	-24	-22
3,000	-16	-17	-17	-15	-16	-19	-23	-24	-25	-25	-23	-24	-24	-24	-22
3,167	-17	-17	-17	-17	-18	-21	-24	-25	-25	-25	-23	-24	-24	-23	-22
3,333	-17	-17	-17	-17	-19	-21	-24	-26	-25	-25	-23	-23	-23	-23	-22
3,500	-18	-18	-18	-18	-20	-22	-25	-26	-25	-25	-22	-23	-23	-22	-22
3,667	-18	-18	-19	-19	-21	-24	-25	-26	-25	-25	-22	-22	-22	-22	-22
3,833	-18	-19	-19	-20	-23	-25	-27	-27	-25	-25	-22	-22	-22	-22	-22
4,000	-19	-19	-20	-20	-24	-26	-28	-28	-26	-25	-22	-22	-22	-22	-22

Initial Supporting table - P0234: Overboost monitor delay timer

Description: Delay timer before enabling the overboost deviation monitoring once all entry conditions are fulfilled. This map is function of engine speed.

Value Units: s
X Unit: rpm

y/x	2,500	2,667	2,833	3,000	3,167	3,333	3,500	3,667	3,833	4,000
1	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P026A: Efficiency Offset

Description: Charge Air Cooler Efficiency Offset, function of compressor total flow and water pump speed

Value Units: [%]
X Unit: [g/s]
Y Units: [rpm]

y/x	1,000	2,000	3,000	4,000	5,000	6,000	7,000
20	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0
200	0	0	0	0	0	0	1
250	0	0	0	0	0	1	1

Initial Supporting table - P0299, P2263: Underboost barometric correction

Description: Ambient air pressure multiplicative correction to the base threshold for underboost monitoring. It is function of ambient air pressure (Y axis) and desired boost pressure (X axis).

Value Units: const [-8, 8]
X Unit: kPa
Y Units: kPa

y/x	215	221	227	233	239	245	251	257	264	269	276	282	288	294	300
63	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
84	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
96	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P0299: Maximum boost pressure for underboost monitor enabling

Description: Maximum desired boost pressure below which the underboost deviation monitoring is enabled. This map is function of ambient air pressure.

Value Units: kPa
X Unit: kPa

y/x	70	80	90	100
1	160	160	160	160

Initial Supporting table - P0299: Minimum boost pressure for underboost monitor enabling

Description: Minimum desired boost pressure above which the underboost deviation monitoring is enabled. This map is function of ambient air pressure.

Value Units: kPa
X Unit: kPa

y/x	70	80	90	100
1	126	126	126	126

Initial Supporting table - P0299: Positive boost deviation threshold (throttle control active)

Description: Boost pressure deviation threshold for the positive boost pressure control deviation monitor when the throttle control is active. It identifies an underboost faulty condition. It is function of engine speed (Y axis) and desired boost pressure (X axis).

Value Units: kPa
X Unit: kPa
Y Units: rpm

y/x	125	127	130	133	135	137	140	143	145	147	150	152	155	157	160
1,300	10	11	14	15	17	17	18	20	21	21	22	23	24	25	26
1,383	10	11	14	15	17	17	18	20	21	21	22	23	24	25	26
1,466	10	11	14	15	17	17	18	20	21	21	22	23	24	25	26
1,550	10	11	14	15	17	17	18	20	21	20	21	22	24	24	25
1,633	10	11	14	15	17	17	18	20	20	19	21	22	23	24	25
1,716	10	11	14	15	17	17	18	20	20	19	20	22	23	24	24
1,800	10	11	14	15	16	16	17	19	19	19	20	21	22	23	24
1,883	10	11	14	15	16	16	17	19	19	19	19	21	22	23	23
1,966	10	11	14	15	16	16	17	19	19	19	19	21	22	23	23
2,050	10	11	14	15	16	16	17	19	19	19	19	21	22	23	23

Initial Supporting table - P0299: Positive boost deviation threshold (throttle control not active)

Description: Boost pressure deviation threshold for the positive boost pressure control deviation monitor when the throttle control is not active. It identifies an underboost faulty condition. It is function of engine speed (Y axis) and desired boost pressure (X axis).

Value Units: kPa
X Unit: kPa
Y Units: rpm

y/x	125	127	130	133	135	137	140	143	145	147	150	152	155	157	160
1,300	10	11	14	15	17	17	18	20	21	21	22	23	24	25	26
1,383	10	11	14	15	17	17	18	20	21	21	22	23	24	25	26
1,466	10	11	14	15	17	17	18	20	21	21	22	23	24	25	26
1,550	10	11	14	15	17	17	18	20	21	20	21	22	24	24	25
1,633	10	11	14	15	17	17	18	20	20	19	21	22	23	24	25
1,716	10	11	14	15	17	17	18	20	20	19	20	22	23	24	24
1,800	10	11	14	15	16	16	17	19	19	19	20	21	22	23	24
1,883	10	11	14	15	16	16	17	19	19	19	19	21	22	23	23
1,966	10	11	14	15	16	16	17	19	19	19	19	21	22	23	23
2,050	10	11	14	15	16	16	17	19	19	19	19	21	22	23	23

Initial Supporting table - P0299: Underboost monitor delay timer

Description: Delay timer before enabling the underboost deviation monitoring once all entry conditions are fulfilled. This map is function of engine speed.

Value Units: s
X Unit: rpm

y/x	1,300	1,383	1,466	1,550	1,633	1,716	1,800	1,883	1,966	2,050
1	2	2	2	1	1	1	1	1	1	1

Initial Supporting table - P0401, P131F: EGR flow monitor enabling

Description: Calibration map to choose if the excessive EGR / insufficient HP EGR flow monitor is enabled or not for each combustion mode.

Value Units: boolean
X Unit: enum

P0401, P131F: EGR flow monitor enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P0401, P131F: EGR flow monitor enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P0401, P131F: EGR flow monitor enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P0401, P131F: EGR flow monitor enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P0401, P131F: EGR intrusive test enabling

Description: Calibration map to choose if the EGR intrusive test is enabled or not for each combustion mode.

Value Units: boolean
X Unit: enum

P0401, P131F: EGR intrusive test enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	0	0	0	0	0

P0401, P131F: EGR intrusive test enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	0	0	0

P0401, P131F: EGR intrusive test enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P0401, P131F: EGR intrusive test enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P0401: Insufficient HP EGR flow barometric correction (low level)

Description: Air Temperature correction at low barometric level for OBDII insufficient HP EGR flow monitor. It is function of air temperature.

Value Units: const [-1,1]
X Unit: °C

y/x	-10	-5	0	5	10	20	30	35	40	50
1	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow barometric correction (mid level)

Description: Air Temperature correction at mid barometric level for OBDII insufficient HP EGR flow monitor. It is function of air temperature.

Value Units: const [-1,1]
X Unit: °C

y/x	-10	-5	0	5	10	20	30	35	40	50
1	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow barometric correction (sea level)

Description: Air Temperature correction at sea barometric level for OBDII insufficient HP EGR flow monitor. It is function of air temperature.

Value Units: const [-1,1]
X Unit: °C

y/x	-10	-5	0	5	10	20	30	35	40	50
1	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow barometric table A (low level)

Description: Barometric (low level) calibration table for defining a OBDII threshold for insufficient HP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	1,125	1,157	1,189	1,221	1,254	1,286	1,318	1,350
3	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow barometric table A (mid level)

Description: Barometric (mid level) calibration table for defining a OBDII threshold for insufficient HP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	1,125	1,157	1,189	1,221	1,254	1,286	1,318	1,350
3	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow barometric table A (sea level)

Description: Barometric (sea level) calibration table for defining a OBDII threshold for insufficient HP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	1,125	1,157	1,189	1,221	1,254	1,286	1,318	1,350
3	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow barometric table B (low level)

Description: Barometric (low level) calibration table for defining a OBDII threshold for insufficient HP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	1,125	1,157	1,189	1,221	1,254	1,286	1,318	1,350
3	-104	-128	-128	-128	-80	-144	-128	-120
5	-112	-208	-208	-208	-168	-208	-192	-184
7	-112	-216	-216	-224	-224	-224	-224	-216
9	-120	-232	-232	-232	-232	-224	-224	-232
11	-128	-232	-232	-232	-232	-224	-240	-248
13	-128	-216	-224	-224	-224	-216	-232	-240
15	-120	-208	-216	-216	-216	-208	-208	-152
17	-128	-192	-208	-200	-208	-184	-160	-88
19	-144	-184	-208	-184	-184	-144	-112	-88

Initial Supporting table - P0401: Insufficient HP EGR flow barometric table B (mid level)

Description: Barometric (mid level) calibration table for defining a OBDII threshold for insufficient HP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	1,125	1,157	1,189	1,221	1,254	1,286	1,318	1,350
3	-104	-128	-128	-128	-80	-144	-128	-120
5	-112	-208	-208	-208	-168	-208	-192	-184
7	-112	-216	-216	-224	-224	-224	-224	-216
9	-120	-232	-232	-232	-232	-224	-224	-232
11	-128	-232	-232	-232	-232	-224	-240	-248
13	-128	-216	-224	-224	-224	-216	-232	-240
15	-120	-208	-216	-216	-216	-208	-208	-152
17	-128	-192	-208	-200	-208	-184	-160	-88
19	-144	-184	-208	-184	-184	-144	-112	-88

Initial Supporting table - P0401: Insufficient HP EGR flow barometric table B (sea level)

Description: Barometric (sea level) calibration table for defining a OBDII threshold for insufficient HP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	1,125	1,157	1,189	1,221	1,254	1,286	1,318	1,350
3	-104	-128	-128	-128	-80	-144	-128	-120
5	-112	-208	-208	-208	-168	-208	-192	-184
7	-112	-216	-216	-224	-224	-224	-224	-216
9	-120	-232	-232	-232	-232	-224	-224	-232
11	-128	-232	-232	-232	-232	-224	-240	-248
13	-128	-216	-224	-224	-224	-216	-232	-240
15	-120	-208	-216	-216	-216	-208	-208	-152
17	-128	-192	-208	-200	-208	-184	-160	-88
19	-144	-184	-208	-184	-184	-144	-112	-88

Initial Supporting table - P0401: Insufficient HP EGR flow Max fuel enabling condition

Description: Maximum desired fuel below which the insufficient HP EGR flow is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	1,100	1,200	1,300	1,400	1,500	1,600	1,650	1,700
64	22	22	22	22	22	22	22	22
68	22	22	22	22	22	22	22	22
72	22	22	22	22	22	22	22	22
76	22	22	22	22	22	22	22	22
80	22	22	22	22	22	22	22	22
84	22	22	22	22	22	22	22	22
88	22	22	22	22	22	22	22	22
92	22	22	22	22	22	22	22	22
96	22	22	22	22	22	22	22	22
100	22	22	22	22	22	22	22	22
104	22	22	22	22	22	22	22	22

Initial Supporting table - P0401: Insufficient HP EGR flow Max OAT threshold for C1

Description: Maximum desired OAT below which the insufficient HP EGR flow is enabled, for the C1 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P0401: Insufficient HP EGR flow Max OAT threshold for C2

Description: Maximum desired OAT below which the insufficient HP EGR flow is enabled, for the C2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P0401: Insufficient HP EGR flow Max OAT threshold for others

Description: Maximum desired OAT below which the insufficient HP EGR flow is enabled, for all other combustion modes. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P0401: Insufficient HP EGR flow Max OAT threshold for V2

Description: Maximum desired OAT below which the insufficient HP EGR flow is enabled, for the V2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P0401: Insufficient HP EGR flow Min fuel enabling condition

Description: Minimum desired fuel above which the insufficient HP EGR flow is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	1,100	1,200	1,300	1,400	1,500	1,600	1,650	1,700
64	3	3	3	3	3	3	3	3
68	3	3	3	3	3	3	3	3
72	3	3	3	3	3	3	3	3
76	3	3	3	3	3	3	3	3
80	3	3	3	3	3	3	3	3
84	3	3	3	3	3	3	3	3
88	3	3	3	3	3	3	3	3
92	3	3	3	3	3	3	3	3
96	3	3	3	3	3	3	3	3
100	3	3	3	3	3	3	3	3
104	3	3	3	3	3	3	3	3

Initial Supporting table - P0401: Insufficient HP EGR flow Min OAT threshold for C1

Description: Minimum desired OAT above which the insufficient HP EGR flow is enabled, for the C1 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P0401: Insufficient HP EGR flow Min OAT threshold for C2

Description: Minimum desired OAT above which the insufficient HP EGR flow is enabled, for the C2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR flow Min OAT threshold for others

Description: Minimum desired OAT above which the insufficient HP EGR flow is enabled, for all other combustion modes. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P0401: Insufficient HP EGR flow Min OAT threshold for V2

Description: Minimum desired OAT above which the insufficient HP EGR flow is enabled, for the V2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P0401: Insufficient HP EGR intrusive test Max fuel enabling condition

Description: Maximum desired fuel below which the insufficient HP EGR intrusive test is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Insufficient HP EGR intrusive test Min fuel enabling condition

Description: Minimum desired fuel above which the insufficient HP EGR intrusive test is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0

Initial Supporting table - P0401: Minimum desired HP EGR flow

Description: Minimum desired HP EGR flow above which the insufficient HP EGR flow is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mg
X Unit: rpm
Y Units: kPa

y/x	1,100	1,200	1,300	1,400	1,500	1,600	1,650	1,700
64	0	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0

Initial Supporting table - P049B: Insufficient LP EGR flow barometric correction (low level)

Description: Air Temperature correction at low barometric level for OBDII insufficient LP EGR flow monitor. It is function of air temperature.

Value Units: const [-1,1]
X Unit: °C

y/x	-20	-10	0	10	20	30	40	45	50	55
1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P049B: Insufficient LP EGR flow barometric correction (mid level)

Description: Air Temperature correction at mid barometric level for OBDII insufficient LP EGR flow monitor. It is function of air temperature.

Value Units: const [-1,1]
X Unit: °C

y/x	-20	-10	0	10	20	30	40	45	50	55
1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P049B: Insufficient LP EGR flow barometric correction (sea level)

Description: Air Temperature correction at sea barometric level for OBDII insufficient LP EGR flow monitor. It is function of air temperature.

Value Units: const [-1,1]
X Unit: °C

y/x	-20	-10	0	10	20	30	40	45	50	55
1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P049B: Insufficient LP EGR flow barometric table A (low level)

Description: Barometric (low level) calibration table for defining a OBDII threshold for insufficient LP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0

Initial Supporting table - P049B: Insufficient LP EGR flow barometric table A (mid level)

Description: Barometric (mid level) calibration table for defining a OBDII threshold for insufficient LP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0

Initial Supporting table - P049B: Insufficient LP EGR flow barometric table A (sea level)

Description: Barometric (sea level) calibration table for defining a OBDII threshold for insufficient LP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0

Initial Supporting table - P049B: Insufficient LP EGR flow barometric table B (low level)

Description: Barometric (low level) calibration table for defining a OBDII threshold for insufficient LP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
13	-48	-48	-48	-48	-48	-48	-48	-48
14	-48	-48	-48	-48	-48	-48	-48	-48
16	-48	-48	-48	-48	-48	-48	-48	-48
18	-48	-48	-48	-48	-48	-48	-48	-48
20	-48	-48	-48	-48	-48	-48	-48	-48
22	-48	-40	-40	-48	-48	-48	-48	-48
23	-40	-32	-32	-40	-48	-48	-40	-40
25	-32	-24	-24	-32	-40	-40	-32	-24
27	-24	-24	-24	-24	-32	-32	-24	-24

Initial Supporting table - P049B: Insufficient LP EGR flow barometric table B (mid level)

Description: Barometric (mid level) calibration table for defining a OBDII threshold for insufficient LP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
13	-48	-48	-48	-48	-48	-48	-48	-48
14	-48	-48	-48	-48	-48	-48	-48	-48
16	-48	-48	-48	-48	-48	-48	-48	-48
18	-48	-48	-48	-48	-48	-48	-48	-48
20	-48	-48	-48	-48	-48	-48	-48	-48
22	-48	-40	-40	-48	-48	-48	-48	-48
23	-40	-32	-32	-40	-48	-48	-40	-40
25	-32	-24	-24	-32	-40	-40	-32	-24
27	-24	-24	-24	-24	-32	-32	-24	-24

Initial Supporting table - P049B: Insufficient LP EGR flow barometric table B (sea level)

Description: Barometric (sea level) calibration table for defining a OBDII threshold for insufficient LP EGR flow deviation monitoring. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: mg
X Unit: rpm
Y Units: mm^3

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
13	-48	-48	-48	-48	-48	-48	-48	-48
14	-48	-48	-48	-48	-48	-48	-48	-48
16	-48	-48	-48	-48	-48	-48	-48	-48
18	-48	-48	-48	-48	-48	-48	-48	-48
20	-48	-48	-48	-48	-48	-48	-48	-48
22	-48	-40	-40	-48	-48	-48	-48	-48
23	-40	-32	-32	-40	-48	-48	-40	-40
25	-32	-24	-24	-32	-40	-40	-32	-24
27	-24	-24	-24	-24	-32	-32	-24	-24

Initial Supporting table - P049B: Insufficient LP EGR flow Max fuel enabling condition

Description: Maximum desired fuel below which the insufficient LP EGR flow is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
69	0	0	0	0	0	0	0	0
70	0	27	27	27	27	27	27	0
72	0	27	27	27	27	27	27	0
76	0	27	27	27	27	27	27	0
80	0	27	27	27	27	27	27	0
84	0	27	27	27	27	27	27	0
88	0	27	27	27	27	27	27	0
92	0	27	27	27	27	27	27	0
96	0	27	27	27	27	27	27	0
100	0	27	27	27	27	27	27	0
104	0	27	27	27	27	27	27	0

Initial Supporting table - P049B: Insufficient LP EGR flow Max OAT threshold for C1

Description: Maximum desired OAT below which the insufficient LP EGR flow is enabled, for the C1 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	55	55	55	55	55	55	55	55	55	55	55

Initial Supporting table - P049B: Insufficient LP EGR flow Max OAT threshold for C2

Description: Maximum desired OAT below which the insufficient LP EGR flow is enabled, for the C2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	55	55	55	55	55	55	55	55	55	55	55

Initial Supporting table - P049B: Insufficient LP EGR flow Max OAT threshold for others

Description: Maximum desired OAT below which the insufficient LP EGR flow is enabled, for all other combustion modes. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	55	55	55	55	55	55	55	55	55	55	55

Initial Supporting table - P049B: Insufficient LP EGR flow Max OAT threshold for V2

Description: Maximum desired OAT below which the insufficient LP EGR flow is enabled, for the V2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	55	55	55	55	55	55	55	55	55	55	55

Initial Supporting table - P049B: Insufficient LP EGR flow Min fuel enabling condition

Description: Minimum desired fuel above which the insufficient LP EGR flow is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
69	100	100	100	100	100	100	100	100
70	100	13	13	13	13	13	13	100
72	100	13	13	13	13	13	13	100
76	100	13	13	13	13	13	13	100
80	100	13	13	13	13	13	13	100
84	100	13	13	13	13	13	13	100
88	100	13	13	13	13	13	13	100
92	100	13	13	13	13	13	13	100
96	100	13	13	13	13	13	13	100
100	100	13	13	13	13	13	13	100
104	100	13	13	13	13	13	13	100

Initial Supporting table - P049B: Insufficient LP EGR flow Min OAT threshold for C1

Description: Minimum desired OAT above which the insufficient LP EGR flow is enabled, for the C1 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P049B: Insufficient LP EGR flow Min OAT threshold for C2

Description: Minimum desired OAT above which the insufficient LP EGR flow is enabled, for the C2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P049B: Insufficient LP EGR flow Min OAT threshold for others

Description: Minimum desired OAT above which the insufficient LP EGR flow is enabled, for all other combustion modes. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P049B: Insufficient LP EGR flow Min OAT threshold for V2

Description: Minimum desired OAT above which the insufficient LP EGR flow is enabled, for the V2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	69	70	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P049B: Insufficient LP EGR flow monitor enabling

Description: Calibration map to choose if the insufficient LP EGR flow monitor is enabled or not for each combustion mode.

Value Units: boolean
X Unit: enum

P049B: Insufficient LP EGR flow monitor enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P049B: Insufficient LP EGR flow monitor enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P049B: Insufficient LP EGR flow monitor enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P049B: Insufficient LP EGR flow monitor enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P049B: Minimum desired LP EGR flow

Description: Minimum desired LP EGR flow above which the insufficient LP EGR flow is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mg
X Unit: rpm
Y Units: kPa

y/x	900	1,000	1,200	1,300	1,400	1,500	1,700	1,800
69	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020
70	1,020	80	80	80	80	80	80	1,020
72	1,020	80	80	80	80	80	80	1,020
76	1,020	80	80	80	80	80	80	1,020
80	1,020	80	80	80	80	80	80	1,020
84	1,020	80	80	80	80	80	80	1,020
88	1,020	80	80	80	80	80	80	1,020
92	1,020	80	80	80	80	80	80	1,020
96	1,020	80	80	80	80	80	80	1,020
100	1,020	80	80	80	80	80	80	1,020
104	1,020	80	80	80	80	80	80	1,020

Initial Supporting table - P04DB: Crankcase Pressure Noise Normalization for Engine Speed

Description: Value to normalize the Crankcase Pressure signal noise based on engine speed

Value Units: Scaling Factor for Noise (Unitless)
X Unit: Engine Speed (RPM)
Y Units: None

y/x	500	1,500	1,700	1,900	2,000	2,100	2,500	4,000	4,500
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - P04DB: Crankcase Pressure Signal Normalization for Air Flow

Description: Value to normalize the Crankcase Pressure signal based on engine air flow

Value Units: Scaling Factor for Signal (Unitless)
X Unit: Engine Air Flow (Grams/Second)
Y Units: None

y/x	0	20	40	80	120	160	200	240	280
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - P0521_CVDOP_MaxOilPressure

Description: Maximum oil pressure threshold.

X Unit: Engine Speed, RPM

y/x	40	50	60	70	80	90	100	110	120
1,000	744	744	744	744	744	744	744	744	744
1,500	744	744	744	744	744	744	744	744	744
2,000	744	744	744	744	744	744	744	744	744
2,500	744	744	744	744	744	744	744	744	744
3,000	744	744	744	744	744	744	744	744	744
3,500	744	744	744	744	744	744	744	744	744
4,000	744	744	744	744	744	744	744	744	744
4,500	744	744	744	744	744	744	744	744	744
5,000	744	744	744	744	744	744	744	744	744

Initial Supporting table - P0521_CVDOP_MinOilPresFail

Description: Minimum oil pressure fail threshold.

X Unit: Engine Speed (RPM)

y/x	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000
1	0	32	38	45	52	59	65	68	71

Initial Supporting table - P062B_CSM_ASIC_RAMCorruption_FailLim

Description: Fail Limit for Controller Status Monitoring - ASIC in case of RAM Corruption fail: CeFULD_Cnt_RAMCorruptionFailLim

y/x	1
1	4

Initial Supporting table - P062B_CSM_ASIC_RAMCorruption_SmplLim

Description: Sample Limit for Controller Status Monitoring - ASIC in case of RAM Corruption: CeFULD_Cnt_RAMCorruptionSmplLim

y/x	1
1	5

Initial Supporting table - P062B_CSM_ASIC_TimeOutReached_FailLim

Description: Fail Limit for Controller Status Monitoring - ASIC in case of TimeOut Reached fail: CeFULD_Cnt_TimeOut_FailLim

y/x	1
1	1

Initial Supporting table - P062B_CSM_ASIC_TimeOutReached_SmplLim

Description: Sample Limit for Controller Status Monitoring - ASIC in case of TimeOut Reached: CeFULD_Cnt_TimeOut_SmplLim

y/x	1
1	2

Initial Supporting table - P06DD_CVDOP_MaxDesPress

Description: The maximum desired pressure, above which the stuck diagnostic will be disabled.

Value Units: Desired oil pressure, kPa
X Unit: Engine oil temperature, °C

y/x	-20	0	20	60	80	100	120	125	130
1	500	450	450	450	450	450	400	350	350

Initial Supporting table - P06DD_CVDOP_MaxPressErr

Description: Error threshold to set the oil pump performance fault.

Value Units: Absolute Oil Pressure Error, kPa
X Unit: Engine Speed, RPM
Y Units: Engine oil temperature, °C

y/x	600	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500
-20	100	100	100	100	100	90	80	70	50
0	88	88	70	60	60	57	54	50	44
20	75	75	50	50	50	50	50	50	50
60	50	50	50	50	50	50	50	50	50
80	50	50	50	50	50	50	50	50	50
100	50	50	50	50	50	50	50	50	50
120	90	90	90	90	90	90	90	90	90
125	100	100	100	100	100	100	100	100	100
130	100	100	100	100	100	100	100	100	100

Initial Supporting table - P06DD_CVDOP_MinDesPres

Description: The minimum desired pressure, below which the stuck diagnostic will be disabled.

Value Units: Desired oil pressure, kPa
X Unit: Engine oil temperature, °C

y/x	-20	0	20	60	80	100	120	125	130
1	180	180	135	135	135	135	135	135	135

Initial Supporting table - P131D: Closed Loop Exhaust pressure too high correction

Description: Barometric pressure correction for OBDII Exhaust pressure too high monitor when ETV upstream pressure controller is in closed loop. It is function of barometric pressure.

Value Units: [-8, 8]
X Unit: kPa

y/x	63	68	72	76	80	84	88	92	96	100	105
1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P131D: Closed Loop Exhaust pressure too high Max fuel enabling condition

Description: Maximum desired fuel below which the Exhaust pressure too high monitor when ETV upstream pressure controller is in closed loop is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000
64	73	74	75	76	77	78	79	80
68	74	75	76	77	78	79	80	81
72	75	76	77	78	79	80	81	82
76	76	77	78	79	80	81	82	83
80	77	78	79	80	81	82	83	84
84	78	79	80	81	82	83	84	85
88	79	80	81	82	83	84	85	86
92	80	81	82	83	84	85	86	87
96	81	82	83	84	85	86	87	88
100	82	83	84	85	86	87	88	89
104	83	84	85	86	87	88	89	90

Initial Supporting table - P131D: Closed Loop Exhaust pressure too high Min fuel enabling condition

Description: Minimum desired fuel above which the Exhaust pressure too high monitor when ETV upstream pressure controller is in closed loop is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000
64	40	39	38	37	36	35	34	33
68	39	38	37	36	35	34	33	32
72	38	37	36	35	34	33	32	31
76	37	36	35	34	33	32	31	30
80	36	35	34	33	32	31	30	29
84	35	34	33	32	31	30	29	28
88	34	33	32	31	30	29	28	27
92	33	32	31	30	29	28	27	26
96	32	31	30	29	28	27	26	25
100	31	30	29	28	27	26	25	24
104	30	29	28	27	26	25	24	23

Initial Supporting table - P131D: Closed Loop Exhaust pressure too high threshold

Description: Exhaust back pressure error threshold for OBDII Exhaust pressure too high monitor when ETV upstream pressure controller is in closed loop. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: kPa
X Unit: rpm
Y Units: mm^3

y/x	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000
0	-30	-30	-30	-30	-30	-30	-30	-30
10	-30	-30	-30	-30	-30	-30	-30	-30
20	-30	-30	-30	-30	-30	-30	-30	-30
30	-30	-30	-30	-30	-30	-30	-30	-30
40	-30	-30	-30	-30	-30	-30	-30	-30
50	-30	-30	-30	-30	-30	-30	-30	-30
60	-30	-30	-30	-30	-30	-30	-30	-30
80	-30	-30	-30	-30	-30	-30	-30	-30
100	-30	-30	-30	-30	-30	-30	-30	-30

Initial Supporting table - P131E: Closed Loop Exhaust pressure too low correction

Description: Barometric pressure correction for OBDII Exhaust pressure too low monitor when ETV upstream pressure controller is in closed loop. It is function of barometric pressure.

Value Units: [-8, 8]
X Unit: kPa

y/x	63	68	72	76	80	84	88	92	96	100	105
1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P131E: Closed Loop Exhaust pressure too low Max fuel enabling condition

Description: Maximum desired fuel below which the Exhaust pressure too low monitor when ETV upstream pressure controller is in closed loop is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000
64	78	79	80	81	82	83	84	85
68	79	80	81	82	83	84	85	86
72	80	81	82	83	84	85	86	87
76	81	82	83	84	85	86	87	88
80	82	83	84	85	86	87	88	89
84	83	84	85	86	87	88	89	90
88	84	85	86	87	88	89	90	91
92	85	86	87	88	89	90	91	92
96	86	87	88	89	90	91	92	93
100	87	88	89	90	91	92	93	94
104	88	89	90	91	92	93	94	95

Initial Supporting table - P131E: Closed Loop Exhaust pressure too low Min fuel enabling condition

Description: Minimum desired fuel above which the Exhaust pressure too low monitor when ETV upstream pressure controller is in closed loop is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000
64	45	44	43	42	41	40	39	38
68	44	43	42	41	40	39	38	37
72	43	42	41	40	39	38	37	36
76	42	41	40	39	38	37	36	35
80	41	40	39	38	37	36	35	34
84	40	39	38	37	36	35	34	33
88	39	38	37	36	35	34	33	32
92	38	37	36	35	34	33	32	31
96	37	36	35	34	33	32	31	30
100	36	35	34	33	32	31	30	29
104	35	34	33	32	31	30	29	28

Initial Supporting table - P131E: Closed Loop Exhaust pressure too low threshold

Description: Exhaust back pressure error threshold for OBDII Exhaust pressure too low monitor when ETV upstream pressure controller is in closed loop. It is function of engine speed (X axis) and fuel request (Y axis).

Value Units: kPa
X Unit: rpm
Y Units: mm^3

y/x	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000
0	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5
30	5	5	5	5	5	5	5	5
40	5	5	5	5	5	5	5	5
50	5	5	5	5	5	5	5	5
60	5	5	5	5	5	5	5	5
80	5	5	5	5	5	5	5	5
100	5	5	5	5	5	5	5	5

Initial Supporting table - P131F: Excessive EGR flow Max OAT threshold for C1

Description: Maximum desired OAT below which the excessive EGR flow is enabled, for the C1 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P131F: Excessive EGR flow Max OAT threshold for C2

Description: Maximum desired OAT below which the excessive EGR flow is enabled, for the C2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P131F: Excessive EGR flow Max OAT threshold for others

Description: Maximum desired OAT below which the excessive EGR flow is enabled, for all others combustion modes. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P131F: Excessive EGR flow Max OAT threshold for V2

Description: Maximum desired OAT below which the excessive EGR flow is enabled, for the V2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	50	50	50	50	50	50	50	50	50	50	50

Initial Supporting table - P131F: Excessive EGR flow Min OAT threshold for C1

Description: Minimum desired OAT above which the excessive EGR flow is enabled, for the C1 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P131F: Excessive EGR flow Min OAT threshold for C2

Description: Minimum desired OAT above which the excessive EGR flow is enabled, for the C2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P131F: Excessive EGR flow Min OAT threshold for others

Description: Minimum desired OAT above which the excessive EGR flow is enabled, for all other combustion modes. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P131F: Excessive EGR flow Min OAT threshold for V2

Description: Minimum desired OAT above which the excessive EGR flow is enabled, for the V2 combustion mode. It is function of barometric pressure.

Value Units: °C
X Unit: kPa

y/x	64	68	72	76	80	84	88	92	96	100	104
1	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20

Initial Supporting table - P140B, P140C: HP EGR slow response enabling

Description: Calibration map for the enabling of HP EGR slow response monitoring, function of combustion mode.

Value Units: boolean

P140B, P140C: HP EGR slow response enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P140B, P140C: HP EGR slow response enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P140B, P140C: HP EGR slow response enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P140B, P140C: HP EGR slow response enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P140B: Increasing HP EGR slow response Max fuel enabling condition

Description: Maximum desired fuel below which the increasing HP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	0	0	0	0	0	0	0	0
70	60	60	60	60	60	0	0	0
72	60	60	60	60	60	0	0	0
76	60	60	60	60	60	0	0	0
80	60	60	60	60	60	0	0	0
84	60	60	60	60	60	0	0	0
88	60	60	60	60	60	0	0	0
92	60	60	60	60	60	0	0	0
96	60	60	60	60	60	0	0	0
100	60	60	60	60	60	0	0	0
104	60	60	60	60	60	0	0	0

Initial Supporting table - P140B: Increasing HP EGR slow response Min fuel enabling condition

Description: Minimum desired fuel above which the increasing HP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	70	70	70	70	70	70	70	70
70	0	0	0	0	0	70	70	70
72	0	0	0	0	0	70	70	70
76	0	0	0	0	0	70	70	70
80	0	0	0	0	0	70	70	70
84	0	0	0	0	0	70	70	70
88	0	0	0	0	0	70	70	70
92	0	0	0	0	0	70	70	70
96	0	0	0	0	0	70	70	70
100	0	0	0	0	0	70	70	70
104	0	0	0	0	0	70	70	70

Initial Supporting table - P140B: Increasing HP EGR slow response threshold

Description: Threshold for increasing HP EGR flow slow response monitoring. It is function of ambient air pressure.

Value Units: %
X Unit: kPa

y/x	72	83	96
1	14	14	14

Initial Supporting table - P140C: Decreasing HP EGR slow response Max fuel enabling condition

Description: Maximum desired fuel below which the decreasing HP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	0	0	0	0	0	0	0	0
70	60	60	60	60	60	0	0	0
72	60	60	60	60	60	0	0	0
76	60	60	60	60	60	0	0	0
80	60	60	60	60	60	0	0	0
84	60	60	60	60	60	0	0	0
88	60	60	60	60	60	0	0	0
92	60	60	60	60	60	0	0	0
96	60	60	60	60	60	0	0	0
100	60	60	60	60	60	0	0	0
104	60	60	60	60	60	0	0	0

Initial Supporting table - P140C: Decreasing HP EGR slow response Min fuel enabling condition

Description: Minimum desired fuel above which the decreasing HP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	70	70	70	70	70	70	70	70
70	0	0	0	0	0	70	70	70
72	0	0	0	0	0	70	70	70
76	0	0	0	0	0	70	70	70
80	0	0	0	0	0	70	70	70
84	0	0	0	0	0	70	70	70
88	0	0	0	0	0	70	70	70
92	0	0	0	0	0	70	70	70
96	0	0	0	0	0	70	70	70
100	0	0	0	0	0	70	70	70
104	0	0	0	0	0	70	70	70

Initial Supporting table - P140C: Decreasing HP EGR slow response threshold

Description: Threshold for decreasing HP EGR flow slow response monitoring. It is function of ambient air pressure.

Value Units: %
X Unit: kPa

y/x	72	83	96
1	5	5	5

Initial Supporting table - P14A5, P14A6: LP EGR slow response enabling

Description: Calibration map for the enabling of LP EGR slow response monitoring, function of combustion mode.

Value Units: boolean

P14A5, P14A6: LP EGR slow response enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P14A5, P14A6: LP EGR slow response enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P14A5, P14A6: LP EGR slow response enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P14A5, P14A6: LP EGR slow response enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P14A5: Increasing LP EGR slow response Max fuel enabling condition

Description: Maximum desired fuel below which the increasing LP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	10	10	10	10	10	10	10	10
70	50	50	50	50	50	10	10	10
72	50	50	50	50	50	10	10	10
76	50	50	50	50	50	10	10	10
80	50	50	50	50	50	10	10	10
84	50	50	50	50	50	10	10	10
88	50	50	50	50	50	10	10	10
92	50	50	50	50	50	10	10	10
96	50	50	50	50	50	10	10	10
100	50	50	50	50	50	10	10	10
104	50	50	50	50	50	10	10	10

Initial Supporting table - P14A5: Increasing LP EGR slow response Min fuel enabling condition

Description: Minimum desired fuel above which the increasing LP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	50	50	50	50	50	50	50	50
70	10	10	10	10	10	50	50	50
72	10	10	10	10	10	50	50	50
76	10	10	10	10	10	50	50	50
80	10	10	10	10	10	50	50	50
84	10	10	10	10	10	50	50	50
88	10	10	10	10	10	50	50	50
92	10	10	10	10	10	50	50	50
96	10	10	10	10	10	50	50	50
100	10	10	10	10	10	50	50	50
104	10	10	10	10	10	50	50	50

Initial Supporting table - P14A5: Increasing LP EGR slow response threshold

Description: Threshold for increasing LP EGR flow slow response monitoring. It is function of ambient air pressure.

Value Units: %
X Unit: kPa

y/x	70	83	96
1	22	22	22

Initial Supporting table - P14A6: Decreasing LP EGR slow response Max fuel enabling condition

Description: Maximum desired fuel below which the decreasing LP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	0	0	0	0	0	0	0	0
70	70	70	70	70	70	0	0	0
72	70	70	70	70	70	0	0	0
76	70	70	70	70	70	0	0	0
80	70	70	70	70	70	0	0	0
84	70	70	70	70	70	0	0	0
88	70	70	70	70	70	0	0	0
92	70	70	70	70	70	0	0	0
96	70	70	70	70	70	0	0	0
100	70	70	70	70	70	0	0	0
104	70	70	70	70	70	0	0	0

Initial Supporting table - P14A6: Decreasing LP EGR slow response Min fuel enabling condition

Description: Minimum desired fuel above which the decreasing LP EGR slow response is enabled. It is function of engine speed (X axis) and barometric pressure (Y axis).

Value Units: mm^3
X Unit: rpm
Y Units: kPa

y/x	950	1,000	1,500	2,000	2,500	3,000	3,500	4,000
68	70	70	70	70	70	70	70	70
70	0	0	0	0	0	70	70	70
72	0	0	0	0	0	70	70	70
76	0	0	0	0	0	70	70	70
80	0	0	0	0	0	70	70	70
84	0	0	0	0	0	70	70	70
88	0	0	0	0	0	70	70	70
92	0	0	0	0	0	70	70	70
96	0	0	0	0	0	70	70	70
100	0	0	0	0	0	70	70	70
104	0	0	0	0	0	70	70	70

Initial Supporting table - P14A6: Decreasing LP EGR slow response threshold

Description: Threshold for decreasing LP EGR flow slow response monitoring. It is function of ambient air pressure.

Value Units: %
X Unit: kPa

y/x	70	83	96
1	19	19	19

Initial Supporting table - P16F3_CB safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on CB Energizing Time compensation (for each torque forming pulse) as a function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_EIA safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on EIA Energizing Time compensation (for each torque forming pulse) as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_FTD safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on FTD Energizing Time compensation as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

y/x	-40	-20	-10	0	50	90
500	345	288	262	233	210	213
600	345	288	262	219	197	200
700	332	275	249	206	184	186
750	311	258	243	204	172	171
850	311	255	228	186	163	166
950	308	235	219	189	166	169
1,050	305	236	220	206	175	180
1,150	315	249	233	229	191	189
1,250	321	260	246	244	200	192
1,450	271	225	212	207	170	165
1,650	231	193	181	175	141	138
1,850	165	134	122	115	84	82
2,050	99	74	63	54	27	26
2,500	-83	-83	-83	-83	-83	-83
3,000	-91	-91	-91	-91	-91	-91
3,500	-100	-100	-100	-100	-100	-100
4,000	-108	-108	-108	-108	-108	-108

Initial Supporting table - P16F3_Speed Control External Load Max f(Vehicle Speed, RPM)

Description: External load calibration table on the basis of engine speed and vehicle speed

y/x	0	5	8	15	20	30	50
500	200	200	200	200	200	200	200
800	200	200	200	200	200	100	50
1,000	200	200	200	100	100	50	0
1,500	200	200	200	100	-100	-100	-100
2,000	200	200	200	100	-100	-100	-100

Initial Supporting table - P16F3_Speed Control External Load Offset f(Vehicle Sped, Transmission Oil Temp)

Description: The offset load to add to KtSPDC_M_ExtrenalLoadMaxLmt.

y/x	0	5	8	15	20	30	50
-40	200	200	150	100	75	25	0
-20	100	100	75	50	50	20	0
-10	75	75	50	30	25	15	0
0	50	50	30	20	20	10	0
50	25	25	20	15	10	5	0
90	0	0	0	0	0	0	0

Initial Supporting table - P16F3_SQA safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on SQA Energizing Time compensation (for each torque forming pulse) as function of Fuel Rail Pressure.

y/x	13	34	56	77	99	120	142	164	185	207	228	250
1	1,063	446	299	230	191	163	140	127	115	109	103	99

Initial Supporting table - P16F3_VCA safety max deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on VCA energizing time correction as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	662	240	174	115	93	79	68	61	56	51	47	45	42	39	38	36	34

Initial Supporting table - P16F3_VCA safety min deadband threshold f(Fuel Rail Pressure)

Description: Minimum allowable safety deadband on VCA energizing time correction as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	-662	-240	-174	-115	-93	-79	-68	-61	-56	-51	-47	-45	-42	-39	-38	-36	-34

Initial Supporting table - P228B Pressure Regulator completely closed command

Description: Command, in terms of pressure (MPa), to consider pressure regulator valve completely closed as function of rail pressure (MPa).

Value Units: MPa
X Unit: MPa

y/x	25	100	200	250
1	50	130	235	285

Initial Supporting table - P228C Positive rail pressure deviation (MU)

Description: Positive rail pressure deviation threshold (MPa) when metering unit is controlled in closed loop as function of engine speed (rpm).

Value Units: MPa
X Unit: rpm

y/x	400	500	650	800	1,000	1,250	1,400	1,600	2,000	2,400	2,800	3,200	3,600	4,200	4,800	5,400
1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16

Initial Supporting table - P228D Negative rail pressure deviation (MU)

Description: Negative rail pressure deviation threshold (MPa) when metering unit is controlled in closed loop as function of engine speed (rpm).

Value Units: MPa
X Unit: rpm

y/x	400	500	650	800	1,000	1,250	1,400	1,600	2,000	2,400	2,800	3,200	3,600	4,200	4,800	5,400
1	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18

Initial Supporting table - P2293 Maximum rail pressure with PR

Description: Maximum rail pressure threshold (MPa) when pressure is governed by Pressure Regulator as function of engine speed (rpm).

Value Units: MPa
X Unit: rpm

y/x	0	1,333	5,067	6,400
1	68	268	268	118

Initial Supporting table - P229A Positive rail pressure deviation (PR)

Description: Positive rail pressure deviation threshold (MPa) when pressure regulator is controlled in closed loop as function of engine speed (rpm).

Value Units: MPa
X Unit: rpm

y/x	400	500	650	800	1,000	1,250	1,400	1,600	2,000	2,400	2,800	3,200	3,600	4,200	4,800	5,400
1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16

Initial Supporting table - P241F: Efficiency Offset

Description: Offset used to correct the computed LP EGR cooler efficiency. It is function of the LP EGR flow.

Value Units: [%]
X Unit: [g/s]

y/x	0	10	20	30	40
1	0	2	4	6	8

Initial Supporting table - P28F7: mimimum torque request

Description: Mimimum torque request to enable Exhaust Pressure Too High monitoring. This map is function of engine speed

Value Units: Nm
X Unit: rpm

y/x	700	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000	4,500	5,000
1	520	520	520	520	420	320	260	200	140	80	20	20	20	20	20	20

Initial Supporting table - P2B86 Coolant Pump “A” Overspeed Fail Threshold

Description: Pump Overspeed failure threshold as a function of pump requested speed

Value Units: Pump overspeed failure threshold (RPM)
X Unit: Commanded pump speed (RPM)

y/x	0	500	1,000	1,500	2,000	2,500	3,000	3,150	3,350	3,480
1	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500

Initial Supporting table - P2B86 Coolant Pump “A” Overspeed Fail Threshold Low Volatage

Description: Pump Overspeed failure threshold in a low voltage condition as a function of pump requested speed

Value Units: Pump overspeed failure threshold low voltage (RPM)
X Unit: Commanded pump speed (RPM)

y/x	0	500	1,000	1,500	2,000	2,500	3,000	3,150	3,350	3,480
1	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500

Initial Supporting table - PmpPerf: Tabel to estimate the expected pump AC current based on the pump speed.

Description: Tabel to estimate the expected pump AC current based on the pump speed.

Value Units: [A] Expected AC current
X Unit: [rpm] KnICPD_n_CAC_PumpSpeed

y/x	840	2,000	3,000	4,000	5,000	6,000	7,000
-20	0	0	1	3	5	7	10
-10	0	0	1	2	4	7	9
20	0	0	1	2	4	6	9
50	0	0	1	2	3	5	7
128	0	0	1	1	3	5	7

Initial Supporting table - Rail Pressure Control Configuration

Description: CeFHPG_e_MU_And_PR_ModeSel = pressure control can be governed by both metering unit and pressure regulator
CeFHPG_e_MU = pressure control can be governed by metering unit only
CeFHPG_e_PR = pressure control can be governed by pressure regulator only

Value Units: -

y/x	1
1	CeFHPG_e_MU_And_PR_ModeSel

Initial Supporting table - Rail Pressure Sensor Configuration

Description: Defines which kind of Rail Pressure Sensor configuration is used:
CeFHPG_e_RPS_SingleTrack = RPS with a single rail pressure information
CeFHPG_e_RPS_DoubleTrack = RPS with a redundant rail pressure information

Value Units: -

y/x	1
1	CeFHPG_e_RPS_DoubleTrack

Initial Supporting table - t_DerTempDsblTmr

Description: Disabling timer based on the time derivative of SCR average temperature [s] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: s
X Unit: °C/s

y/x	-10	-5	-3	-1	1	3	5	10
1	30	20	10	5	5	10	20	30

Initial Supporting table - t_DerTempDsblTmr_SCR2

Description: Disabling timer based on the time derivative of SCR2 average temperature [s] for SCR2 monitoring (P2C7A)

Value Units: s
X Unit: °C/s

y/x	-10	-5	-3	-1	1	3	5	10
1	25	20	10	5	5	10	20	25

Initial Supporting table - T_MaxTempGrad

Description: Upper boundary of SCR temperature gradient (difference between SCR upstream and SCR downstream) [°C] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: °C
X Unit: °C

y/x	200	220	250	280	300	320	350	380
1	30	40	50	50	50	50	50	50

Initial Supporting table - T_MaxTempGrad_SCR2

Description: Upper boundary of SCR2 temperature gradient (difference between SCR2 upstream and SCR2 downstream temperature) [°C] for SCR2 monitoring (P2C7A)

Value Units: °C
X Unit: °C

y/x	220	250	280	300	320	340	360	380
1	20	20	20	25	25	25	25	25

Initial Supporting table - T_MinTempGrad

Description: Lower boundary of SCR temperature gradient (difference between SCR upstream and SCR downstream) [°C] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: °C
X Unit: °C

y/x	200	220	250	280	300	320	350	380
1	-30	-40	-50	-50	-50	-50	-50	-50

Initial Supporting table - T_MinTempGrad_SCR2

Description: Lower boundary of SCR2 temperature gradient (difference between SCR2 upstream and SCR2 downstream temperature) [°C] for SCR2 monitoring (P2C7A)

Value Units: °C
X Unit: °C

y/x	220	250	280	300	320	340	360	380
1	-20	-20	-20	-25	-25	-25	-25	-25

Initial Supporting table - t_NOxFlowIncDsblTmr

Description: Debounce time to wait after the NOx flow becomes in range [sec] for SCR NOx catalyst efficiency monitoring (P20EE)

Value Units: sec
X Unit: mg/sec
Y Units: sec

y/x	1	1	2	2	5	6	10
50	2	2	5	5	25	25	30
60	2	2	5	5	25	25	30
70	2	2	5	5	40	40	45
80	2	2	5	5	40	40	45
90	2	2	5	5	40	40	45
100	2	2	5	5	40	40	45
150	2	2	5	5	40	40	45
300	2	2	5	5	40	40	45

Initial Supporting table - Time since last regeneration

Description: Base value to trigger regeneration for time spent since last regeneration, function of regeneration priority

Time since last regeneration - Part 1						
y/x	CeDPFC_e_RgnPriority_0	CeDPFC_e_RgnPriority_1	CeDPFC_e_RgnPriority_2	CeDPFC_e_RgnPriority_3	CeDPFC_e_RgnPriority_4	CeDPFC_e_RgnPriority_5
1	86,400	86,400	86,400	86,400	86,400	86,400

Time since last regeneration - Part 2						
y/x	CeDPFC_e_RgnPriority_6	CeDPFC_e_RgnPriority_7	CeDPFC_e_RgnPriority_8	CeDPFC_e_RgnPriority_9	CeDPFC_e_RgnPriority_10	CeDPFC_e_RgnPriority_11
1	86,400	86,400	86,400	86,400	86,400	86,400

Time since last regeneration - Part 3						
y/x	CeDPFC_e_RgnPriority_12	CeDPFC_e_RgnPriority_13	CeDPFC_e_RgnPriority_14	CeDPFC_e_RgnPriority_15	CeDPFC_e_RgnPriority_16	
1	86,400	86,400	86,400	86,400	86,400	

Initial Supporting table - TimeForOilAeration

Description: The timer limit to declare an engine oil aeration condition exists.

X Unit: Engine oil temperature (deg C)

y/x	-40	-20	0	15	18	19	80	100	120	126	130
1	30	30	30	30	30	30	30	30	30	30	30

Initial Supporting table - P0071: OAT Performance Drive Equilibrium Engine Off

Description: OAT Performance Diagnostic counter increment for determining OAT-IAT equilibrium for engine off (for hybrid applications)

Value Units: Counter Increment Value (Unitless)
X Unit: Vehicle Speed (KPH)

y/x	0.0	20.0	30.0	45.0	60.0	75.0	90.0	105.0	120.0
1.0	0.0	4.0	6.0	6.8	7.3	7.8	8.0	8.0	8.0

Initial Supporting table - P0071: OAT Performance Drive Equilibrium Engine Running

Description: OAT Performance Diagnostic counter increment for determining OAT-IAT equilibrium for engine running

Value Units: Counter Increment Value (Unitless)
X Unit: Vehicle Speed (KPH)
Y Units: Engine Air Flow (Grams/Second)

y/x	0.0	20.0	30.0	45.0	60.0	75.0	90.0	105.0	120.0
0.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
15.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
25.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
35.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
45.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
55.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
65.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
75.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5
85.0	-0.2	0.1	0.2	0.3	0.4	0.4	0.5	0.5	0.5

Initial Supporting table - 1st_FireAftrMisfr_Acel

Description: Used for P0300 - P0308, Multiplier for establishing the expected acceleration of the cylinder after the misfire

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	0.86	1.15	1.66	1.50	1.83	2.14	2.44	2.43	2.36	1.96	1.00	1.14	1.36	1.72	0.88	0.58	0.95
6	1.24	1.78	2.65	2.85	2.11	2.45	2.78	2.63	2.40	1.93	1.38	1.17	1.41	1.83	1.00	0.73	1.22
10	1.38	1.97	3.60	3.70	2.94	3.38	3.14	2.83	2.43	1.91	1.50	1.20	1.50	1.94	1.26	1.00	1.47
14	1.08	1.55	2.88	4.27	3.25	3.48	3.87	2.71	2.43	1.84	1.72	1.33	2.00	2.18	1.56	1.33	1.77
18	0.84	1.24	2.69	3.81	3.64	3.55	3.76	2.65	2.34	1.87	1.81	1.59	2.11	2.29	2.00	1.50	2.18
22	0.72	1.07	2.17	3.66	3.85	3.80	3.37	2.44	2.14	1.70	1.52	1.61	2.11	2.41	2.15	1.77	2.40
26	0.61	0.91	1.56	2.93	3.58	3.59	2.52	1.88	2.04	1.63	1.32	1.54	2.00	2.21	1.71	1.67	2.27
40	0.44	0.62	0.86	1.67	1.55	1.63	1.48	1.07	1.41	1.25	0.99	1.17	1.44	1.75	1.31	1.24	1.23
98	0.22	0.30	0.37	0.98	0.86	0.95	0.91	0.57	0.77	0.86	0.69	0.91	1.01	0.79	0.92	0.81	0.54

Initial Supporting table - 1st_FireAftrMisfr_Jerk

Description: Used for P0300 - P0308, Multiplier for establishing the expected Jerk of the cylinder after the misfire

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	-0.50	-0.22	-0.05	-0.15	0.10	0.57	0.00	-0.35	0.10	-0.04	-0.11	-0.13	-0.04	-0.05	-0.39	-0.35	-0.55
6	-0.55	-0.42	-0.02	-0.10	0.15	0.60	0.05	-0.10	0.05	-0.13	-0.13	-0.08	0.00	-0.05	-0.40	-0.42	-0.67
10	-0.54	-0.46	-0.23	-0.34	-0.01	0.45	-0.05	-0.25	-0.04	-0.24	-0.19	-0.24	-0.39	-0.26	-0.55	-0.63	-0.80
14	-0.45	-0.48	-0.35	-0.41	-0.04	0.40	-0.06	-0.33	-0.23	-0.38	-0.40	-0.33	-0.45	-0.44	-0.52	-0.58	-0.87
18	-0.39	-0.50	-0.41	-0.47	-0.06	0.35	-0.07	-0.39	-0.35	-0.51	-0.56	-0.40	-0.49	-0.59	-0.48	-0.64	-0.72
22	-0.36	-0.50	-0.44	-0.42	-0.06	0.35	-0.07	-0.44	-0.46	-0.60	-0.63	-0.42	-0.51	-0.62	-0.48	-0.82	-0.70
26	-0.35	-0.52	-0.48	-0.40	-0.07	0.35	-0.08	-0.47	-0.56	-0.66	-0.70	-0.46	-0.52	-0.60	-0.56	-0.92	-0.68
40	-0.33	-0.55	-0.54	-0.44	-0.07	0.35	-0.19	-0.50	-0.64	-0.81	-0.76	-0.47	-0.56	-0.67	-0.61	-0.98	-0.57
98	-0.33	-0.57	-0.61	-0.48	-0.08	0.30	-0.36	-0.44	-0.72	-1.00	-0.90	-0.53	-0.57	-0.70	-0.74	-1.14	-0.46

Initial Supporting table - 1stFireAfterMisJerkAFM

Description: Used for P0300 - P0308, Multiplier for establishing the expected jerk of the cylinder after the misfire if Active Fuel Management cylinder deact mode is active

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - 1stFireAftrMisAcelAFM

Description: Used for P0300 - P0308, Multiplier for establishing the expected acceleration of the cylinder after the misfire if Active Fuel Management cylinder deact mode is active

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
8	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - Abnormal Cyl Mode

Description: Used for P0300-P0308. Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Cylinder Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2	2	3	2	2	2	2	2	2

Initial Supporting table - Abnormal Rev Mode

Description: Used for P0300-P0308. Abnormal Rev Mode Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Rev Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Initial Supporting table - Abnormal SCD Mode

Description: Used for P0300-P0308. Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (SCD Mode Equation)

Value Units: Number of consecutive number of decelerating cylinders (integer)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2	2

Initial Supporting table - Bank_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
6	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
10	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
12	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
16	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
20	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
24	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
30	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
98	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60

Initial Supporting table - Bank_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to Medres SCD jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: mulitplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - BankCylModeDecel

Description: Used for P0300 - P0308, Mulitplier to Lores Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	0.96	0.60	0.70	0.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.38	1.14	1.00	1.00	1.00	1.00
6	0.89	0.65	0.65	0.55	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00
10	0.53	0.75	0.73	0.73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.42	0.72	0.71	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	0.76	0.51	0.50	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	0.90	0.44	0.47	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	0.95	0.49	0.48	0.66	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	0.97	0.53	0.48	0.75	0.82	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	0.78	0.56	0.87	0.79	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82	1.00	0.90	0.79

Initial Supporting table - BankCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	1.00	1.00	1.06	1.00	1.19	1.43	1.00	2.09	1.38	1.42	1.95	2.19	1.21	1.10	1.22	1.43	1.10
6	0.85	0.99	1.01	0.56	1.00	1.00	1.00	1.00	1.05	1.00	1.42	1.27	1.13	1.29	1.15	1.37	1.11
10	0.76	0.73	0.85	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.05	1.38	1.20
12	0.80	0.70	0.80	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.29	1.13
16	0.75	0.57	0.55	0.66	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	0.76	0.58	0.34	0.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	0.80	0.64	0.47	0.27	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	0.82	0.76	0.66	0.35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00
98	1.00	1.00	0.98	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00

Initial Supporting table - Catalyst_Damage_Misfire_Percentage

Description: Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.

Value Units: percent misfire over 200 revolutions (%)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
0	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
10	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
20	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
30	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
40	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
50	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
60	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
70	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
80	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
90	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0
100	512.0	512.0	512.0	512.0	512.0	512.0	512.0	512.0

Initial Supporting table - CatCrtdEffRepEWMA

Description: Minimum Catalyst (CC DOC) conversion efficiency threshold (repass fault threshold) as function of ambient temperature [K] in case of Catalyst EWMA filter enabled and Catalyst conversion inefficiency previously detected (Catalyst FA = TRUE)

y/x	250.00	266.00	282.00	298.00	314.00	330.00
1.00	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500

Initial Supporting table - CatCrtdEffThrsh

Description: Minimum Catalyst (CC DOC) conversion efficiency threshold (fault threshold) as function of ambient temperature [K]

X Unit: Outside Air Temperature
Y Units: Minimum catalyst efficiency

y/x	250.00	266.00	282.00	298.00	314.00	340.00
1.00	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500

Initial Supporting table - ClyAfterAFM_Decel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire after a deactivated cylider. Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - ClyBeforeAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CombustModeIdleTbl

Description: Used for P0300 - P0308, Only used on Diesel engines. Combustion modes that will force use of Idle table. A value of CeCMBR_i_CombModesMax means not selected.

Value Units: Enumerated value of differant combustion modes (enumeration)
X Unit: Current Combustion Mode (enumeration)

CombustModeIdleTbl - Part 1						
y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

CombustModeIdleTbl - Part 2						
y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax

CombustModeIdleTbl - Part 3						
y/x	12	13	14	15	16	
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	

Initial Supporting table - ConsecCylModDecel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	1.18	1.56	1.43	1.53	1.50	2.37	2.16	2.05	2.21	2.15	1.41	1.76	1.55	1.89	1.67	1.38	1.45
6	1.35	1.81	1.76	2.00	1.10	1.41	1.44	1.35	1.49	1.57	1.46	1.39	1.36	1.56	1.55	1.45	1.67
10	1.84	2.00	2.30	2.40	1.90	2.00	1.56	1.55	1.46	1.30	1.31	1.28	1.36	1.50	1.58	1.67	1.80
12	1.87	2.00	1.93	2.35	2.20	2.08	1.87	1.52	1.55	1.23	1.46	1.44	1.65	1.65	1.56	1.71	1.93
16	1.74	2.00	1.50	2.40	2.60	1.97	2.04	1.62	1.57	1.32	1.72	1.70	2.11	1.76	1.87	2.00	2.42
20	1.64	2.00	1.40	2.30	2.80	2.10	1.83	1.66	1.65	1.45	1.90	2.23	2.26	1.88	2.31	2.15	3.10
24	1.43	2.00	1.48	1.90	2.80	2.14	1.40	1.45	1.58	1.48	1.86	2.28	2.50	2.11	2.33	2.21	3.40
30	1.36	2.01	1.33	1.50	1.75	1.45	0.90	1.00	1.38	1.49	1.69	2.45	2.52	2.23	2.40	2.53	2.40
98	0.85	1.39	0.95	0.97	0.70	0.79	0.55	0.72	0.95	1.49	1.66	2.77	3.00	1.64	3.19	1.72	0.88

Initial Supporting table - ConsecCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0
10	0	0	-1	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0
12	0	0	-1	-1	0	0	-1	-1	-1	0	-1	0	0	0	0	0	0
16	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0
20	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0
24	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	0	0
30	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0
98	0	0	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	-1	0

Initial Supporting table - ConsecSCD_Decel

Description: Used for P0300 - P0308, Mulitplier to medres decel to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - ConsecSCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to medres Jerk to account for different pattern of the second cylinder of consecutive misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - CylAfterAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Lores Jerk to account for different pattern of misfire after a deactivated cylider. Similar to the second cylinder of consecutive cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1
80	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1

Initial Supporting table - CylBeforeAFM_Decel

Description: Used for P0300 - P0308, Mulitplier to Lores decel to account for different pattern of misfire before a deactivated cylider, but after an active cylinder that follows an deactive cylinder on engine that supports cylinder deactivation in non even fire patterns.. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - CylModeDecel

Description: Used for P0300-P0308. Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

CylModeDecel - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
2	2,012	1,690	1,123	692	511	404	323	233	160	99	62	46	33
4	2,262	1,657	978	611	419	319	262	203	129	91	61	45	33
6	2,129	1,742	855	539	337	250	206	176	96	83	60	43	32
8	2,206	1,801	714	461	310	209	164	146	83	71	55	40	29
10	2,638	2,000	805	511	311	239	154	132	83	67	47	35	26
12	2,765	2,150	936	618	350	284	176	140	82	68	46	32	26
14	2,873	2,289	1,046	722	402	324	196	144	79	64	47	32	28
16	3,043	2,408	1,185	823	455	367	201	147	86	61	46	34	29
18	3,152	2,480	1,364	927	514	407	213	154	97	58	45	36	30
20	3,237	2,584	1,511	1,030	556	449	244	183	101	59	46	37	30
22	3,355	2,737	1,636	1,136	606	483	269	218	110	61	46	36	31
24	3,492	2,870	1,788	1,234	669	520	329	267	128	79	48	36	33
26	3,663	3,035	1,941	1,318	727	555	380	315	149	95	53	43	35
30	3,965	3,234	2,165	1,498	842	627	484	405	202	126	86	56	55
40	4,727	3,891	2,790	1,919	1,145	834	725	614	329	190	152	90	97
60	6,467	5,205	3,883	2,732	1,701	1,233	1,207	1,010	582	321	274	163	168
97	9,862	7,752	6,035	4,285	2,711	1,921	2,061	1,741	1,040	574	508	321	308

CylModeDecel - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
2	25	20	17	14	16	11	11	9	10	12	13	11	11
4	25	20	17	14	15	11	11	9	10	12	12	10	10
6	25	20	18	15	13	12	11	9	9	11	11	9	9
8	26	19	18	16	13	12	11	9	9	10	10	8	8
10	25	20	19	17	13	13	11	9	8	10	9	8	8
12	23	21	19	18	13	13	10	9	8	9	9	7	7
14	23	23	20	19	13	12	9	9	8	8	8	7	7
16	23	24	21	19	13	12	9	9	8	8	7	6	6
18	26	25	22	20	13	11	9	9	8	7	7	6	6
20	27	25	23	21	15	11	10	9	8	7	7	5	5
22	31	29	26	23	17	12	10	9	8	7	7	5	5

Initial Supporting table - CylModeDecel

24	37	33	28	24	18	13	10	9	9	8	7	5	5
26	45	39	29	26	21	13	11	10	10	9	8	6	6
30	59	54	35	31	24	16	13	11	11	10	9	7	7
40	98	82	49	41	34	21	17	14	15	13	13	11	11
60	168	143	79	60	52	31	25	26	26	19	21	19	19
97	296	259	131	95	86	50	38	48	46	30	34	34	34

Initial Supporting table - CylModeJerk

Description: Crankshaft jerk threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Change in Delta time per cylinder from last cylinder (usec)
Y Units: percent load of max indicated torque (%)

CylModeJerk - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
2	1,674	1,442	885	584	432	262	245	179	124	74	40	25	19
4	1,752	1,403	904	568	425	281	255	194	129	77	49	34	24
6	1,555	1,299	907	578	407	301	263	208	128	79	57	41	31
8	2,035	1,606	954	670	479	333	260	221	133	94	66	52	35
10	2,461	1,942	1,033	766	541	370	260	233	143	112	77	63	39
12	2,874	2,268	1,164	835	599	429	282	234	157	126	87	75	43
14	3,441	2,440	1,376	913	673	473	335	237	172	138	92	85	46
16	3,047	2,552	1,546	984	750	524	387	262	187	156	98	95	50
18	3,413	2,729	1,697	1,058	811	583	446	310	214	178	108	106	53
20	3,452	2,891	1,861	1,143	891	657	509	400	254	195	120	117	57
22	3,567	3,031	2,012	1,238	951	725	561	466	311	219	131	127	62
24	3,733	3,158	2,150	1,313	1,008	787	610	510	360	247	146	137	70
26	3,786	3,247	2,264	1,380	1,066	857	654	542	405	267	164	152	80
30	4,151	3,399	2,490	1,551	1,205	969	742	622	467	312	195	173	93
40	4,796	3,879	2,981	1,937	1,493	1,255	1,004	827	615	407	269	224	125
60	6,018	4,818	3,830	2,709	2,110	1,831	1,533	1,218	902	601	400	333	184
97	8,514	6,869	5,412	4,177	3,409	2,825	2,422	1,982	1,453	991	672	552	303

CylModeJerk - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
2	16	12	15	12	10	8	12	11	11	12	12	10	10
4	20	17	17	14	11	11	12	10	10	11	11	10	10
6	25	24	19	16	12	13	12	9	9	10	10	9	9
8	27	27	22	18	16	15	12	10	9	10	9	9	9
10	30	29	25	21	19	17	12	12	10	10	8	8	8
12	34	32	29	26	21	18	13	12	12	10	9	8	8
14	39	36	33	30	22	20	15	13	13	12	10	8	8
16	41	40	37	33	23	20	16	13	13	12	11	9	9
18	46	44	42	36	24	22	18	14	13	13	11	9	9
20	49	47	45	39	27	24	20	15	14	14	11	10	10
22	54	50	46	42	30	26	22	17	15	15	11	10	10

Initial Supporting table - CylModeJerk

24	59	54	48	45	32	28	23	20	17	15	12	11	11
26	64	57	50	48	35	30	25	22	20	16	13	11	11
30	70	65	59	53	40	35	28	25	23	19	16	12	12
40	92	89	81	68	55	46	36	32	30	26	21	14	14
60	136	146	126	96	82	67	51	50	46	37	29	18	18
97	221	259	209	151	128	105	79	81	72	56	43	26	26

Initial Supporting table - DeacCylInversionDecel

Description: Used for P0300 - P0308, Negative Torque can cause crank readings to invert (active cylinders appear weak & deactivated cylinders appear "strong" If deactivated cylinders don't decelerate at least this amount then the crank signal is inverting. Function of speed and load.

Value Units: Delta time per cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0

Initial Supporting table - DeacCylInversionJerk

Description: Used for P0300 - P0308, Negative Torque can cause crank readings to invert (active cylinders appear weak & deactivated cylinders appear "strong" If deactivated cylinders don't jerk at least this amount then the crank signal is inverting. Function of speed and load.

Value Units: Change in Delta time per cylinder from last cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0

Initial Supporting table - EngineOverSpeedLimit

Description: Engine OverSpeed Limit versus gear

Value Units: RPM
X Unit: Enumeration of transmission gear state (enumeration)

EngineOverSpeedLimit - Part 1

y/x	CeTGRR_e_TransGr1	CeTGRR_e_TransGr2	CeTGRR_e_TransGr3	CeTGRR_e_TransGr4	CeTGRR_e_TransGr5	CeTGRR_e_TransGr6	CeTGRR_e_TransGr9
1	5,000	5,000	5,000	5,000	5,000	5,000	5,000

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	5,000	4,100	5,000	4,100	5,000	5,000	

Initial Supporting table - InfrequentRegen

Description: Used for P0300-P0308. Only used on Diesel engines. Initiates a misfire delay when the current combustion mode matchs a selection in the table. A value of CeCMBR_i_CombModesMax means not selected.

Value Units: Enumerated value of differant combustion modes (enumeration)
X Unit: Current Combustion Mode (enumeration)

InfrequentRegen - Part 1						
y/x	0	1	2	3	4	5
1	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_PN	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_i_CombModesMax
InfrequentRegen - Part 2						
y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax
InfrequentRegen - Part 3						
y/x	12	13	14	15	16	
1	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	CeCMBR_i_CombModesMax	

Initial Supporting table - Number of Normals

Description: Used for P0300-P0308. Number of Normals for the Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

Value Units: Number of Engine cycles after isolated misfire (Engine cycles)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2	2

Initial Supporting table - P0101: MAF performance enabling

Description: Calibration map for the enabling of MAF sensor performance monitoring, function of combustion mode.

Value Units: boolean
X Unit: enum

P0101: MAF performance enabling - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0

P0101: MAF performance enabling - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P0101: MAF performance enabling - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P0101: MAF performance enabling - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - P0101: Manifold pressure High limit in Overrun

Description: Intake manifold pressure high limit in overrun condition, below which the MAF sensor performance monitoring is enabled. It is function of engine speed.

Value Units: kPa
X Unit: rpm

y/x	700	1,000	2,000	2,500	3,000	4,000	4,500	5,000
1	115	120	125	130	135	140	140	140

Initial Supporting table - P0101: Manifold pressure Low limit in Overrun

Description: Intake manifold pressure low limit in overrun condition, above which the MAF sensor performance monitoring is enabled. It is function of engine speed.

Value Units: kPa
X Unit: rpm

y/x	700	1,000	2,000	2,500	3,000	4,000	4,500	5,000
1	70	70	70	70	70	70	70	70

Initial Supporting table - P0101: Pulsation Map

Description: Adjustment of the air mass flow measured by the MAF sensor for flow distribution and pulsations. It is function of engine speed (X axis) and fuel request (Y axis)

Value Units: const
X Unit: rpm
Y Units: mm^3

y/x	600	850	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000	4,500
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
70	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
80	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
90	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P0101: VGT position High limit in Overrun

Description: VGT position high limit in overrun condition, below which the MAF sensor performance monitoring is enabled. It is function of engine speed.

Value Units: %
X Unit: rpm

y/x	700	1,000	2,000	2,500	3,000	4,000	4,500	5,000
1	90	90	90	90	90	90	90	90

Initial Supporting table - P0101: VGT position Low limit in Overrun

Description: VGT position low limit in overrun condition, above which the MAF sensor performance monitoring is enabled. It is function of engine speed.

Value Units: %
X Unit: rpm

y/x	700	1,000	2,000	2,500	3,000	4,000	4,500	5,000
1	5	5	5	5	5	5	5	5

Initial Supporting table - P16F3_CB safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on CB Energizing Time compensation (for each torque forming pulse) as a function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_EIA safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on EIA Energizing Time compensation (for each torque forming pulse) as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_FTD safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on FTD Energizing Time compensation as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

y/x	-40	-20	-10	0	50	90
500	345	288	262	233	210	213
600	345	288	262	219	197	200
700	332	275	249	206	184	186
750	311	258	243	204	172	171
850	311	255	228	186	163	166
950	308	235	219	189	166	169
1,050	305	236	220	206	175	180
1,150	315	249	233	229	191	189
1,250	321	260	246	244	200	192
1,450	271	225	212	207	170	165
1,650	231	193	181	175	141	138
1,850	165	134	122	115	84	82
2,050	99	74	63	54	27	26
2,500	-83	-83	-83	-83	-83	-83
3,000	-91	-91	-91	-91	-91	-91
3,500	-100	-100	-100	-100	-100	-100
4,000	-108	-108	-108	-108	-108	-108

Initial Supporting table - P16F3_Speed Control External Load Max f(Vehicle Speed, RPM)

Description: External load calibration table on the basis of engine speed and vehicle speed

y/x	0	5	8	15	20	30	50
500	200	200	200	200	200	200	200
800	200	200	200	200	200	100	50
1,000	200	200	200	100	100	50	0
1,500	200	200	200	100	-100	-100	-100
2,000	200	200	200	100	-100	-100	-100

Initial Supporting table - P16F3_Speed Control External Load Offset f(Vehicle Sped, Transmission Oil Temp)

Description: The offset load to add to KtSPDC_M_ExtrenalLoadMaxLmt.

y/x	0	5	8	15	20	30	50
-40	200	200	150	100	75	25	0
-20	100	100	75	50	50	20	0
-10	75	75	50	30	25	15	0
0	50	50	30	20	20	10	0
50	25	25	20	15	10	5	0
90	0	0	0	0	0	0	0

Initial Supporting table - P16F3_SQA safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on SQA Energizing Time compensation (for each torque forming pulse) as function of Fuel Rail Pressure.

y/x	13	34	56	77	99	120	142	164	185	207	228	250
1	1,063	446	299	230	191	163	140	127	115	109	103	99

Initial Supporting table - P16F3_VCA safety max deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on VCA energizing time correction as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	662	240	174	115	93	79	68	61	56	51	47	45	42	39	38	36	34

Initial Supporting table - P16F3_VCA safety min deadband threshold f(Fuel Rail Pressure)

Description: Minimum allowable safety deadband on VCA energizing time correction as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	-662	-240	-174	-115	-93	-79	-68	-61	-56	-51	-47	-45	-42	-39	-38	-36	-34

Initial Supporting table - Pair_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD_Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - Pair_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to P0300_SCD_Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - PairCylModeDecel

Description: Used for P0300 - P0308, Mulitplier to Cyl Mode Deceleration to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: mulitplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	0.93	1.01	0.87	1.00	1.29	1.23	1.40	1.38	1.30	1.41	0.97	0.95	0.95	1.17	1.17	0.92	1.23
6	0.88	0.81	0.93	0.96	0.86	0.77	0.90	0.88	0.83	0.87	0.85	0.74	0.77	0.78	1.00	1.00	1.17
10	0.79	0.85	0.92	0.96	1.00	0.96	0.88	0.83	0.78	0.82	0.89	0.88	0.77	0.78	0.89	0.94	1.07
12	0.84	0.92	0.95	1.00	1.00	1.02	0.98	0.83	0.82	0.80	0.88	0.96	0.85	0.88	0.78	0.94	1.07
16	1.00	1.00	1.12	1.00	1.00	0.95	1.07	0.83	0.81	0.95	1.12	1.17	1.06	1.06	0.93	1.07	1.00
20	1.01	1.10	1.30	1.48	1.22	1.13	1.15	0.84	0.93	0.98	1.24	1.41	1.11	1.24	1.23	1.08	1.20
24	1.02	1.12	1.30	1.60	1.57	1.30	1.09	0.78	0.95	0.96	1.28	1.40	1.30	1.39	1.33	1.14	1.40
30	1.03	1.11	1.15	1.34	1.33	1.29	1.08	0.66	0.94	0.97	1.19	1.32	1.28	1.45	1.25	1.35	1.36
98	1.18	1.13	0.87	0.96	1.17	1.00	0.86	0.64	0.90	0.89	0.92	1.06	1.24	1.02	1.42	1.25	1.00

Initial Supporting table - PairCylModeJerk

Description: Used for P0300 - P0308, Mulitplier to P0300_CylModeJerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	2.08	2.06	2.06	2.39	2.50	2.50	3.50	3.74	2.41	2.63	2.40	2.05	1.46	1.15	1.50	1.96	1.60
6	1.81	1.42	1.20	1.69	1.45	1.45	1.71	1.38	1.41	1.50	1.10	1.14	1.29	1.10	1.30	2.00	1.56
10	1.51	1.37	1.30	1.43	1.10	1.10	1.48	1.21	1.14	1.14	1.10	1.12	1.39	1.10	1.30	2.06	1.67
12	1.45	1.46	1.30	1.30	1.10	1.10	1.38	1.16	1.16	1.14	1.05	1.19	1.35	1.15	1.25	1.82	1.60
16	1.26	1.52	1.50	1.35	1.10	1.10	1.27	1.05	1.10	1.15	1.13	1.25	1.25	1.23	1.08	1.23	1.24
20	1.23	1.59	1.63	1.51	1.23	1.00	1.38	1.12	1.10	1.13	1.21	1.21	1.18	1.27	1.26	1.27	1.16
24	1.28	1.62	1.56	1.33	1.19	1.00	1.52	1.26	1.31	1.13	1.28	1.22	1.15	1.15	1.27	1.29	1.24
30	1.29	1.61	1.56	1.35	1.40	1.10	1.78	1.38	1.32	1.17	1.25	1.13	1.09	1.06	1.11	1.42	1.33
98	1.70	1.65	1.37	1.35	1.20	1.27	1.85	1.11	1.16	1.13	1.04	1.00	1.04	0.90	1.19	1.64	1.44

Initial Supporting table - Random_SCD_Decel

Description: Used for P0300 - P0308, Mulitplier to SCD_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - Random_SCD_Jerk

Description: Used for P0300 - P0308, Mulitplier to Random_SCD_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	550	700	800	900	1,000	1,200	1,400	1,600
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Decl

Description: Used for P0300 - P0308, Mulitplier to Cylinder_Decel while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomAFM_Jerk

Description: Used for P0300 - P0308, Mulitplier to Cylinder_Jerk while in Cylnder Deactivation mode to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	800	1,000	1,200	1,600	2,000	2,400	2,600	3,000	3,500
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomCylModDecel

Description: Used for P0300 - P0308. Multiplier to CylMode_Decel. account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: Multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.42	1.23	1.23
6	1.00	1.00	1.00	1.00	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.05	1.17
10	1.75	1.76	1.90	1.60	1.29	1.65	1.14	1.10	1.35	1.21	1.35	1.20	1.14	1.22	1.05	1.06	1.13
14	1.79	1.90	2.00	2.00	1.71	2.18	1.53	1.27	1.60	1.35	1.72	1.50	1.67	1.53	1.50	1.27	1.23
18	1.64	1.80	2.50	2.50	2.50	2.65	1.86	1.82	1.70	1.54	2.12	2.14	2.17	2.00	2.23	1.64	1.55
22	1.53	1.80	2.50	2.50	3.04	3.00	2.26	2.04	1.88	1.72	2.03	2.52	2.58	2.41	2.69	2.23	2.00
26	1.44	1.85	2.10	2.10	3.32	3.21	1.94	1.95	2.18	1.96	2.05	2.69	2.71	2.63	2.47	2.33	2.18
40	1.31	1.66	1.73	1.93	2.10	1.94	1.48	1.65	2.04	1.86	1.97	2.55	2.38	2.10	2.31	1.96	1.82
98	1.05	1.47	1.20	1.36	1.57	1.47	1.27	1.39	1.87	1.84	1.81	2.59	2.43	1.77	2.25	1.57	1.37

Initial Supporting table - RandomCylModJerk

Description: Used for P0300 - P0308, Multiplier to CylMode_Jerk to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	700	900	1,100	1,400	1,800	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,200	4,400	4,850
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.25	1.19	1.00	1.00	1.00	1.00	1.08	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.56	1.20
14	1.31	1.36	1.38	1.19	1.00	1.05	1.13	1.03	1.05	1.00	1.07	1.00	1.03	1.12	1.00	1.26	1.13
18	1.24	1.42	1.41	1.50	1.00	1.16	1.15	1.03	1.02	1.00	1.08	1.02	1.03	1.26	1.04	1.14	1.06
22	1.18	1.38	1.33	1.32	1.06	1.19	1.31	1.09	1.09	1.01	1.03	1.02	1.09	1.21	1.10	1.32	1.05
26	1.17	1.42	1.29	1.21	1.14	1.13	1.35	1.14	1.22	1.02	1.12	1.08	1.12	1.14	1.16	1.35	1.05
40	1.20	1.48	1.27	1.22	1.30	1.26	1.46	1.24	1.16	1.04	1.04	1.00	1.11	1.06	1.02	1.20	1.07
98	1.38	1.47	1.20	1.25	1.36	1.31	1.52	1.08	1.07	1.03	1.02	1.00	1.09	1.00	1.00	1.09	1.02

Initial Supporting table - RandomRevModDecl

Description: Used for P0300 - P0308, Mulitplier to RevMode_Decel to account for different pattern of light level misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	3,000	3,500	4,000	4,500	5,000	5,500	6,000	7,000	8,000
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RepetSnapDecayAdjst

Description: Used for P0300 - P0308, If misfire is present in consecutive engine cycles, this multiplier is applied to the misfire jerk threshold and compared to a crankshaft snap value after the misfire has taken place.. Table lookup as a function of engine rpm.

Value Units: multiplier
X Unit: RPM

y/x	700	1,100	1,200	1,600	2,200	2,600	3,000	3,400	4,400
1	1.18	1.76	1.94	1.23	1.22	1.37	1.37	1.00	1.00

Initial Supporting table - RevMode_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time between revolutions (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,100	3,500	4,000	4,500	5,000	5,500	6,500	7,000
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - Ring Filter

Description: Used for P0300-P0308. Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

Value Units: Number of Engine cycles after isolated misfire (Engine cycles)
X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	5	5	5	5	5	5	5	5	5

Initial Supporting table - SCD_Decel

Description: Used for P0300-P0308 Crankshaft decel threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - SCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Change in Delta time per cylinder from last cylinder (usec)
X Unit: RPM
Y Units: percent load of max indicated torque (%)

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - SnapDecayAfterMisfire

Description: Used for P0300 - P0308, multiplier times the ddt_jerk value used used to detect misfire at that speed and load to see if size of disturbance has died down as expected of real misfire. Table lookup as a function of engine rpm and trans gear ratio.

Value Units: multiplier
X Unit: RPM
Y Units: gear ratio

y/x	700	1,100	1,200	1,600	2,200	2,600	3,000	3,400	4,400
1	3.85	3.85	3.85	3.60	3.80	3.67	3.67	3.67	3.67
1	4.29	4.29	4.29	2.73	3.20	2.65	2.10	2.10	2.10
1	5.00	5.00	5.20	2.90	3.30	3.20	2.20	1.63	1.63
1	3.81	3.81	3.81	3.80	3.50	4.00	2.45	2.02	1.40
2	2.35	2.35	2.60	3.60	3.50	3.80	2.33	2.15	1.82
2	2.74	2.74	3.23	3.41	4.10	3.80	2.90	2.60	1.80
2	2.50	2.47	3.84	2.60	4.30	3.80	2.72	2.75	1.65
3	3.02	3.02	3.15	3.65	3.50	3.30	2.72	2.85	2.30
5	4.27	3.53	3.50	3.20	3.50	3.70	2.54	3.85	2.40

Initial Supporting table - TOSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Rough Road source = TOSS: dispersion value on Transmission Output Speed Sensor above which rough road is indicated present

Value Units: change in rpm per sec (rpm)
X Unit: Engine Speed (RPM)
Y Units: Transmission Speed (RPM)

y/x	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
100	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
300	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
600	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
900	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,200	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,500	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1,800	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
2,100	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
2,400	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
2,700	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
3,000	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
3,300	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
3,600	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
4,200	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Initial Supporting table - WaitToStart

Description: Used for P0300-P0308. Number of engine cycles to delay if diesel engine is cranked before wait to start lamp is extinguished. This lookup table determines the delay length by taking into account the coolant temperature.

Value Units: Number of Engine Cycles (integer)
X Unit: Engine Coolant (deg C)

y/x	-20	-10	0	10	20	30	40	50	60
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - WSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Wheel speed from ABS is used. If difference between wheel speed readings is larger than this limit, rough road is present

Value Units: acceleration
X Unit: Vehicle Speed (KPH)

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005	1.05005

Initial Supporting table - ZeroTorqueAFM

Description: Used for P0300-P0308. Zero torque engine load while in Active Fuel Management. %of Max Brake Torque along the Neutral rev line, as a function of RPM and Baro

Value Units: Percent of Maximum Brake torque (%)
X Unit: RPM
Y Units: Barometric Pressure (kPa)

ZeroTorqueAFM - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ZeroTorqueAFM - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Initial Supporting table - ZeroTorqueEngLoad

Description: Used for P0300-P0308. %of Max Brake Torque that represents Zero Brake torque along the Neutral rev line, as a function of RPM and Baro

Value Units: Percent of Maximum Brake torque (%)
X Unit: RPM
Y Units: Barometric Pressure (kPa)

ZeroTorqueEngLoad - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
65	-0.47	-0.65	-1.03	-0.90	0.37	0.45	1.15	1.54	1.50	0.51	-1.03	-1.60	-1.62
75	0.30	0.25	0.25	0.27	0.22	0.65	0.75	0.57	0.05	0.23	-1.09	-3.11	-3.55
85	-1.39	-1.45	-1.57	-1.65	-0.86	0.01	0.02	-0.02	0.56	-0.66	-0.99	-2.93	-3.50
95	0.26	-0.28	-1.04	-1.26	-1.55	-0.98	-0.15	-0.46	0.68	-0.49	-1.93	-1.20	-1.56
105	0.26	-0.28	-1.04	-1.26	-1.55	-0.98	-0.15	-0.46	0.68	-0.49	-1.93	-1.20	-1.56

ZeroTorqueEngLoad - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
65	-1.39	-3.46	-2.47	-1.47	-0.48	0.51	1.50	2.50	3.49	4.48	5.47	7.71	10.93
75	-3.08	-1.99	-1.14	-0.29	0.56	1.41	2.26	3.11	3.96	4.80	5.65	7.56	10.32
85	-2.81	-1.43	-0.61	0.21	1.02	1.84	2.66	3.47	4.28	5.10	5.91	7.75	10.41
95	-1.97	-1.82	-0.52	0.79	2.09	3.39	4.69	6.00	7.30	8.61	9.91	12.84	17.08
105	-1.97	-1.82	-0.52	0.79	2.09	3.39	4.69	6.00	7.30	8.61	9.91	12.84	17.08

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	200.000	200.000	500.000	1,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	5	3	5	3	5	3	5	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	5	5	5	3	3	3	3	5

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P129F Threshold High

Description: P129F Filtered Fuel Pump Speed Error High Threshold [over-performing motor]
Instantaneously calculated filtered pump speed error measured is higher than commanded

Value Units: revs / min
X Unit: revs / min [commanded pump speed]
Y Units: kiloPascals [requested fuel pressure]

y/x	200.0	300.0	400.0	500.0	600.0
1,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0
2,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0
3,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0
4,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0
5,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0
6,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0
7,000.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0	-1,125.0

Initial Supporting table - P129F Threshold Low

Description: P129F Filtered Fuel Pump Speed Error Low Threshold [under-performing motor]
Instantaneously calculated filtered pump speed error measured is lower than commanded

Value Units: revs / min
X Unit: revs / min [commanded pump speed]
Y Units: kiloPascals [requested fuel pressure]

y/x	200.0	300.0	400.0	500.0	600.0
1,000.0	1,125.0	1,125.0	1,125.0	1,125.0	1,125.0
2,000.0	1,125.0	1,125.0	1,125.0	1,125.0	1,125.0
3,000.0	1,125.0	1,125.0	1,125.0	1,125.0	1,125.0
4,000.0	1,125.0	1,125.0	1,125.0	1,125.0	1,125.0
5,000.0	1,125.0	1,125.0	1,125.0	1,125.0	1,125.0
6,000.0	1,750.0	1,750.0	1,750.0	1,750.0	1,750.0
7,000.0	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0

Initial Supporting table - P2635 Max Fuel Flow

Description: P2635 Maximum Fuel Flow Disable Criteria
Maximum allowed fuel flow values above which the diagnostic is disabled

Value Units: grams / second
X Unit: kilopascals [commanded fuel pressure]
Y Units: volts [device supply]

y/x	200	250	300	350	400	450	500	550	600
5	512	512	512	512	512	512	512	512	512
6	512	512	512	512	512	512	512	512	512
8	512	512	512	512	512	512	512	512	512
9	512	512	512	512	512	512	512	512	512
11	512	512	512	512	512	512	512	512	512
12	512	512	512	512	512	512	512	512	512
14	512	512	512	512	512	512	512	512	512
15	512	512	512	512	512	512	512	512	512
17	512	512	512	512	512	512	512	512	512
18	512	512	512	512	512	512	512	512	512
20	512	512	512	512	512	512	512	512	512
21	512	512	512	512	512	512	512	512	512
23	512	512	512	512	512	512	512	512	512
24	512	512	512	512	512	512	512	512	512
26	512	512	512	512	512	512	512	512	512
27	512	512	512	512	512	512	512	512	512
29	512	512	512	512	512	512	512	512	512

Initial Supporting table - P2635 Threshold High

Description: P2635 Filtered Fuel Pressure Error High Threshold [under-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kilopascals
X Unit: kilopascals [commanded fuel pressure]
Y Units: grams / sec [fuel flow]

y/x	200	250	300	350	400	450	500	550	600
0	40	40	40	40	40	40	130	180	230
2	40	40	40	40	40	40	130	180	230
3	40	40	40	40	40	40	130	180	230
5	40	40	40	40	40	40	130	180	230
6	40	40	40	40	40	40	130	180	230
8	40	40	40	40	40	40	130	180	230
9	40	40	40	40	40	40	130	180	230
11	40	40	40	40	40	40	130	180	230
12	40	40	40	40	40	40	130	180	230
14	40	40	40	40	40	40	130	180	230
15	40	40	40	40	40	40	130	180	230
17	40	40	40	40	40	40	130	180	230
18	40	40	40	40	40	40	130	180	230
20	40	40	40	40	40	40	130	180	230
21	40	40	40	40	40	40	130	180	230
23	40	40	40	40	40	40	130	180	230
24	40	40	40	40	40	60	130	180	230
26	40	40	40	40	40	60	130	180	230
27	40	40	40	40	40	60	130	180	230
29	40	40	40	40	40	60	130	180	230
30	40	40	40	40	40	60	130	180	230
32	40	40	40	40	40	60	130	180	230
33	40	40	40	40	40	60	130	180	230
35	40	40	40	40	40	60	130	180	230
36	40	40	40	40	40	60	130	180	230
38	40	40	40	40	40	60	130	180	230
39	40	40	40	40	40	60	130	180	230
41	40	40	40	40	40	60	130	180	230
42	40	40	40	40	40	60	130	180	230
44	40	40	40	40	40	60	130	180	230
45	40	40	40	40	40	60	130	180	230

Initial Supporting table - P2635 Threshold High

47	40	40	40	40	40	60	130	180	230
48	40	40	40	40	40	60	130	180	230

Initial Supporting table - P2635 Threshold Low

Description: P2635 Filtered Pressure Error Low Threshold [over-performing pump]
Instantaneously calculated filtered fuel pressure error

Value Units: kilopascals
X Unit: kilopascals [commanded fuel pressure]
Y Units: grams / second [fuel flow]

y/x	200	250	300	350	400	450	500	550	600
0	-190	-190	-190	-190	-190	-190	-190	-190	-190
2	-190	-190	-190	-190	-190	-190	-190	-190	-190
3	-190	-190	-190	-190	-190	-190	-190	-190	-190
5	-190	-190	-190	-190	-190	-190	-190	-190	-190
6	-190	-190	-190	-190	-190	-190	-190	-190	-190
8	-190	-190	-190	-190	-190	-190	-190	-190	-190
9	-190	-190	-190	-190	-190	-190	-190	-190	-190
11	-190	-190	-190	-190	-190	-190	-190	-190	-190
12	-190	-190	-190	-190	-190	-190	-190	-190	-190
14	-190	-190	-190	-190	-190	-190	-190	-190	-190
15	-190	-190	-190	-190	-190	-190	-190	-190	-190
17	-190	-190	-190	-190	-190	-190	-190	-190	-190
18	-190	-190	-190	-190	-190	-190	-190	-190	-190
20	-190	-190	-190	-190	-190	-190	-190	-190	-190
21	-190	-190	-190	-190	-190	-190	-190	-190	-190
23	-190	-190	-190	-190	-190	-190	-190	-190	-190
24	-190	-190	-190	-190	-190	-190	-190	-190	-190
26	-190	-190	-190	-190	-190	-190	-190	-190	-190
27	-190	-190	-190	-190	-190	-190	-190	-190	-190
29	-190	-190	-190	-190	-190	-190	-190	-190	-190
30	-190	-190	-190	-190	-190	-190	-190	-190	-190
32	-190	-190	-190	-190	-190	-190	-190	-190	-190
33	-190	-190	-190	-190	-190	-190	-190	-190	-190
35	-190	-190	-190	-190	-190	-190	-190	-190	-190
36	-190	-190	-190	-190	-190	-190	-190	-190	-190
38	-190	-190	-190	-190	-190	-190	-190	-190	-190
39	-190	-190	-190	-190	-190	-190	-190	-190	-190
41	-190	-190	-190	-190	-190	-190	-190	-190	-190
42	-190	-190	-190	-190	-190	-190	-190	-190	-190
44	-190	-190	-190	-190	-190	-190	-190	-190	-190
45	-190	-190	-190	-190	-190	-190	-190	-190	-190

Initial Supporting table - P2635 Threshold Low

47	-190	-190	-190	-190	-190	-190	-190	-190	-190
48	-190	-190	-190	-190	-190	-190	-190	-190	-190

Initial Supporting table - P057B KtBRKI_K_CmpltTestPointWeight

Description:

y/x	0.000	0.010	0.025	0.033	0.050	0.250	0.500	0.750	1.000
1	0	0	0	1	1	1	1	1	1

Initial Supporting table - P057B KtBRKI_K_FastTestPointWeight

Description:

y/x	0.000	0.010	0.025	0.033	0.050	0.250	0.500	0.750	1.000
1	0	0	0	1	1	1	1	1	1

Initial Supporting table - KaFADR_e_FSA_CombModeEnblGrp

Description: Enable FSA learning based on the combustion modes and select related maps based on calibrated groups

Value Units: -
X Unit: -

KaFADR_e_FSA_CombModeEnblGrp - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	CeFADR_e_FSA_Grp1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeEnblGrp - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeEnblGrp - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	CeFADR_e_FSA_Grp1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeEnblGrp - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeEnblGrp - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	

Initial Supporting table - KaFADR_e_FSA_CombModeRelGrp

Description: Enable FSA correction release based on the combustion modes and select related maps based on calibrated groups

Value Units: -
X Unit: -

KaFADR_e_FSA_CombModeRelGrp - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	CeFADR_e_FSA_Grp1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeRelGrp - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_Grp1
KaFADR_e_FSA_CombModeRelGrp - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	CeFADR_e_FSA_Grp1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeRelGrp - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_CombModeRelGrp - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	

Initial Supporting table - KaFADR_e_FSA_ECM_CombModeGrp

Description: Enable P026C and P026D in specific combustion modes and select related threshold maps based on calibrated group

Value Units: -
X Unit: -

KaFADR_e_FSA_ECM_CombModeGrp - Part 1				
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions
1	CeFADR_e_FSA_Grp1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_ECM_CombModeGrp - Part 2				
y/x	CeCMBR_e_LNT_DeNOx	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_ECM_CombModeGrp - Part 3				
y/x	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2
1	CeFADR_e_FSA_Grp1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_ECM_CombModeGrp - Part 4				
y/x	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn	CeCMBR_e_HCS_DeHC_Drive
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd
KaFADR_e_FSA_ECM_CombModeGrp - Part 5				
y/x	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	CeFADR_e_FSA_GrpNotAllwd	

Initial Supporting table - KtFADC_V_FSA_FuelMax

Description: Map used to define FSA maximum authority

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	5	10	20	30	40	50	60	70	80	90
1,000	9	10	9	12	14	16	18	20	22	23
1,250	10	11	10	12	14	16	18	20	22	24
1,500	10	11	10	12	14	16	19	21	23	24
1,750	10	11	10	12	14	17	19	21	23	24
2,000	10	11	10	12	14	17	19	21	23	25
2,250	10	11	10	12	15	17	19	21	23	25
2,500	10	11	10	12	15	17	19	21	23	25
2,750	10	11	10	12	15	17	20	21	23	25
3,000	10	11	10	13	15	17	20	21	23	24
3,250	10	11	10	13	15	17	19	21	23	24

Initial Supporting table - KtFADC_V_FSA_FuelMin

Description: Map used to define FSA minimum authority

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	5	10	20	30	40	50	60	70	80	90
1,000	-9	-10	-9	-12	-14	-16	-18	-20	-22	-23
1,250	-10	-11	-10	-12	-14	-16	-18	-20	-22	-24
1,500	-10	-11	-10	-12	-14	-16	-19	-21	-23	-24
1,750	-10	-11	-10	-12	-14	-17	-19	-21	-23	-24
2,000	-10	-11	-10	-12	-14	-17	-19	-21	-23	-25
2,250	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,500	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,750	-10	-11	-10	-12	-15	-17	-20	-21	-23	-25
3,000	-10	-11	-10	-13	-15	-17	-20	-21	-23	-24
3,250	-10	-11	-10	-13	-15	-17	-19	-21	-23	-24

Initial Supporting table - KtFADD_K_FSA_ECM_PresAmbWghtHi

Description: Curve of the weighting factor dependent on ambient pressure for P026D

Value Units: -
X Unit: kPa

y/x	72	83	96
1	1	1	1

Initial Supporting table - KtFADD_K_FSA_ECM_PresAmbWghtLo

Description: Curve of the weighting factor dependent on ambient pressure for P026C

Value Units: -
X Unit: kPa

y/x	72	83	96
1	1	1	1

Initial Supporting table - KtFADD_V_FSA_ECM_HiThrshGrp1

Description: Map to define P026D threshold for combustion mode Group 1

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	15	20	25	30	35	40	45	50	55	60
1,100	7	7	7	7	7	7	7	7	7	7
1,200	7	7	7	7	7	7	7	7	7	7
1,300	7	7	7	7	7	7	7	7	7	7
1,400	8	8	8	8	7	7	7	7	7	7
1,500	8	8	8	8	7	7	7	7	7	7
1,600	9	8	8	9	7	7	7	7	7	7
1,700	9	9	9	9	8	8	8	8	8	8
1,800	9	8	8	9	8	8	8	8	8	8

Initial Supporting table - KtFADD_V_FSA_ECM_HiThrshGrp2

Description: Map to define P026D threshold for combustion mode Group 2

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	15	20	25	30	35	40	45	50	55	60
1,100	9	9	9	9	9	9	9	9	9	9
1,200	9	9	9	9	9	9	9	9	9	9
1,300	9	9	9	9	9	9	9	9	9	9
1,400	9	9	9	9	9	9	9	9	9	9
1,500	9	9	9	9	9	9	9	9	9	9
1,600	9	9	9	9	9	9	9	9	9	9
1,700	9	9	9	9	9	9	9	9	9	9
1,800	9	9	9	9	9	9	9	9	9	9

Initial Supporting table - KtFADD_V_FSA_ECM_HiThrshGrp3

Description: Map to define P026D threshold for combustion mode Group 3

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	15	20	25	30	35	40	45	50	55	60
1,100	9	9	9	9	9	9	9	9	9	9
1,200	9	9	9	9	9	9	9	9	9	9
1,300	9	9	9	9	9	9	9	9	9	9
1,400	9	9	9	9	9	9	9	9	9	9
1,500	9	9	9	9	9	9	9	9	9	9
1,600	9	9	9	9	9	9	9	9	9	9
1,700	9	9	9	9	9	9	9	9	9	9
1,800	9	9	9	9	9	9	9	9	9	9

Initial Supporting table - KtFADD_V_FSA_ECM_LoThrshGrp1

Description: Map to define P026C threshold for combustion mode Group 1

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	15	20	25	30	35	40	45	50	55	60
1,100	-6	-5	-5	-5	-6	-7	-7	-7	-7	-7
1,200	-5	-5	-5	-6	-6	-7	-7	-7	-7	-7
1,300	-6	-5	-5	-5	-6	-7	-9	-9	-9	-9
1,400	-5	-5	-5	-6	-6	-7	-8	-8	-8	-8
1,500	-5	-6	-5	-5	-6	-7	-7	-8	-8	-8
1,600	-6	-6	-5	-6	-6	-7	-7	-6	-6	-6
1,700	-6	-7	-7	-6	-7	-7	-8	-9	-9	-9
1,800	-7	-7	-7	-6	-6	-6	-6	-6	-6	-6

Initial Supporting table - KtFADD_V_FSA_ECM_LoThrshGrp2

Description: Map to define P026C threshold for combustion mode Group 2

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	15	20	25	30	35	40	45	50	55	60
1,100	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,200	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,300	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,400	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,500	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,600	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,700	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,800	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3

Initial Supporting table - KtFADD_V_FSA_ECM_LoThrshGrp3

Description: Map to define P026C threshold for combustion mode Group 3

Value Units: mm^3
X Unit: mm^3
Y Units: rpm

y/x	15	20	25	30	35	40	45	50	55	60
1,100	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,200	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,300	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,400	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,500	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,600	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,700	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
1,800	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3

Initial Supporting table - P2BAA RDP Min Press Drop

Description: This calibration is used to define the minimum expected pressure drop based on pump efficiency after that the injection is commanded. The input of this table is the motorpump average commanded duty cycle before the injection is commanded

Value Units: kPa
X Unit: %

y/x	30	35	40	45	50	55	60	65	70
1	66	61	55	50	46	43	42	40	38

Initial Supporting table - FastFailTempDiff

Description: EOT Sensor Cold Start Fast Fail Threshold

Value Units: Threshold between power-up engine oil temperature and power-up engine coolant temperature (Deg C)
X Unit: PowerUp coolant temperature (deg C)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	79.5	79.5	79.5	60.0	60.0	39.8	39.8	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Initial Supporting table - P0196_TotalAccumulatedFlow

Description: Total accumulated air consumed by engine since engine start as a function of powerup undefaulted Oil Temperature

Value Units: Minimum accumulated (total) air grams consumed by engine (gram)
X Unit: PowerUp coolant temperature (deg C)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	15,000	14,000	13,000	12,000	11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	5,000	4,000	3,000	3,000	3,000

Initial Supporting table - P0494_LIN_Threshold

Description: Tabulated LIN Fan1 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan1 Speed rpm
Y Units: Sensed LIN Fan1 Speed Lower Limit rpm

y/x	0	625	626	2,140	2,141	2,142	2,143	2,144	2,145	2,146	2,147	2,148	2,149	2,150	2,151	2,152	2,153
1	0	425	425	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940

Initial Supporting table - P2CB9_LIN_Threshold

Description: Tabulated LIN Fan2 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan2 Speed rpm
Y Units: Sensed LIN Fan2 Speed Lower Limit rpm

y/x	0	625	626	2,500	2,501	2,502	2,503	2,504	2,505	2,506	2,507	2,508	2,509	2,510	2,511	2,512	2,513
1	0	425	425	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300

Initial Supporting table - Shutter 1 AC OFF - Open / Close Commands

Description: Open / Close Commands for Shutter 1 - AC OFF

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 1 AC OFF - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 1 - AC OFF Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 1 AC OFF - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 1 - AC OFF Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 1 AC ON - Open / Close Commands

Description: Open / Close Commands for Shutter 1 - AC ON

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 1 AC ON - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 1 - AC ON Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 1 AC ON - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 1 - AC ON Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 2 AC OFF - Open / Close Commands

Description: Open / Close Commands for Shutter 2 - AC OFF

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 2 AC OFF - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 2 - AC OFF Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 2 AC OFF - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 2 - AC OFF Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 2 AC ON - Open / Close Commands

Description: Open / Close Commands for Shutter 2 - AC ON

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 2 AC ON - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 2 - AC ON Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 2 AC ON - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 2 - AC ON Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - TooHiThreshold

Description:

y/x	0	100	200	300	400	500	600	700	800
0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_CCB_SootThrsh

Description:

y/x	1,000	1,500	2,000	2,250	2,500	3,000	3,500	4,000	4,500
0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_EffRgnHysHi

Description:

y/x	5	10	15	20	25	30	35	40	45	50	60	70	90	110	130
0	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
5	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
10	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
15	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
20	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
25	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
30	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
40	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
50	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
60	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
70	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
75	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
80	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
85	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
90	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
95	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
100	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
105	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
110	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530

Initial Supporting table - DPF_EffRgnHysLo

Description:

y/x	5	10	15	20	25	30	35	40	45	50	60	70	90	110	130
0	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
5	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
10	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
15	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
20	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
25	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
30	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
40	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
50	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
60	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
70	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
75	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
80	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
85	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
90	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
95	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
100	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
105	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
110	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520

Initial Supporting table - DPF_ResistFlowDsblHi

Description:

y/x	600	800	1,200	1,600	2,000	2,400	2,800	3,200
1	130	130	130	130	130	130	130	130

Initial Supporting table - DPF_ResistFlowDsblLo

Description:

y/x	600	800	1,200	1,600	2,000	2,400	2,800	3,200
1	0	0	0	0	0	0	0	0

Initial Supporting table - DPF_SootThrshCrtn

Description:

y/x	0	20	40	60	80	100	120	140
1	0	0	0	0	0	0	0	0

Initial Supporting table - EGT_FuelReqHysHiThrsh_DPF

Description:

y/x	1,000	1,100	1,500	2,500	3,000	3,500	4,000	5,000
1	-5	-5	-5	-5	-5	-5	-5	5

Initial Supporting table - EGT_FuelReqHysLoThrsh_DPF

Description:

y/x	1,000	1,100	1,500	2,500	3,000	3,500	4,000	5,000
1	-5	-5	-5	-5	-5	-5	-5	5

Initial Supporting table - EGT_FuelReqMaxThreshold

Description:

y/x	950	1,000	1,750	2,500	3,000	3,500	4,000	4,500
1	50	50	60	60	60	30	0	0

Initial Supporting table - EGT1 DynChk EngPtEnbl

Description: Contains the engine speed and fuel rate enablments for EGT1 Dynamic Check.

y/x	0.0	21.0	22.0	40.0	60.0	80.0	120.0
899.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
900.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
1,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,000.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
3,200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - EGT1 Fuel request integral

Description:

y/x	-40	-20	0	25	50	75	100	127
1	397,440	388,800	337,152	238,560	230,720	223,440	216,160	207,760

Initial Supporting table - EGT1 Stuck Temperature Variation

Description:

y/x	-40	-8	24	56	88	120	149	150
1	190	158	126	94	62	30	1	0

Initial Supporting table - EGT1 Stuck Wait Time

Description:

y/x	-40	-8	24	56	88	120	149	150
1	460	443	426	409	392	375	359	32,768

Initial Supporting table - EGT2 Fuel request integral

Description:

y/x	-40	-20	0	25	50	75	100	127
1	488,160	476,064	411,648	290,080	280,000	269,920	259,840	249,200

Initial Supporting table - EGT2 Stuck Temperature Variation

Description:

y/x	-40	-8	24	56	88	120	149	150
1	190	158	126	94	62	30	1	0

Initial Supporting table - EGT2 Stuck Wait Time

Description:

y/x	-40	-8	24	56	88	120	149	150
1	565	542	519	496	473	450	429	32,768

Initial Supporting table - EGT3 DynChk EngPtEnbl

Description: Contains the engine speed and fuel rate enablments for EGT3 Dynamic Check.

y/x	0.0	21.0	22.0	40.0	60.0	80.0	120.0
899.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
900.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
1,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,000.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
2,500.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0
3,200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - EGT3 Fuel request integral

Description:

y/x	-40	-20	0	25	50	75	100	127
1	524,280	524,280	524,280	368,480	347,200	325,920	305,200	282,240

Initial Supporting table - EGT3 Stuck Temperature Variation

Description:

y/x	-40	-8	24	56	88	120	149	150
1	190	158	126	94	62	30	1	0

Initial Supporting table - EGT3 Stuck Wait Time

Description:

y/x	-40	-8	24	56	88	120	149	150
1	606	606	659	611	563	515	471	32,768

Initial Supporting table - EnginePointEnable_DPF_TempDeviation

Description:

y/x	900	1,000	2,000	2,500	3,000	3,010	4,000	4,200
0	0	0	0	0	0	0	0	0
5	0	1	1	1	1	1	1	1
10	0	1	1	1	1	1	1	1
15	0	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1
61	1	1	1	1	1	1	1	1

Initial Supporting table - KaFADC_b_CB_EnblCMBR

Description: Specifies, for the specific combustion mode, if enable or not CB

KaFADC_b_CB_EnblCMBR - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0
KaFADC_b_CB_EnblCMBR - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0
KaFADC_b_CB_EnblCMBR - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0
KaFADC_b_CB_EnblCMBR - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	0	0	

Initial Supporting table - KaFADC_b_SQC_CWA_EnblLink

Description: Engine speed ranges to be learned with CWA before give a positive report to Zero Torque Coordinator.

y/x	0	1	2	3	4	5
1	0	0	0	0	0	0

Initial Supporting table - KaFADC_n_CB_EngSpdRngThrsh2

Description: Threshold 2 for engine speed range detection in the Cylinder Balancing (driveline-group dependent) [rpm]

Value Units: rpm

KaFADC_n_CB_EngSpdRngThrsh2 - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100

KaFADC_n_CB_EngSpdRngThrsh2 - Part 2

y/x	11	12	13	14	15	16	17	18	19	20	
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	

Initial Supporting table - KaFADC_n_CB_EngSpdRngThrsh3

Description: Threshold 3 for engine speed range detection in the Cylinder Balancing (driveline-group dependent) [rpm].

Value Units: rpm

KaFADC_n_CB_EngSpdRngThrsh3 - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100

KaFADC_n_CB_EngSpdRngThrsh3 - Part 2

y/x	11	12	13	14	15	16	17	18	19	20	
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	

Initial Supporting table - KaFADC_n_DFSA_EngSpdThrsh

Description: Threshold to evaluate the engine speed steady state, as function of the engaged gear

Value Units: rpm

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	3	3	3	3	3	3	3	3	3	3

Initial Supporting table - KaFADC_n_FSA_EngSpdThrsh

Description: Threshold to evaluate the engine speed steady state, as function of the engaged gear

Value Units: rpm

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - KaFADC_n_SQC_HiThrshDelt

Description: Engine speed high threshold [rpm] delta for SQC actuators enable function of driveline group

Value Units: rpm

KaFADC_n_SQC_HiThrshDelt - Part 1				
y/x	CeFADR_e_CWA_DrvInGrpNotAlwd	CeFADR_e_CWA_DrivelineGrp1	CeFADR_e_CWA_DrivelineGrp2	CeFADR_e_CWA_DrivelineGrp3
1	100	100	100	100
KaFADC_n_SQC_HiThrshDelt - Part 2				
y/x	CeFADR_e_CWA_DrivelineGrp4	CeFADR_e_CWA_DrivelineGrp5	CeFADR_e_CWA_DrivelineGrp6	CeFADR_e_CWA_DrivelineGrp7
1	100	100	100	100
KaFADC_n_SQC_HiThrshDelt - Part 3				
y/x	CeFADR_e_CWA_DrivelineGrp8	CeFADR_e_CWA_DrivelineGrp9	CeFADR_e_CWA_DrivelineGrp10	
1	100	100	100	

Initial Supporting table - KaFADC_p_SQA_LrnDelt

Description: Delta Rail Pressure allowed to enable SQA learning [MPa] function of nominal rail pressure setpoint defined for SQA.

Value Units: MPa

y/x	0	1	2	3	4
1	3	3	3	3	3

Initial Supporting table - KaFADC_t_SQA_MaxAdptDeltET[us]

Description: Upper Energizing time limit for SQA [us] max authority function of rail pressure levels defined for SQA.

Value Units: us

y/x	0	1	2	3	4
1	230	121	91	74	20

Initial Supporting table - KaFADC_t_SQA_MinAdptDeltET[us]

Description: Lower Energizing time limit for SQA max authority [us] function of rail pressure levels defined for SQA.

Value Units: us

y/x	0	1	2	3	4
1	-163	-85	-77	-62	-20

Initial Supporting table - KtFADC_p_SQA_MAP_HiThrsh

Description: Manifold Air Pressure High Threshold [kPa] to disable SQA Strategy function on Rail Pressure levels defined for SQA

Value Units: MPa

y/x	1,000	1,200	1,400	1,600	1,800
1	200	200	200	200	200

Initial Supporting table - KtFADC_V_CB_HiThrshFuelQnty

Description: Injected quantity high threshold to enable Cylinder Balancing control [mm^3]

Value Units: mm^3

y/x	600	700	750	800	850	900	950	1,000	1,100	1,200	1,350	1,500
1	20	20	20	20	20	20	20	20	25	25	25	30

Initial Supporting table - KtFADC_V_FSA_FuelMax

Description: Map used to define FSA maximum authority

Value Units: mm^3

y/x	5	10	20	30	40	50	60	70	80	90
1,000	9	10	9	12	14	16	18	20	22	23
1,250	10	11	10	12	14	16	18	20	22	24
1,500	10	11	10	12	14	16	19	21	23	24
1,750	10	11	10	12	14	17	19	21	23	24
2,000	10	11	10	12	14	17	19	21	23	25
2,250	10	11	10	12	15	17	19	21	23	25
2,500	10	11	10	12	15	17	19	21	23	25
2,750	10	11	10	12	15	17	20	21	23	25
3,000	10	11	10	13	15	17	20	21	23	24
3,250	10	11	10	13	15	17	19	21	23	24

Initial Supporting table - KtFADC_V_FSA_FuelMin

Description: Map used to define FSA minimum authority

Value Units: mm^3

y/x	5	10	20	30	40	50	60	70	80	90
1,000	-9	-10	-9	-12	-14	-16	-18	-20	-22	-23
1,250	-10	-11	-10	-12	-14	-16	-18	-20	-22	-24
1,500	-10	-11	-10	-12	-14	-16	-19	-21	-23	-24
1,750	-10	-11	-10	-12	-14	-17	-19	-21	-23	-24
2,000	-10	-11	-10	-12	-14	-17	-19	-21	-23	-25
2,250	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,500	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,750	-10	-11	-10	-12	-15	-17	-20	-21	-23	-25
3,000	-10	-11	-10	-13	-15	-17	-20	-21	-23	-24
3,250	-10	-11	-10	-13	-15	-17	-19	-21	-23	-24

Initial Supporting table - KtFADC_V_FSA_MaxFuelFall

Description: Upper bound of fuel quantity range to enable the FSA learning phase depending on the engine speed

Value Units: mm^3

y/x	510	511	1,000	1,600	1,800	2,000	2,400	3,200	3,600	4,000
1	80	80	80	80	80	80	80	80	80	80

Initial Supporting table - KtFADD_p_XSQA_MAP_HiThrsh

Description: Manifold Air Pressure High Threshold [kPa] to disable SQA Emission Correlated Monitoring function on Rail Pressure levels defined for SQA

Value Units: kPa

y/x	1,000	1,200	1,400	1,600	1,800
1	200	200	200	200	200

Initial Supporting table - KtFADD_Pct_SSQA_InjSuspConfLvl

Description: Calibration table to define the suspicious confidence level [%] function of current last raw Delta Energizing Time [us] and previous one [us]

Value Units: %

y/x	-100	-80	-51	-50	-40	0	40	50	51	80	100
-100	0	0	0	0	0	0	0	0	0	0	0
-51	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	100	100	100	100	100	0	0	0
-40	0	0	0	100	100	100	100	100	0	0	0
0	0	0	0	100	100	100	100	100	0	0	0
40	0	0	0	100	100	100	100	100	0	0	0
52	0	0	0	100	100	100	100	100	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	200.000	200.000	500.000	1,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	5	3	5	3	5	3	5	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	5	5	5	3	3	3	3	5

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

Description: The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

Value Units: Run/Crank Voltages required to pull in PT Relay (V)
X Unit: Induction Air Temperature (deg C)

y/x	23.0	85.0	95.0	105.0	125.0
1	7.000	8.699	9.000	9.199	10.000

Initial Supporting table - P16F3_CB safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on CB Energizing Time compensation (for each torque forming pulse) as a function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_EIA safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on EIA Energizing Time compensation (for each torque forming pulse) as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_FTD safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on FTD Energizing Time compensation as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	1,325	481	348	231	186	157	136	122	111	102	95	89	84	79	75	71	68

Initial Supporting table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

y/x	-40	-20	-10	0	50	90
500	345	288	262	233	210	213
600	345	288	262	219	197	200
700	332	275	249	206	184	186
750	311	258	243	204	172	171
850	311	255	228	186	163	166
950	308	235	219	189	166	169
1,050	305	236	220	206	175	180
1,150	315	249	233	229	191	189
1,250	321	260	246	244	200	192
1,450	271	225	212	207	170	165
1,650	231	193	181	175	141	138
1,850	165	134	122	115	84	82
2,050	99	74	63	54	27	26
2,500	-83	-83	-83	-83	-83	-83
3,000	-91	-91	-91	-91	-91	-91
3,500	-100	-100	-100	-100	-100	-100
4,000	-108	-108	-108	-108	-108	-108

Initial Supporting table - P16F3_SQA safety deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on SQA Energizing Time compensation (for each torque forming pulse) as function of Fuel Rail Pressure.

y/x	13	34	56	77	99	120	142	164	185	207	228	250
1	1,063	446	299	230	191	163	140	127	115	109	103	99

Initial Supporting table - P16F3_VCA safety max deadband threshold f(Fuel Rail Pressure)

Description: Maximum allowable safety deadband on VCA energizing time correction as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	662	240	174	115	93	79	68	61	56	51	47	45	42	39	38	36	34

Initial Supporting table - P16F3_VCA safety min deadband threshold f(Fuel Rail Pressure)

Description: Minimum allowable safety deadband on VCA energizing time correction as function of Fuel Rail Pressure.

y/x	13	27	42	57	72	87	102	116	131	146	161	176	191	205	220	235	250
1	-662	-240	-174	-115	-93	-79	-68	-61	-56	-51	-47	-45	-42	-39	-38	-36	-34

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	200.000	200.000	500.000	1,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	5	3	5	3	5	3	5	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	5	5	5	3	3	3	3	5

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - KaFADC_b_SQA_EnblCMBR

Description: SQA combustion mode enable

KaFADC_b_SQA_EnblCMBR - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

KaFADC_b_SQA_EnblCMBR - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

KaFADC_b_SQA_EnblCMBR - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

KaFADC_b_SQA_EnblCMBR - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	0	0	0	0	

Initial Supporting table - KaFADC_n_SQC_HiThrsh

Description: Engine speed high threshold for SQC enable function of driveline group and SQA rail pressure level index.

Value Units: Rpm

KaFADC_n_SQC_HiThrsh - Part 1

y/x	CeFADR_e_CWA_DrvInGrpNotAlwd	CeFADR_e_CWA_DrivelineGrp1	CeFADR_e_CWA_DrivelineGrp2	CeFADR_e_CWA_DrivelineGrp3
0	1,750	1,750	1,750	1,750
1	1,750	1,750	1,750	1,750
2	1,750	1,750	1,750	1,750
3	1,750	1,750	1,750	1,750
4	1,750	1,750	1,750	1,750

KaFADC_n_SQC_HiThrsh - Part 2

y/x	CeFADR_e_CWA_DrivelineGrp4	CeFADR_e_CWA_DrivelineGrp5	CeFADR_e_CWA_DrivelineGrp6	CeFADR_e_CWA_DrivelineGrp7
0	1,750	1,750	1,750	1,750
1	1,750	1,750	1,750	1,750
2	1,750	1,750	1,750	1,750
3	1,750	1,750	1,750	1,750
4	1,750	1,750	1,750	1,750

KaFADC_n_SQC_HiThrsh - Part 3

y/x	CeFADR_e_CWA_DrivelineGrp8	CeFADR_e_CWA_DrivelineGrp9	CeFADR_e_CWA_DrivelineGrp10	
0	1,750	1,750	1,750	
1	1,750	1,750	1,750	
2	1,750	1,750	1,750	
3	1,750	1,750	1,750	
4	1,750	1,750	1,750	

Initial Supporting table - KaFADC_n_SQC_LoThrsh

Description: Engine speed low threshold for SQC enable function of driveline group and SQA rail pressure level index.

Value Units: Rpm

KaFADC_n_SQC_LoThrsh - Part 1

y/x	CeFADR_e_CWA_DrvInGrpNotAlwd	CeFADR_e_CWA_DrivelineGrp1	CeFADR_e_CWA_DrivelineGrp2	CeFADR_e_CWA_DrivelineGrp3
0	1,100	1,100	1,100	1,100
1	1,100	1,100	1,100	1,100
2	1,100	1,100	1,100	1,100
3	1,100	1,100	1,100	1,100
4	1,100	1,100	1,100	1,100

KaFADC_n_SQC_LoThrsh - Part 2

y/x	CeFADR_e_CWA_DrivelineGrp4	CeFADR_e_CWA_DrivelineGrp5	CeFADR_e_CWA_DrivelineGrp6	CeFADR_e_CWA_DrivelineGrp7
0	1,100	1,100	1,100	1,100
1	1,100	1,100	1,100	1,100
2	1,100	1,100	1,100	1,100
3	1,100	1,100	1,100	1,100
4	1,100	1,100	1,100	1,100

KaFADC_n_SQC_LoThrsh - Part 3

y/x	CeFADR_e_CWA_DrivelineGrp8	CeFADR_e_CWA_DrivelineGrp9	CeFADR_e_CWA_DrivelineGrp10	
0	1,100	1,100	1,250	
1	1,100	1,100	1,250	
2	1,100	1,100	1,250	
3	1,100	1,100	1,250	
4	1,100	1,100	1,250	

Initial Supporting table - KaFADC_b_CB_EnblCMBR

Description: Specifies, for the specific combustion mode, if enable or not CB

KaFADC_b_CB_EnblCMBR - Part 1

y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	1	0	0	0

KaFADC_b_CB_EnblCMBR - Part 2

y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

KaFADC_b_CB_EnblCMBR - Part 3

y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

KaFADC_b_CB_EnblCMBR - Part 4

y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	0	0	

Initial Supporting table - KaFADC_b_SQC_CWA_EnblLink

Description: Engine speed ranges to be learned with CWA before give a positive report to Zero Torque Coordinator.

y/x	0	1	2	3	4	5
1	0	0	0	0	0	0

Initial Supporting table - KaFADC_n_CB_EngSpdRngThrsh2

Description: Threshold 2 for engine speed range detection in the Cylinder Balancing (driveline-group dependent) [rpm]

Value Units: rpm

KaFADC_n_CB_EngSpdRngThrsh2 - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100

KaFADC_n_CB_EngSpdRngThrsh2 - Part 2

y/x	11	12	13	14	15	16	17	18	19	20	
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	

Initial Supporting table - KaFADC_n_CB_EngSpdRngThrsh3

Description: Threshold 3 for engine speed range detection in the Cylinder Balancing (driveline-group dependent) [rpm].

Value Units: rpm

KaFADC_n_CB_EngSpdRngThrsh3 - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100

KaFADC_n_CB_EngSpdRngThrsh3 - Part 2

y/x	11	12	13	14	15	16	17	18	19	20	
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	

Initial Supporting table - KaFADC_n_DFSA_EngSpdThrsh

Description: Threshold to evaluate the engine speed steady state, as function of the engaged gear

Value Units: rpm

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	3	3	3	3	3	3	3	3	3	3

Initial Supporting table - KaFADC_n_FSA_EngSpdThrsh

Description: Threshold to evaluate the engine speed steady state, as function of the engaged gear

Value Units: rpm

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - KaFADC_n_SQC_HiThrshDelt

Description: Engine speed high threshold [rpm] delta for SQC actuators enable function of driveline group

Value Units: rpm

KaFADC_n_SQC_HiThrshDelt - Part 1				
y/x	CeFADR_e_CWA_DrvInGrpNotAlwd	CeFADR_e_CWA_DrivelineGrp1	CeFADR_e_CWA_DrivelineGrp2	CeFADR_e_CWA_DrivelineGrp3
1	100	100	100	100
KaFADC_n_SQC_HiThrshDelt - Part 2				
y/x	CeFADR_e_CWA_DrivelineGrp4	CeFADR_e_CWA_DrivelineGrp5	CeFADR_e_CWA_DrivelineGrp6	CeFADR_e_CWA_DrivelineGrp7
1	100	100	100	100
KaFADC_n_SQC_HiThrshDelt - Part 3				
y/x	CeFADR_e_CWA_DrivelineGrp8	CeFADR_e_CWA_DrivelineGrp9	CeFADR_e_CWA_DrivelineGrp10	
1	100	100	100	

Initial Supporting table - KaFADC_p_SQA_LrnDelt

Description: Delta Rail Pressure allowed to enable SQA learning [MPa] function of nominal rail pressure setpoint defined for SQA.

Value Units: MPa

y/x	0	1	2	3	4
1	3	3	3	3	3

Initial Supporting table - KaFADC_t_SQA_MaxAdptDeltET[us]

Description: Upper Energizing time limit for SQA [us] max authority function of rail pressure levels defined for SQA.

Value Units: us

y/x	0	1	2	3	4
1	230	121	91	74	20

Initial Supporting table - KaFADC_t_SQA_MinAdptDeltET[us]

Description: Lower Energizing time limit for SQA max authority [us] function of rail pressure levels defined for SQA.

Value Units: us

y/x	0	1	2	3	4
1	-163	-85	-77	-62	-20

Initial Supporting table - KtFADC_p_SQA_MAP_HiThrsh

Description: Manifold Air Pressure High Threshold [kPa] to disable SQA Strategy function on Rail Pressure levels defined for SQA

Value Units: MPa

y/x	1,000	1,200	1,400	1,600	1,800
1	200	200	200	200	200

Initial Supporting table - KtFADC_V_CB_HiThrshFuelQnty

Description: Injected quantity high threshold to enable Cylinder Balancing control [mm^3]

Value Units: mm^3

y/x	600	700	750	800	850	900	950	1,000	1,100	1,200	1,350	1,500
1	20	20	20	20	20	20	20	20	25	25	25	30

Initial Supporting table - KtFADC_V_FSA_FuelMax

Description: Map used to define FSA maximum authority

Value Units: mm^3

y/x	5	10	20	30	40	50	60	70	80	90
1,000	9	10	9	12	14	16	18	20	22	23
1,250	10	11	10	12	14	16	18	20	22	24
1,500	10	11	10	12	14	16	19	21	23	24
1,750	10	11	10	12	14	17	19	21	23	24
2,000	10	11	10	12	14	17	19	21	23	25
2,250	10	11	10	12	15	17	19	21	23	25
2,500	10	11	10	12	15	17	19	21	23	25
2,750	10	11	10	12	15	17	20	21	23	25
3,000	10	11	10	13	15	17	20	21	23	24
3,250	10	11	10	13	15	17	19	21	23	24

Initial Supporting table - KtFADC_V_FSA_FuelMin

Description: Map used to define FSA minimum authority

Value Units: mm^3

y/x	5	10	20	30	40	50	60	70	80	90
1,000	-9	-10	-9	-12	-14	-16	-18	-20	-22	-23
1,250	-10	-11	-10	-12	-14	-16	-18	-20	-22	-24
1,500	-10	-11	-10	-12	-14	-16	-19	-21	-23	-24
1,750	-10	-11	-10	-12	-14	-17	-19	-21	-23	-24
2,000	-10	-11	-10	-12	-14	-17	-19	-21	-23	-25
2,250	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,500	-10	-11	-10	-12	-15	-17	-19	-21	-23	-25
2,750	-10	-11	-10	-12	-15	-17	-20	-21	-23	-25
3,000	-10	-11	-10	-13	-15	-17	-20	-21	-23	-24
3,250	-10	-11	-10	-13	-15	-17	-19	-21	-23	-24

Initial Supporting table - KtFADC_V_FSA_MaxFuelFall

Description: Upper bound of fuel quantity range to enable the FSA learning phase depending on the engine speed

Value Units: mm^3

y/x	510	511	1,000	1,600	1,800	2,000	2,400	3,200	3,600	4,000
1	80	80	80	80	80	80	80	80	80	80

Initial Supporting table - KtFADD_p_XSQA_MAP_HiThrsh

Description: Manifold Air Pressure High Threshold [kPa] to disable SQA Emission Correlated Monitoring function on Rail Pressure levels defined for SQA

Value Units: kPa

y/x	1,000	1,200	1,400	1,600	1,800
1	200	200	200	200	200

Initial Supporting table - KtFADD_Pct_SSQA_InjSuspConfLvl

Description: Calibration table to define the suspicious confidence level [%] function of current last raw Delta Energizing Time [us] and previous one [us]

Value Units: %

y/x	-100	-80	-51	-50	-40	0	40	50	51	80	100
-100	0	0	0	0	0	0	0	0	0	0	0
-51	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	100	100	100	100	100	0	0	0
-40	0	0	0	100	100	100	100	100	0	0	0
0	0	0	0	100	100	100	100	100	0	0	0
40	0	0	0	100	100	100	100	100	0	0	0
52	0	0	0	100	100	100	100	100	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0494_LIN_Threshold

Description: Tabulated LIN Fan1 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan1 Speed rpm
Y Units: Sensed LIN Fan1 Speed Lower Limit rpm

y/x	0	625	626	2,140	2,141	2,142	2,143	2,144	2,145	2,146	2,147	2,148	2,149	2,150	2,151	2,152	2,153
1	0	425	425	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940

Initial Supporting table - P2CB9_LIN_Threshold

Description: Tabulated LIN Fan2 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan2 Speed rpm
Y Units: Sensed LIN Fan2 Speed Lower Limit rpm

y/x	0	625	626	2,500	2,501	2,502	2,503	2,504	2,505	2,506	2,507	2,508	2,509	2,510	2,511	2,512	2,513
1	0	425	425	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300

Initial Supporting table - Shutter 1 AC OFF - Open / Close Commands

Description: Open / Close Commands for Shutter 1 - AC OFF

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 1 AC OFF - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 1 - AC OFF Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 1 AC OFF - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 1 - AC OFF Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 1 AC ON - Open / Close Commands

Description: Open / Close Commands for Shutter 1 - AC ON

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 1 AC ON - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 1 - AC ON Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 1 AC ON - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 1 - AC ON Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 2 AC OFF - Open / Close Commands

Description: Open / Close Commands for Shutter 2 - AC OFF

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 2 AC OFF - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 2 - AC OFF Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 2 AC OFF - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 2 - AC OFF Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 2 AC ON - Open / Close Commands

Description: Open / Close Commands for Shutter 2 - AC ON

Value Units: Percent
X Unit: KPH
Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	95	95	95	95	95	95	95	95	95
6	0	90	90	90	90	90	90	90	90	90
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 2 AC ON - Percent Fan Command Axis

Description: Percent Fan Command Axis for Shutter 2 - AC ON Table

Value Units: Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	4	8	14	17	18	20	22	24	83	90

Initial Supporting table - Shutter 2 AC ON - Vehicle Speed Axis

Description: Vehicle Speed Axis for Shutter 2 - AC ON Table

Value Units: KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - P0494_LIN_Threshold

Description: Tabulated LIN Fan1 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan1 Speed rpm
Y Units: Sensed LIN Fan1 Speed Lower Limit rpm

y/x	0	625	626	2,140	2,141	2,142	2,143	2,144	2,145	2,146	2,147	2,148	2,149	2,150	2,151	2,152	2,153
1	0	425	425	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940

Initial Supporting table - P2CB9_LIN_Threshold

Description: Tabulated LIN Fan2 Speed Low Limits

Value Units: rpm
X Unit: Commanded LIN Fan2 Speed rpm
Y Units: Sensed LIN Fan2 Speed Lower Limit rpm

y/x	0	625	626	2,500	2,501	2,502	2,503	2,504	2,505	2,506	2,507	2,508	2,509	2,510	2,511	2,512	2,513
1	0	425	425	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300

Initial Supporting table - P0216_ET_CumulEnbl

Description: This calibration provides the capability to select which pulses of the injection pattern have to be monitored
1 -> pulse monitored
0 -> pulse NOT monitored

Value Units: Boolean
X Unit: Pulse ID

P0216_ET_CumulEnbl - Part 1

y/x	CeFULR_e_PulsPI	CeFULR_e_PulsR2	CeFULR_e_PulsR1	CeFULR_e_PulsM	CeFULR_e_PulsA1	CeFULR_e_PulsA2	CeFULR_e_PulsA3
1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00

P0216_ET_CumulEnbl - Part 2

y/x	CeFULR_e_PulsA4	CeFULR_e_PulsP1	CeFULR_e_PulsP2	CeFULR_e_PulsP3	CeFULR_e_PulsP4	CeFULR_e_PulsP5	
1.00	1.00	0.00	0.00	0.00	0.00	0.00	

Initial Supporting table - P0216_PulsWidthErrHi

Description: This error threshold map defines the maximum acceptable positive error [us] between cumulative ET HW and ET SW, depending on the number of pulses driven and monitored.

Value Units: us
X Unit: -
Y Units: Number of pulses

y/x	0.00	1.00	2.00	3.00	4.00	5.00
1.00	32,767.00	14.00	14.00	18.00	22.00	40.00

Initial Supporting table - P054E_IFM_CombModesEnbl

Description: This calibration provides the capability to select in which combustion mode the Idle Fuel Monitoring shall be enabled.
1 -> monitor enabled
0 -> monitor disabled

Value Units: Boolean
X Unit: Combustion Mode

P054E_IFM_CombModesEnbl - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P054E_IFM_CombModesEnbl - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P054E_IFM_CombModesEnbl - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P054E_IFM_CombModesEnbl - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	0	0	

Initial Supporting table - P054E_IFM_MinFuelIdleC1_G

Description: During Normal combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	11	11	11	13	15
-10	10	10	10	11	14
0	9	9	9	11	12
20	9	9	9	11	12
40	6	6	6	9	13
70	5	5	5	8	11

Initial Supporting table - P054E_IFM_MinFuelIdleC1_PN

Description: During Normal combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	11	11	11	10	9
-10	8	8	8	8	8
0	5	5	5	6	7
20	4	4	4	5	5
40	4	4	4	4	4
70	2	2	2	2	3

Initial Supporting table - P054E_IFM_MinFuelIdleHC_G

Description: During HC Unloading combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	16	16	16	18	19
-10	13	13	13	15	17
0	9	9	9	12	15
20	8	8	8	11	13
40	7	7	7	12	16
70	5	5	5	9	13

Initial Supporting table - P054E_IFM_MinFuelIdleHC_PN

Description: During HC Unloading combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	14	14	14	15	16
-10	11	11	11	11	13
0	8	8	8	10	11
20	7	7	7	8	9
40	4	4	4	5	5
70	3	3	3	3	4

Initial Supporting table - P054E_IFM_MinFuelIdleV2_G

Description: During Soft Warm Up combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	11	11	11	12	12
-10	10	10	10	10	10
0	9	9	9	7	7
20	8	8	8	10	13
40	7	7	7	10	14
70	5	5	5	8	11

Initial Supporting table - P054E_IFM_MinFuelIdleV2_PN

Description: During Soft Warm Up combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	12	12	12	12	12
-10	10	10	10	10	10
0	6	6	6	7	7
20	5	5	5	5	6
40	4	4	4	4	5
70	2	2	2	3	3

Initial Supporting table - P054E_IFM_MinFuelIdleV3_G

Description: During Strong Warm Up combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	10	10	10	12	15
-10	9	9	9	11	14
0	8	8	8	10	14
20	7	7	7	10	13
40	6	6	6	9	12
70	5	5	5	8	11

Initial Supporting table - P054E_IFM_MinFuelIdleV3_PN

Description: During Strong Warm Up combustion mode, this error threshold map indicates the minimum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	11	11	11	11	12
-10	8	8	8	9	9
0	6	6	6	6	7
20	5	5	5	5	5
40	4	4	4	4	4
70	1	3	3	3	3

Initial Supporting table - P054F_IFM_CombModesEnbl

Description: This calibration provides the capability to select in which combustion mode the Idle Fuel Monitoring shall be enabled.
1 -> monitor enabled
0 -> monitor disabled

Value Units: Boolean
X Unit: Combustion Mode

P054F_IFM_CombModesEnbl - Part 1					
y/x	CeCMBR_e_Normal	CeCMBR_e_DPF_HiO2	CeCMBR_e_DPF_LoO2	CeCMBR_e_FullyWarmEmissions	CeCMBR_e_LNT_DeNOx
1	1	0	0	0	0

P054F_IFM_CombModesEnbl - Part 2					
y/x	CeCMBR_e_LNT_DeSOx_Lean	CeCMBR_e_LNT_DeSOx_Rich	CeCMBR_e_StrongExhGasWarmUp	CeCMBR_e_SoftExhGasWarmUp	CeCMBR_e_DPF_PN
1	0	0	1	1	0

P054F_IFM_CombModesEnbl - Part 3					
y/x	CeCMBR_e_DPF_RichIdle	CeCMBR_e_DPF_EngPrtct_HiO2	CeCMBR_e_DPF_EngPrtct_LoO2	CeCMBR_e_LNT_EngPrtct	CeCMBR_e_FAD_IdleInjLrn
1	0	0	0	0	0

P054F_IFM_CombModesEnbl - Part 4					
y/x	CeCMBR_e_HCS_DeHC_Drive	CeCMBR_e_HCS_DeHC_Park	CeCMBR_e_SCR_ServWarmUp	CeCMBR_e_SCR_ServCheck	
1	1	1	0	0	

Initial Supporting table - P054F_IFM_MaxFuelIdleC1_G

Description: During Normal combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	24	24	24	24	25
-10	19	19	21	23	27
0	19	19	20	22	26
20	18	18	20	22	26
40	18	18	20	22	25
70	16	16	17	20	25

Initial Supporting table - P054F_IFM_MaxFuelIdleC1_PN

Description: During Normal combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	20	20	20	21	22
-10	18	18	18	18	18
0	17	17	17	17	18
20	17	17	17	17	17
40	16	16	16	17	17
70	14	14	14	15	15

Initial Supporting table - P054F_IFM_MaxFuelIdleHC_G

Description: During HC Unloading combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	23	23	23	28	31
-10	22	22	22	27	30
0	21	21	21	25	29
20	20	20	20	24	28
40	16	16	16	21	27
70	15	15	15	20	25

Initial Supporting table - P054F_IFM_MaxFuelIdleHC_PN

Description: During HC Unloading combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	31	31	31	32	34
-10	26	26	26	28	29
0	22	22	22	24	25
20	19	19	19	20	21
40	18	18	18	19	20
70	14	14	16	16	17

Initial Supporting table - P054F_IFM_MaxFuelIdleV2_G

Description: During Soft Warm Up combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	21	21	24	30	38
-10	18	18	21	25	31
0	18	18	21	21	25
20	17	17	19	19	24
40	16	16	18	19	23
70	16	16	18	18	22

Initial Supporting table - P054F_IFM_MaxFuelIdleV2_PN

Description: During Soft Warm Up combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	24	24	24	28	32
-10	21	21	21	24	28
0	19	19	19	22	25
20	18	18	18	21	24
40	17	17	17	18	19
70	16	16	16	16	17

Initial Supporting table - P054F_IFM_MaxFuelIdleV3_G

Description: During Strong Warm Up combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in gear. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	36	36	36	37	38
-10	33	33	33	34	34
0	30	30	30	31	32
20	24	24	24	27	29
40	19	19	19	23	27
70	17	17	19	22	27

Initial Supporting table - P054F_IFM_MaxFuelIdleV3_PN

Description: During Strong Warm Up combustion mode, this error threshold map indicates the maximum fuel requested [mm3] in nominal condition and with transmission in park and neutral. It's function of engine coolant temperature [°C] and engine speed [rpm]

Value Units: mm3
X Unit: rpm
Y Units: °C

y/x	0	400	800	1,000	1,200
-20	34	34	34	35	36
-10	31	31	31	32	33
0	27	27	27	29	31
20	21	21	21	23	26
40	17	17	17	20	23
70	16	16	16	17	19

Initial Supporting table - RufCyl_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufCyl_Decel - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
2	1,854	1,690	1,235	692	511	404	323	233	160	103	76	61	49
4	1,931	1,657	1,061	611	419	319	262	203	129	91	69	53	41
6	1,895	1,742	855	539	337	250	206	176	96	83	62	47	35
8	2,206	1,801	714	461	310	209	164	135	83	71	53	41	30
10	2,638	2,000	805	511	320	239	154	132	83	67	45	31	23
12	2,765	2,150	936	696	392	299	176	140	82	68	45	32	24
14	2,873	2,289	1,025	846	451	355	196	144	79	64	47	32	25
16	3,043	2,408	1,185	960	504	390	201	147	86	61	46	35	28
18	3,152	2,480	1,408	1,023	534	432	213	154	97	58	45	35	27
20	3,237	2,584	1,511	1,067	556	466	244	183	101	59	48	37	29
22	3,355	2,737	1,636	1,136	606	492	269	218	110	61	43	36	30
24	3,492	2,870	1,788	1,234	669	520	329	267	128	79	46	35	34
26	3,663	3,035	1,941	1,318	727	559	380	315	149	95	53	39	35
30	3,965	3,234	2,165	1,462	842	627	484	405	202	126	86	56	55
40	4,727	3,891	2,790	1,919	1,145	834	725	614	329	190	152	90	97
60	6,467	5,205	3,883	2,732	1,724	1,233	1,207	1,010	582	321	274	163	168
97	9,862	7,752	6,035	4,285	2,711	1,921	2,061	1,741	1,040	574	508	321	308

RufCyl_Decel - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
2	35	27	31	21	22	20	20	17	16	15	16	13	13
4	32	24	26	18	18	18	18	15	14	13	14	12	12
6	29	21	22	15	16	15	15	13	13	12	12	10	10
8	27	19	20	16	14	14	14	12	11	11	11	9	9
10	19	18	17	16	12	12	12	11	10	10	9	8	8
12	17	18	17	14	12	11	9	9	9	10	9	7	7
14	17	16	14	12	10	10	9	8	8	9	7	7	7
16	15	16	15	12	10	10	8	7	7	8	7	6	6
18	19	17	16	12	12	10	8	7	7	7	7	6	6
20	20	20	17	14	12	10	9	7	7	7	7	5	5
22	28	23	21	19	16	11	9	8	7	7	7	5	5

Initial Supporting table - RufCyl_Decel

24	35	30	24	23	18	12	10	9	8	7	7	5	5
26	44	39	29	26	21	13	11	10	10	9	8	6	6
30	59	54	36	31	24	16	13	11	11	11	9	7	7
40	98	82	49	41	34	21	17	14	14	13	13	11	11
60	168	143	79	60	52	31	25	20	19	19	21	19	19
97	296	259	131	95	86	50	38	31	29	30	34	34	34

Initial Supporting table - RufCyl_Jerk

Description: Crankshaft jerk threshold during Idle or GPF regen. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufCyl_Jerk - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
2	1,613	1,442	1,066	584	505	299	273	215	161	90	58	54	45
4	1,622	1,403	998	568	445	281	264	204	141	83	56	50	39
6	1,555	1,299	930	578	407	301	263	208	128	80	57	46	32
8	1,842	1,606	944	663	422	314	260	221	133	95	66	54	36
10	2,170	1,942	968	715	429	326	247	233	131	115	77	60	39
12	2,529	2,268	1,164	816	560	351	276	194	157	126	87	62	39
14	2,685	2,440	1,376	881	673	396	349	186	172	128	92	66	42
16	2,796	2,552	1,546	947	750	464	387	238	176	142	98	79	44
18	2,925	2,729	1,697	1,058	811	558	467	305	188	169	98	90	48
20	3,320	2,891	1,861	1,143	891	657	509	400	254	195	101	104	55
22	3,465	3,031	2,012	1,254	951	725	566	466	311	219	110	127	62
24	3,733	3,158	2,150	1,313	1,008	787	626	510	360	247	130	143	70
26	3,786	3,247	2,264	1,380	1,066	857	666	542	405	260	154	155	80
30	4,151	3,399	2,490	1,551	1,205	969	742	622	467	312	195	173	93
40	4,796	3,879	2,981	1,937	1,493	1,255	1,004	827	615	407	269	224	125
60	6,018	4,818	3,830	2,709	2,110	1,831	1,545	1,218	902	601	400	333	184
97	8,514	6,869	5,412	4,177	3,409	2,825	2,422	1,982	1,453	991	672	552	313

RufCyl_Jerk - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
2	45	36	34	26	25	32	22	17	18	17	17	12	12
4	35	27	28	22	20	26	19	14	15	14	15	11	11
6	27	20	23	18	15	21	16	12	12	12	13	10	10
8	28	24	24	20	16	14	12	12	11	11	12	9	9
10	29	26	24	21	17	15	13	13	11	10	10	8	8
12	28	26	27	22	19	16	14	13	12	11	10	8	8
14	29	26	28	24	21	17	15	13	13	12	10	8	8
16	29	30	27	29	22	19	16	13	13	12	11	8	8
18	31	32	26	31	23	21	18	13	13	13	11	9	9
20	35	33	28	33	25	24	20	14	13	14	11	10	10
22	38	40	34	36	29	26	23	17	14	15	11	10	10

Initial Supporting table - RufCyl_Jerk

24	40	42	40	40	32	27	25	20	17	15	11	11	11
26	43	46	46	43	35	30	28	21	20	16	13	11	11
30	56	58	56	50	40	35	31	25	23	19	16	12	12
40	84	89	81	66	55	46	39	33	31	26	21	14	14
60	136	146	126	96	82	67	52	47	44	37	29	18	18
97	221	259	209	150	128	105	79	72	69	56	44	26	26

Initial Supporting table - RufSCD_Decel

Description: Used for P0300-P0308. Crankshaft decel threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load. Note: Misfire's Load term is %, but not PID$04. PID $04 is not robust to temperature and alititude shifts. (especially decel and jerk thresholds since they track actual air trapped in cylinder)

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufSCD_Decel - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

RufSCD_Decel - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Decel

20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)
X Unit: rpm
Y Units: percent load of max indicated torque (%)

RufSCD_Jerk - Part 1

y/x	550	625	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

RufSCD_Jerk - Part 2

y/x	2,400	2,600	2,800	3,000	3,200	3,400	3,600	3,800	4,000	4,200	4,400	4,850	5,500
2	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
4	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD_Jerk

22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID

Description: Crankshaft Indicated Mean Effective Pressure (IMEP) Estimate that below which will be considered misfire. Misfire calibrations used with Crankshaft Based IMEP (Indicated Mean Effective Pressure) estimatimation do not interpolate versus speed and load. Instead they use unique calibrations within each small speed load region or "bin". Each Bin has has its own "BinID". This BinID keeps all the Crank Based IMEP estimate calculations and various Misfire calibrations synchronized while minimzing through put. Each speed load range defines a unique "Bin ID" in this Bin ID table.
The BinID table's Y axis is cylinder load, and X axis is rpm as defined in Misfire_IMEP_BinID_Load_Axis and Misfire_IMEP_BinID_RPM_Axis tables

Value Units: KPa
X Unit: BinID

Misfire_IMEP_Thresh_vs_BinID - Part 1

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 2

y/x	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 3

y/x	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 4

y/x	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 5

y/x	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 6

y/x	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 7

y/x	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 8

y/x	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Misfire_IMEP_Thresh_vs_BinID - Part 9

y/x	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152

Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID

1	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255	-255

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit Low	C124F	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	≤ -3.8500 g ≥ -3.8500 g (≤ 0.5 Ω impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit High	C1250	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	≥ 3.8500 g ≤ 3.8500 g (≤ 0.5 Ω impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Performance	C1251	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a signal value that is stuck in a valid range by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal) update raw lateral acceleration signal fail, 50 millisecond update rate	≥ 0.5300 g ≤ 3.8500 g	battery voltage run crank voltage diagnostic monitor enable update raw lateral acceleration signal stablity time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw lateral acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean ≥ 15.0 KPH = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit Low	C1252	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	≤ -3.8500 g ≥ -3.8500 g (≤ 0.5 Ω impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time ≥ 15.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit High	C1253	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	≥ 3.8500 g ≤ 3.8500 g (≤ 0.5 Ω impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Performance	C1254	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal rationalized against the TOSS vehicle speed acceleration. The diagnostic monitor can be designed to detect an invalid longitudinal acceleration signal based on the TOSS vehicle speed windows and TOSS vehicle speed acceleration, 4 windows can be enabled. The delta between the TOSS vehicle speed acceleration and longitudinal acceleration signal is taken within each window to verify the delta is small, no failure indicated, or the delta is large indicating the longitudinal acceleration signal is in error. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 1 fail time, 50 millisecond update rate	≥ 0.5300 g	battery voltage run crank voltage diagnostic monitor enable region 1 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 1 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≥ 80.0 Nm ≥ 0.1500 g ≥ 15.0 KPH ≤ 200.0 KPH	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate region 1 fail time ≥ 75.0 seconds out of region 1 sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	< 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 2 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 2 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal)	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					update region 2 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	 ≤ 0.70 % ≥ 80.0 Nm ≥ 0.1500 g ≥ 0.0 KPH ≤ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 2 fail time ≥ 75.0 seconds out of region 2 sample time ≥ 120.0 seconds, 50 millisecond update rate	
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 3 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 3 sample time: brake pedal position engine torque ABS(TOSS vehicle speed acceleration) TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≥ 80.0 Nm ≤ 0.1000 g ≥ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 3 fail time ≥ 75.0 seconds out of region 3 sample time ≥ 120.0 seconds, 50 millisecond update rate	
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 4 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 4 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≤ 80.0 Nm ≤ 0.1500 g ≥ 0.0 KPH ≤ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 4 fail time ≥ 75.0 seconds out of region 4 sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Acceleration Sensor Signal Message Counter Incorrect	P175F	The diagnostic monitor detects an alive rolling count error or checksum error in the CAN frame containing the lateral acceleration signal value and longitudinal acceleration sensor signal value. Emission neutral default state sets lateral and longitudinal acceleration signal = 0.0 g.	rolling count value received from EBCM and expected TCM calculated value not equal OR checksum lateral and longitudinal acceleration CAN frame message value error 50 millisecond update rate	= TRUE = TRUE	enable alive rolling count error detection: diagnostic monitor enable lateral and longitudinal acceleration CAN frame message received battery voltage run crank voltage enable checksum error detection: diagnostic monitor enable lateral and longitudinal acceleration CAN frame message received normal CAN battery voltage run crank voltage communication enabled DTCs not fault active	= 1 Boolean = TRUE ≥ 11.0 volts ≥ 11.0 volts = 1 Boolean = TRUE ≥ 11.0 volts ≥ 11.0 volts = TRUE U0073	alive rolling count errors ≥ 54 out of 9 sample counts 50 millisecond update rate checksum error time ≥ 54.00 seconds	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Steering Wheel Angle Sensor Signal Message Counter Incorrect	C1211	This DTC monitors for an error in the Steering Wheel Angle Sensor Signal Message Counter. emission neutral default action sets steering angle = 0 degress rotation	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) of the following signals received over serial data is incorrect for: Steering Wheel Angle ARC Steering Angle Sensor CSUM	>= 15.00 counts out of >= 18.00 counts >= 3.00 counts out of >= 18.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Executes in 12.5ms loop.	Emissions Neutral Diagnostics – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit Low	C124F	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	≤ -3.8500 g ≥ -3.8500 g (≤ 0.5 Ω impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit High	C1250	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	raw lateral acceleration signal when sensor type is directly proportional OR raw lateral acceleration signal when sensor type is inversely proportional update raw lateral acceleration signal stability time, fail and sample time, 50 millisecond update rate	≥ 3.8500 g ≤ 3.8500 g (≤ 0.5 Ω impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw lateral acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Performance	C1251	Controller specific analog circuit diagnoses the raw lateral acceleration signal for a signal value that is stuck in a valid range by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral acceleration signal = 0.0 g.	ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal) update raw lateral acceleration signal fail, 50 millisecond update rate	≥ 0.5300 g ≤ 3.8500 g	battery voltage run crank voltage diagnostic monitor enable update raw lateral acceleration signal stablity time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw lateral acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean ≥ 15.0 KPH = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA	raw lateral acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit Low	C1252	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to ground or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	≤ -3.8500 g ≥ -3.8500 g (≤ 0.5 Ω impedance between signal and controller ground)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit High	C1253	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal for a short to power or open fault by comparing raw signal value to fail thresholds. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate	≥ 3.8500 g ≤ 3.8500 g (≤ 0.5 Ω impedance between signal and controller power)	battery voltage run crank voltage diagnostic monitor enable sensor type is either directly proportional or inversely proportional U0073 fault active U0073 test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = CeLATR_e_VoltageDirectProp = FALSE = FALSE	raw longitudinal acceleration signal stability time ≥ 30.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Performance	C1254	Controller specific analog circuit diagnoses the raw longitudinal acceleration signal rationalized against the TOSS vehicle speed acceleration. The diagnostic monitor can be designed to detect an invalid longitudinal acceleration signal based on the TOSS vehicle speed windows and TOSS vehicle speed acceleration, 4 windows can be enabled. The delta between the TOSS vehicle speed acceleration and longitudinal acceleration signal is taken within each window to verify the delta is small, no failure indicated, or the delta is large indicating the longitudinal acceleration signal is in error. Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.	ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 1 fail time, 50 millisecond update rate	≥ 0.0800 g	battery voltage run crank voltage diagnostic monitor enable region 1 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 1 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 1 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≥ 50.0 Nm ≥ 0.0800 g ≥ 2.0 KPH ≤ 120.0 KPH	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate region 1 fail time ≥ 4.0 seconds out of region 1 sample time ≥ 5.0 seconds, 50 millisecond update rate	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	< 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError		
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 2 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 2 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal)	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					update region 2 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	 ≤ 0.70 % ≥ 80.0 Nm ≥ 0.1500 g ≥ 0.0 KPH ≤ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 2 fail time ≥ 75.0 seconds out of region 2 sample time ≥ 120.0 seconds, 50 millisecond update rate	
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 3 fail time, 50 millisecond update rate	≥ 0.0000 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 0 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 3 sample time: brake pedal position engine torque ABS(TOSS vehicle speed acceleration) TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≥ 80.0 Nm ≤ 0.1000 g ≥ 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 3 fail time ≥ 75.0 seconds out of region 3 sample time ≥ 120.0 seconds, 50 millisecond update rate	
			ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal) update raw longitudinal acceleration signal region 4 fail time, 50 millisecond update rate	≥ 0.1700 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stablity time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable	≥ 11.00 volts ≥ 11.00 volts = 1 Boolean = 1 Boolean ≥ 15.0 KPH ≤ 0.5300 g = TRUE = TRUE = TRUE	raw lateral longitudinal acceleration signal stability time ≥ 10.0 seconds, fail time ≥ 75.0 seconds out of sample time ≥ 120.0 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					diagnsotic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on P07BF fault active P07BF test fail this key on P07C0 fault active P07C0test fail this key on attained gear ABS(raw longitudinal acceleration signal) AND ABS(raw longitudinal acceleration signal) update region 4 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed ABS(raw longitudinal acceleration signal) update sample time U0073 fault active U0073 test fail this key on DTCs not fault active	= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th ≥ 0.5300 g ≤ 3.8500 g ≤ 0.70 % ≤ 50.0 Nm ≤ -0.1700 g ≥ 2.0 KPH ≤ 120.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 4 fail time ≥ 2.0 seconds out of region 4 sample time ≥ 2.5 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect or the flash memory detects an uncorrectable error via the Error Correcting Code.	The Primary Processor's calculated checksum does not match the stored checksum value. Covers all software and calibrations.	1 failure if the fault is detected during the first pass. 5.00 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type A, 1 Trips
			The Primary Processor's Error Correcting Code hardware in the flash memory detects an error. Covers all software and calibrations.	254 failures detected via Error Correcting Code			Diagnostic runs continuously via the flash hardware.	
				In all cases, the failure count is cleared when controller shuts down				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Not Programmed	P0602	This DTC will be stored if the DEC ECU has not been flash programmed with production software and calibration.	controller not flash programmed calibration	= 0 Boolean	controller normal power up initialization, ignition run crank transtions from low to high service Mode $04 active during one second loop	 = FALSE	at controller power up intitalization one time (one event/ occurance) OR in one second time loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Reset	P0603	This DTC detects an invalid NVM which includes a Static NVM, Perserved NVM, ECC ROM in NVM Flash Region, and Perserved NVM during shut down.	Static NVM region error detected during initialization				Diagnostic runs at controller power up.	Type A, 1 Trips
			Perserved NVM region error detected during initialization				Diagnostic runs at controller power up.	
			Perserved NVM region error detected during shut down.				Diagnostic runs at controller power down.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Random Access Memory (RAM)	P0604	Indicates that the controller has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	3 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.40000 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	65,534 counts			Diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Internal Performance	P0606	Indicates that the controller has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for both the primary and secondary processsors.	Time new seed not received exceeded			always running	409.594 seconds	Type A, 1 Trips
			MAIN processor receives seed in wrong order			always running	18 / 17 counts intermittent. 50 ms/count in the controller main processor	
			2 fails in a row in the MAIN processor's ALU check			Test is Enabled: 0 (If 0, this test is disabled)	25 ms	
			2 fails in a row in the MAIN processor's configuration register masks versus known good data			Test is Enabled: 1 (If 0, this test is disabled)	12.5 to 25 ms	
			Checks number of stack over/under flow since last powerup reset >=	5.00		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		Test is Enabled: 1 (If 0, this test is disabled)	5 / 10 counts or 0.450 seconds continuous; 50 ms/count in the controller main processor	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization.	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Counter >=					
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	
			MAIN processor DMA transfer from Flash to RAM has 1 failure			Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to write flash to RAM	
			Safety critical software is not executed in proper order.	>= 1 incorrect sequence.		Test is Enabled: 1 (If 0, this test is disabled)	Fail Table, f(Loop Time). See supporting tables: **P0606_PSW Sequence Fail f (Loop Time)** / Sample Table, f (Loop Time)See supporting tables: **P0606_PSW Sequence Sample f(Loop Time)** counts 50 ms/count in the controller main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			MAIN processor determines a seed has not changed within a specified time period within the 50ms task.	Previous seed value equals current seed value.		Test is Enabled: 1 (If 0, this test is disabled)	Table, f(Loop Time). See supporting tables: **P0606_Last Seed Timeout f (Loop Time)**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Performance	P0607	Indicates that the controller has detected an internal processor integrity performance.	Performs the failure diagnostic for the offline and online BIST results.			Test is enabled: 0 . (If 0, this test is disabled)	5 counts background task/ count in the controller main processor	Type A, 1 Trips
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: 1 . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occured since last controller initialization. Counter >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: 1 . (If 0, this test is disabled)	variable, depends on length of time to write flash to RAMvariable, depends on length of time to write flash to RAM	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Internal Control Module EEPROM Error	P062F	This DTC detects a NVM long term performance. There are two types of diagnostics that run during controller power up. One for HWIO reports that writing to NVM (at shutdown) will not succeed, and the other HWIO reports the assembly calibration integrity check has failed.	HWIO reports that writing to NVM (at shutdown) will not succeed				Diagnostic runs at controller power up.	Type A, 1 Trips
			HWIO reports the assembly calibration integrity check has failed				Diagnostic runs at controller power up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Actuator Supply Voltage Circuit Low	P0658	Controller specific output driver circuit diagnoses the high sided driver circuit for a short to ground failure, or where controller H/W cannot differentiate, diagnoses the high sided driver circuit for a short to ground failure or open circuit failure, when the output is powered on, by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground or an open circuit.	≤ 0.5 Ω impedance between signal and controller ground OR ≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail count and increment sample count, otherwise increment only sample count	(ground short diagnostic monitor enable calibration OR open circuit diagnostic monitor enable calibration) high side drive ON service mode $04 active	= 1 Boolean = 1 Boolean = TRUE = FALSE	ground short fail count ≥ 6 counts within sample count of 2,400 counts OR open circuit fail count ≥ 30 counts within sample count of 50 counts 6.25 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range (TR) Switch Circuit Low Voltage	P0707	Diagnoses the internal range sensor circuit A and wiring for a ground short circuit fault using controller specific PWM duty cycle measurement thresholds.	when PWM sensor type and PWM voltage direct conditional internal range sensor A PWM duty cycle when PWM sensor type and PWM voltage inverse conditional internal range sensor A PWM duty cycle Increment fail and sample time, update rate 25 milliseconds Controller specific PWM duty cycle thresholds are set to meet the following controller specification for a short to ground.	≤ 7.779 % duty cycle ≥ 7.779 % duty cycle ≤ 0.5 Ω impedance between signal and controller ground	diagnostic monitor enable battery voltage when sensor type is PWM duty cycle direct or inverse conditional for fail threshold is used conditional type check calibration	= 1 Boolean ≥ 0.00 volts = CeTRGD_e_VoltDirctProp	fail time ≥ 0.500 seconds out of sample time ≥ 1.500 seconds battery voltage time ≥ 1.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range (TR) Switch Circuit High Voltage	P0708	Diagnoses the internal range sensor circuit A and wiring for a short to voltage circuit fault using controller specific PWM duty cycle measurement thresholds.	when PWM sensor type and PWM voltage direct conditional internal range sensor A PWM duty cycle when PWM sensor type and PWM voltage inverse conditional internal range sensor A PWM duty cycle Increment fail and sample time, update rate 25 milliseconds Controller specific PWM duty cycle thresholds are set to meet the following controller specification for a short to power.	≥ 92.221 % duty cycle ≤ 92.221 % duty cycle ≤ 0.5 Ω impedance between signal and controller power	diagnostic monitor enable battery voltage when sensor type is PWM duty cycle direct or inverse conditional for fail threshold is used conditional type check calibration ECM Message Available Communication Check Enable for ECM message Vehicle is in a mode that enables accessory power	= 1 Boolean ≥ 0.00 volts = CeTRGD_e_VoltDirctProp = TRUE = 1.00 Boolean = TRUE	fail time ≥ 0.900 seconds out of sample time ≥ 1.100 seconds battery voltage time ≥ 1.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature (TFT) Sensor Performance	P0711	The diagnostic monitor will verify the time to transmission fluid temperature warm up based on the raw transmission fluid temperature sesnor, any intermittent signal that causes multiple unrealistic delta changes (intermittent faults) based on the raw transmission fluid temperature sesnor, and, raw transmission fluid temperature sesnor signal stuck in valid range.	raw transmission fluid temperature and the transmission fluid temperature warm up time has elapsed	≤ -6.7 °C			transmission fluid temperature warm up time ≥ **transmission fluid temperature warm up time** seconds	Type B, 2 Trips
					diagnsotic monitor enable	= 1 Boolean		
					P0712 NOT fault active			
					P0713 NOT fault active			
					battery voltage	≥ 9.00 volts	battery voltage time ≥ 0.100 seconds	
					run crank voltage	≥ 9.00 volts	run crank voltage time ≥ 0.100 seconds	
					warm up test enable	= 1 Boolean		
					TFT rationality diagnostic monitor enabled	= VeTFSR_b_TFT_RatlEnbl		
					driver accelerator pdeal position	≥ 5.0 %		
					engine torque	≥ 50.0 Nm		
					engine speed	≥ 500.0 RPM		
					vehicle speed	≥ 10.0 KPH		
					engine coolant temperature	≥ -40.0 °C		
					engine coolant temperature	≤ 150.0 °C		
					raw transmission fluid temperature	≥ -273.0 °C		
					raw transmission fluid temperature	≤ 150.0 °C		
					P2818 fault active	= FALSE		
					P2818 test fail this key on	= FALSE		
					DTCs not fault active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						EngineTorqueEstInaccurate AcceleratorPedalFailure CrankSensor_FA ECT_Sensor_FA VehicleSpeedSensor_FA		
					TFT Warmup Pass P0711 test fail this key on	= FALSE = FALSE		
			current transmission fluid temperature string length = previous transmission fluid temperature transmission temperature string length + (raw transmission fluid temperature - previous raw transmission fluid temperature, update rate 100 milliseconds, increment sample count	≥ 80.0 °C			sample count ≥ 10 counts evaluate fail temperature threshold, 100 millisecond update rate, if transmission fluid temperature string length above fail threshold increment fail time fail time ≥ 8.0 seconds out of sample time ≥ 12.0 seconds	
					diagnsotic monitor enable P0712 NOT fault active P0713 NOT fault active	= 1 Boolean		
					battery voltage	≥ 9.00 volts	battery voltage time ≥ 0.100 seconds	
					run crank voltage	≥ 9.00 volts	run crank voltage time ≥ 0.100 seconds	
					intermittent test enable	= 1 Boolean		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					propulsion system active	= TRUE		
			raw transmission fluid temperature - previous raw transmission fluid temperature, update rate 100 milliseconds, update fail time	≤ 0.0000 °C	diagnsotic monitor enable P0712 NOT fault active P0713 NOT fault active battery voltage run crank voltage stuck in range test enable propulsion system active raw transmission fluid temperature raw transmission fluid temperature	= 1 Boolean ≥ 9.00 volts ≥ 9.00 volts = 1 Boolean = TRUE ≥ -273.0 °C ≤ 150.0 °C	fail time ≥ 600.0 seconds battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0712	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance update fail time 1 seconds update rate	≤ 13.000 Ω			fail time ≥ 5.00 seconds out of sample time ≥ 6.00 seconds 1 seconds update rate	Type B, 2 Trips
					diagnostic monitor enable	= 1 Boolean	battery voltage in range time ≥ 0.100 seconds	
					battery voltage	≥ 9.00 volts		
					run crank voltage run crank voltage in range time	≥ 9.00 volts	run crank voltage in range time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0713	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for an open circuit or short to voltage failure by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance update fail time 1 seconds update rate	≥ 284,177.0 Ω	diagnostic monitor enable battery voltage run crank voltage run crank voltage in range time	= 1 Boolean ≥ 9.00 volts ≥ 9.00 volts	fail time ≥ 5.00 seconds out of fail time ≥ 6.00 seconds 1 seconds update rate battery voltage in range time ≥ 0.100 seconds run crank voltage in range time ≥ 0.100 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input Speed Sensor Performance	P0716	Detects unrealistic drop in raw transmission input speed signal RPM. Drop events are counted up to fail threshold. A drop event is defined by a sudden delta change in RPM from one value to a lower value. The raw transmission input speed must achieve a value high enough to record an unrealistic drop sample to sample. Once the drop threshold is met, fail time is accumualted indicating the raw transmission input speed has not recovered above a threshold, allowing the fail event count to increment. Multiple fail event counts must occur, but if the signal remains low, no further deltas occur, the "Input Speed Sensor Circuit Low Voltage" DTC will set before P0716, as P0716 is designed to set based on an intermittent raw transmission input speed signal RPM.	delta raw transmission input speed delta raw transmission input speed = raw transmission input speed - last valid raw transmission input speed, 25 millisecond update rate	≥ 2,000.0 RPM	service mode $04 active diagnostic monitor enable P0717 test fail this key on P07BF test fail this key on P07C0 test fail this key on last valid raw transmission input speed OR valid raw transmission input speed (before drop event) last valid raw transmission input speed updates very 25 milliseconds when stablity time complete as long as (delta delta raw transmission input speed AND raw transmission input speed) raw transmission output speed accelerator pedal position engine torque engine torque transmission hydraulic pressure available: engine speed	= FALSE = 1 Boolean = FALSE = FALSE = FALSE ≥ 240.0 RPM ≥ 240.0 RPM ≤ 320.0 RPM > 200.0 RPM ≥ 377.0 RPM ≥ 5.0 % ≤ 8,191.9 Nm ≥ 30.0 Nm ≥ 500.0 RPM	fail time ≥ 1.500 seconds updated fail event count, fail event count ≥ 5 counts, 25 millisecond update rate raw transmission input speed time ≥ 2.000seconds stability time ≥ 0.100 seconds engine speed time ≥	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate	**engine speed time for transmission hydraulic pressure available**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input Speed Sensor Circuit Low Voltage	P0717	Detects no activity in raw transmission input speed signal RPM due to open ciruit electrical failure mode or sensor internal faults, or, controller internal failure modes. The raw transmission input speed signal RPM is rationalized against vehicle conditions in which the the powertrain is producing torque available at the drive wheels, but raw transmission input speed signal RPM remains low. After a sudden drop in raw transmission input speed signal RPM, a race condition can occur between P0717 and "Input Speed Sensor Performance" depending on the true nature of the failure.	raw transmission input speed OR TISS/TOSS fault (single power supply to TISS and TOSS) = TRUE, update fail time 25 millisecond update rate	≤ 168.0 RPM < 175.0 RPM	service mode $04 active diagnostic monitor enable run crank voltage service fast learn active run crank voltage P0722 fault active P0723 fault active P077C fault active P077D fault active brake pedal position sesnor must be OBDII to use brake pedal conditional brake pedal position sesnor type brake pedal position P0716 test fail this key on P07BF test fail this key on P07C0 test fail this key on accelerator pedal position engine torque engine torque (transmission current attained gear transmission current attained gear raw transmission output speed OR transmission current attained gear transmission current attained gear raw transmission output speed) P0717 fault active P0717 test fail this key on	= FALSE = 1 Boolean ≥ 5.00 volts = FALSE ≥ 9.00 volts = FALSE = FALSE = FALSE = FALSE = CeBRKR_e_OBD < 70.0 % = FALSE = FALSE = FALSE ≥ 5.0 % ≥ 30.0 Nm ≤ 8,191.9 Nm ≤ CeCGSR_e_CR_Fourth ≥ CeCGSR_e_CR_First ≥ 250.0 RPM ≤ CeCGSR_e_CR_Tenth ≥ CeCGSR_e_CR_Fourth ≥ 377.0 RPM	fail time ≥ 4.00 seconds run crank voltage time ≥ 25 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						= FALSE = FALSE		
					TISS/TOSS fault (single power supply to TISS and TOSS) = TRUE occurs when: (P0722 fail time high gear exceeds fail threshold OR P0722 fail time low gear exceeds fail threshold) TISS/TOSS has single power supply calibration TISS/TOSS single power supply test enabled transmission hydraulic pressure available: engine speed DTCs not fault active	= 0 Boolean = 1 Boolean ≥ 500.0 RPM EngineTorqueEstInaccurate	engine speed time ≥ **engine speed time for transmission hydraulic pressure available**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Performance	P0721	The diagnostic monitor determines if the direction TOSS value is coherent based on the on period time of the directional sensor and TOSS raw. When the on period time indicates a transitional state, the direction must also be transitional as measured by very slow TOSS raw RPM. When the on period time indicates a non-transitional state, forward or reverse, the direction must also be transition, not forward and not reverse.	TOSS raw direction when TOSS transitional period = FALSE AND TOSS raw direction when TOSS transitional period = FALSE OR TOSS raw when TOSS transitional period = TRUE update fail and sample time 6.26 millisecond update rate	≠ FORWARD ≠ REVERSE ≥ 225.0 RPM	service mode $04 active diagnostic monitor enable TOSS count sample period P0721 fault active P0721 test fail this key on TOSS transitional period detected = FALSE when: on period on period when direction unknown OR on period on period when direction is reverse OR on period on period when direction is forward TOSS transitional period detected = TRUE when: on period on period when direction unknown senor type is directional senor type cailbration	= FALSE = 1 Boolean ≠ 0 counts = FALSE = FALSE ≥ 0.4434 seconds ≤ 0.2773 seconds < 0.2363 seconds > 0.1240 seconds < 0.0811 seconds > 0.0088 seconds < 0.4434 seconds > 0.2773 seconds = CeTOSR_e_Directional	fail time ≥ 3.500 seconds out of sample time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit Low Voltage	P0722	Detects no activity in raw transmission output speed signal RPM due to open ciruit electrical failure mode or sensor internal faults, or, controller internal failure modes. The raw transmission output speed signal RPM is rationalized against vehicle conditions in which the the powertrain is producing torque, but raw transmission output speed signal RPM remains low. After a sudden drop in raw transmission output speed signal RPM, a race condition can occur between P0722 and "Output Speed Sensor Circuit Intermittent" depending on the true nature of the failure.	raw transmission output speed, update fail time 6.25 millisecond update rate when: attained gear attained gear AND attained gear use high gear fail time threshold ELSE use low gear fail time threshold	≤ 30.0 RPM ≥ CeCGSR_e_CR_First ≤ CeCGSR_e_CR_Tenth > CeCGSR_e_CR_Fourth	service mode $04 active diagnostic monitor enable when neutral range occurs: (garage shift OR PRNDL OR PRNDL OR range inhibit state) {}{when not neutral range occurs: attained gear attained gear (attained gear engine torque hysteresis high engine torque hysteresis low accelerator pedal position hysteresis high accelerator pedal position hysteresis low) when not neutral range occurs: (attained gear engine torque hysteresis high engine torque hysteresis low accelerator pedal position hysteresis high accelerator pedal position hysteresis low)}	= FALSE = 1 Boolean ≠ COMPLETE = PARK = NEUTRAL ≠ no inhibit active ≥ CeCGSR_e_CR_First ≤ CeCGSR_e_CR_Tenth > CeCGSR_e_CR_Fourth ≥ 30.0 Nm > 20.0 Nm ≥ 3.0 % > 1.5 % ≤ CeCGSR_e_CR_Fourth ≥ 50.0 Nm > 30.0 Nm ≥ 3.5 % > 2.0 %	fail time ≥ 4.00 seconds high gear OR fail time ≥ 3.00 seconds low gear Engine Torque criteria met > 0.15 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR {}{Wheel Speed Rationality Enable AND Transfer Case Range Valid AND Vehicle Speed Fault AND Tcase state AND Wheel Speed Sensor Present AND Output Speed calculdate from wheel speed} TISS/TOSS has single power supply calibration AND TISS AND TISS) OR TISS/TOSS has single power supply calibration AND TISS AND TISS) P0716 test fail this key on P0717 test fail this key on P07BF test fail this key on P07C0 test fail this key on PTO check: PTO enable calibration is FALSE OR	= 1.00 Boolean =TRUE = FALSE != Neutral = TRUE >= 100.00 rpm = 0 Boolean ≤ 8,191.9 RPM ≥ 175.0 RPM = 0 Boolean ≤ 8,191.9 RPM ≥ 3,500.0 RPM = FALSE = FALSE = FALSE = FALSE ≠ 1 Boolean	Wheel Speed Rationality met = 0 s counts down from 0.25 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(PTO enable calibration is TRUE AND PTO active) run crank voltage service fast learn active run crank voltage transmission fluid temperature P0723 test fail this key on P077C test fail this key on P077D test fail this key on P0722 fault active P0722 test fail this key on transmission hydraulic pressure available: engine speed DTCs not fault active	= 1 Boolean = TRUE ≥ 5.00 volts = FALSE ≥ 9.00 volts ≥ -40.00 °C = FALSE = FALSE = FALSE = FALSE = FALSE ≥ 500.0 RPM AcceleratorPedalFailure EngineTorqueEstInaccurate	run crank voltage time ≥ 25 milliseconds engine speed time ≥ **engine speed time for transmission hydraulic pressure available**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit Intermittent	P0723	Detects unrealistic drop in raw transmission output speed signal RPM. Drop events are counted up to fail threshold. A drop event is defined by a sudden delta change in RPM from one value to a lower value. The raw transmission output speed must achieve a value high enough to record an unrealistic drop sample to sample. Once the drop threshold is met, fail time is accumualted indicating the raw transmission output speed has not recovered above a threshold, allowing the fail event count to increment. Multiple fail event counts must occur, but if the signal remains low, no further deltas occur, the "Output Speed Sensor Circuit Low Voltage" DTC will set before P0723, as P0723 is designed to set based on an intermittent raw transmission output speed signal RPM.	delta raw transmission output speed = raw transmission output speed previous loop - raw transmission output speed, 25 millisecond update rate Failing criteria depends on below decision tree for failure threshold If 4WD low engaged and wheel speed usage is not enabled Else If Wheel speed usage enabled for failing TOS drop diagnostic Else (Not 4WD and not Wheel Speed usage) If 4WD low is engaged and Wheel speed usage enabled	 ≥ 1,755.0 RPM **P0723 Wheel Speed Calc** function of output speed ≥ 650.0 RPM ≥ Above threshold * 2.70	service mode $04 active diagnostic monitor enable transmission engaged state 4WD low state PTO check: PTO enable calibration is FALSE OR (PTO enable calibration is TRUE AND PTO active) run crank voltage service fast learn active run crank voltage P077C test fail this key on P077D test fail this key on when PRNDL is moved to	= FALSE = 1 Boolean ≠ not engaged = 4WD low state previous loop, 25 millisecond update rate ≠ 1 Boolean = 1 Boolean = TRUE ≥ 5.00 volts = FALSE ≥ 9.00 volts = FALSE = FALSE	fail time ≥ 1.500 seconds updated fail event count, fail event count ≥ 5 counts, 25 millisecond update rate transmission engaged state time ≥ **P0723 (MY21) transmission engaged state time threshold** 4WD low change time ≥ 3.0 seconds run crank voltage time ≥ 25 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					NEUTRAL allow transmission engaged state time before enabling fail evaluation, or, if raw raw transmission output speed is active in NEUTRAL enable fail evaluation:			
					PRNDL	= CeTRGR_e_PRNDL_Neutral		
					OR			
					PRNDL	= CeTRGR_e_PRNDL_Transitional1		
					OR	N-D transitional		
					PRNDL	= CeTRGR_e_PRNDL_Transitional4		
					OR	R-N transitional		
					raw transmission output speed	≥ 250.0 RPM		
					OR			
					last valid raw transmission output speed	≥ 250.0 RPM		
					determine if raw transmission input speed is stable:			
					((raw transmission input speed - raw transmission input speed previous, 25 millisecond update	≤ 4,095.9 RPM		
					AND		raw transmission input speed stability time ≥ 2.00 seconds	
					raw transmission input speed)	≥ 200.0 RPM		
					OR			
					Wheel speed usage enabled for failing TOS drop diagnostic)	= TRUE		
					OR			
					(TISS/TOSS has single power supply calibration	= 0 Boolean	no time required	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND raw transmission input speed)	= 0.0 RPM		
					select delta RPM fail theshold: (4WD low state AND 4WD low valid) select P0723 4WD TOSS delta fail threshold otherwise use P0723 TOSS delta fail threshold	 = TRUE = TRUE		
					last valid raw transmission output speed OR valid raw transmission output speed (before drop event)	> 36.0 RPM > 36.0 RPM	raw transmission output speed time ≥ 2.00 seconds	
					Wheel speed usage enabled for failing TOS drop diagnostic AND TOS - Calculated TOS from Wheel Speed	= TRUE ≥ 50.00 rpm		
					last valid raw transmission output speed updates every 25 milliseconds when stablity time complete as long as (delta delta raw transmission output speed AND raw transmission output speed)	≤ 140.0 RPM ≥ 36.0 RPM	stability time ≥ 0.100 seconds	
					transmission hydraulic pressure available: engine speed	≥ 500.0 RPM	engine speed time ≥	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate	**engine speed time for transmission hydraulic pressure available**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Torque Converter Clutch (TCC) System Performance - GR10 specific	P0741	The GR10 diagnostic monitor detects the transmission torque converter control valve failed hydraulically on. If the control valve is stuck, the torque converter will drain down, resulting in an excessive K factor above expected value	calculated transmission torque converter K factor = engine speed / SQR (engine torque) increment fail count 25 millisecond update rate	>**P0741 GR10 torque converter K factor fail limit** see supporting table			fail count ≥ 4 counts in 75 count sample 25 millisecond update rate	Type A, 1 Trips
					diagnostic monitor enable	= 1 Boolean		
					(TCC stuck off enable OR TCC stuck on enable)	= 1 Boolean		
					hydraulic pressure available:	= 1 Boolean		
					engine speed	≥ 500.0 RPM	engine speed time ≥ **engine speed time for transmission hydraulic pressure available** see supporting table	
					battery voltage	≥ 9.00 volts	battery voltage time ≥ 0.100 seconds	
					run crank voltage	≥ 9.00 volts	run crank voltage time ≥ 0.100 seconds	
					engine speed status	≠ INVALID		
					PRNDL	≠ PARK		
					PRNDL	≠ NEUTRAL		
					Commanded Gear	≠ PARK		
					Commanded Gear	≠ NEUTRAL		
					transmission fluid temperature	≥ -6.66 °C		
					transmission fluid temperature	≤ 130.0 °C		
					engine speed	≥ 1,500.0 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					intrusive shift active (intrusive shift due to fault maturing for clutch pressure control solenoid stuck off/on P0746, P0747, P0776, P0777, P0796, P0797, P2714, P2715, P2723, P2724, P2732, P2733, P2820, P2821) P0741 test fail this key on range shift state attained gear slip engine torque accelerator pedal position accelerator pedal position engine acceleration transmission torque converter speed ratio (transmission turbine shaft speed / engine speed) DTCs not fault active DTCs not fault pending	= FALSE = FALSE = range shift complete (steady state gear) ≤ 75.0 RPM ≥ 5.00 Nm ≥ 0.00 % ≤ 100.0 % ≥ -200.0 RPM/sec ≤ 0.900 AcceleratorPedalFailure EngineTorqueEstInaccurate CrankSensor_FA P281B, P281D, P281E, P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D P0722, P0723, P0716, P0717, P07BF, P07C0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Stuck Off (GR10)	P0746	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C1 clutch slip speed, update fail time 6.25 milliscond update	≥ 200.0 RPM	********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time ≥ 1.00 seconds, update fail count, fail count ≥ 2 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available (hydraulic pressure OR Clutch Stuck on in Park/ Neutral fault pending OR Neutral Staging Line Pressure Disable) ********** enable C1 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR accelerator pedal position OR	= FALSE Boolean = TRUE ≥ 10.00 kPa = TRUE = TRUE ********** = FALSE = TRUE ≠ initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE ≥ 36.0 RPM ≥ 0.50 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C1 (GR10 CB123456R) clutch pressure control solenoid.			engine speed OR transmission input shaft speed) C1 clutch slip speed valid C1 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ********** DTCs not fault pending DTCs not fault active	≥ 1,000.0 RPM ≥ 350.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C1 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = range shift complete ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C	≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Stuck On	P0747	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C1 clutch slip speed OR shift type is garage shift: C1 clutch slip speed ELSE shift is another type: C1 clutch slip speed update fail time 6.25 milliscond update	< 50.0 RPM < 100.00 RPM < 50.0 RPM			Base fail time: shift type is power down shift: fail time ≥ 0.60 seconds shift type is garage shift: fail time ≥ 0.25 shift type is another type: fail time ≥ 0.150 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count ≥ 3 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GR10 C1 CB123456R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					(hydraulic pressure	≥ 10 kPa		
					OR Park/Neutral Stuck on FP	= TRUE		
					OR Neutral Staging Line Pressure Disable)	= TRUE		
					**********	**********		
					range shift state	≠ range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	≥ 36.0 RPM		
					((C1 off going clutch pressure control ramp time out complete	= TRUE		
					AND off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR C1 off going clutch command pressure)	 ≤ 350.0 kPa	closed throttle upshift: **C1 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C1 exhaust delay open throttle power on up shift** garage shifts: **C1 exhaust delay garage shift** closed throttle downshift: **C1 exhaust delay closed throttle down shift** negative torque upshift: **C1 exhaust delay negative torque up shift** open throttle downshift: **C1 exhaust delay open throttle power down shift**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	≥ 8,191.8 Nm = 0 (0 is enable, 1 is enable) = TRUE ≠ clutch fill phase ≥ pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: **C2 Torque-Based Pressure Clip** OR **C3 Torque-Based Pressure Clip** OR **C4 Torque-Based Pressure Clip** OR **C5 Torque-Based Pressure Clip** OR	Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: **C2_Oncoming Post-Torque Phase Delay** OR **C3_Oncoming Post-Torque Phase Delay** OR **C4_Oncoming Post-Torque Phase Delay** OR **C5_Oncoming Post-Torque Phase Delay** OR **C6_Oncoming Post-Torque Phase Delay**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					C1 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation ********** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for garage shift	**C6 Torque-Based Pressure Clip** clip thresholds for all other shift types: garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts** = TRUE ********** ≠ Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 1 (0 will enable, 1 will		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ********** DTCs not fault pending	enable) = NEUTRAL OR commanded gear = 1 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 1 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs not fault active DTCs not test fail this key on ********** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an	P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B **********		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed ≥ clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Stuck Off (GR10)	P0776	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C2 clutch slip speed, update fail time 6.25 milliscond update	≥ 200.0 RPM	********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time ≥ 1.00 seconds, update fail count, fail count ≥ 2 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available (hydraulic pressure OR Clutch Stuck on in Park/ Neutral fault pending OR Neutral Staging Line Pressure Disable) ********** enable C2 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR accelerator pedal position OR	= FALSE Boolean = TRUE ≥ 10.00 kPa = TRUE = TRUE ********** = FALSE = TRUE ≠ initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE ≥ 36.0 RPM ≥ 0.50 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C2 (GR10 CB128910R) clutch pressure control solenoid.			engine speed OR transmission input shaft speed) C2 clutch slip speed valid C2 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ********** DTCs not fault pending DTCs not fault active	≥ 1,000.0 RPM ≥ 350.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C2 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = range shift complete ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C	≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Stuck On	P0777	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C2 clutch slip speed OR shift type is garage shift: C2 clutch slip speed ELSE shift is another type: C2 clutch slip speed update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time ≥ 0.60 seconds shift type is garage shift: fail time ≥ 0.25 shift type is another type: fail time ≥ 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count ≥ 3 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GR10 C2 CB128910R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					(hydraulic pressure	≥ 10 kPa		
					OR Park/Neutral Stuck on FP	= TRUE		
					OR Neutral Staging Line Pressure Disable)	= TRUE		
					**********	**********		
					range shift state	≠ range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	≥ 36.0 RPM		
					((C2 off going clutch pressure control ramp time out complete	= TRUE		
					AND off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR C2 off going clutch command pressure)	 ≤ 350 kPa	closed throttle upshift: **C2 exhaust delay open throttle power on up shift** open throttle upshift: **C2 exhaust delay open throttle power on up shift** garage shifts: **C2 exhaust delay garage shift** closed throttle downshift: **C2 exhaust delay closed throttle down shift** negative torque upshift: **C2 exhaust delay negative torque up shift** open throttle downshift: **C2 exhaust delay open throttle power down shift**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	≥ 8,192 Nm = 0 (0 is enable, 1 is enable) = TRUE ≠ clutch fill phase ≥ pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: **C1 Torque-Based Pressure Clip** OR **C3 Torque-Based Pressure Clip** OR **C4 Torque-Based Pressure Clip** OR **C5 Torque-Based Pressure Clip** OR **C6 Torque-Based Pressure Clip**	Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: **C1_Oncoming Post-Torque Phase Delay** OR **C3_Oncoming Post-Torque Phase Delay** OR **C4_Oncoming Post-Torque Phase Delay** OR **C5_Oncoming Post-Torque Phase Delay** OR **C6_Oncoming Post-Torque Phase Delay**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						clip thresholds for all other shift types: garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**		
					C2 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation ********** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for garage shift AND	= TRUE ********** ≠ Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 1 (0 will enable, 1 will enable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ********** DTCs not fault pending	= NEUTRAL OR commanded gear = 1 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 1 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					**********	**********		
					NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed ≥ clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit Low	P077C	Controller specific analog circuit diagnoses the transmission output speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission output speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≤ 0.2500 volts (≤ 0.5 Ω impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P077D fault active service fast learn run crank voltage battery voltage P077C fault active P077C test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = FALSE = FALSE	fail time ≥ 0.050 seconds, update fail count, fail count ≥ 16 counts 6.25 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit High	P077D	Controller specific analog circuit diagnoses the transmission output speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission output speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≥ 4.7500 volts (≤ 0.5 Ω impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P077C fault active service fast learn run crank voltage battery voltage P077D fault active P077D test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = FALSE = FALSE	fail time ≥ 0.050 seconds, update fail count, fail count ≥ 16 counts 6.25 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Stuck Off (GR10)	P0796	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C3 clutch slip speed, update fail time 6.25 milliscond update	≥ 200.0 RPM	********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time ≥ 1.00 seconds, update fail count, fail count ≥ 2 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available (hydraulic pressure OR Clutch Stuck on in Park/ Neutral fault pending OR Neutral Staging Line Pressure Disable) ********** enable C3 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR accelerator pedal position OR	= FALSE Boolean = TRUE ≥ 10.00 kPa = TRUE = TRUE ********** = FALSE = TRUE ≠ initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE ≥ 36.0 RPM ≥ 0.50 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C3 (GR10 C23457910) clutch pressure control solenoid.			engine speed OR transmission input shaft speed) C3 clutch slip speed valid C3 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ********** DTCs not fault pending DTCs not fault active	≥ 1,000.0 RPM ≥ 350.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C3 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = range shift complete ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C	≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Stuck On	P0797	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C3 clutch slip speed OR shift type is garage shift: C3 clutch slip speed ELSE shift is another type: C3 clutch slip speed update fail time 6.25 milliscond update	 < 50.00 RPM < 50.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time ≥ 0.60 seconds shift type is garage shift: fail time ≥ 0.35 shift type is another type: fail time ≥ 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count ≥ 3 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GR10 C3 C23457910 clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					(hydraulic pressure	≥ 10 kPa		
					OR			
					Park/Neutral Stuck on FP	=TRUE		
					OR			
					Neutral Staging Line Pressure Disable)	=TRUE		
					**********	**********		
					range shift state	≠ range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	≥ 36.0 RPM		
					((C3 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR C3 off going clutch command pressure)	disable) ≤ 350 kPa	closed throttle upshift: **C3 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C3 exhaust delay open throttle power on up shift** garage shifts: **C3 exhaust delay garage shift** closed throttle downshift: **C3 exhaust delay closed throttle down shift** negative torque upshift: **C3 exhaust delay negative torque up shift** open throttle downshift: **C3 exhaust delay open throttle power down shift**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	≥ 8,192 Nm = 0 (0 is enable, 1 is enable) = TRUE ≠ clutch fill phase ≥ pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: **C1 Torque-Based Pressure Clip** OR **C2 Torque-Based Pressure Clip** OR **C4 Torque-Based Pressure Clip** OR **C5 Torque-Based Pressure Clip** OR	Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: **C1_Oncoming Post-Torque Phase Delay** OR **C2_Oncoming Post-Torque Phase Delay** OR **C4_Oncoming Post-Torque Phase Delay** OR **C5_Oncoming Post-Torque Phase Delay** OR **C6_Oncoming Post-Torque Phase Delay**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						C6 Torque-Based Pressure Clip clip thresholds for all other shift types: garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**		
					C3 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation ********** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for	= TRUE ********** ≠ Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 1 (0 will enable, 1 will		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					garage shift AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ********** DTCs not fault pending	enable) = NEUTRAL OR commanded gear = 1 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 1 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					**********	**********		
					NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed ≥ clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input/Turbine Speed Sensor A Circuit Low	P07BF	Controller specific analog circuit diagnoses the transmission input/ turbine speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intput/turbine speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≤ 0.2500 volts (≤ 0.5 Ω impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P07C0 fault active service fast learn run crank voltage battery voltage P07BF fault active P07BF test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = FALSE = FALSE	fail time ≥ 0.050 seconds, update fail count, fail count ≥ 16 counts 6.25 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input/Turbine Speed Sensor A Circuit High	P07C0	Controller specific analog circuit diagnoses the transmission input/ turbine speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission input/turbine speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≥ 4.7500 volts (≤ 0.5 Ω impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P07BF fault active service fast learn run crank voltage battery voltage P07C0 fault active P07C0 test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = FALSE = FALSE	fail time ≥ 0.050 seconds, update fail count, fail count ≥ 16 counts 6.25 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Upshift Switch Circuit	P0815	Diagnoses the state of the upshift switch circuit, stuck in the state "tap up" (upshift) active. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	switch state update fail time 1 100 millisecond update rate	= tap up (upshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active P0826 fault active P0826 test fail this key on P0826 fault pending (P0815 fault active OR P0815 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = 1 Boolean ≥ 5.00 volts ≥ 25 milliseconds ≥ 9.00 volts = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE ≥ 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity	fail time 1 ≥ 1.00 seconds	Emissions Neutral Diagnostics – Type C
			switch state update fail time 2 100 millisecond update rate	= tap up (upshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active	= FALSE = 1 Boolean ≥ 5.00 volts ≥ 25 milliseconds ≥ 9.00 volts = FALSE	fail time 2 ≥ 120.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0826 fault active P0826 test fail this key on P0826 fault pending (P0815 fault active OR P0815 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = FALSE = FALSE = FALSE = FALSE ≥ 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Downshift Switch Circuit	P0816	Diagnoses the state of the downshift switch circuit, stuck in the state "tap down" (downshift) active. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	switch state update fail time 1 100 millisecond update rate	= tap down (downshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active P0826 fault active P0826 test fail this key on P0826 fault pending (P0816 fault active OR P0816 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = 1 Boolean ≥ 5.00 volts ≥ 25 milliseconds ≥ 9.00 volts = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE ≥ 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity	fail time 1 ≥ 1.00 seconds	Emissions Neutral Diagnostics – Type C
			switch state update fail time 2 100 millisecond update rate	= tap down (downshift) state active	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time run crank voltage P1761 fault active	= FALSE = 1 Boolean ≥ 5.00 volts ≥ 25 milliseconds ≥ 9.00 volts = FALSE	fail time 2 ≥ 120.00 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0826 fault active P0826 test fail this key on P0826 fault pending (P0816 fault active OR P0816 fault active test fail this key on) PRNDL range change time PRNDL in range: D1 OR D2 OR D3 OR D4 OR D5 OR D6 OR D7 OR D8 OR D9 OR D10 OR NEUTRAL OR PARK OR REVERSE DTCs not fault pending	= FALSE = FALSE = FALSE = FALSE = FALSE ≥ 1.00 seconds = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 1 Boolean = 0 Boolean = 0 Boolean = 0 Boolean Transmission Shift Lever Position Validity		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Up and Down Shift Switch Circuit	P0826	Diagnoses the state of the upshift/downshift switch circuit at an illegal voltage, voltage out of range. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	switch state update fail time 100 millisecond update rate	= illegal (voltage out of range)	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage P1761 fault active (P0826 fault active OR P0826 fault active test fail this key on)	= FALSE = 1 Boolean ≥ 5.00 volts ≥ 9.00 volts = FALSE = FALSE = FALSE	fail time ≥ 60.00 seconds run crank voltage time ≥ 25 milliseconds	Emissions Neutral Diagnostics – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Control Circuit Open	P0960	Controller specific circuit diagnoses 9 speed CB123456, 10 speed CB123456R, 8 speed CB1278R clutch, or CVT secondary pulley solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit Increment fail time	≥ 200 K Ω impedance between signal and controller ground			fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds	Type A, 1 Trips
					battery voltage	≥ 9.00 volts and ≤ 32.00 volts	≥ 1.00 seconds	
					(run crank voltage OR accessory voltage active OR Power Mode)	≥ 5.00 volts = TRUE = ACCESSORY	≥ 25 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)	≥ 12.5 milliseconds	
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Control Circuit Low	P0962	Controller specific circuit diagnoses 9 speed CB123456, 10 speed CB123456R, 8 speed CB1278R clutch, or CVT secondary pulley solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time			fail time ≥ 0.10 seconds out of sample time ≥ 0.17 seconds 6.25 millisecond update rate	Type A, 1 Trips
					battery voltage	≥ 9.00 volts and ≤ 32.00 volts	≥ 1.00 seconds	
					(run crank voltage OR accessory voltage active OR Power Mode))	≥ 5.00 volts = TRUE = ACCESSORY	≥ 25 milliseconds ≥ 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Control Circuit High	P0963	Controller specific circuit diagnoses 9 speed CB123456, 10 speed CB123456R, 8 speed CB1278R clutch, or CVT secondary pulley solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Control Circuit Open	P0964	Controller specific circuit diagnoses 9 speed CB29, 10 speed CB128910R, 8 speed CB12345R clutch, or CVT primary pulley solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Control Circuit Low	P0966	Controller specific circuit diagnoses 9 speed CB29, 10 speed CB128910R, 8 speed CB12345R clutch, or CVT primary pulley solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time			fail time ≥ 0.10 seconds out of sample time ≥ 0.17 seconds 6.25 millisecond update rate	Type A, 1 Trips
					battery voltage	≥ 9.00 volts and ≤ 32.00 volts	≥ 1.00 seconds	
					(run crank voltage OR accessory voltage active OR Power Mode)	≥ 5.00 volts = TRUE = ACCESSORY	≥ 25 milliseconds ≥ 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Control Circuit High	P0967	Controller specific circuit diagnoses 9 speed CB29, 10 speed CB128910R, 8 speed CB12345R clutch, or CVT primary pulley solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Control Circuit Open	P0968	Controller specific circuit diagnoses 9 speed CB38, 10 speed C23457910, 8 speed C13567 clutch, or CVT line pressure solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Control Circuit Low	P0970	Controller specific circuit diagnoses 9 speed CB38,10 speed C23457910, 8 speed C13567 clutch, or CVT line pressure solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.10 seconds out of sample time ≥ 0.17 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Control Circuit High	P0971	Controller specific circuit diagnoses 9 speed CB38, 10 speed C23457910, 8 speed C13567 clutch, or CVT line pressure solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance	P16F3	The diagnostic monitor is a rationalization of command values: command clutch pressures, command gear, and commanded direction. The monitor is broken up into three fault detection routines, command pressure (tie up) fault detection, command gear/shift fault detection, and commanded direction. The command pressure (tie up) fault detection is designed to verify the number of clutches applied in a given gear state is limited, in order to prevent a transmission internal mechanical tie-up condition. A condition which could lead to a vehicle deceleration above the design safety metric. If commanded clutch pressures are above a threshold which would allow multiple clutches to carry torque, the clutch is considered applied, otherwise the clutch is considered released. If there are more clutches applied, via the commanded clutch pressures, in a given gear state than is	For each combination of clutches which can lead to an output lock: Commanded Clutch PCS Pressure OR For each combination of clutches which can lead to a mult-clutch tie-up: Commanded Clutch PCS Pressure	≥ **Cmnd Tie Up Monitor Output Lock Thresh** * **Clutch PCS Pressure Gain** + **Clutch PCS Pressure Offset** transfer case range is 4WD Low: ≥ **Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo** * **Clutch PCS Pressure Gain** + **Clutch PCS Pressure Offset** Else ≥ **Cmnd Tie Up Monitor Multi-Clutch Thresh** * **Clutch PCS Pressure Gain** +				Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		rational, one or more of the clutch pressure command values are in error. Given rate of change of transmission output shaft speed, command gear state clutches and clutch hydraulic fill volumes, those clutches in transition from the hydraulic released state to the hydraulic applied state and from the hydraulic applied state to the hydraulic released state, the rationality detects any number of command clutch pressures above a threshold, that are simultaneously active to cause a vehicle deceleration above the design safety metric. The command gear/ shift fault detection is designed to verify the commanded gear will not induce a downshift resulting in a gear state that is erroneous given vehicle operating conditions. The detection rationalizes the command gear against a minimum gear, highest gear ratio, for given vehicle speed and transfer case range	if above criteria met, increment fail timer by 3.125 6.25 ms update rate	**Clutch PCS Pressure Offset**	commanded tie up monitor enable calibration vehicle speed OR commanded tie up fault pending OR (vehicle speed AND monitor enabled in previous loop) High Side Driver 1 On High Side Driver 2 On Service Fast Learn OR (Service Fast Learn AND Vehicle Speed) Number of fill factor conditions below which need to be met Clutch 1 volume fill factor Clutch 2 volume fill factor Clutch 3 volume fill factor Clutch 4 volume fill factor Clutch 5 volume fill factor Clutch 6 volume fill factor SOWC volume fill factor (GF9 only) output shaft deceleration	= 1 (1 to enable, 0 to disable) ≥ 5.0 KPH = TRUE ≥ 5.0 KPH = TRUE = TRUE = TRUE = FALSE = TRUE ≥ 8.0 KPH = 4 Filled Clutches ≥ 1.00 ≥ 1.00 ≥ 1.00 ≥ 1.00 ≥ 1.00 ≥ 1.00 ≥ 1.00 Transfer case range is 4WD Lo: ≤ -397.3 RPM/sec	when fail timer reaches 100, set DTC ≥ 2.50 sec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		The command direction fault detection is designed to verify the clutches commanded on will result in the commanded direction (e.g. reverse clutches are being commaned on when the commanded range is reverse). This is used to prevent an incorrect direction safety hazard.				Else ≤ -147.1 RPM/sec		
					DTCs Not Fault Active	P077C, P077D		
					DTCs Not Test Failed This Key On	P0723, P0722		
			Commanded Gear	< **Shift Monitor Lowest Allowed Gear**			when incorrect downshift fail timer reaches 4.63 sec, set DTC	
			AND at least one of the following:					
			Previous Loop Commanded Gear and current loop commanded	> Current Loop Commanded Gear (i.e a downshift) = a forward, locked gear				
			OR					
			current commanded gear and previous loop commanded gear	= a forward, locked gear ≠ a forward, locked gear				
			OR					
			incorrect downshift fail timer	> 0.0				
			if above conditions are met, increment incorrect downshift fail timer 6.25 ms update rate					
			Alternatively, if commanded gear increment invalid commanded gear fail timer	= NULL			when invalid fail timer reaches 4.63 sec, set DTC	
					command shift monitor	= 1 (1 to enable, 0 to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			6.25 ms update rate		enable calibration Service Fast Learn OR (Service Fast Learn AND Vehicle Speed) High Side Driver 1 On High Side Driver 2 On DTCs Not Fault Active DTCs Not Test Failed This Key On	disable) = FALSE = TRUE ≥ 8.0 KPH = TRUE = TRUE P077C, P077D, P0721 P0723, P0722, P172A, P172B	≥ 2.50 sec	
			Criteria based on driver requested range: Drive: An invalid combination of drive clutches commanded on* driver requested range Incorrect drive enable calibration Incrorrect drive disable calibration Reverse: An invalid combination of reverse clutches commanded on* driver requested range	**Illegal Drive Clutch** = **Combinations** = Drive = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = **Illegal Reverse Clutch Combinations** = Reverse			Fault pending fail timer **Clutch Connectivity Wrong** ≥ **Direction FP** Fail time based on driver requested range: **Incorrect Drive Fail Time** **Incorrect Reverse Fail Time** **Incorrect Neutral Fail Time** **Incorrect Park Fail Time** 6.25 ms update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Incorrect reverse enable calibration	= 1 (1 to enable, 0 to disable)	Current driver requested range	= previous driver requested range	≥ **Incorrect Direction Range Change Delay Time**	
			Incrorrect reverse disable calibration	= 0 (0 to enable, 1 to enable)				
			Neutral:		(vehicle speed	≥ -6.00 KPH		
					AND			
			An invalid combinatio of neutral clutches commanded on*	= **Illegal Park-Neutral Clutch Combinations**	vehicle speed	≥ 6.00 KPH		
					OR			
					Fail Timer)	> 0.0		
			driver requested range	= Neutral	clutch connectivity detection enable calibration	= 1 (1 to enable, 0 to disable)		
			Incorrect neural enable calibration	= 1 (1 to enable, 0 to disable)	clutch connectivity monitor enable	= 1 (1 to enable, 0 to disable		
			Incrorrect neutral disable calibration	= 0 (0 to enable, 1 to disable)	OR			
					clutch connectivity monitor disable	= 0 (0 to enable, 1 to disable)		
			Park:					
					Service Fast Learn	= FALSE		
					OR			
			An invalid combination of reverse clutches commanded on*	= **Illegal Park-Neutral Clutch Combinations**	(Service Fast Learn	= TRUE		
					AND			
					Vehicle Speed)	≥ 8.0 KPH	≥ 2.50 sec	
			driver requested range	= Park	High Side Driver 1 On	= TRUE		
					High Side Driver 2 On	= TRUE		
			Incorrect park enable calibration	= 1 (1 to enable, 0 to disable)	DTCs Not Fault Active	P077C, P077D, P0721		
			Incrorrect park disable calibration	= 0 (0 to enable, 1 to disable)	DTCs Not Test Failed This Key On	P0723, P0722, P172A, P172B		
					* Note, clutch is considered "on" when the following conditions are met:			
					Clutch commanded	≥		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressure AND Current clutch pressure command * 0.25 + 1st derivative of pressure command * 0.25 + 2nd derivative of pressure command * -0.25 + 3rd derivative of pressure command * -0.25	**Clutch Connectivity C1 On Threshold** OR ≥ **Clutch Connectivity C2 On Threshold** OR ≥ **Clutch Connectivity C3 On Threshold** OR ≥ **Clutch Connectivity C4 On Threshold** OR ≥ **Clutch Connectivity C5 On Threshold** OR ≥ **Clutch Connectivity C6 On Threshold** OR ≥ **Clutch Connectivity C7 On Threshold** = 0.0 OR > -1.00 kPa		
			ratio monitor fault pending	= TRUE			increment fail timer by	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Output speed direction OR Output speed direction Plus following criteria based on driver requested range: Drive: driver requested range Incorrect drive enable calibration Incrorrect drive disable calibration Reverse: driver requested range Incorrect reverse enable calibration Incrorrect reverse disable calibration Neutral: driver requested range Incorrect neural enable calibration Incrorrect neutral disable calibration Park: driver requested range	= FORWARD = REVERSE = Drive = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = Reverse = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to enable) = Neutral = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = Park	********** If all conditions below are met, increment ratio monitor fault pending timer: vehicle speed OR vehicle speed (note: fault pending will remain latched if vehicle speed max thresholds are exceeded) Monitor Armed	********** > 0.50 AND ≤ 6.00 KPH < -0.50 AND ≥ -6.00 KPH = TRUE	**Ratio Monitor Fail Increment Rate (Percent per Loop)** when timer reaches 100, set fault pending Fail time based on driver requested range (once fault pending has matured): **Incorrect Drive Fail Time** **Incorrect Reverse Fail Time** **Incorrect Neutral Fail Time** **Incorrect Park Fail Time** 6.25 ms update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Incorrect park enable calibration Incrorrect park disable calibration	= 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable)	Measured output speed direction Input speed default direction Current driver requested range based on PRNDL position: driver requested range AND transmission measured speed ratio AND Loop-to-loop change in measured ratio AND (Direction By Ratio OR Direction By Clutch Slip) driver requested range AND transmission measured speed ratio AND Loop-to-loop change in measured speed ratio AND (Direction By Ratio OR Direction By Clutch Slip) ********** Monitor Armed Enables: if Range Shift enable cal: THEN	= REVERSE or FORWARD = REVERSE or FORWARD = previous driver requested range = Reverse > 0.40 ≥ -8.00 = FORWARD = a FORWARD Gear = Drive < -0.40 ≤ 8.00 = REVERSE = REVERSE ********** = 0 (1 to enable, 0 to disable)	≥ **Incorrect Direction Range Change Delay Time**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Range Shift State OR if Attained Gear enable cal: THEN Attained Gear ALSO Engine Speed Ratio Monitor enable cal OR Ratio Monitor disable cal ********** Direction By Ratio: Direction By Ratio Enable cal (vehicle speed OR vehicle speed) WHEN: Measured output speed direction AND Absolute measured gear ratio THEN Direction by Ratio ELSE WHEN Measured output speed direction AND Absolute measured gear ratio THEN Direction by Ratio	= Range Shift Complete = 0 (1 to enable, 0 to disable) ≠ Neutral AND ≠ Park ≥ 400 RPM = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) ********** = 1 (1 to enable, 0 to disable) ≥ 0.50 KPH ≤ -0.50 KPH = reverse ≥ 4.80 AND ≤ 4.92 = REVERSE = forward ≥ 4.65 AND ≤ 0.66 = FORWARD		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					**********	**********		
					Direction by Clutch Slip:			
					C1 clutch slip valid C2 clutch slip valid C5 clutch slip valid C3C4 dual clutch slip valid C3C6 dual clutch slip valid C4C6 dual clutch slip valid	= TRUE = TRUE = TRUE = TRUE = TRUE = TRUE		
					Direction by Clutch Slip Enable cal	= 1 (1 to enable, 0 to disable)		
					(vehicle speed OR vehicle speed)	≥ 0.50 KPH ≤ -0.50 KPH		
					for each clutch: current clutch slip	**Ratio Monitor Slip ≤ Threshold** (if slip condition met, clutch held = 1, else held = 0)		
					clutch held combination matches a valid gear in:	**Ratio Monitor Clutch States**		
					**********	**********		
					General enables:			
					Genral Ratio Monitor Detection enable cal	= 1 (1 to enable, 0 to disable)		
					Transmission Type	= RWD 10 Spd Automatic		
					Service Fast Learn OR (Service Fast Learn AND Vehicle Speed)	= FALSE = TRUE ≥ 8.0 KPH	≥ 2.50 sec	
					High Side Driver 1 On	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					High Side Driver 2 On	= TRUE		
					DTCs Not Fault Pending	P0716, P0717, P07BF, P07C0, P0721, P0722, P0723, P077C, P077D, P172A, P172B, P1783, P17CE		
					DTCs Not Fault Active	P0716, P0717, P07BF, P07C0, P077C, P077D, P0721, P17CE, P1783		
					DTCs Not Test Failed This Key On	P0721, P0722, P0723, P172A, P172B		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit Forward Direction Error	P172A	The TOS sensor is a directional sensor, and raw TOS direction is rationalized based on attained gear and multiple speed sensors. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. If the raw TOS direction is not a forward gear but attained gear is a forward gear, and, TISS and intermediate speed sensors confirm consistent direction, the raw TOS direction is in error.	(raw TOS direction OR raw TIS direction OR intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	≠ forward ≠ forward **intermediate speed sensor 1 or 2** ≠ **predicted direction intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** =**enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	Type A, 1 Trips
			(raw TOS direction OR intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	≠ forward **intermediate speed sensor 1 or 2** ≠ **predicted direction intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available**	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete ≥ 1.00 seconds		
			(raw TOS direction OR raw TIS direction OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	≠ forward ≠ forward **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete)	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time	≥ 1.00 seconds		
			(raw TOS direction OR raw TIS direction OR intermediate speed sensor 1 direction raw) AND attained gear AND attained gear	≠ forward ≠ forward **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			(raw TOS direction OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	≠ forward **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						engine speed time for transmission hydraulic pressure available		
					battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete ≥ 1.00 seconds		
			(raw TOS direction OR intermediate speed sensor 1 direction raw) AND attained gear AND attained gear	≠ forward **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range shift state (auto trans shift complete) enable time	= range shift complete ≥ 1.00 seconds		
			(raw TOS direction OR raw TIS direction) AND attained gear AND attained gear	≠ forward ≠ forward ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			raw TOS direction attained gear	≠ forward ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds ≥ 1st gear ≤ 10th gear = FALSE = range shift complete ≥ 1.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Control System - Shift Limiting Active	P175E	The latent fault diagnostic monitors detects when the vehicle has been driven excessively with an emission MIL request. The DTCs requesting the emission MIL are all due to a safety critical system or component fault present in which a DTC is set fault active, test fail this key on or fault pending (fault pending is fail time ≠ 0). The safety critical systems or safety critical components include: transmission input, output and intermediate speed sensors, transmission range sensors, clutch pressure control solenoids including unintended deceleration detected due to clutch pressure control solenoids, driver accelerator pedal position, engine crankshaft position and engine torque. The DTCs for these safety critical systems or safety critical components include both electrical fault DTCs and performance fault DTCs. The latent fault diagnostic monitor	unintended decel test system fault unintended decel test system fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND unintended deceleration latent fault fail count)) UPDATE unintended decel test system fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE continue execute only IF: calibrated for a back up signal to longitudinal acceleration and total brake axle torque using and wheel speed or TOSS OR U0121 (loss comm ABS/EBCM) occurs OR brake pedal position fault THEN SET unintended decel test system fault occur = TRUE	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE ≥ 18.0 KPH ≥ 120.0 seconds = CeTSDD_e_WhlSpdBackUp	unintended decel test system fault time ≥ 10.0 seconds UPDATE unintended deceleration latent fault fail count SET unintended decel test system fault = TRUE unintended deceleration latent fault fail count ≥ 100 counts 25 millisecond update rate	Type A, 1 Trips
			ECM range sensor fault ECM range sensor fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active	= FALSE = TRUE = TRUE = FALSE = TRUE	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE	ECM range sensor fault time ≥ 10.0 seconds UPDATE ECM range sensor latent fault fail count SET ECM range sensor fault = TRUE	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		counts the run/crank ignition cycles before the latent fault DTC is set fault active.	AND ECM range sensor latent fault fail count)) UPDATE ECM range sensor fault time *default gear option active occurs when emission MIL active due to transmission default gear	= 100 counts	met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF ECM P2802 fault active OR ECM P2803 fault active SET ECM range sensor fault occur = TRUE	= TRUE ≥ 18.0 KPH ≥ 120.0 seconds = TRUE = TRUE	ECM range sensor latent fault fail count ≥ 100 counts 25 millisecond update rate	
			TCM range sensor fault TCM range sensor fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND TCM range sensor latent fault fail count)) UPDATE TCM range sensor fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF TCM P0707 fault active OR TCM P0708 fault active SET TCM range sensor fault occur = TRUE	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE ≥ 18.0 KPH ≥ 120.0 seconds = TRUE = TRUE	TCM range sensor fault time ≥ 10.0 seconds UPDATE TCM range sensor latent fault fail count SET TCM range sensor fault = TRUE TCM range sensor latent fault fail count ≥ 100 counts 25 millisecond update rate	
			TOSS fault TOSS fault occur RunCrankVoltageMet (*default gear option	= FALSE = TRUE = TRUE = FALSE	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage	= 1 Boolean > 5.00 volts	TOSS fault time ≥ 10.0 seconds UPDATE TOSS latent fault fail count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			active OR (*default gear option active AND TOSS sensor latent fault fail count)) UPDATE TOSS fault time *default gear option active occurs when emission MIL active due to transmission default gear	 = TRUE = 100 counts	for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF P077C or P077D fault active OR P0722 or P0723 test fail this key on SET TOSS fault occur = TRUE	> 12.5 milliseconds = FALSE = TRUE ≥ 18.0 KPH ≥ 120.0 seconds = TRUE = TRUE	SET TOSS fault = TRUE TOSS latent fault fail count ≥ 100 counts 25 millisecond update rate	
			tie-up fault tie-up fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND tie-up latent fault fail count)) UPDATE tie-up fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF P077C or P077D fault active OR P0722 or P0723 test fail this key on	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE ≥ 18.0 KPH ≥ 120.0 seconds = TRUE = TRUE	tie-up fault time ≥ 10.0 seconds UPDATE tie-up latent fault fail count SET tie-up fault = TRUE tie-up latent fault fail count ≥ 100 counts 25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					SET tie-up fault occur = TRUE			
			trans range fault trans range fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND tie-up latent fault fail count)) UPDATE trans range fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 200 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF [(P0717 or P07C0 or P07BF fault active or P077D or P077C fault active or P723 test fail this key on or P0723 or P077D or P077C or P0722 fault pending or P0716 or P07C0 or P07BF or P0717 fault pending or P172B or P172A or P0721 fault pending or P1783 or P17CE fault active or	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE ≥ 18.0 KPH ≥ 120.0 seconds = TRUE = TRUE = TRUE = TRUE = TRUE = TRUE = TRUE	trans range fault time ≥ 10.0 seconds UPDATE trans range latent fault fail count SET trans range fault = TRUE trans range latent fault fail count ≥ 200 counts 25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P1783 or P17CE fault pending or P172A or P172B test fail this key on or P0721 fault active) AND (safety diasble cal not FALSE OR safety enable cal TRUE)] OR [(P176C or P160E or P0963 or P078F or P0707 fault pending or P18AA fault active) AND (safety diasble cal not FALSE OR safety enable cal TRUE)] SET trans range fault occur = TRUE	= TRUE = TRUE = TRUE = 0 Boolean = 1 Boolean = TRUE = TRUE = 0 Boolean = 1 Boolean		
			tie-up test disable fault tie-up test disable fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND tie-up test latent fault fail count)) UPDATE tie-up test latent fault time *default gear option active	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE ≥ 18.0 KPH ≥ 120.0 seconds	tie-up test latent fault time ≥ 10.0 seconds UPDATE tie-up test latent fault fail count SET tie-up test disable fault = TRUE tie-up test latent fault fail count ≥ 100 counts 25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			occurs when emission MIL active due to transmission default gear		IF EngineTorqueEstInaccura te AcceleratorPedalFailure OR CrankSensor_FA OR P2534 fault active OR (P0707 test fail this key on OR P0707 fault active OR P0708 test fail this key on OR P0708 fault active OR P2805 fault active OR P27EE fault active OR P27EB fault active OR P27ED fault active OR P17F7 fault active OR P17F5 fault active OR P17F6 fault active OR P17FC fault active OR P17FA fault active OR P17FB fault active) OR (P0716 fault pending, fault active, test fail this key on OR P0717 fault pending, fault active, test fail this key on OR P0721 fault pending, fault active, test fail this key on OR P0722 fault pending, fault active, test fail this key on OR P0723 fault pending, fault active, test fail this key on OR P077B fault pending, fault	= TRUE = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					active, test fail this key on	= TRUE		
					OR			
					P077C fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P077D fault pending, fault active, test fail this key on	= TRUE = TRUE		
					OR			
					P07BF fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P07C0 fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P172A fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P172B fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P176B fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P176C fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P176D fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P1783 fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P178F fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P17C4 fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P17C5 fault pending, fault active, test fail this key on	= TRUE		
					OR			
					P17C6 fault pending, fault	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					active, test fail this key on OR P17C7 fault pending, fault active, test fail this key on OR P17CC fault pending, fault active, test fail this key on OR P17CD fault pending, fault active, test fail this key on OR P17CE fault pending, fault active, test fail this key on OR P17D3 fault pending, fault active, test fail this key on OR P17D6 fault pending, fault active, test fail this key on) SET tie-up test disable fault occur = TRUE	= TRUE = TRUE = TRUE = TRUE = TRUE = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Acceleration Sensor Signal Message Counter Incorrect	P175F	The diagnostic monitor detects an alive rolling count error or checksum error in the serial data frame containing the lateral acceleration signal value and longitudinal acceleration sensor signal value. Emission neutral default state sets lateral and longitudinal acceleration signal = 0.0 g.	rolling count value received from Tx module and expected TCM calculated value not equal OR checksum lateral and longitudinal acceleration received from Tx value error update error count buffer entry, buffer is 16 entries sum error count buffer entries	= TRUE = TRUE	lateral and longitudinal acceleration serial data frame message received battery voltage service mode $04 normal serial communication enabled	≥ 11.0 volts not active	sum error count ≥ 8 out of 10 sample counts minimum sample rate 6.25 milliseconds per count maximum sample rate 500 milliseconds per count	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Up and Down Shift Switch Signal Circuit	P1761	The alive rolling count normally cycles 0, 1, 2, and 3 as a serial data periodic frame is processed normally. The diagnostic monitor counts the number of times an alive rolling count error occurs over a period of time. The TCM receives a serial data frame at a periodic rate, during which, the receive data is processed the comparing the current value of the alive rolling count in the frame date to the incremented value of the diagnostic alive rolling count. When the two values of the alive rolling count do not agree, an alive rolling count error has occurred. The error indicator is saved in an array buffer, and when the number of error indicators in the buffer exceed the fail threshold the fail time is allowed to time up. Emissions neutral default, disables tap-up tap-down or manual-up manual-down.	alive rolling count error counter update fail time 100 millisecond update rate	≥ 3 counts	service mode $04 active diagnostic monitor enable run crank voltage run crank voltage time up and down shift serial data frame receive occurred when up and down shift serial data frame receive occurred: increment the diagnsotic alive rolling count data value, if the diagnsotic alive rolling count data value, set alive rolling count error to TRUE, when alive rolling count error AND previous alive rolling count error in 10 element arrary buffer, increment alive rolling count error counter	= FALSE = 1 Boolean ≥ 9.00 volts ≥ 0.100 seconds = TRUE ≠ frame alive rolling count data value = TRUE = FALSE	fail time ≥ 10.00 seconds	Emissions Neutral Diagnostics – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Planetary Gearset Ring Gear Speed Sensor Circuit Range/ Performance	P176B	The diagnostic monitor rationalizes the transmission intermediate shaft speed sensor by using the transmission output shaft output speed sensor and the known ratio between the transmission intermediate shaft speed and the transmission output shaft output speed based on the commanded gear and the transmission lever node design. The estimated transmission intermediate shaft speed is equal to the gear ratio times the transmission output shaft output speed. The absolute value of the delta between the measured transmission intermediate shaft speed and the estimated transmission intermediate shaft speed is used to determine if the measured transmission intermediate shaft speed is rational.	delta1 = ABS (transmission input speed - (transmission output speed * gear ratio commanded)) update faiil time 25 millisecond update rate	> 10.0 RPM	diagnostic monitor enable speed sesnor configuration calibration is single OR dual ratio calibration is function of command gear and intermediate speed sesnor when not REVERSE ratio calibration is function of command gear and intermediate speed sesnor when REVERSE ********** delay time updates when: estimated transmission intermediate speed (transmission input speed / ratio calibration)	= 1 Boolean = CeTNSR_e_NSPD_Dual SpdSnsr **P176B ratio calibration = when not REVERSE** see supporting tables **P176B ratio calibration = when REVERSE** see supporting tables ********** ≥ **P176B minimum estimated transmission intermediate speed to enable fail evaluation**	fail time ≥ **P176B intermediate speed sensor fail time threshold** see supporting tables fail time threshold met increments fail count, fail count ≥ **P176B intermediate speed sensor fail count threshold** see supporting tables ********** delay time ≥	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					with	see supporting tables	**P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation** see supporting tables	
						P176B minimum transmission input speed to enable fail ≥ evaluation		
					transmission input speed	see supporting tables		
						P176B holding clutch = states		
					input speed sensor ready based on commaned gear and transmission intermediate speed sensor (state output must be FALSE to enable fail evaluation)	see supporting tables		
					with	= REVERSE		
					with attained gear	OR = 1st thru 10th		
					**********	**********		
					transmission input speed	≥ 240.0 RPM		
					transmission output speed	≥ 36.0 RPM		
					neutral idle mode	= nuetral idle mode ON		
					range shift state	= range shift complete		
					P0716 fault active	= FALSE		
					P0717 fault active	= FALSE		
					P07BF fault active	= FALSE		
					P07C0 fault active	= FALSE		
					P0722 fault active	= FALSE		
					P0723 fault active	= FALSE		
					P077C fault active	= FALSE		
					P077D fault active	= FALSE		
					P176C fault active	= FALSE		
					P176D fault active	= FALSE		
					battery voltage	≥ 9.00 volts		
						= FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					service fast learn active run crank voltage transmission hydraulic pressure available: engine speed	≥ 9.00 volts ≥ 500.0 RPM	battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds engine speed time ≥ **engine speed time for transmission hydraulic pressure available** see supporting tables	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Planetary Gearset Ring Gear Speed Sensor Circuit Low	P176C	Controller specific analog circuit diagnoses the transmission intermediate speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intermediate speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≤ 0.25 volts (≤ 0.5 Ω impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P176D fault active service fast learn run crank voltage battery voltage P176C fault active P176C test fail this key on	= FALSE = 1.00 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = FALSE = FALSE	fail time ≥ 0.05 seconds, update fail count, fail count ≥ 40.00 counts 6.25 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Planetary Gearset Ring Gear Speed Sensor Circuit High	P176D	Controller specific analog circuit diagnoses the transmission intermediate speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intermediate speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≥ 4.75 volts (≤ 0.5 Ω impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P176C fault active service fast learn run crank voltage battery voltage P176D fault active P176D test fail this key on	= FALSE = 1.00 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = FALSE = FALSE	fail time ≥ 0.05 seconds, update fail count, fail count ≥ 40.00 counts 6.25 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input Speed Sensor Direction Not Plausible - Forward	P1783	The TIS sensor is a directional sensor, and raw TIS direction is rationalized based on attained gear and multiple speed sensors. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. If the raw TIS direction is not reverse but attained gear is reverse, or, if the raw TIS direction is not forward but attained gear is a forward gear, the raw TIS direction is in error.	raw TIS direction AND attained gear	≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	Type A, 1 Trips
			raw TIS direction AND attained gear AND attained gear	≠ FORWARD ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		
			intermediate speed sensor 1 direction raw AND TIS direction AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete)	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time			
			intermediate speed sensor 1 direction raw AND raw TIS direction AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			intermediate speed sensor 2 direction raw AND TIS direction AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						engine speed time for transmission hydraulic pressure available seconds		
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE		
					range shift state (auto trans shift complete)	= range shift complete		
					enable time	≥ 1.00 seconds		
			intermediate speed sensor 2 direction raw AND raw TIS direction AND attained gear AND attained gear	**intermediate speed sensor 1 or 2 ≠ predicted direction** ≠ FORWARD ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable	**speed sensor directional rationality = enable calibration**	2.50 seconds	
					TOSS sensor type must be directional	= CeTOSR_e_Directional		
					engine speed engine speed time	≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds		
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range shift state (auto trans shift complete) enable time	≥ 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND TIS direction AND attained gear	**intermediate speed sensor 1 or 2** **≠ predicted direction** **intermediate speed sensor 1 or 2** **≠ predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND	**intermediate speed sensor 1 or 2** **≠ predicted direction** **intermediate speed sensor 1 or 2** **≠ predicted direction**	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			raw TIS direction AND attained gear AND attained gear	≠ FORWARD ≥ 1st gear ≤ 10th gear	engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intermediate Speed Sensor 1 Direction Not Plausible - Forward	P178F	The intermediate speed sensor 1 is a directional sensor, and raw intermediate speed sensor 1 direction is rationalized based on attained gear. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. Intermediate speed sensor 1 direction can be predicted, based on a function of the attained gear. When the raw intermediate speed sensor 1 direction does not correlate to the predicted direction and does not correlate to the attained gear, the intermediate speed sensor 1 directional is in error.	intermediate speed sensor 1 direction raw AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	Type A, 1 Trips
			intermediate speed sensor 1 direction raw AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		
			intermediate speed sensor 1 direction raw AND TIS direction AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete)	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time			
			intermediate speed sensor 1 direction raw AND raw TIS direction AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** **intermediate speed sensor 1 or 2** ≠ **predicted direction** = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						engine speed time for transmission hydraulic pressure available seconds		
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE		
					range shift state (auto trans shift complete)	= range shift complete		
					enable time	≥ 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds	2.50 seconds	
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range shift state (auto trans shift complete) enable time	≥ 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw OR TIS direction) AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw OR TIS direction) AND	**intermediate speed sensor 1 or 2** ≠ **predicted direction** **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			attained gear AND attained gear	≥ 1st gear ≤ 10th gear	engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intermediate Speed Sensor 2 Performance	P17C5	The diagnostic monitor determines if the direction transmission intermediate speed sensor value is coherent based on the on period time of the directional sensor and raw speed sensor value. When the on period time indicates a transitional state, the direction must also be transitional as measured by very slow raw signal RPM. When the on period time indicates a non-transitional state, forward or reverse, the direction must also be transition, not forward and not reverse.	when: (intermediate speed sensor raw direction when transitional period = FALSE AND intermediate speed sensor raw direction when transitional period = FALSE) OR intermediate speed sesnor raw when transitional period = TRUE update fail and sample time	≠ FORWARD ≠ REVERSE **P17C5 P17D3 intermediate speed ≥ sensor RPM**	service mode $04 active diagnostic monitor enable intermediate speed sesnor count sample period P17C5 fault active OR P17C5 test fail this key on senor type cailbration (senor type is directional) transitional period detected = FALSE when: on period OR on period when direction unknown OR on period on period when direction is reverse OR on period on period when direction is forward transitional period detected = TRUE when: on period on period when direction unknown	= FALSE = 1 Boolean ≠ 0 counts = FALSE = FALSE = CeTNSR_e_NSPD_Dual SpdSnsr ≥ 0.4434 seconds ≤ 0.2773 seconds < 0.2363 seconds > 0.1240 seconds < 0.0811 seconds > 0.0088 seconds < 0.4434 seconds > 0.2773 seconds	fail time ≥ 3.500 seconds out of sample time ≥ 5.000 seconds 6.26 millisecond update	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intermediate Speed Sensor 2 Direction Not Plausible - Forward	P17C6	The intermediate speed sensor 2 is a directional sensor, and raw intermediate speed sensor 2 direction is rationalized based on attained gear. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. Intermediate speed sensor 2 direction can be predicted, based on a function of the attained gear. When the raw intermediate speed sensor 2 direction does not correlate to the predicted direction and does not correlate to the attained gear, the intermediate speed sensor 2 directional is in error.	intermediate speed sensor 2 direction raw AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	Type A, 1 Trips
			intermediate speed sensor 2 direction raw AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		
			intermediate speed sensor 2 direction raw AND TIS direction AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete)	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time	≥ 1.00 seconds		
			intermediate speed sensor 2 direction raw AND raw TIS direction AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** ≠ FORWARD ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** **intermediate speed sensor 1 or 2** ≠ **predicted direction** = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						engine speed time for transmission hydraulic pressure available seconds		
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	**intermediate speed sensor 1 or 2** ≠ **predicted direction** **intermediate speed sensor 1 or 2** ≠ **predicted direction** ≥ 1st gear ≤ 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear	**speed sensor directional rationality** = **enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0721 Fault Active range shift state (auto trans shift complete) enable time	= FALSE = range shift complete ≥ 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw OR TIS direction) AND attained gear	**intermediate speed sensor 1 or 2 ≠ predicted direction** **intermediate speed sensor 1 or 2 ≠ predicted direction** ≠ FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	**speed sensor directional rationality = enable calibration** = CeTOSR_e_Directional ≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed	**intermediate speed sensor 1 or 2 ≠ predicted direction** **intermediate speed sensor 1 or 2 ≠ predicted direction**	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional	**speed sensor directional rationality = enable calibration** = CeTOSR_e_Directional	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			sensor 2 direction raw OR TIS direction) AND attained gear AND attained gear	≠ FORWARD ≥ 1st gear ≤ 10th gear	engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	≥ 500.0 RPM ≥ **engine speed time for transmission hydraulic pressure available** seconds ≥ 9.00 volts ≥ 0.100 seconds = FALSE ≥ 9.00 volt ≥ 0.100 seconds = REVERSE = FALSE = range shift complete ≥ 1.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Intermediate Speed Sensor B Circuit Low	P17CC	Controller specific analog circuit diagnoses the transmission intermediate speed sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intermediate speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≤ 0.250 volts (≤ 0.5 Ω impedance between signal and controller ground)	service mode $04 active diagnostic monitor enable P17CD fault active service fast learn run crank voltage battery voltage sensor configuration is single OR dual P17CC fault active OR P17CC test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = CeTNSR_e_NSPD_DualSpdSnsr = FALSE = FALSE	fail time ≥ 0.050 seconds, update fail count 12.5 millisecond update rate fail count ≥ 40 counts 12.5 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Intermediate Speed Sensor B Circuit High	P17CD	Controller specific analog circuit diagnoses the transmission intermediate speed sensor and wiring for a short to voltage fault by comparing a voltage measurement to controller specific voltage thresholds.	transmission intermediate speed sesnor raw voltage, update fail time, 12.5 millisecond update rate	≥ 4.750 volts (≤ 0.5 Ω impedance between signal and controller power)	service mode $04 active diagnostic monitor enable P17CC fault active service fast learn run crank voltage battery voltage sensor configuration is single OR dual P17CD fault active OR P17CD test fail this key on	= FALSE = 1 Boolean = FALSE = FALSE ≥ 10.00 volts ≥ 10.00 volts = CeTNSR_e_NSPD_DualSpdSnsr = FALSE = FALSE	fail time ≥ 0.050 seconds, update fail count 12.5 millisecond update rate fail count ≥ 40 counts 12.5 millisecond update rate run crank and battery voltage time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input Speed Sensor Direction Error	P17CE	The diagnostic monitor determines if the direction transmission input shaft speed sensor value is coherent based on the on period time of the directional sensor and raw speed sensor value. When the on period time indicates a transitional state, the direction must also be transitional as measured by very slow raw signal RPM. When the on period time indicates a non-transitional state, forward or reverse, the direction must also be transition, not forward and not reverse.	input shaft speed sesnor raw direction when transitional period = FALSE AND input shaft speed sesnor raw direction when transitional period = FALSE OR input shaft speed sesnor raw when transitional period = TRUE update fail and sample time, update rate defined in Secondary Parameters	≠ FORWARD ≠ REVERSE ≥ 225.0 RPM	determine update rate: 6.26 millisecond update rate calibration, TRUE, update rate = 6.25 millisecond FALSE, update rate = 25 millisecond service mode $04 active diagnostic monitor enable input shaft speed sesnor count sample period senor type cailbration (senor type is directional) P17CE fault active OR P17CE test fail this key on transitional period detected = FALSE when: on period OR on period when direction unknown OR on period on period when direction is reverse OR on period on period when direction is forward transitional period detected = TRUE when: on period on period when direction unknown	= 1 Boolean = FALSE = 1 Boolean ≠ 0 counts = CeTISR_e_Directional = FALSE = FALSE ≥ 0.4434 seconds ≤ 0.2773 seconds < 0.2363 seconds > 0.1240 seconds < 0.0811 seconds > 0.0088 seconds < 0.4434 seconds > 0.2773 seconds	fail time ≥ 3.500 seconds out of sample time ≥ 5.000 seconds update rate defined in Secondary Parameters	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intermediate Speed Sensor 1 Direction Error	P17D3	The diagnostic monitor determines if the direction transmission intermediate speed sensor value is coherent based on the on period time of the directional sensor and raw speed sensor value. When the on period time indicates a transitional state, the direction must also be transitional as measured by very slow raw signal RPM. When the on period time indicates a non-transitional state, forward or reverse, the direction must also be transition, not forward and not reverse.	intermediate speed sesnor raw direction when transitional period = FALSE AND intermediate speed sesnor raw direction when transitional period = FALSE OR intermediate speed sesnor raw when transitional period = TRUE update fail and sample time 6.26 millisecond update rate	≠ FORWARD ≠ REVERSE **P17C5 P17D3 intermediate speed ≥ sensor RPM**	service mode $04 active diagnostic monitor enable intermediate speed sesnor count sample period P17D3 fault active OR P17D3 test fail this key on senor type cailbration (senor type is directional) transitional period detected = FALSE when: on period OR on period when direction unknown OR on period on period when direction is reverse OR on period on period when direction is forward transitional period detected = TRUE when: on period on period when direction unknown	= FALSE = 1 Boolean ≠ 0 counts = FALSE = FALSE = CeTNSR_e_NSPD_Dual SpdSnsr ≥ 0.4434 seconds ≤ 0.2773 seconds < 0.2363 seconds > 0.1240 seconds < 0.0811 seconds > 0.0088 seconds < 0.4434 seconds > 0.2773 seconds	fail time ≥ 3.500 seconds out of sample time ≥ 5.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Intermediate Speed Sensor B Circuit Range/ Performance	P17D6	The diagnostic monitor rationalizes the transmission intermediate shaft speed sensor by using the transmission output shaft output speed sensor and the known ratio between the transmission intermediate shaft speed and the transmission output shaft output speed based on the commanded gear and the transmission lever node design. The estimated transmission intermediate shaft speed is equal to the gear ratio times the transmission output shaft output speed. The absolute value of the delta between the measured transmission intermediate shaft speed and the estimated transmission intermediate shaft speed is used to determine if the measured transmission intermediate shaft speed is rational.	delta1 = ABS (transmission input speed - (transmission output speed * gear ratio commanded)) AND delta2 = ABS (transmission input speed - (transmission intermediate speed * ratio calibration)) update faiil time 25 millisecond update rate	> 10.0 RPM > **P17D6 intermediate speed sensor fail RPM threshold** see supporting tables	diagnostic monitor enable speed sesnor configuration calibration is dual ratio calibration is function of command gear and intermediate speed sesnor when not REVERSE ratio calibration is function of command gear and intermediate speed sesnor when REVERSE ********** delay time updates when: estimated transmission intermediate speed (transmission input speed / ratio calibration) with	= 1 Boolean = CeTNSR_e_NSPD_Dual SpdSnsr = **P17D6 ratio calibration when not REVERSE** see supporting tables = **P17D6 ratio calibration when REVERSE** see supporting tables ********** ≥ **P17D6 minimum estimated transmission intermediate speed to enable fail evaluation** see supporting tables	fail time ≥ **P17D6 intermediate speed sensor fail time threshold** see supporting tables fail time threshold met increments fail count, fail count ≥ **P17D6 intermediate speed sensor fail count threshold** see supporting tables ********** delay time ≥	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission input speed	≥ **P17D6 minimum transmission input speed to enable fail evaluation** see supporting tables	**P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation** see supporting tables	
					input speed sensor ready based on commaned gear and transmission intermediate speed sensor (state output must be FALSE to enable fail evaluation) with with attained gear	= **P17D6 holding clutch states** see supporting tables = REVERSE OR = 1st thru 10th		
					**********	**********		
					transmission input speed	≥ 240.0 RPM		
					transmission output speed	≥ 36.0 RPM		
					neutral idle mode	= nuetral idle mode ON		
					range shift state	= range shift complete		
					P0716 fault active	= FALSE		
					P0717 fault active	= FALSE		
					P07BF fault active	= FALSE		
					P07C0 fault active	= FALSE		
					P0722 fault active	= FALSE		
					P0723 fault active	= FALSE		
					P077C fault active	= FALSE		
					P077D fault active	= FALSE		
					P17CC fault active	= FALSE		
					P17CD fault active	= FALSE		
					battery voltage	≥ 9.00 volts		
					service fast learn active	= FALSE		
					run crank voltage	≥ 9.00 volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission hydraulic pressure available: engine speed	≥ 500.0 RPM	battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds engine speed time ≥ **engine speed time for transmission hydraulic pressure available** see supporting tables	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit Low	P2534	Detects a low ignition switch run/start position curcuit. This diagnostic reports the DTC when this circut is low. Monitoring occurs when the ECM run/ crank is active.	Ignition switch Run/Start position circuit low	Run / Crank = FALSE	Ignition switch Run/Start position circuit low diag enable and Run / Crank active ECM	= 1.00 = TRUE	280 failures out of 280 samples 25 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit High	P2535	Detects a high ignition switch run/start position curcuit. This diagnostic reports the DTC when this circut is high. Monitoring occurs when the ECM run/ crank is NOT active.	Ignition switch Run/Start position circuit high	Run / Crank = TRUE	Ignition switch Run/Start position circuit low diag enable and Run / Crank active ECM	= 1.00 = FALSE	280 failures out of 280 samples 25 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Actuator Supply Voltage B Circuit Low	P2670	Controller specific output driver circuit diagnoses the high sided driver circuit for a short to ground failure, or where controller H/W cannot differentiate, diagnoses the high sided driver circuit for a short to ground failure or open circuit failure, when the output is powered on, by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground or an open circuit.	≤ 0.5 Ω impedance between signal and controller ground OR ≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail count and increment sample count, otherwise increment only sample count	(ground short diagnostic monitor enable calibration OR open circuit diagnostic monitor enable calibration) high side drive 2 ON service mode $04 active	= 1 Boolean = 1 Boolean = TRUE = FALSE	ground short fail count ≥ 6 counts within sample count of 2,400 counts OR open circuit fail count ≥ 30 counts within sample count of 50 counts 6.25 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Stuck Off (GR10)	P2714	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C4 clutch slip speed, update fail time 6.25 milliscond update	≥ 200.0 RPM	********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time ≥ 1.00 seconds, update fail count, fail count ≥ 2 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available (hydraulic pressure OR Clutch Stuck on in Park/ Neutral fault pending OR Neutral Staging Line Pressure Disable) ********** enable C4 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR accelerator pedal position OR	= FALSE Boolean = TRUE ≥ 10.00 kPa = TRUE = TRUE ********** = FALSE = TRUE ≠ initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE ≥ 36.0 RPM ≥ 0.50 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C4 (GR10 C23467810R) clutch pressure control solenoid.			engine speed OR transmission input shaft speed) C4 clutch slip speed valid C4 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ********** DTCs not fault pending DTCs not fault active	≥ 1,000.0 RPM ≥ 350.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C4 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = range shift complete ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C	≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Stuck On	P2715	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C4 clutch slip speed OR shift type is garage shift: C4 clutch slip speed ELSE shift is another type: C4 clutch slip speed update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time ≥ 0.60 seconds shift type is garage shift: fail time ≥ 0.25 shift type is another type: fail time ≥ 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count ≥ 3 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to GR10 C4 C23467810R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					(hydraulic pressure OR Park/Neutral Stuck on FP OR Neutral Staging Line Pressure Disable) **********	≥ 10 kPa =TRUE =TRUE **********		
					range shift state	≠ range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	≥ 36.0 RPM		
					((C4 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable)	= TRUE = 1 (1 to enable, 0 to disable)	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR C4 off going clutch command pressure)	 ≤ 350 kPa	closed throttle upshift: **C4 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C4 exhaust delay open throttle power on up shift** garage shifts: **C4 exhaust delay garage shift** closed throttle downshift: **C4 exhaust delay closed throttle down shift** negative torque upshift: **C4 exhaust delay negative torque up shift** open throttle downshift: **C4 exhaust delay open throttle power down shift**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	≥ 8,192 Nm = 0 (0 is enable, 1 is enable) = TRUE ≠ clutch fill phase ≥ pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: **C1 Torque-Based Pressure Clip** OR **C2 Torque-Based Pressure Clip** OR **C3 Torque-Based Pressure Clip** OR **C5 Torque-Based Pressure Clip**	Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: **C1_Oncoming Post-Torque Phase Delay** OR **C2_Oncoming Post-Torque Phase Delay** OR **C3_Oncoming Post-Torque Phase Delay** OR **C5_Oncoming Post-Torque Phase Delay** OR **C6_Oncoming Post-Torque Phase Delay**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						OR **C6 Torque-Based Pressure Clip** clip thresholds for all other shift types: garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**		
					C4 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation ********** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND	= TRUE ********** ≠ Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					shift type enable cal for garage shift AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ********** DTCs not fault pending	= 1 (0 will enable, 1 will enable) = NEUTRAL OR commanded gear = 1 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 1 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not fault active	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					**********	**********		
					NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					is set to TIE UP TEST HOLD during an automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed ≥ clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					execute. OR The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					execute to verify which clutch pressure control solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Control Circuit Open	P2718	Controller specific circuit diagnoses 9 speed C4, 10 speed C23467810R, 8 speed C23468 clutch, or CVT input clutch solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Control Circuit Low	P2720	Controller specific circuit diagnoses 9 speed C4, 10 speed C23467810R, 8 speed C23468 clutch, or CVT input clutch, solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.10 seconds out of sample time ≥ 0.17 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Control Circuit High	P2721	Controller specific circuit diagnoses 9 speed C4, 10 speed C23467810R, 8 speed C23468 clutch, or CVT input clutch, solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Stuck Off (GR10)	P2723	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C5 clutch slip speed, update fail time 6.25 milliscond update	≥ 200.0 RPM	********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time ≥ 1.00 seconds, update fail count, fail count ≥ 2 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available (hydraulic pressure OR Clutch Stuck on in Park/ Neutral fault pending OR Neutral Staging Line Pressure Disable) ********** enable C5 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR accelerator pedal position	= FALSE Boolean = TRUE ≥ 10.00 kPa = TRUE = TRUE ********** = FALSE = TRUE ≠ initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE ≥ 36.0 RPM ≥ 0.50 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C5 (GR10 C1356789) clutch pressure control solenoid.			OR engine speed OR transmission input shaft speed) C5 clutch slip speed valid C5 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ********** DTCs not fault pending DTCs not fault active	≥ 1,000.0 RPM ≥ 350.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C5 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = range shift complete ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0	≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA			
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Stuck On	P2724	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C5 clutch slip speed OR shift type is garage shift: C5 clutch slip speed ELSE shift is another type: C5 clutch slip speed update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time ≥ 0.60 seconds shift type is garage shift: fail time ≥ 0.25 shift type is another type: fail time ≥ 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count ≥ 3 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GR10 C5 C1356789 clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					(hydraulic pressure OR Park/Neutral Stuck on FP OR Neutral Staging Line Pressure Disable) **********	≥ 10 kPa =TRUE =TRUE **********		
					range shift state	≠ range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	≥ 36.0 RPM		
					((C5 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable)	= TRUE = 1 (1 to enable, 0 to disable)	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR C5 off going clutch command pressure)	 ≤ 350 kPa	closed throttle upshift: **C5 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C5 exhaust delay open throttle power on up shift** garage shifts: **C5 exhaust delay garage shift** closed throttle downshift: **C5 exhaust delay closed throttle down shift** negative torque upshift: **C5 exhaust delay negative torque up shift** open throttle downshift: **C5 exhaust delay open throttle power down shift**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	≥ 8,192 Nm = 0 (0 is enable, 1 is enable) = TRUE ≠ clutch fill phase ≥ pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: **C1 Torque-Based Pressure Clip** OR **C2 Torque-Based Pressure Clip** OR **C3 Torque-Based Pressure Clip** OR **C4 Torque-Based Pressure Clip** OR	Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: **C1_Oncoming Post-Torque Phase Delay** OR **C2_Oncoming Post-Torque Phase Delay** OR **C3_Oncoming Post-Torque Phase Delay** OR **C4_Oncoming Post-Torque Phase Delay** OR **C6_Oncoming Post-Torque Phase Delay**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						C6 Torque-Based Pressure Clip clip thresholds for all other shift types: garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts**		
					C5 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation ********** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for garage shift	= TRUE ********** ≠ Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 1 (0 will enable, 1 will		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ********** DTCs not fault pending	enable) = NEUTRAL OR commanded gear = 1 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 1 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs not fault active DTCs not test fail this key on ********** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an	P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B **********		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					automatic transmission shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed ≥ clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					The automatic transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					solenoid is in the stuck on failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Control Circuit Open	P2727	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R clutch solenoid, or CVT TCC Control solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Control Circuit Low	P2729	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R clutch, or CVT TCC Control solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.10 seconds out of sample time ≥ 0.17 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Control Circuit High	P2730	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R, or CVT TCC Control solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid F Stuck Off (GR10)	P2732	Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. In the failure mode the clutch slip speed, and gear box gear slip, will be excessive, not near or at zero RPM. The clutch slip speed is calculated based on the transmission lever node design, requiring transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. The clutch pressure control solenoid is tested after an automatic transmission shift occurs and has been considered shift complete, or, steady state gear is deemed active, range shift complete. When the automatic transmission shift is complete, steady state gear is considered, the clutch pressure control solenoid is mapped to transmission line	C6 clutch slip speed, update fail time 6.25 milliscond update	≥ 200.0 RPM	********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled service fast learn active service solenoid cleaning	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean = FALSE Boolean	fail time ≥ 1.00 seconds, update fail count, fail count ≥ 2 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		pressure control, which normally allows the clutch to maintain full torque holding capacity at the given engine crankshaft torque, to maintain true gear ratio. When the clutch pressure control solenoid is failed hydraulically off, the clutch does not maintain holding capacity at any engine crankshaft torque, and the clutch slip speed is uncontrollable. The clutch pressure control solenoid test is suspended if the higher level safety startle mitigation function is active. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed in the opposite sense, clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional, which must take priority over any clutch pressure control solenoid stuck off diagnostic monitor. All clutch pressure control			procedure active hydraulic pressure available (hydraulic pressure OR Clutch Stuck on in Park/ Neutral fault pending OR Neutral Staging Line Pressure Disable) ********** enable C6 clutch slip speed fail compare when: ((startle mitigation active OR (startle mitigation active AND startle mitigation gear)) (see startle mitigation active NOTE below) unintended deceleration fault pending OR unintended deceleration fault pending enable cal is FALSE (startle mitigation) clutch steady state adaptive active (transmission output shaft speed OR accelerator pedal position OR	= FALSE Boolean = TRUE ≥ 10.00 kPa = TRUE = TRUE ********** = FALSE = TRUE ≠ initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE ≥ 36.0 RPM ≥ 0.50 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		solenoid stuck on/off diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck off test is disabled. This diagnostic monitor is relative to C6 GR10 C45678910R clutch pressure control solenoid.			engine speed OR transmission input shaft speed) C6 clutch slip speed valid C6 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ********** DTCs not fault pending DTCs not fault active	≥ 1,000.0 RPM ≥ 350.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C6 clutch pressure has reached fully applied state = 1 (1 to enable, 0 to disable) = FORWARD = a FORWARD gear = 0 (1 to enable, 0 to disable) = REVERSE = REVERSE = range shift complete ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C	≥ 0.500 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not test fail this key on	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
					NOTE: startle mitigation active is used to detect unintended deceleration due to clutch pressure control solenoid stuck on failure modes, the clutch pressure control solenoid stuck on DTCs being P0747 P0777 P0797 P2715 P2724 P2733 P2821			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid F Stuck On (GR10)	P2733	Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. The clutch pressure control solenoid is tested during an automatic transmission shift by monitoring the off going clutch slip speed. With the clutch pressure control solenoid failed on, still allowing hydraulic pressure to the clutch being commanded off, the intended off going clutch continues to maintain torque capacity during the transmission automatic shift. In the failure mode, the off going clutch slip speed will remain near zero RPM when the clutch pressure control solenoid is commanded to an off pressure in the normal operation to release the holding clutch. The clutch slip speed is calculated based on the transmission lever node design, requiring	shift type is power down shift: C6 clutch slip speed OR shift type is garage shift: C6 clutch slip speed ELSE shift is another type: C6 clutch slip speed update fail time 6.25 milliscond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time ≥ 0.60 seconds shift type is garage shift: fail time ≥ 0.25 shift type is another type: fail time ≥ 0.15 seconds Add fail time offset according to shift type: open throttle upshift: **Clutch Stuck On Fail Offset Time PU Shifts** open throttle downshift: **Clutch Stuck On Fail Offset Time PD Shifts** garage shift: **Clutch Stuck On Fail Offset Time GS Shifts** closed throttle downshift:	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		transmission input shaft speed, transmission output shaft speed, and, one transmission intermediate shaft speed. As part of the pressure control solenoid stuck on diagnostic monitor, the safety startle mitigation function executes when in steady state gear, no automatic transmission shift in progress. The safety startle mitigation function is triggered when a sudden vehicle deceleration occurs due to a clutch pressure control solenoid that has failed hydraulically on, while the solenoid is electrically functional. All clutch pressure control solenoid stuck on diagnostic monitors are emission MIL DTCs. System voltage must be normal, all clutch pressure control solenoid driver circuits must be functional, no clutch pressure control solenoid electrical or performance faults can be present, and no speed sensor electrical or performance faults can be present, or the clutch pressure control solenoid stuck on test			********** system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)	********** = 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts	**Clutch Stuck On Fail Offset Time CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** clutch staging shift: **Clutch Stuck On Fail Offset Time STGR Shifts** update fail count, fail count ≥ 3 counts 6.25 milliscond update battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GR10 C6 C45678910R clutch pressure control solenoid.			TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure available	= TRUE		
					(hydraulic pressure	≥ 10 kPa		
					OR			
					Park/Neutral Stuck on FP	=TRUE		
					OR			
					Neutral Staging Line Pressure Disable)	=TRUE		
					**********	**********		
					range shift state	≠ range shift complete		
					diagnostic clutch test	= OFF GOING CLUTCH TEST		
					transmission output shaft speed	≥ 36.0 RPM		
					((C6 off going clutch pressure control ramp time out complete	= TRUE		
					AND			
					off going clutch pressure ramp control ramp time out enable)	= 1 (1 to enable, 0 to disable)	exhaust delay by shift type:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR C6 off going clutch command pressure)	 ≤ 350 kPa	closed throttle upshift: **C6 exhaust delay closed throttle lift foot up shift** open throttle upshift: **C6 exhaust delay open throttle power on up shift** garage shifts: **C6 exhaust delay garage shift** closed throttle downshift: **C6 exhaust delay garage shift** negative torque upshift: **C6 exhaust delay negative torque up shift** open throttle downshift: **C6 exhaust delay open throttle power down shift**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	≥ 8,192 Nm = 0 (0 is enable, 1 is enable) = TRUE ≠ clutch fill phase ≥ pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: **C1 Torque-Based Pressure Clip** OR **C2 Torque-Based Pressure Clip** OR **C3 Torque-Based Pressure Clip** OR **C4 Torque-Based Pressure Clip** OR	Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: **C1_Oncoming Post-Torque Phase Delay** OR **C2_Oncoming Post-Torque Phase Delay** OR **C3_Oncoming Post-Torque Phase Delay** OR **C4_Oncoming Post-Torque Phase Delay** OR **C5_Oncoming Post-Torque Phase Delay**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					C6 clutch slip speed valid, all speed sensors are functional for lever node clucth slip speed calculation ********** conditions needed to trigger test: (current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for garage shift AND	**C5 Torque-Based Pressure Clip** clip thresholds for all other shift types: garage shifts: **Clutch Clip Press GS Shifts** closed throttle downshift: **Clutch Clip Press CD Shifts** negative torque upshift: **Clutch Clip Press NU Shifts** open throttle downshift: **Clutch Clip Press PD Shifts** = TRUE ********** ≠ Garage shift **Clutch Stuck On Shift = Type Enable** (0 table value will disable, 1 will enable) = FALSE = 1 (0 will enable, 1 will enable)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Attained Gear AND (stuck on enable cal for forward garge shifts AND driver requested direction AND commanded gear) OR (stuck on enable cal for reverse garage shifts AND driver requested direction AND commanded gear)) clutch stuck off intrusive shift active startle mitigation active (see note on startle mitigation below) (new clutch controller has been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ********** DTCs not fault pending	= NEUTRAL OR commanded gear = 1 (0 to disable, 1 to enable) = FORWARD = a FORWARD gear = 1 (0 to disable, 1 to enable) = REVERSE = REVERSE = FALSE = FALSE = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs not fault active DTCs not test fail this key on ********** NOTE: Clutch control solenoid test state TIE UP TEST HOLD is necessary, as it is possible to have multiple off going clutches during one automatic transmission shift. Clutch control solenoid test state is set to TIE UP TEST HOLD during an automatic transmission	P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B **********		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					shift due to two conditions: Current value of clutch control solenoid test state is TIE UP TEST TEST STATE, when one off going clutch pressure control solenoid stuck on diagnostic monitor is currently executing. AND That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed ≥ clutch slip speed fail threshold. Once clutch control solenoid test state is set to TIE UP TEST HOLD, it remains TIE UP TEST HOLD during the automatic transmission shift, until: An additional off going clutch occurs, as indicated by solenoid stuck on test trigger = TRUE, subsequently clutch control solenoid test state is reset to TIE UP TEST TEST STATE, to allow the additional corresponding off going clutch pressure control solenoid stuck on diagnostic monitor to execute. OR The automatic			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission shift completes, range shift state = range shift complete. NOTE: Startle mitigation is used to detect unintended vehicle deceleration due to a clutch pressure control solenoid stuck on failure mode that occurs during steady state gear, not during an automatic transmission shift. The startle mitigation active then forces the transmission clutch pressure control system to a safe gear or neutral state, based on the active and inactive clutches, when the unintended vehicle deceleration occurred. Once a safe vehicle gear state is attained, the gear and clutch pressure control system allows transitions of the clutches on and off, to sequence automatic transmission shifts, single step shifts. As each single step automatic transmission shift occurs the normal pressure control solenoid stuck on diagnostic monitors execute to verify which clutch pressure control solenoid is in the stuck on			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					failure mode, allowing one of the clutch pressure control solenoid stuck on DTCs to set P0747, P0777, P0797, P2715, P2724, P2733, P2821.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid F Control Circuit Open	P2736	Controller specific circuit diagnoses 9 speed (C6789/SOWC CBR1) clutch, 10 speed C45678910R clutch, 8 speed Line Pressure Control Circuit, or CVT binary pump, solenoid for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid F Control Circuit Low	P2738	Controller specific circuit diagnoses 9 speed (C6789/SOWC CBR1), 10 speed C45678910R clutch, 8 speed line pressure control, or CVT binary pump, solenoid for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.10 seconds out of sample time ≥ 0.17 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid F Control Circuit High	P2739	Controller specific circuit diagnoses 9 speed (C6789/SOWC CBR1), 10 speed C45678910R clutch, 8 speed line pressure control, or CVT binary pump, solenoid for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Circuit Open	P2796	Controller specific auxiliary transmission fluid pump motor control circuit diagnoses the pump motor and wiring for an open circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit update fail and sample count	≥ 200 K Ω impedance between signal and controller ground	diagnostic report enable diagnostic monitor enable run crank voltage battery voltage battery voltage (pump is fed by high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (pump is fed by high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (pump is fed by high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3) OR pump is not fed by any HSD	= 1 Boolean = 1 Boolean > 5.00 volts > 9.00 volts < 15.0 volts = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will enable)	≥ 20 fail counts out of ≥ 25 sample counts update rate 100 milliseconds ≥ 25 milliseconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Performance	P2797	Detects when the transmission auxiliary pump system, used to provide transmission hydraulic pressure, is not capable of supplying adequate hydraulic pressure during an engine auto-start. The transmission holding clutch pressures are commanded to meet the engine crank shaft torque output, to prevent clutch slip to those holding clutches, during the engine auto-start. The diagnostic monitors transmission input shaft speed during the auto-start event as the primary malfunction criteria. Measured input shaft speed that is excessive is an indication the holding clutches are slipping due to inadequate hydraulic pressure, as a result of a failed surge accumulator or transmission auxiliary pump system.	Transmission turbine speed is greater than predicted turbine speed during autostart event, update initial fail count	**P2797 predicted ≥ turbine speed error** Refer to "Transmission Supporting Tables" for details	diagnosic enable cal PRNDL state defaulted Transmission shift lever position Propulsion system active Ignition voltage Ignition voltage Transmission fluid temp Transmission fluid temp	= 1 (1 to enable, 0 to disable) = False = Forward range A = True > 9.00 volts < 31.99 volts > 0.00 °C < 110.00 °C	≥ 8 counts (initial fail count) Frequency =12.5ms Once the above counts are achieved then increment the final fail counter once. The final fail counter can only increment once per autostart event ≥ 3 counts (final fail counter) If above counter is greater than threshold then report DTC failed. Frequency = 12.5ms propulsion system active for ≥ 5.00 sec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					engine state AutoStop duration min During autostop Engine speed was ********** If above conditions are met then the following must occur: Turbine speed Engine speed Hydraulic pressure delay time If above conditions are met then increment time-out timer. Time-out timer Note: The initial fail counter must achieve the fail threshold in less than the time-out time. ********** If vehicle is launched then: Transmission gear ratio	= Engine off ≥ 1.200 seconds < 5.0 RPM ≥ 80.0 RPM ≥ 450.0 RPM **P2797 hydraulic** ≥ **pressure delay** Refer to "Transmission Supporting Tables" for details ≤ 0.38 seconds = 4.696 1st gear ratio = 2.985 2nd gear ratio = 2.156 3rd gear ratio = 1.779 4th gear ratio = 1.526 5th gear ratio = 1.278 6th gear ratio		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Trans 1st gear ratio Trans 1st gear ratio Trans gear ratio not 1st gear Trans gear ratio not 1st gear Valid transmission gear ratio achieved time OR If vehicle is not launched but autostart occurs then: Turbine speed Turbine speed less then above threshold for Note: During an autostart event the lack of hydraulic pressure will result in momentary clutch slip in the C1234 clutch. After the clutch slip event, the main transmission pump and clutch will gain capacity, clutch slip will go to zero. If the vehicle is launching (moving) then a valid transmission ratio can be achieved. Or if the brake is continually applied and an autostart occurs naturally, then no ratio can be measured. In this case turbine speed	≤ 1.120 % of 1st gear ratio ≥ 0.880 % of 1st gear ratio ≤ 1.070 % of gear ratio ≥ 0.930 % of gear ratio ≥ 0.500 seconds ≤ 5.00 RPM ≥ 0.500 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					will return to near zero rpm. ********** DTCs not fault active DTCs not Test Failed This Key On	CrankSensor_FA Transmission Output Shaft Angular Velocity Validity Transmission Turbine Angular Velocity Validity Transmission Oil Temperature FA P171A, P171B, P171C, U0101, P182E, P1915 P2796, P2798, P2799		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Circuit Low	P2798	Controller specific auxiliary transmission fluid pump motor control circuit diagnoses the pump motor and wiring for a ground short circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short update fail and sample count	≤ 0.5 Ω impedance between signal and controller ground	diagnostic report enable diagnostic monitor enable run crank voltage battery voltage battery voltage (pump is fed by high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (pump is fed by high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (pump is fed by high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3) OR pump is not fed by any HSD	= 1 Boolean = 1 Boolean ≥ 5.00 volts > 9.00 volts < 15.0 volts = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will enable)	≥ 20 fail counts out of ≥ 25 sample counts update rate 100 milliseconds ≥ 25 milliseconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Circuit High	P2799	Controller specific auxiliary transmission fluid pump motor control circuit diagnoses the pump motor and wiring for a short to power circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a voltage short Controller specific circuit voltage thresholds are set to meet the following controller specification for a voltage short Increment fail and sample count	≤ 0.5 Ω impedance between signal and controller voltage source	diagnostic report enable diagnostic monitor enable run crank voltage battery voltage battery voltage (pump is fed by high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (pump is fed by high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (pump is fed by high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3) OR pump is not fed by any HSD	= 1 Boolean = 1 Boolean ≥ 5.00 volts > 9.00 volts < 15.0 volts = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will enable)	≥ 20 fail counts out of ≥ 25 sample counts update rate 100 milliseconds ≥ 25 milliseconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid A Calibration Incorrect	P27A7	The diagnostic monitor verifies that the pressure control solenoid A (GF9 line or GR10 C1 C123456R clutch or CVT secondary pulley) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid A electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid B Calibration Incorrect	P27A8	The diagnostic monitor verifies that the pressure control solenoid B (GF9 TCC or GR10 C2 C128910R clutch or CVT primary pulley) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid B electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power event during the controller initialization before normal time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid C Calibration Incorrect	P27A9	The diagnostic monitor verifies that the pressure control solenoid C (GF9 C1 CB123456 clutch or GR10 C3 C23457910 clutch or CVT line) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid C electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid D Calibration Incorrect	P27AA	The diagnostic monitor verifies that the pressure control solenoid D (GF9 C2 CB29 clutch or GR10 C5 C1356789 clutch pressure or CVT C1 clutch) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid D electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid E Calibration Incorrect	P27AB	The diagnostic monitor verifies that the pressure control solenoid E (GF9 C3 CB38 clutch or GR10 C4 C23467810R clutch or CVT TCC) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid E electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid F Calibration Incorrect	P27AC	The diagnostic monitor verifies that the pressure control solenoid F (GF9 C4 C4 clutch or GR10 C6 C45678910R clutch or CVT binary pump) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid F electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid G Calibration Incorrect	P27AD	The diagnostic monitor verifies that the pressure control solenoid G (GF9 C5 C57R clutch or GR10 line or CVT mode valve A ETRS only) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid G electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid H Calibration Incorrect	P27AE	The diagnostic monitor verifies that the pressure control solenoid H (GF9 C6 C6789 clutch or GR10 TCC or CVT mode valve B ETRS only) characterization data is programmed correctly into the TCM EEPROM to match the pressure control solenoid H electrical characteristics of the device currently installed in the transmission valve body assembly.	pressure control solenoid characterization data programming complete Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry. pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present: Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed. OR Solenoid class programming fault – the characterization data indicates a different type of device than the TCM calibration data OR Checksum mismatch – the checksum that was calculated from the programmed pressure control solenoid characterization data region does not match the calculated valve at the time of programming. OR Axis data fault – pressure	= FALSE	Pressure control solenoid characterization data is programmed originally at vehicle plant assembly based on transmission valve body assembly part number associated to the unit installed in vehicle. When valve body is serviced, dealership performs reprogramming of TCM with pressure control solenoid characterization data based on the associated transmission valve body part number installed.		execution of monitor occurs once per controller normal power up event during the controller initialization before normal controller time loop execution	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			control solenoid characterization data has one or more points that are less than the previous match point, axis data must be greater than or equal to previous data values.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Sensor A/B Correlation	P2805	Internal range sensor A is wired independently to the TCM while internal range sensor B is wired independently to the ECM. The monitor diagnoses the internal range sensor A PWM duty cycle by comparing the raw sensor A value against the raw sensor B adjusted value, to verify signals are consistent, or determine the TCM internal range sensor A does not correlate to the ECM internal range sensor B. The ECM transmits internal range sensor B raw PWM to the TCM over the serial data bus.	ABS((TCM internal range sesnor A + ECM internal range sesnor B raw adjusted for high or low time) - 100 %)) Increment fail and sample time, update rate 25 milliseconds	> 4.849 % duty cycle	diagnostic monitor enable P0707 fault active P0708 fault active U0100 fault active ECM internal range sesnor B available from ECM ECM internal range sesnor B fault active battery voltage ABS(TCM internal range sesnor A current loop value - TCM internal range sesnor A previous loop value), update TCM internal range sesnor A stablity time, update rate 25 milliseconds ABS(ECM internal range sesnor B current loop value - ECM internal range sesnor B previous loop value), update ECM internal range sesnor B stablity time, update rate 25 milliseconds TCM internal range sesnor A stability time met OR ECM internal range sesnor B stability time met ECM internal range sesnor B raw adjusted for	= 1 Boolean = FALSE = FALSE = FALSE = TRUE = FALSE ≥ 0.00 volts < 1.001 % duty cycle < 1.001 % duty cycle = ABS(ECM internal range sesnor B raw -	PWM fail time ≥ 1.000 seconds out of sample time ≥ 1.500 seconds battery voltage time ≥ 1.000 seconds TCM internal range sesnor A stability time ≥ 1.000 seconds ECM internal range sesnor B stability time ≥ 1.000 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					high or low time Vehicle is in a mode that enables accessory power	0.000 %) = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid G Control Circuit Open	P2812	Controller specific circuit diagnoses 9 speed Line Pressure Control Circuit, 10 speed Line Pressure Control Circuit, 8 speed TCC Control, or CVT Mode Valve A Circuit for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.60 seconds out of sample time ≥ 0.65 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid G Control Circuit Low	P2814	Controller specific circuit diagnoses 9 speed Line Pressure Circuit, 10 speed Line Pressure Circuit, 8 speed TCC Control, or CVT Mode Valve A Circuit for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time			fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate	Type A, 1 Trips
					battery voltage	≥ 9.00 volts and ≤ 32.00 volts	≥ 1.00 seconds	
					(run crank voltage OR accessory voltage active OR Power Mode)	≥ 5.00 volts = TRUE = ACCESSORY	≥ 25 milliseconds ≥ 12.5 milliseconds	
					diagnostic monitor enable calibration	= 1 (1 is enable, 0 is disable)		
					(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		
					OR			
					(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid G Control Circuit High	P2815	Controller specific circuit diagnoses 9 speed Line Pressure Circuit, 10 speed Line Pressure Circuit, 8 speed TCC Control, or CVT Mode Valve A Circuit for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid H Performance /Stuck Off - GR10 Specific	P2817	The diagnostic monitor detects the transmission torque converter control valve solenoid failed hydraulically off. The monitor executes when the transmission torque converter is commanded to a “lock” mode during which the torque converter will be controlled to near zero (0.0) RPM slip speed, or, an “on” mode during which the torque converter will be controlled to target slip speed using slip speed error. The transmission torque converter control valve solenoid is considered failed hydraulically off when the “lock” mode slip speed is excessive, or, when the ‘on” mode slip speed error is excessive.	if use TCC slip speed error OR TCC control mode TCC slip speed error = TCC slip speed - TCC command slip speed else if TCC control mode torque convert slip = engine speed - transmission input shaft speed then update fail time 25 millisecond update rate	= 0 Boolean = ON mode (controlled slip mode) ≥ **P2817 TCC stuck off fail TCC slip speed** = LOCK ≥ 130.0 RPM	diagnostic monitor enable TCC command capacity TCC command pressure (TCC control mode previous TCC control mode previous TCC control mode previous) AND (TCC control mode current OR TCC control mode current) (TCC stuck off enable OR TCC stuck on enable) hydraulic pressure available: engine speed	= 1 Boolean ≥ 0.00 % ≥ 500.0 kPa ≠ TCC control mode current ≠ ON mode (controlled slip mode) ≠ LOCK = ON mode (controlled slip mode) = LOCK = 1 Boolean = 1 Boolean ≥ 500.0 RPM	fail time ≥ 4.000 seconds increment fail count fail count ≥ 3 counts 25 millisecond update rate TCC command capacity time ≥ 0.00 seconds TCC command pressure time ≥ 2.00 seconds engine speed time ≥ **engine speed time for transmission hydraulic pressure available**	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							see supporting table	
					service fast learn active	= FALSE		
					battery voltage	≥ 9.00 volts	battery voltage time ≥ 0.100 seconds	
					run crank voltage	≥ 9.00 volts	run crank voltage time ≥ 0.100 seconds	
					(PTO active	= FALSE		
					OR	= 1 Boolean		
					PTO disable calibration)	≥ 8.0 %		
					accelerator pedal position	≤ 99.0 %		
					accelerator pedal position	= range shift complete		
					range shift state	≥ -6.66 °C		
					transmission fluid temperature	≤ 130.0 °C		
					transmission fluid temperature	≥ 50.0 Nm		
					engine torque	≤ 8,191.8 Nm		
					engine torque	= FALSE		
					P2817 test fail this key on	= ON mode (controlled slip mode)		
					(TCC control mode	= LOCK		
					OR			
					TCC control mode)	≥ CeCGSR_e_CR_Second		
					attained gear	≥ 75.00 RPM		
					attainded gear slip	AcceleratorPedalFailure EngineTorqueEstInaccurate		
					DTCs not fault active	P281B, P281D, P281E, P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D		
					DTCs not fault pending	P0722, P0723, P0716, P0717, P07BF, P07C0		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid H Stuck On - GR10 specific	P2818	The diagnostic monitor detects the transmission torque converter control valve solenoid failed hydraulically on. This is evaluated by monitoring slip across the torque converter in two cases: 1) during low speed shifts into drive and reverse while monitoring engine speed and 2) outside of garage shifts by monitoring engine speed decel and torque for potential engine stall	ABS(TCC slip speed) (set point engine speed - actual engine speed) (maximum engine speed during garage shift - current engine speed) engine torque update TCC stuck on fail time garage shift	≤ 40.0 RPM ≥ 50.0 RPM ≥ 50.0 RPM ≥ 85.0 Nm	MIN(commanded or attained gear turbine speed) active clutch control freewheel-to-lock shift lock-to-freewheel shift (commanded gear AND output speed) OR (commanded gear AND output speed) primary oncoming clutch command primary oncoming control state (TCC stuck off enable OR TCC stuck on enable)	≤ desired engine speed - 50.0 RPM = garage shift = FALSE = FALSE = REVERSE ≤ 50.0 RPM ≥ FIRST GEAR ≥ -50.0 RPM ≥ Return spring - **P2818 GR10 Oncoming Clutch Capacity Offset** ≠ clutch fill = 1 Boolean = 1 Boolean	TCC stuck on fail time garage shift ≥ **P2818 TCC stuck on fail time garage shift - GR10** update fail count when: fail count ≥ 3 counts set DTC fault active 25 millisecond update rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage	≥ 9.00 volts		
					run crank voltage	≥ 9.00 volts		
					diagnostic monitor enable	= 1 Boolean	battery voltage time ≥ 0.100 seconds	
					PRNDL	≠ PARK	run crank voltage time ≥ 0.100 seconds	
					commanded gear	≠ PARK		
					PRNDL	≠ NEUTRAL		
					commanded gear	≠ NEUTRAL		
					TCC command mode	= OFF		
					(PTO active	= FALSE		
					OR			
					PTO disable calibration)	= 1 (0 to enable, 1 to disable)		
					transmission fluid temperature	≥ -6.66 °C		
					transmission fluid temperature	≤ 130.00 °C		
					engine torque	≥ -25.0 Nm		
					engine torque	≤ 800.0 Nm		
					turbine speed	≥ cmnd gear turbine speed - 25.0 RPM		
					P2818 test fail this key on	= FALSE		
					engine speed	≥ 300.0 RPM		
					engine speed	≤ 850.0 RPM		
					accelerator pedal position	≤ 5.0 %		
					4WD low state	= FALSE		
					(driver shift mode active	= FALSE		
					OR			
					driver shift mode calibration)	= 0 (0 to enable, 1 to disable)		
					(misfire requests TCC off	= FALSE		
					OR			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					misfire TCC off calibration) clucth control solenoid stuck ON AND stuck OFF intrusive shift active TCC solenoid pulse request vehicle speed (not garage shift) minimum turbine speed DTCs not fault pending DTCs not fault active	= 0 (0 to enable, 1 to disable)Boolean = FALSE = FALSE ≤ 4.0 KPH ≤ set point engine speed - 50.0 RPM P281B, P281D, P281E, P0722, P0723, P0716, P0717, P07BF, P07C0, P0746, P0747, P0776, P0777, P0796, P0797, P2714, P2715, P2723, P2724, P2732, P2733, P2820, P2821 AcceleratorPedalFailure EngineTorqueEstInaccurate P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D		
			active clutch control ABS(TCC slip speed) engine torque [(set point engine speed - actual engine speed) OR	≠ garage shift ≤ 30.0 RPM ≥ 90.0 Nm ≥ 150.0 RPM			TCC stuck on stall pending time ≥ **P2818 TCC stuck on fail time stall pending - GR10** when: fail count	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			rate of change of engine speed] update TCC stuck on stall pending time	≤ -2,000 RPM/second			≥ 4 counts set DTC fault active 25 millisecond update rate	
					MIN(commanded or attained gear turbine speed)	≤ desired engine speed - 50.0 RPM		
					active clutch control	≠ garage shift		
					freewheel-to-lock shift	= FALSE		
					lock-to-freewheel shift	= FALSE		
					(commanded gear AND output speed) OR (commanded gear AND output speed)	= REVERSE ≤ -999,999.0 RPM ≥ FIRST GEAR ≥ 0.0 RPM		
					primary oncoming clutch command	≥ Return spring - **P2818 GR10 Oncoming Clutch Capacity Offset**		
					(TCC stuck off enable OR TCC stuck on enable)	= 1 Boolean = 1 Boolean		
					battery voltage	≥ 9.00 volts		
					run crank voltage	≥ 9.00 volts	battery voltage time ≥ 0.100 seconds	
					diagnostic monitor enable	= 1 Boolean	run crank voltage time ≥ 0.100 seconds	
					PRNDL	≠ PARK		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					commanded gear	≠ PARK		
					PRNDL	≠ NEUTRAL		
					commanded gear	≠ NEUTRAL		
					TCC command mode	= OFF		
					(PTO active OR PTO disable calibration)	= FALSE = 1 (0 to enable, 1 to disable)		
					transmission fluid temperature	≥ -6.66 °C		
					transmission fluid temperature	≤ 130.00 °C		
					engine torque	≥ -25.0 Nm		
					engine torque	≤ 800.0 Nm		
					turbine speed	≥ cmnd gear turbine speed - 25.0 RPM		
					P2818 test fail this key on	= FALSE		
					engine speed	≥ 300.0 RPM		
					engine speed	≤ 850.0 RPM		
					accelerator pedal position	≤ 5.0 %		
					4WD low state (driver shift mode active OR driver shift mode calibration)	= FALSE = FALSE = 0 (0 to enable, 1 to disable)		
					(misfire requests TCC off OR misfire TCC off	= FALSE = 0 (0 to enable, 1 to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					calibration)	disable)Boolean		
					clucth control solenoid stuck ON AND stuck OFF	= FALSE		
					intrusive shift active			
					TCC solenoid pulse request	= FALSE		
					vehicle speed	≤ 15.0 KPH		
					minimum turbine speed	≤ set point engine speed - 50.0 RPM		
					DTCs not fault pending	P281B, P281D, P281E, P0722, P0723, P0716, P0717, P07BF, P07C0, P0746, P0747, P0776, P0777, P0796, P0797, P2714, P2715, P2723, P2724, P2732, P2733, P2820, P2821		
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate P0716, P0717, P07BF, P07C0, P0722, P0723, P077C, P077D		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid H Control Circuit Open	P281B	Controller specific circuit diagnoses 9 speed TCC Control Circuit, 10 speed TCC Control Circuit, 8 speed T93 Default Valve Control Circuit, or CVT Mode Valve B Control Circuit for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid H Control Circuit Low	P281D	Controller specific circuit diagnoses 9 speed TCC Pressure Control Circuit, 10 speed TCC Control Circuit, 8 speed Default Valve Control Circuit, or CVT Mode Valve B for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds. For 8 speed T87a controllers, an open circuit on the Default Valve Control Circuit will also set P281D.	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid H Control Circuit High	P281E	Controller specific circuit diagnoses 9 speed TCC Pressure Control Circuit, 10 speed TCC Control Circuit, 8 speed Default Valve Control Circuit, or CVT Mode Valve B Control Circuit for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control (PC) Solenoid J Stuck Off (GR10)	P2820	Each pressure control solenoid stuck off diagnostic monitor detects a control solenoid failed hydraulically off, while the solenoid is electrically functional. This diagnostic monitor detects the default disable valve solenoid failed hydraulically off. The default disable valve is used to route hydraulic fluid to transmission clutches to achieve a hydraulic default gear in the event that a fault occurs which requires the solenoid electrical drivers to be turned off. If the default disable solenoid is hydraulically stuck off, the transmission will enter hydraulic default unintentionally while the control system is actively commanding another gear, which can result in a tie-up condition. When the default disable valve solenoid is hydraulically off while in drive, hydraulic fluid will be routed to clutches to achieve either 7th or 2nd gear. If the vehicle is moving	(gear ratio AND gear ratio) OR (gear ratio AND gear ratio) (C1 clutch slip speed C2 clutch slip speed C3 clutch slip speed C4 clutch slip speed OR C3 clutch slip speed C4 clutch slip speed C5 clutch slip speed C6 clutch slip speed) update fail time 6.25 milliscond update	≥ 3.000 ≤ 2.960 ≥ 0.980 ≤ 1.020 ≤ 50.00 ≤ 50.00 ≤ 50.00 ≤ 50.00 ≤ 50.00 ≤ 50.00 ≤ 50.00 ≤ 50.00	**********	**********	if engine torque < 20.0 Nm fail time ≤ 0.50 sec else fail time = 0.25 seconds 6.25 milliscond update	Type A, 1 Trips
					system-level enables: use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= 1 Boolean = 1 Boolean ≥ 9.00 volts = 1 Boolean = 1 Boolean ≥ 9.00 volts = TRUE Boolean = TRUE Boolean	battery voltage time ≥ 0.100 seconds run crank voltage time ≥ 0.100 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and the control system is commanding a different gear, the solenoid fault can be detected as either a clutch tie-up or startle mitigation event. Shifting to neutral while monitoring gear ratio will isolate the fault as either a stuck on clutch solenoid or a stuck off default disable valve solenoid. For GR10 non-ETRS applications, the stuck off solenoid can be detected by monitoring transmission input speed deceleration magnitude and timing during a stationary shift into drive from park, neutral, or reverse. If the driver attempts unsucessfully to accelerate and then again shifts into drive, this 2nd shift triggers a neutral test which monitors input speed to confirm that the default disable solenoid is stuck off			service fast learn active service solenoid cleaning procedure active hydraulic pressure available hydraulic line pressure ********** conditions to trigger start of test: (clutch control solenoid test state OR clutch control solenoid test state) Offgoing clutch stuck on test result (for any clutch) Default disable stuck off enable cal for tie-up events current predicted hydraulic default gear if solenoid drivers are turned off ********** conditions needed through duration of test: attained gear transmission output speed driver direction request	= FALSE Boolean = FALSE Boolean = TRUE ≥ 10.00 kPa ********** = Tie Up Test Active = Tie Up Test Hold = Test Failing = 1 (1 to enable, 0 to disable) = a drive gear (i.e. 2nd or 7th gear) ********** = NEUTRAL ≥ 36.00 RPM = FORWARD		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					********** DTCs not fault pending DTCs not test fail this key on DTCs not fault active	********** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6 P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
			(gear ratio AND gear ratio) OR (gear ratio AND	≥ 3.000 ≤ 2.960 ≥ 0.980			if engine torque < 20.0 Nm fail time ≤ 0.50 sec else	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			gear ratio)	≤ 1.020			fail time = 0.25 seconds	
			(C1 clutch slip speed C2 clutch slip speed C3 clutch slip speed C4 clutch slip speed	≤ 40.00 ≤ 40.00 ≤ 40.00 ≤ 40.00			6.25 milliscond update	
					**********	**********		
					system-level enables:			
			OR					
					use battery voltage calibration is FALSE	= 1 Boolean		
			C3 clutch slip speed C4 clutch slip speed C5 clutch slip speed C6 clutch slip speed)	≤ 40.00 ≤ 40.00 ≤ 40.00 ≤ 40.00	OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
			update fail time 6.25 milliscond update					
					AND			
					battery voltage)	≥ 9.00 volts	battery voltage time ≥ 0.100 seconds	
					use run crank voltage calibration is FALSE OR	= 1 Boolean		
					(use run crank voltage calibration is TRUE AND	= 1 Boolean		
					run crank voltage)	≥ 9.00 volts	run crank voltage time ≥ 0.100 seconds	
					TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					hydraulic pressure available	= TRUE		
					(hydraulic line pressure	≥ 10.00 kPa		
					OR Clutch Stuck on in Park/ Neutral Fault Pending	= TRUE		
					OR Neutral Staging Line Pressure Disable)	=TRUE		
					**********	**********		
					conditions to trigger start of test:			
					clutch control solenoid test state	= Neutral Test State		
					Default disable stuck off enable cal for startle events	= 0 (1 to enable, 0 to disable)		
					Startle Mitigation Active	= TRUE		
					**********	**********		
					conditions needed through duration of test:			
					current predicted hydraulic default gear if solenoid drivers are turned off	= a drive gear (i.e. 2nd or 7th gear)		
					attained gear	= NEUTRAL		
					driver direction request	= FORWARD		
					**********	**********		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not test fail this key on	P2534 P0707 P0708 P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA		
					DTCs not fault active	P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732 P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		
			Input speed decel test: transmission input speed deceleration neutral test to set DTC on next shift into drive:	> **P2820 GR10 hydraulic default input speed deceleration threshold**			decel time: ≥ 0.05 sec decel observed within **P2820 GR10 hydraulic default at launch test window**	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			transmission input speed	< 100 RPM			neutral test fail time ≥ 0.10	
					**********	**********	6.25 milliscond update	
					system-level enables:			
					use battery voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use battery voltage calibration is TRUE	= 1 Boolean		
					AND			
					battery voltage)	≥ 9.00 volts		
					use run crank voltage calibration is FALSE	= 1 Boolean		
					OR			
					(use run crank voltage calibration is TRUE	= 1 Boolean		
					AND			
					run crank voltage)	≥ 9.00 volts		
					TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled	= TRUE Boolean		
					service fast learn active	= FALSE Boolean		
					service solenoid cleaning procedure active	= FALSE Boolean		
					hydraulic pressure	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					available			
					(hydraulic pressure	≥ 10.00 kPa		
					OR			
					Clutch Stuck on in Park/ Neutral fault pending	= TRUE		
					OR			
					Neutral Staging Line Pressure Disable)	= TRUE		
					**********	**********		
					conditions needed to trigger decel test:			
					Driver direction change request	= TRUE		
					Driver requested direction	= FORWARD		
					default disable stuck off at launch enable cal	= 1 (1 to enable, 0 to disable)		
					ETRS system type	= CeTRGR_e_NoETRS (CeTRGR_e_NoETRS to enable)		
					deceleration test on previous shift into drive failed	= TRUE		
					P2820 Test Passed this Key on	= FALSE		
					OR			
					(Multiple pass cal	= 1 (1 to enable, 0 to disable)		
					AND			
					Trans output speed since last pass)	≥ 36.0 RPM		
					Accelerator pedal position	≤ 2.5 %	≥ 0.10 sec	
					transmission input speed	≤ 900 RPM		
					transmission output speed	≤ 100 RPM		
					**********	**********		
					conditions needed through duration of decel			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					test:			
					commanded gear	= NEUTRAL		
					Driver direction request	= FORWARD		
					current predicted hydraulic default gear if solenoid drivers are turned off	= a drive gear (i.e. 2nd)		
					transmission input speed	≤ 900 RPM		
					transmission output speed	≤ 100 RPM		
					**********	**********		
					conditions needed to trigger neutral test:			
					decel test failed	= TRUE	All conditions met for ≥ 1.00 sec, increment count. count > 1 , set FP	
					transmission output speed	≤ 100 RPM		
					attained gear direction	= FORWARD		
					brake pedal position	≤ 5.00 %		
					park brake status	≠ APPLIED		
					park brake status	≠ APPLY IN PROGRESS		
					accelerator pedal position	≥ 10.0 %		
					Driver direction change request	= TRUE		
					driver requested direction	= FORWARD		
					transmission input speed	≥ 100 RPM		
					**********	**********		
					DTCs not fault pending	P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172A P172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6		
					DTCs not test fail this key	P2534 P0707 P0708		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					on DTCs not fault active	P0716 P0717 P07C0 P07BF P077D P077C P126C P176D P17CC P17CD P0962 P0966 P0970 P2720 P2729 P2738 P0963 P0967 P0971 P2721 P2730 P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA P0707 P0708 P0723 P0722 P176B P17D6 P0747 P0777 P0797 P2715 P2724 P2733 P0746 P0776 P0796 P2714 P2723 P2732, P2818, P2821 P2820 P178F P17C6 P17C4 P17C7 P172A P172B		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid J Control Circuit Open (T93 Controller only)	P2824	Controller specific circuit diagnoses 10 speed Default Disable Control Circuit for an open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit	≥ 200 K Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid J Control Circuit Low	P2826	Controller specific circuit diagnoses 9 speed Clutch Select Valve Control Circuit, 10 speed Default Disable Control Circuit, or 8 speed Boost Valve Control Circuit for a ground short circuit failure by comparing a voltage measurement to controller specific voltage thresholds. For T87a controllers, an open circuit on solenoid I/J will also set P2826	Voltage measurement outside of controller specific acceptable range indicates a ground short Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short	≤ 0.5 Ω impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds 6.25 millisecond update rate ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid J Control Circuit High	P2827	Controller specific circuit diagnoses 9 speed Clutch Valve Control Circuit, 10 speed Default Disable Control Circuit, or 8 speed Boost Valve Control Circuit for a short to voltage circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates a short to voltage Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage	≤ 0.5 Ω impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) diagnostic monitor enable calibration (solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1) OR (solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2) OR (solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)	≥ 9.00 volts and ≤ 32.00 volts ≥ 5.00 volts = TRUE = ACCESSORY = 1 (1 is enable, 0 is disable) = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON = CeTSCR_e_HSD2 (CeTSCR_e_NoHSD will disable) = ON	fail time ≥ 0.30 seconds out of sample time ≥ 0.50 seconds ≥ 1.00 seconds ≥ 25 milliseconds ≥ 12.5 milliseconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Stall Prevention Active Signal Message Counter Incorrect	P30BD	The diagnostic monitor detects an alive rolling count error in the CAN frame containing the engine stall protection signal value.	The signal value of the Alive Rolling Count (ARC) of the following signals received over serial data is incorrect for: Torque Converter Clutch (TCC) stall saver active ARC	>= 8.00 counts out of >= 10.00 counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus. All the following conditions are met for: Battery voltage Accessory mode to off mode transition not pending If controller is a non-OBD controller then battery voltage Controller type: OBD Controller	>= 3,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P30D6	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 8.00 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the controller main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 2	P30D7	This DTC detects intermitent and continuous invalid SPI messages. This is based on the detection of missing or invalid receive message within the main processor before receiving a valid message.	This function detects a serial communications fault based upon the detection of missing or invalid (receive) message within the main processor.		Run/Crank voltage	>= 8.00 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the controller main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures equals or exceeds before the sample time of is reached	3 counts (equivalent to 800.01 milliseconds) 800.01 milliseconds	General Enable Criteria: Starter motor engaged for Or Run/Crank ignition voltage All below criteria have been met for CAN channel is requesting full communications Normal CAN transmission on Bus is enabled Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If calibratable low voltage disable mode is not Never Disabled Low voltage disable mode: OBDII	 > 15,000.00 milliseconds > 11.00 Volts >= 5,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If OBDII: Run/Crank ignition voltage If EOBD: Run/Crank ignition voltage If Secure: Starter motor engaged for Or Run/Crank ignition voltage If Hybrid Secure: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>= 11.00 Volts >= 9.00 Volts > 15,000.00 milliseconds > 11.00 Volts >= 8.00 Volts 1.00 (1 indicates enabled) >= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With ECM	U0100	This DTC monitors for a loss of communication with the Engine Control Module	Message is not received from controller for Message $0C9 Message $287 Message $3E9 Message $4C1 Message $4D1 Message $4F1	 ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank:	 >= 5,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Power Mode is run			
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds > 11.00 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 8.00 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled Or Controller is an OBD controller	1.00 (1 indicates enabled)		
					Controller shutdown is not impending			
					Power Mode is not run/ crank			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Anti-Lock Brake System (ABS) Control Module	U0121	This DTC monitors for a loss of communication with the Anti-Lock Brake System (ABS) Control Module (Non-OBD Module ID 243).	Message is not received from controller for Message $0C1 Message $0C5 Message $1E9 Message $2F9	 ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 5,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15,000.00 milliseconds		
					Or Run/Crank ignition voltage	> 11.00 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 8.00 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	1.00 (1 indicates enabled)		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Power Steering Control Module	U0131	This DTC monitors for a loss of communication with the Power Steering Control Module.	Message is not received from controller for Message $1E5	≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 5,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15,000.00 milliseconds		
					Or Run/Crank ignition voltage	> 11.00 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 8.00 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	1.00 (1 indicates enabled)		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $12A Message $1F1 Message $1F3 Message $4E1 Message $4E9	 ≥ 500.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds ≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	 >= 5,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Emissions Neutral Diagnostic – Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15,000.00 milliseconds		
					Or Run/Crank ignition voltage	> 11.00 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 8.00 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	1.00 (1 indicates enabled)		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Gateway A	U0146	This DTC monitors for a loss of communication with Gateway A.	Message is not received from controller for Message $3CF	≥ 10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Conroller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run	>= 5,000.00 milliseconds > 11.00 Volts <= 18.00 Volts	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled			
					Low voltage disable mode: OBDII			
					If OBDII: Run/Crank ignition voltage	>= 11.00 Volts		
					If EOBD: Run/Crank ignition voltage	>= 9.00 Volts		
					If Secure: Starter motor engaged for	> 15,000.00 milliseconds		
					Or Run/Crank ignition voltage	> 11.00 Volts		
					If Hybrid Secure: Run/Crank ignition voltage	>= 8.00 Volts		
					If power mode = Accessory:			
					Off key cycle diagnostics are enabled	1.00 (1 indicates enabled)		
					Or Controller is an OBD controller			
					Controller shutdown is not impending			
					Power Mode is not run/ crank			
					Battery voltage	>= 11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Input Power Circuit A - Ignition Input On/Start Circuit Correlation	U3023	Detect a Power A vs RuncCrank correlation error	Power A - RunCrank Voltage	> 3.00	PowerA - RunCrank Correlation monitoring enable = TRUE Battey Present RunCrank Active Starter Motor NOT Engaged	1.00 Battey Present = TRUE RunCrank Active = TRUE Starter Motor Engaged = FALSE	40.00 failures out of 50.00	Type A, 1 Trips

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description:

Value Units: predicted direction: forward, reverse, unknown
X Unit: attained gear
Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1			
y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 2			
y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 3			
y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 4			
y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 5			
y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	500.000	500.000	1,000.000	2,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	3	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	3	3	3	3	3	3	3	3

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	350	225

Initial Supporting table - P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P17D6 holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P17D6 intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P17D6 intermediate speed sensor fail RPM threshold

Description: P17D6 intermediate speed sensor fail RPM speed threshold

Value Units: RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	100	100

Initial Supporting table - P17D6 intermediate speed sensor fail time threshold

Description: P17D6 intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P17D6 minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P17D6 ratio calibration when REVERSE or P17D6 ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P17D6 ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P2797 hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds
X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.050	0.050	0.050	0.050

Initial Supporting table - P2797 predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fliud temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error
X Unit: transmission fluid temperature DegC
Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	300	300	300	300	300
500	300	300	300	300	300
1,100	300	300	300	300	300
1,500	300	300	300	300	300
2,500	300	300	300	300	300

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Value Units: Max Time for Last Seed Timeout (ms)
X Unit: Operating Loop Sequence (enum)

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	500.000	500.000	1,000.000	2,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Value Units: Fail threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	3	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	3	3	3	3	3	3	3	3

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Value Units: Sample threshold for PSW (count)
X Unit: Operating Loop (enum)

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

P0606_Last Seed Timeout f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

P0606_Last Seed Timeout f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	200.000	500.000	500.000	1,000.000	2,000.000	8,191.875	8,191.875	8,191.875

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

P0606_PSW Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	3	3	3	3	3	3	3	3

P0606_PSW Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	3	3	3	3	3	3	3	3

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

P0606_PSW Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msSeq	CePISR_e_3p125msSeq	CePISR_e_5msSeq	CePISR_e_6p25msSeq	CePISR_e_10msSeq	CePISR_e_12p5msSeq	CePISR_e_20msSeq	CePISR_e_25msSeq
1	4	4	4	4	4	4	4	4

P0606_PSW Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_40msSeq	CePISR_e_50msSeq	CePISR_e_80msSeq	CePISR_e_100msSeq	CePISR_e_250msSeq	CePISR_e_EventA_Seq	CePISR_e_EventB_Seq	CePISR_e_EventC_Seq
1	4	4	4	4	4	4	4	4

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction

Value Units: predicted direction: forward, reverse, unknown
X Unit: attained gear
Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1			
y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 2			
y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 3			
y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 4			
y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 5			
y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	350	225

Initial Supporting table - P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P17D6 holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P17D6 intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P17D6 intermediate speed sensor fail RPM threshold

Description: P17D6 intermediate speed sensor fail RPM speed threshold

Value Units: RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	100	100

Initial Supporting table - P17D6 intermediate speed sensor fail time threshold

Description: P17D6 intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P17D6 minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P17D6 ratio calibration when REVERSE or P17D6 ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P17D6 ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P2817 TCC stuck off fail TCC slip speed

Description: TCC stuck off slip speed fail threshold when TCC is in ON mode (controlled slip mode)

Value Units: RPM
X Unit: engine torque Nm

y/x	0.00	64.00	128.00	192.00	256.00	320.00	384.00	448.00	512.00
1	50.0	50.0	100.0	100.0	150.0	200.0	250.0	250.0	250.0

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction

Value Units: predicted direction: forward, reverse, unknown
X Unit: attained gear
Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1			
y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 2			
y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 3			
y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 4			
y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 5			
y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	350	225

Initial Supporting table - P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P17D6 holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P17D6 inter□ ediate speed sensor □ail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P17D6 inter□ ediate speed sensor □ail RPM threshold

Description: P17D6 intermediate speed sensor fail RPM speed threshold

Value Units: RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	100	100

Initial Supporting table - P17D6 intermediate speed sensor fail time threshold

Description: P17D6 intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P17D6 minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P17D6 ratio calibration when REVERSE or P17D6 ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P17D6 ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P2797 hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds
X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.050	0.050	0.050	0.050

Initial Supporting table - P2797 predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fliud temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error
X Unit: transmission fluid temperature DegC
Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	300	300	300	300	300
500	300	300	300	300	300
1,100	300	300	300	300	300
1,500	300	300	300	300	300
2,500	300	300	300	300	300

Initial Supporting table - P2817 TCC stuck off fail TCC slip speed

Description: TCC stuck off slip speed fail threshold when TCC is in ON mode (controlled slip mode)

Value Units: RPM
X Unit: engine torque Nm

y/x	0.00	64.00	128.00	192.00	256.00	320.00	384.00	448.00	512.00
1	50.0	50.0	100.0	100.0	150.0	200.0	250.0	250.0	250.0

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Initial Supporting table - C1 exhaust delay closed throttle down shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay closed throttle lift foot up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay garage shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.250	0.250	0.250	0.250	0.250

Initial Supporting table - C1 exhaust delay negative torque up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C1 exhaust delay open throttle power down shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 exhaust delay open throttle power on up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.750	0.750	0.750	0.750	0.750

Initial Supporting table - C1 Torque-Based Pressure Clip

Description: Pressure clip values for C1 based on clutch torque. Clutch torque calculated from engine torque using torque lever ratios, which are hardware and shift specific.

Value Units: Clutch Pressure (kPa)
X Unit: C1 Oncoming Clutch Torque (Nm)

y/x	0	100	200	300	600
1	690	690	690	690	690

Initial Supporting table - C1_Oncoming Post-Torque Phase Delay

Description: Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C1 is the oncoming clutch

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - C2 exhaust delay closed throttle down shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C2 exhaust delay garage shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.250	0.250	0.250	0.250	0.250

Initial Supporting table - C2 exhaust delay negative torque up shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C2 exhaust delay open throttle power down shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C2 exhaust delay open throttle power on up shift

Description: P0777 C2 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.750	0.750	0.750	0.750	0.750

Initial Supporting table - C2 Torque-Based Pressure Clip

Description:

Value Units: Clutch Pressure (kPa)
X Unit: C2 Oncoming Clutch Torque (Nm)

y/x	0	100	200	300	600
1	300	400	500	500	500

Initial Supporting table - C2_Oncoming Post-Torque Phase Delay

Description: Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C2 is the oncoming clutch

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - C3 exhaust delay closed throttle down shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 exhaust delay closed throttle lift foot up shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 exhaust delay garage shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.250	0.250	0.250	0.250	0.250

Initial Supporting table - C3 exhaust delay negative torque up shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C3 exhaust delay open throttle power down shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 exhaust delay open throttle power on up shift

Description: P0797 C3 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	3.000	0.750	0.750	0.750	0.750

Initial Supporting table - C3 Torque-Based Pressure Clip

Description:

Value Units: Clutch Pressure (kPa)
X Unit: C3 Oncoming Clutch Torque (Nm)

y/x	0	100	200	300	600
1	300	400	500	575	800

Initial Supporting table - C3_Oncoming Post-Torque Phase Delay

Description: Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C3 is the oncoming clutch

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - C4 exhaust delay closed throttle down shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 exhaust delay closed throttle lift foot up shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 exhaust delay garage shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.250	0.250	0.250	0.250	0.250

Initial Supporting table - C4 exhaust delay negative torque up shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C4 exhaust delay open throttle power down shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 exhaust delay open throttle power on up shift

Description: P2715 C4 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.750	0.750	0.750	0.750	0.750

Initial Supporting table - C4 Torque-Based Pressure Clip

Description:

Value Units: Clutch Pressure (kPa)
X Unit: C4 Oncoming Clutch Torque (Nm)

y/x	0	100	200	300	600
1	400	650	750	800	900

Initial Supporting table - C4_Oncoming Post-Torque Phase Delay

Description: Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C4 is the oncoming clutch

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - C5 exhaust delay closed throttle down shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in closed throttle down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 exhaust delay closed throttle lift foot up shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 exhaust delay garage shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - C5 exhaust delay negative torque up shift

Description: P0747 C1 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C5 exhaust delay open throttle power down shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 exhaust delay open throttle power on up shift

Description: P2724 C5 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.750	0.750	0.750	0.750	0.750

Initial Supporting table - C5 Torque-Based Pressure Clip

Description:

Value Units: Clutch Pressure (kPa)
X Unit: C5 Oncoming Clutch Torque (Nm)

y/x	0	100	200	300	600
1	300	600	700	750	900

Initial Supporting table - C5_Oncoming Post-Torque Phase Delay

Description: Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C5 is the oncoming clutch

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - C6 exhaust delay closed throttle lift foot up shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in closed throttle lift foot up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C6 exhaust delay garage shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in garage shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.250	0.250	0.250	0.250	0.250

Initial Supporting table - C6 exhaust delay negative torque up shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in negative torque up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.500	0.500	0.500	0.500	0.500

Initial Supporting table - C6 exhaust delay open throttle power down shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in open throttle power down shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C6 exhaust delay open throttle power on up shift

Description: P2733 C6 clutch hydraulic circuit exhaust time in open throttle power on up shift

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-20.00	0.00	30.00	110.00
1	0.750	0.750	0.750	0.750	0.750

Initial Supporting table - C6 Torque-Based Pressure Clip

Description:

Value Units: Clutch Pressure (kPa)
X Unit: C6 Oncoming Clutch Torque (Nm)

y/x	0	100	200	300	600
1	350	650	750	800	950

Initial Supporting table - C6_Oncoming Post-Torque Phase Delay

Description: Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C6 is the oncoming clutch

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Clip Press CD Shifts

Description: Oncoming clutch clip pressure for closed throttle down shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	400	400	320	400	400	400

Initial Supporting table - Clutch Clip Press GS Shifts

Description: Oncoming clutch clip pressure for garage shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	450	750	850	400	400	400

Initial Supporting table - Clutch Clip Press NU Shifts

Description: Oncoming clutch clip pressure for negative torque up shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	450	450	450	600	450	450

Initial Supporting table - Clutch Clip Press PD Shifts

Description: Oncoming clutch clip pressure for open throttle power down shifts

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	450	500	600	750	750	500

Initial Supporting table - Clutch Stuck On Fail Offset Time CD Shifts

Description: Used for closed throttle down shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time GS Shifts

Description: Used for garage shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time PD Shifts

Description: Used for open throttle power down shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time PU Shifts

Description: Used for powered up shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	1	0	0	0	0

Initial Supporting table - Clutch Stuck On Fail Offset Time STGR Shifts

Description: Used for clutch staging shifts to add additional fail time based on oil temperature

Value Units: time (seconds)
X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	0	0	0	0	0

Initial Supporting table - Clutch Stuck On Shift Type Enable

Description: Calibration to enable the clutch stuck on test for each shift type

X Unit: Shift Type
Y Units: Boolean

y/x	CeTSER_e_STGR	CeTSER_e_GSCR	CeTSER_e_NUCR	CeTSER_e_PUCR	CeTSER_e_CDCR	CeTSER_e_PDCR	CeTSER_e_CLAR
1	0	1	1	1	1	1	0

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction

Value Units: predicted direction: forward, reverse, unknown
X Unit: attained gear
Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1			
y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 2			
y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 3			
y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 4			
y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 5			
y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	

Initial Supporting table - P0741 GR10 torque converter K factor fail limit

Description:

Value Units: transmission torque converter K factor
X Unit: transmission torque converter speed ratio = transmission turbine shaft speed / engine speed

y/x	0.000	0.100	0.200	0.300	0.500	0.700	0.800	0.945	0.950
1	400.0	300.0	225.0	200.0	200.0	200.0	250.0	1,000.0	16,383.8

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	350	225

Initial Supporting table - P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P17D6 holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P17D6 intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P17D6 intermediate speed sensor fail RPM threshold

Description: P17D6 intermediate speed sensor fail RPM speed threshold

Value Units: RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	100	100

Initial Supporting table - P17D6 intermediate speed sensor fail time threshold

Description: P17D6 intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P17D6 minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P17D6 ratio calibration when REVERSE or P17D6 ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P17D6 ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P2797 hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds
X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.050	0.050	0.050	0.050

Initial Supporting table - P2797 predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fliud temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error
X Unit: transmission fluid temperature DegC
Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	300	300	300	300	300
500	300	300	300	300	300
1,100	300	300	300	300	300
1,500	300	300	300	300	300
2,500	300	300	300	300	300

Initial Supporting table - P2817 TCC stuck off fail TCC slip speed

Description: TCC stuck off slip speed fail threshold when TCC is in ON mode (controlled slip mode)

Value Units: RPM
X Unit: engine torque Nm

y/x	0.00	64.00	128.00	192.00	256.00	320.00	384.00	448.00	512.00
1	50.0	50.0	100.0	100.0	150.0	200.0	250.0	250.0	250.0

Initial Supporting table - P2818 TCC stuck on fail time garage shift - GR10

Description: GR10 P2818 TCC stuck on fail time garage shift

Value Units: seconds
X Unit: rate of change of engine speed, RPM/second
Y Units: unitless

y/x	50	100	150	250	300
1	0.250	0.200	0.125	0.100	0.100

Initial Supporting table - P2818 TCC stuck on fail time stall pending - GR10

Description: GR10 P2818 TCC stuck on fail time stall pending

Value Units: seconds
X Unit: rate of change of engine speed, RPM/second
Y Units: unitless

y/x	50	100	150	250	300
1	0.750	0.300	0.300	0.200	0.100

Initial Supporting table - P2820 GR10 hydraulic default at launch test window

Description:

Value Units: RPM/sec
X Unit: °C

y/x	-10	5	15	30	110
1	0	0	1	1	1

Initial Supporting table - P2820 GR10 hydraulic default input speed deceleration threshold

Description: Negative acceleration needed to increment fail timer for GR10 default disable solenoid stuck off at launch diagnostic

Value Units: RPM/sec
X Unit: °C

y/x	-10	5	15	30	110
1	-32,768	-32,768	-3,500	-2,000	-2,000

Initial Supporting table - speed sensor directional rationality enable calibration

Description: speed sensor directional rationality enable calibration

Value Units: Boolean
X Unit: scheduled gear
Y Units: unitless

y/x	CeCGSR_FwdCmded	CeCGSR_NeutCmded	CeCGSR_RvrsCmded	CeCGSR_ParkCmded
1	1	1	0	1

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction

Value Units: predicted direction: forward, reverse, unknown
X Unit: attained gear
Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1			
y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 2			
y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 3			
y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 4			
y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 5			
y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	350	225

Initial Supporting table - P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P17D6 holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P17D6 intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P17D6 intermediate speed sensor fail RPM threshold

Description: P17D6 intermediate speed sensor fail RPM speed threshold

Value Units: RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	100	100

Initial Supporting table - P17D6 intermediate speed sensor fail time threshold

Description: P17D6 intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P17D6 minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P17D6 ratio calibration when REVERSE or P17D6 ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P17D6 ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - speed sensor directional rationality enable calibration

Description: speed sensor directional rationality enable calibration

Value Units: Boolean
X Unit: scheduled gear
Y Units: unitless

y/x	CeCGSR_FwdCmded	CeCGSR_NeutCmded	CeCGSR_RvrsCmded	CeCGSR_ParkCmded
1	1	1	0	1

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Initial Supporting table - Clutch Connectivity C1 On Threshold

Description: Pressure command above which C1 will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C2 On Threshold

Description: Pressure command above which C2 will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C3 On Threshold

Description: Pressure command above which C3 will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C4 On Threshold

Description: Pressure command above which C4 will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C5 On Threshold

Description: Pressure command above which C5 will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C6 On Threshold

Description: Pressure command above which C6 will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C7 On Threshold

Description: Pressure command above which SOWC will be considered commanded on

Value Units: Commanded Pressure (kPa)
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	300	300	300	300	300

Initial Supporting table - Clutch Connectivity Wrong Direction FP

Description: Fault pending time for cluch connectivity detecting wrong direction

Value Units: time (sec)
X Unit: transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	1	1	1	1	1

Initial Supporting table - Clutch PCS Pressure Gain

Description: Gain value to convert clutch pressure command to regulator valve command

Value Units: Gain (unitless)
X Unit: Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	1	1	1	1	1	1

Initial Supporting table - Clutch PCS Pressure Offset

Description: Offset value to convert clutch pressure command to regulator valve command

Value Units: offset (kPa)
X Unit: Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	0	0	0	0	0	0

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

Description: Maximum pressure command allowed for each combination of clutches which can lead to a multi-clutch tie up

Value Units: Pressure (kPa)
X Unit: Commanded Gear
Y Units: Clutch

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5
CeTRMR_e_C1_Clutch	166	166	4,096	166	166	174	166
CeTRMR_e_C2_Clutch	139	139	139	4,096	139	139	141
CeTRMR_e_C3_Clutch	182	182	182	182	4,096	182	880
CeTRMR_e_C4_Clutch	311	311	311	311	311	4,096	311
CeTRMR_e_C5_Clutch	148	148	148	148	577	148	4,096
CeTRMR_e_C6_Clutch	81	81	81	81	81	145	81
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 2

y/x	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3
CeTRMR_e_C1_Clutch	166	4,096	4,096	4,096	4,096	4,096	166
CeTRMR_e_C2_Clutch	139	4,096	4,096	139	139	141	4,096
CeTRMR_e_C3_Clutch	182	4,096	182	4,096	182	880	4,096
CeTRMR_e_C4_Clutch	1,760	4,096	311	311	4,096	311	311
CeTRMR_e_C5_Clutch	148	4,096	148	577	148	4,096	577
CeTRMR_e_C6_Clutch	4,096	4,096	81	81	145	81	81
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 3

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

y/x	CeCGSR_e_NeutralC2C4	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6	CeCGSR_e_NeutralC4C5
CeTRMR_e_C1_Clutch	174	166	166	179	166	166	174
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	139	154	139	141
CeTRMR_e_C3_Clutch	182	1,626	182	4,096	4,096	4,096	880
CeTRMR_e_C4_Clutch	4,096	311	1,760	4,096	311	1,760	4,096
CeTRMR_e_C5_Clutch	148	4,096	148	577	4,096	926	4,096
CeTRMR_e_C6_Clutch	145	81	4,096	145	81	4,096	394
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 4

y/x	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC1C2C3C6	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4
CeTRMR_e_C1_Clutch	174	166	166	4,096	166	166	174
CeTRMR_e_C2_Clutch	139	139	139	139	4,096	139	139
CeTRMR_e_C3_Clutch	182	182	182	182	182	4,096	182
CeTRMR_e_C4_Clutch	4,096	311	311	311	311	311	4,096
CeTRMR_e_C5_Clutch	148	148	148	148	148	577	148
CeTRMR_e_C6_Clutch	4,096	81	81	81	81	81	145
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 5

y/x	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
CeTRMR_e_C1_Clutch	166	166	4,096	4,096	166	174	166
CeTRMR_e_C2_Clutch	141	139	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	880	182	4,096	182	4,096	182	1,626

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

CeTRMR_e_C4_Clutch	311	1,760	4,096	311	311	4,096	311
CeTRMR_e_C5_Clutch	4,096	148	4,096	148	577	148	4,096
CeTRMR_e_C6_Clutch	81	4,096	4,096	81	81	145	81
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 6

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC1C2C3C6
CeTRMR_e_C1_Clutch	166	179	166	166	174	174	166
CeTRMR_e_C2_Clutch	4,096	139	154	139	141	139	139
CeTRMR_e_C3_Clutch	182	4,096	4,096	4,096	880	182	182
CeTRMR_e_C4_Clutch	1,760	4,096	311	1,760	4,096	4,096	311
CeTRMR_e_C5_Clutch	148	577	4,096	926	4,096	148	148
CeTRMR_e_C6_Clutch	4,096	145	81	4,096	394	4,096	81
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth
CeTRMR_e_C1_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	4,096	4,096	214	139
CeTRMR_e_C3_Clutch	182	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C4_Clutch	4,096	311	311	4,096	4,096	4,096	4,096
CeTRMR_e_C5_Clutch	148	4,096	4,096	577	577	4,096	926
CeTRMR_e_C6_Clutch	4,096	81	81	145	145	394	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 8

y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	
CeTRMR_e_C1_Clutch	4,096	4,096	271	174	166	179	
CeTRMR_e_C2_Clutch	154	141	407	4,096	4,096	4,096	
CeTRMR_e_C3_Clutch	4,096	880	4,096	1,626	4,096	4,096	
CeTRMR_e_C4_Clutch	2,000	4,096	4,096	4,096	1,760	4,096	
CeTRMR_e_C5_Clutch	4,096	4,096	4,096	4,096	4,096	1,811	
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

Description: Maximum pressure command allowed for each combination of clutches which can lead to a multi-clutch tie up when transfer case is in 4WD low range

Value Units: Pressure (kPa)
X Unit: Commanded Gear
Y Units: Clutch

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 1

y/x	CeCGSR_e_NullForSched	CeCGSR_e_NeutralNoClutch	CeCGSR_e_NeutralC1	CeCGSR_e_NeutralC2	CeCGSR_e_NeutralC3	CeCGSR_e_NeutralC4	CeCGSR_e_NeutralC5
CeTRMR_e_C1_Clutch	62	62	4,096	62	62	65	62
CeTRMR_e_C2_Clutch	52	52	52	4,096	52	52	52
CeTRMR_e_C3_Clutch	67	67	67	67	4,096	67	326
CeTRMR_e_C4_Clutch	115	115	115	115	115	4,096	115
CeTRMR_e_C5_Clutch	55	55	55	55	214	55	4,096
CeTRMR_e_C6_Clutch	30	30	30	30	30	54	30
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 2

y/x	CeCGSR_e_NeutralC6	CeCGSR_e_NeutralC7	CeCGSR_e_NeutralC1C2	CeCGSR_e_NeutralC1C3	CeCGSR_e_NeutralC1C4	CeCGSR_e_NeutralC1C5	CeCGSR_e_NeutralC2C3
CeTRMR_e_C1_Clutch	62	4,096	4,096	4,096	4,096	4,096	62
CeTRMR_e_C2_Clutch	52	4,096	4,096	52	52	52	4,096
CeTRMR_e_C3_Clutch	67	4,096	67	4,096	67	326	4,096
CeTRMR_e_C4_Clutch	652	4,096	115	115	4,096	115	115
CeTRMR_e_C5_Clutch	55	4,096	55	214	55	4,096	214
CeTRMR_e_C6_Clutch	4,096	4,096	30	30	54	30	30
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 3

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

y/x	CeCGSR_e_NeutralC2C4	CeCGSR_e_NeutralC2C5	CeCGSR_e_NeutralC2C6	CeCGSR_e_NeutralC3C4	CeCGSR_e_NeutralC3C5	CeCGSR_e_NeutralC3C6	CeCGSR_e_NeutralC4C5
CeTRMR_e_C1_Clutch	65	62	62	66	62	62	65
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	52	57	52	52
CeTRMR_e_C3_Clutch	67	602	67	4,096	4,096	4,096	326
CeTRMR_e_C4_Clutch	4,096	115	652	4,096	115	652	4,096
CeTRMR_e_C5_Clutch	55	4,096	55	214	4,096	343	4,096
CeTRMR_e_C6_Clutch	54	30	4,096	54	30	4,096	146
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 4

y/x	CeCGSR_e_NeutralC4C6	CeCGSR_e_NeutralC1C2C3C6	CeCGSR_e_Park_wNC	CeCGSR_e_Park_wNC1	CeCGSR_e_Park_wNC2	CeCGSR_e_Park_wNC3	CeCGSR_e_Park_wNC4
CeTRMR_e_C1_Clutch	65	62	62	4,096	62	62	65
CeTRMR_e_C2_Clutch	52	52	52	52	4,096	52	52
CeTRMR_e_C3_Clutch	67	67	67	67	67	4,096	67
CeTRMR_e_C4_Clutch	4,096	115	115	115	115	115	4,096
CeTRMR_e_C5_Clutch	55	55	55	55	55	214	55
CeTRMR_e_C6_Clutch	4,096	30	30	30	30	30	54
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 5

y/x	CeCGSR_e_Park_wNC5	CeCGSR_e_Park_wNC6	CeCGSR_e_Park_wNC7	CeCGSR_e_Park_wNC1C2	CeCGSR_e_Park_wNC2C3	CeCGSR_e_Park_wNC2C4	CeCGSR_e_Park_wNC2C5
CeTRMR_e_C1_Clutch	62	62	4,096	4,096	62	65	62
CeTRMR_e_C2_Clutch	52	52	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	326	67	4,096	67	4,096	67	602

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

CeTRMR_e_C4_Clutch	115	652	4,096	115	115	4,096	115
CeTRMR_e_C5_Clutch	4,096	55	4,096	55	214	55	4,096
CeTRMR_e_C6_Clutch	30	4,096	4,096	30	30	54	30
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 6

y/x	CeCGSR_e_Park_wNC2C6	CeCGSR_e_Park_wNC3C4	CeCGSR_e_Park_wNC3C5	CeCGSR_e_Park_wNC3C6	CeCGSR_e_Park_wNC4C5	CeCGSR_e_Park_wNC4C6	CeCGSR_e_Park_wNC1C2C3C6
CeTRMR_e_C1_Clutch	62	66	62	62	65	65	62
CeTRMR_e_C2_Clutch	4,096	52	57	52	52	52	52
CeTRMR_e_C3_Clutch	67	4,096	4,096	4,096	326	67	67
CeTRMR_e_C4_Clutch	652	4,096	115	652	4,096	4,096	115
CeTRMR_e_C5_Clutch	55	214	4,096	343	4,096	55	55
CeTRMR_e_C6_Clutch	4,096	54	30	4,096	146	4,096	30
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondLckd	CeCGSR_e_SecondFW	CeCGSR_e_Third	CeCGSR_e_Fourth
CeTRMR_e_C1_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	4,096	4,096	79	52
CeTRMR_e_C3_Clutch	67	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C4_Clutch	4,096	115	115	4,096	4,096	4,096	4,096
CeTRMR_e_C5_Clutch	55	4,096	4,096	214	214	4,096	343
CeTRMR_e_C6_Clutch	4,096	30	30	54	54	146	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 8

y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	
CeTRMR_e_C1_Clutch	4,096	4,096	100	65	62	66	
CeTRMR_e_C2_Clutch	57	52	151	4,096	4,096	4,096	
CeTRMR_e_C3_Clutch	4,096	326	4,096	602	4,096	4,096	
CeTRMR_e_C4_Clutch	741	4,096	4,096	4,096	652	4,096	
CeTRMR_e_C5_Clutch	4,096	4,096	4,096	4,096	4,096	671	
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	

Initial Supporting table - Cmnd Tie Up Monitor Output Lock Thresh

Description: Maximum pressure command allowed for each invalid combination of clutches which can lead to an output tie-up

Value Units: Pressure (kPa)
X Unit: Possible Output Tie-up Combination (unitless)
Y Units: Clutch

y/x	CeTCLR_e_TUM_OutLock1	CeTCLR_e_TUM_OutLock2	CeTCLR_e_TUM_OutLock3	CeTCLR_e_TUM_OutLock4	CeTCLR_e_TUM_OutLock5	CeTCLR_e_TUM_OutLock6	CeTCLR_e_TUM_OutLock7
CeTRMR_e_C1_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C2_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C3_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C4_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C5_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C6_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C7_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: transmission fluid temperature °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - engine speed time for transmission hydraulic pressure available

Description: time needed for engine speed to trigger "transmission hydraulic pressure available"

Value Units: seconds
X Unit: °C

y/x	-40.00	-30.00	-20.00	0.00	40.00
1	0.300	0.300	0.300	0.250	0.200

Initial Supporting table - Illegal Drive Clutch Combinations

Description: All combinations of clutch commands which can lead to reverse when the driver is requesting drive (1 indicates clutch on, 0 incdicates clutch off)

Value Units: Boolean (1 for on, 0 for off)
X Unit: Illegal Clutch Combination
Y Units: Clutch

y/x	CeTRMR_e_IllegalDrv_Rev1	CeTRMR_e_IllegalDrv_Rev2
CeTRMR_e_C1_Clutch	1	1
CeTRMR_e_C2_Clutch	1	1
CeTRMR_e_C3_Clutch	0	0
CeTRMR_e_C4_Clutch	1	1
CeTRMR_e_C5_Clutch	0	0
CeTRMR_e_C6_Clutch	1	1
CeTRMR_e_C7_Clutch	0	0

Initial Supporting table - Illegal Park-Neutral Clutch Combinations

Description: All combinations of clutch commands which can lead to drive or reverse when the driver is requesting park or neutral (1 indicates clutch on, 0 incdicates clutch off)

Value Units: Boolean (1 for on, 0 for off)
X Unit: Illegal Clutch Combination
Y Units: Clutch

Illegal Park-Neutral Clutch Combinations - Part 1

y/x	CeTRMR_e_IllegalPN_Rev	CeTRMR_e_IllegalPN_1A	CeTRMR_e_IllegalPN_1Ac	CeTRMR_e_IllegalPN_1Ad	CeTRMR_e_IllegalPN_1Af
CeTRMR_e_C1_Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	0	0	0	0
CeTRMR_e_C3_Clutch	0	0	1	0	0
CeTRMR_e_C4_Clutch	1	0	0	1	0
CeTRMR_e_C5_Clutch	0	1	1	1	1
CeTRMR_e_C6_Clutch	1	0	0	0	1
CeTRMR_e_C7_Clutch	0	0	0	0	0

Illegal Park-Neutral Clutch Combinations - Part 2

y/x	CeTRMR_e_IllegalPN_1M	CeTRMR_e_IllegalPN_1Mc	CeTRMR_e_IllegalPN_1Md	CeTRMR_e_IllegalPN_1Mf	CeTRMR_e_IllegalPN_2A
CeTRMR_e_C1_Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	0
CeTRMR_e_C3_Clutch	0	1	0	0	1
CeTRMR_e_C4_Clutch	0	0	1	0	1
CeTRMR_e_C5_Clutch	1	1	1	1	0
CeTRMR_e_C6_Clutch	0	0	0	1	0
CeTRMR_e_C7_Clutch	0	0	0	0	0

Illegal Park-Neutral Clutch Combinations - Part 3

y/x	CeTRMR_e_IllegalPN_2M	CeTRMR_e_IllegalPN_3	CeTRMR_e_IllegalPN_4	CeTRMR_e_IllegalPN_5	CeTRMR_e_IllegalPN_6
CeTRMR_e_C1_Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	0	0	0	0
CeTRMR_e_C3_Clutch	1	1	1	1	0
CeTRMR_e_C4_Clutch	1	1	1	0	1
CeTRMR_e_C5_Clutch	0	1	0	1	1
CeTRMR_e_C6_Clutch	0	0	1	1	1
CeTRMR_e_C7_Clutch	0	0	0	0	0

Illegal Park-Neutral Clutch Combinations - Part 4

y/x	CeTRMR_e_IllegalPN_7	CeTRMR_e_IllegalPN_8	CeTRMR_e_IllegalPN_9	CeTRMR_e_IllegalPN_10	
CeTRMR_e_C1_Clutch	0	0	0	0	
CeTRMR_e_C2_Clutch	0	1	1	1	

Initial Supporting table - Illegal Park-Neutral Clutch Combinations

CeTRMR_e_C3_Clutch	1	0	1	1	
CeTRMR_e_C4_Clutch	1	1	0	1	
CeTRMR_e_C5_Clutch	1	1	1	0	
CeTRMR_e_C6_Clutch	1	1	1	1	
CeTRMR_e_C7_Clutch	0	0	0	0	

Initial Supporting table - Illegal Reverse Clutch Combinations

Description: All combinations of clutch commands which can lead to drive when the driver is requesting reverse (1 indicates clutch on, 0 incdicates clutch off)

Value Units: Boolean (1 for on, 0 for off)
X Unit: Illegal Clutch Combination
Y Units: Clutch

Illegal Reverse Clutch Combinations - Part 1

y/x	CeTRMR_e_IllegalRev_1A	CeTRMR_e_IllegalRev_1Ac	CeTRMR_e_IllegalRev_1Ad	CeTRMR_e_IllegalRev_1Af	CeTRMR_e_IllegalRev_1M	CeTRMR_e_IllegalRev_1Mc
CeTRMR_e_C1_Clutch	1	1	1	1	1	1
CeTRMR_e_C2_Clutch	0	0	0	0	1	1
CeTRMR_e_C3_Clutch	0	1	0	0	0	1
CeTRMR_e_C4_Clutch	0	0	1	0	0	0
CeTRMR_e_C5_Clutch	1	1	1	1	1	1
CeTRMR_e_C6_Clutch	0	0	0	1	0	0
CeTRMR_e_C7_Clutch	0	0	0	0	0	0

Illegal Reverse Clutch Combinations - Part 2

y/x	CeTRMR_e_IllegalRev_1Md	CeTRMR_e_IllegalRev_1Mf	CeTRMR_e_IllegalRev_2A	CeTRMR_e_IllegalRev_2M	CeTRMR_e_IllegalRev_3	CeTRMR_e_IllegalRev_4
CeTRMR_e_C1_Clutch	1	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	0	1	0	0
CeTRMR_e_C3_Clutch	0	0	1	1	1	1
CeTRMR_e_C4_Clutch	1	0	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	0	0	1	0
CeTRMR_e_C6_Clutch	0	1	0	0	0	1
CeTRMR_e_C7_Clutch	0	0	0	0	0	0

Illegal Reverse Clutch Combinations - Part 3

y/x	CeTRMR_e_IllegalRev_5	CeTRMR_e_IllegalRev_6	CeTRMR_e_IllegalRev_7	CeTRMR_e_IllegalRev_8	CeTRMR_e_IllegalRev_9	CeTRMR_e_IllegalRev_10
CeTRMR_e_C1_Clutch	1	1	0	0	0	0
CeTRMR_e_C2_Clutch	0	0	0	1	1	1
CeTRMR_e_C3_Clutch	1	0	1	0	1	1
CeTRMR_e_C4_Clutch	0	1	1	1	0	1
CeTRMR_e_C5_Clutch	1	1	1	1	1	0
CeTRMR_e_C6_Clutch	1	1	1	1	1	1
CeTRMR_e_C7_Clutch	0	0	0	0	0	0

Initial Supporting table - Incorrect Direction Range Change Delay Time

Description: Time delay after PRNDL change before incorrect direction monitor will be enabled

Value Units: time (sec)
X Unit: transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	1	1	1	1	1

Initial Supporting table - Incorrect Drive Fail Time

Description: Fail Time as a function of temperature for incorrectly commanded drive condition

Value Units: time (sec)
X Unit: transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Neutral Fail Time

Description: Fail Time as a function of temperature for incorrectly commanded neutral condition

Value Units: time (sec)
X Unit: transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Park Fail Time

Description: Fail Time as a function of temperature for incorrectly commanded park condition

Value Units: time (sec)
X Unit: transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Reverse Fail Time

Description: Fail Time as a function of temperature for incorrectly commanded reverse condition

Value Units: time (sec)
X Unit: transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction

Value Units: predicted direction: forward, reverse, unknown
X Unit: attained gear
Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1			
y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 2			
y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
intermediate speed sensor 1 or 2 predicted direction - Part 3			
y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 4			
y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
intermediate speed sensor 1 or 2 predicted direction - Part 5			
y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	

Initial Supporting table - P0723 (MY21) transmission engaged state time threshold

Description: time necessary after transmission engaged state indicates transmsision engaged to allow P0723 enable

Value Units: seconds
seconds

y/x	-40	0	40
1	5	3	1

Initial Supporting table - P0723 Wheel Speed Calc

Description:

y/x	200	300	400	500	600
1	100	150	200	300	450

Initial Supporting table - P0741 GR10 torque converter K factor fail limit

Description:

Value Units: transmission torque converter K factor
X Unit: transmission torque converter speed ratio = transmission turbine shaft speed / engine speed

y/x	0.000	0.100	0.200	0.300	0.500	0.700	0.800	0.945	0.950
1	400.0	300.0	225.0	200.0	200.0	200.0	250.0	1,000.0	16,383.8

Initial Supporting table - P176B delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P176B holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: intermediate speed sensor select
Y Units: commanded gear

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P176B intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P176B intermediate speed sensor fail time threshold

Description: P176B intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P176B minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P176B ratio calibration when REVERSE or P176B ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192.0	192.0

Initial Supporting table - P176B ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P176B ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P17C5 P17D3 intermediate speed sensor RPM

Description: P17C5 P17D3 intermediate speed sensor RPM at signal period transtion to enable fail time update

Value Units: intermediate speed sensor RPM
X Unit: intermediate speed sensor 1 or 2

y/x	0	1
1	350	225

Initial Supporting table - P17D6 delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Description: delay to allow transmission input, intermediate and output speeds to stablize for fail evaluation

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	0.500	0.500

Initial Supporting table - P17D6 holding clutch states

Description: inditaces when the clutch states allow transmission intermediate speed sensor evaluation, when rotating components can trigger speed sesnor, holding clutches will not allow evaluation while clutches not holding will allow evaluation

Value Units: TRUE or FALSE
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
CeCGSR_e_CR_NullForSched	1	1
CeCGSR_e_CR_Neutral	1	1
CeCGSR_e_CR_Park	1	1
CeCGSR_e_CR_Reverse	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	1	0
CeCGSR_e_CR_Fourth	1	0
CeCGSR_e_CR_Fifth	1	0
CeCGSR_e_CR_Sixth	1	0
CeCGSR_e_CR_Seventh	0	0
CeCGSR_e_CR_Eighth	0	0
CeCGSR_e_CR_Ninth	0	0
CeCGSR_e_CR_Tenth	0	0

Initial Supporting table - P17D6 intermediate speed sensor fail count threshold

Description: P176B intermediate speed sensor fail count threshold

Value Units: fail counts
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	3	3

Initial Supporting table - P17D6 intermediate speed sensor fail RPM threshold

Description: P17D6 intermediate speed sensor fail RPM speed threshold

Value Units: RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	100	100

Initial Supporting table - P17D6 intermediate speed sensor fail time threshold

Description: P17D6 intermediate speed sensor fail time threshold

Value Units: seconds
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.500	1.500

Initial Supporting table - P17D6 minimum estimated transmission intermediate speed to enable fail evaluation

Description: minimum estimated transmission intermediate speed to enable fail evaluation, where estimate is based on transmission input speed / ratio calibration, where ratio calibration is either P17D6 ratio calibration when REVERSE or P17D6 ratio calibration when not REVERSE

Value Units: estimated transmission intermediate speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 minimum transmission input speed to enable fail evaluation

Description: minimum transmission input speed to enable fail evaluation

Value Units: transmission input speed RPM
X Unit: intermediate speed sensor select

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	192	192

Initial Supporting table - P17D6 ratio calibration when not REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is not REVERSE

Value Units: ratio
X Unit: commanded gear
Y Units: intermediate speed sensor select

y/x	CeTGRR_e_Gear1	CeTGRR_e_Gear2	CeTGRR_e_Gear3	CeTGRR_e_Gear4	CeTGRR_e_Gear5	CeTGRR_e_Gear6	CeTGRR_e_Gear7	CeTGRR_e_Gear8	CeTGRR_e_Gear9	CeTGRR_e_Gear10
CeTSRR_e_C2C_ClchSpdSnsr1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.5596	0.4342	0.4342
CeTSRR_e_C2C_ClchSpdSnsr2	1.0000	1.0000	3.1250	1.7699	1.7699	1.3774	1.0000	0.8224	0.6382	0.6382

Initial Supporting table - P17D6 ratio calibration when REVERSE

Description: used to estimate transmission input speed based on transmission intermediate speed when range is REVERSE

Value Units: ratio

y/x	CeTSRR_e_C2C_ClchSpdSnsr1	CeTSRR_e_C2C_ClchSpdSnsr2
1	1.0000	1.0000

Initial Supporting table - P2817 TCC stuck off fail TCC slip speed

Description: TCC stuck off slip speed fail threshold when TCC is in ON mode (controlled slip mode)

Value Units: RPM
X Unit: engine torque Nm

y/x	0.00	64.00	128.00	192.00	256.00	320.00	384.00	448.00	512.00
1	50.0	50.0	100.0	100.0	150.0	200.0	250.0	250.0	250.0

Initial Supporting table - P2818 GR10 Oncoming Clutch Capacity Offset

Description: Primary Oncoming Clutch Capacity Offset from return spring pressure

Value Units: kPa
X Unit: Oncoming Clutch

y/x	CeTSER_e_C1_Clutch	CeTSER_e_C2_Clutch	CeTSER_e_C3_Clutch	CeTSER_e_C4_Clutch	CeTSER_e_C5_Clutch	CeTSER_e_C6_Clutch
1	50	50	50	50	50	50

Initial Supporting table - P2818 TCC stuck on fail time garage shift - GR10

Description: GR10 P2818 TCC stuck on fail time garage shift

Value Units: seconds
X Unit: rate of change of engine speed, RPM/second
Y Units: unitless

y/x	50	100	150	250	300
1	0.250	0.200	0.125	0.100	0.100

Initial Supporting table - P2818 TCC stuck on fail time stall pending - GR10

Description: GR10 P2818 TCC stuck on fail time stall pending

Value Units: seconds
X Unit: rate of change of engine speed, RPM/second
Y Units: unitless

y/x	50	100	150	250	300
1	0.750	0.300	0.300	0.200	0.100

Initial Supporting table - P2820 GR10 hydraulic default at launch test window

Description:

Value Units: RPM/sec
X Unit: °C

y/x	-10	5	15	30	110
1	0	0	1	1	1

Initial Supporting table - P2820 GR10 hydraulic default input speed deceleration threshold

Description: Negative acceleration needed to increment fail timer for GR10 default disable solenoid stuck off at launch diagnostic

Value Units: RPM/sec
X Unit: °C

y/x	-10	5	15	30	110
1	-32,768	-32,768	-3,500	-2,000	-2,000

Initial Supporting table - Ratio Monitor Clutch States

Description: Array of valid combinations of clutch held/off which constitues a valid gear (1 = clutch held, 0 = clutch off)

Value Units: Clutch Held Boolean
X Unit: Gear
Y Units: Clutch

Ratio Monitor Clutch States - Part 1

y/x	CeTRMR_e_GRX_GearR	CeTRMR_e_GRX_Gear1A	CeTRMR_e_GRX_Gear1Ac	CeTRMR_e_GRX_Gear1Ad	CeTRMR_e_GRX_Gear1Af
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	0	0	0	0
CeTSER_e_C3_Clutch	0	0	1	0	0
CeTSER_e_C4_Clutch	1	0	0	1	0
CeTSER_e_C5_Clutch	0	1	1	1	1
CeTSER_e_C6_Clutch	1	0	0	0	1

Ratio Monitor Clutch States - Part 2

y/x	CeTRMR_e_GRX_Gear1M	CeTRMR_e_GRX_Gear1Mc	CeTRMR_e_GRX_Gear1Md	CeTRMR_e_GRX_Gear1Mf	CeTRMR_e_GRX_Gear2A
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	0
CeTSER_e_C3_Clutch	0	1	0	0	1
CeTSER_e_C4_Clutch	0	0	1	0	1
CeTSER_e_C5_Clutch	1	1	1	1	0
CeTSER_e_C6_Clutch	0	0	0	1	0

Ratio Monitor Clutch States - Part 3

y/x	CeTRMR_e_GRX_Gear2M	CeTRMR_e_GRX_Gear3	CeTRMR_e_GRX_Gear4	CeTRMR_e_GRX_Gear5	CeTRMR_e_GRX_Gear6
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	0	0	0	0
CeTSER_e_C3_Clutch	1	1	1	1	0
CeTSER_e_C4_Clutch	1	1	1	0	1
CeTSER_e_C5_Clutch	0	1	0	1	1
CeTSER_e_C6_Clutch	0	0	1	1	1

Ratio Monitor Clutch States - Part 4

y/x	CeTRMR_e_GRX_Gear7	CeTRMR_e_GRX_Gear8	CeTRMR_e_GRX_Gear9	CeTRMR_e_GRX_Gear10	
CeTSER_e_C1_Clutch	0	0	0	0	
CeTSER_e_C2_Clutch	0	1	1	1	
CeTSER_e_C3_Clutch	1	0	1	1	
CeTSER_e_C4_Clutch	1	1	0	1	
CeTSER_e_C5_Clutch	1	1	1	0	

Initial Supporting table - Ratio Monitor Clutch States

CeTSER_e_C6_Clutch	1	1	1	1	

Initial Supporting table - Ratio Monitor Fail Increment Rate (Percent per Loop)

Description: Ratio Monitor Fail Increment Rate

Value Units: Percent Increment Per Loop
X Unit: Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Ratio Monitor Slip Threshold

Description: Threshold slip value below which the clutch is considered holding

Value Units: clutch slip (RPM)
X Unit: Clutch

y/x	CeTRMR_e_ClchSlipC1	CeTRMR_e_ClchSlipC2	CeTRMR_e_ClchSlipC5	CeTRMR_e_ClchSlipC3C4	CeTRMR_e_ClchSlipC3C6	CeTRMR_e_ClchSlipC4C6
1	30	30	30	25	25	25

Initial Supporting table - Shift Monitor Lowest Allowed Gear

Description: Y axis shows lowest allowed gear for the current vehicle speed and transfer case range

Value Units: Vehicle Speed (kph)
X Unit: Transfer Case Range
Y Units: Lowest Allowed Gear

y/x	CeTCLR_e_4WD_Hi	CeTCLR_e_4WD_Lo
CeTGRR_e_Gear1	56	21
CeTGRR_e_Gear2	88	33
CeTGRR_e_Gear3	123	46
CeTGRR_e_Gear4	149	55
CeTGRR_e_Gear5	174	64
CeTGRR_e_Gear6	207	77
CeTGRR_e_Gear7	264	98
CeTGRR_e_Gear8	309	115
CeTGRR_e_Gear9	383	142
CeTGRR_e_Gear10	415	154

Initial Supporting table - speed sensor directional rationality enable calibration

Description: speed sensor directional rationality enable calibration

Value Units: Boolean
X Unit: scheduled gear
Y Units: unitless

y/x	CeCGSR_FwdCmded	CeCGSR_NeutCmded	CeCGSR_RvrsCmded	CeCGSR_ParkCmded
1	1	1	0	1

Initial Supporting table - transmission fluid temperature warm up time

Description:

Value Units: transmission fluid temperature normal warn up time, seconds
X Unit: transmission fluid temperature at controller power up, °C

y/x	-40.00	-30.00	-20.00	0.00	20.00
1	1,800.0	1,500.0	1,200.0	600.0	60.0

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
Glow Plug Control Module Performance	P064C	Electronic circuitry determines fault with GP switch	Glow Plug Current and Glow plug is commanded and voltage at glow plug	< = =	3.2 On 0	amps volts	glow plugs are commanded on DTCs P163C, P0671-P0678	= 	True Not set		fail conditions exists for 3.5 seconds. monitor runs with 0.5 s rate whenever enable conditions are met.	Type B, 2 Trips
		Checksum error between calculated and stored values are compared	ROM error: Checksums match	=	NO		Module power		On		fail conditions exists for 4.5 s. monitor runs with 1.5 s rate whenever enable conditions are met.	
		Compariarson of read write values	RAM error: Read write values match	=	NO		Module power		On		fail conditions exists for 3.2 seconds. monitor runs with 0.2 s rate whenever enable conditions are met.	
		Checksum error between calculated and stored values	EEPROM error: Checksums match	=	NO		Module power		On		fail conditions exists for 3.2 seconds. monitor runs with 0.2 s rate whenever enable conditions are met.	
		measured voltage of charge pump is determined to be out of tolerance	Charge Pump Under voltage	<=	Battery voltage at GPCM + 7	volts	Battery voltage at GPCM	>	6	volts	fail conditions exists for 3.13 seconds. monitor runs with 0.13 s rate whenever enable conditions are met.	
		measured voltage of charge pump is determined to be out of tolerance	Charge Pump Over voltage	>=	Battery voltage at GPCM + 18	volts					fail conditions exists for 3.16 seconds. monitor runs with 0.16 s rate whenever enable conditions are met.	

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
		Elecrtonic circuitry determines that the reverse polarity protection voltage drop is in range	GPCM reverse polarity switch "high voltage drop" Path 1 [Battery voltage at GPCM - mean glow plug voltage value] Path 2 (Battery voltage at GPCM - mean glow plug voltage value with charge pump off) - (Battery - mean glow plug voltage value with charge pump on	> <	2.3 0.300	volts volts	glow plugs are commanded Battery voltage at GPCM GP current GP current P0671,P0672, P0675, P0676 Battery voltage at GPCM stable for 30ms	= > > > = <	On 5 3.2 60 Not set 2	 volts amps amps volts	Path1: fail conditions exists for 9 seconds. monitor runs with 6 s rate whenever enable conditions are met. Path2: fail conditions exists for 13 seconds. monitor runs with 10 s rate whenever enable conditions are met.	
		Internal and external Watchdogs are monitored for interuption Monitor for undefined instruction code interupt Monitor for osolation stop detection	GPCM running reset: number of running resets or undefined instruction code detected or Osolation stop detection	>	9 events in a row		none				fail conditions exists for 5 seconds. monitor runs with 2 s rate whenever enable conditions are met.	
		measure temperature of the SBC	system basic chip (SBC) over temperature: temperature of the high side switch inside the SBC	>	155	deg C	Internal GPCM temperature	<	100	deg C	fail conditions exists for 3.13 seconds. monitor runs with 0.13 s rate whenever enable conditions are met.	
Glow Plug 1 through 8 Circuit Fault	P0671-P0678	glow plug open: electronic circuitry determines a fault exists on GP circuit	Glow Plug Current and voltage at glow plug pin	< and >	4.00 and 6.0	amps volt	Ignition - glow plugs are commanded on P163D,P163C Supply voltage	= > >	On 5 not set 8.5	 secs volts	fail conditions exists for 1.13 seconds. monitor runs with 0.13 s rate whenever enable conditions are met.	Type B, 2 Trips

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
		glow plug high resistance: electronic circuitry determines a fault exists on GP circuit	Glow Plug Resistance AND Glow Plug Current	> >=	1.83 4.00	ohm amps	Ignition on Battery voltage at GPCM glow plugs are commanded on over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM]	= > = = = <	on 7.0 on false false 7.0	 volts volts	fail conditions exists for 1.16 seconds. monitor runs with 0.16 s rate whenever enable conditions are met.	
Glow Plug 1 through 8 Circuit Fault	P066A-P068E	glow plug short: electronic circuitry determines a fault exists on GP circuit	Path 1: Glow Plug Current Path 2: Hardware over current	> >	60 100	amps amps	Ignition glow plug command over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM]	= = = = <	on on false false 6.0	 volts	Path1: fail conditions exists for 1.13 seconds. monitor runs with 0.13 s rate whenever enable conditions are met. Path2: fail conditions exists for 1.26 seconds. monitor runs with 0.26 s rate whenever enable conditions are met.	Type B, 2 Trips
		Glow plug low resistance: electronic circuitry determines a fault exists on GP circuit	Path 1: Glow Plug Resistance	<	250	mOhm	glow plugs are commanded on over temperature condition over voltage condition- abs[Battery supply at GPCM - IGN voltage at GPCM] glow plugs "on" duration	= = = > >	on false false 7.0 glow plugs "on" for more than 600 ms	 volts	fail conditions exists for 1.16 seconds. monitor runs with 0.16 s rate whenever enable conditions are met.	
			Path 2: Glow Plug Resistance	<	500	mOhm	glow plugs are commanded on over temperature condition over voltage condition- abs[Battery supply at GPCM - IGN voltage at GPCM] glow plugs "on" duration	= = = > >	on false false 7.0 glow plugs "on" for more than 10 sec	 volts		

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
Lost Communication With Glow Plug Control Module	U18C8	GMLAN Communication ECM -> GPCM: ECM monitors serial data from GPCM for U0106. Error Message indicating GPCM is not receiving major GMLAN signals.	Timeout of message $C9 or Timeout of message $4C1 or Timeout of message $4F1	> > >	0.100 2 3	sec sec sec	Ignition 1 battery voltage at GPCM	>> >	3.9 7.0	volts	fail conditions exists for 11 seconds. monitor runs with 10 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Control Module Not Programed	P161A	ECM monitors serial data from GPCM for P161A. GPCM is configured as service part by calibration parameter	Glow Plug Control Module determines settings of configuration parameter located in calibration data set				Ignition	=	ON		fail conditions exists for 3.2 seconds. monitor runs with 0.2 s rate whenever enable conditions are met.	Type A, 1 Trip
Glow Plug Module Primary Circuit	P163C	Electronic GPCM circuitry determines the voltage supply to GPCM is out of range	PATH 1: voltage supply to GPCM or PATH 2: (voltage supply to GPCM- IGN) or PATH 3: (voltage supply to GPCM -ECM reported voltage via CAN)	< > >	6.0 +/-5 +/-3	volt volt volt	GPCM Ignition voltage or GPCM voltage supply GPCM Ignition voltage or GPCM supply voltage Engine speed	>> >> > >> >	9.0 6.0 4.0 6 10< rpm >400	volt volt volt volt rpm	fail conditions exists for 4 seconds. monitor runs with 1 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Module Secondary Circuit	P163D	Electronic GPCM circuitry determines serveral signal voltage levels to GPCM are out of range	Path 1: Key state (Ign 1) or Path 2: Electronic circuitry determines voltage at glow plug pin or Path 3: [GPCM ground - GP ground]	= > >	OFF 6.0 +/-1.5	 volt volts	Path 1 glow plug activation request from ECM or Path 2 GP commanded or Path 3 GP commanded DTCs not set	= or = or =	ON or Off or ON P0671,P0675		fail conditions exists for 4 seconds. monitor runs with 1 s rate whenever enable conditions are met.	Type B, 2 Trips

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
Glow Plug Control Module Temperature Sensor (µC) Circuit Low voltage	P16AD	ECM monitors serial data from GPCM for P16AD Error Message indicating GPCM detects GPCM temperature sensor (µC) voltage out of range low	PATH 1: GPCM temperature sensor voltage	<	0.078	volts					fail conditions exists for 1.80 seconds. monitor runs with 1.30 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Control Module Temperature Sensor (HSS14) Circuit Low voltage	P101B	ECM monitors serial data from GPCM for P101B Error Message indicating GPCM detects GPCM temperature sensor (HSS14) voltage out of range low	PATH 1: GPCM temperature sensor voltage	<	0.078	volts					fail conditions exists for 1.80 seconds. monitor runs with 1.30 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Control Module Temperature Sensor (HSS58) Circuit Low voltage	P101D	ECM monitors serial data from GPCM for P16AD Error Message indicating GPCM detects GPCM temperature sensor (HSS58) voltage out of range low	PATH 1: GPCM temperature sensor voltage	<	0.078	volts					fail conditions exists for 1.80 seconds. monitor runs with 1.30 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Control Module Temperature Sensor (µC) Circuit High voltage	P16AE	ECM monitors serial data from GPCM for P16AE Error Message indicating GPCM detects GPCM temperature sensor (µC) voltage our of range high	GPCM temperature sensor voltage	>	4.916	volts					fail conditions exists for 1.80 seconds. monitor runs with 1.30 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Control Module Temperature Sensor (HSS14) Circuit High voltage	P101C	ECM monitors serial data from GPCM for P16AE Error Message indicating GPCM detects GPCM temperature sensor (HSS58) voltage our of range high	GPCM temperature sensor voltage	>	4.916	volts					fail conditions exists for 1.80 seconds. monitor runs with 1.30 s rate whenever enable conditions are met.	Type B, 2 Trips

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
Glow Plug Control Module Temperature Sensor (HSS58) Circuit High voltage	P101E	ECM monitors serial data from GPCM for P16AE Error Message indicating GPCM detects GPCM temperature sensor (HSS58) voltage our of range high	GPCM temperature sensor voltage	>	4.916	volts					fail conditions exists for 1.80 seconds. monitor runs with 1.30 s rate whenever enable conditions are met.	Type B, 2 Trips
Glow Plug Control Module Temperature at µC not plausible	P101F	ECM monitors serial data from GPCM for P101F Error Message indicating GPCM detects GPCM temperature sensor (µC) plausibility	PATH 1: Temp µC – Temp HSS14 and Temp µC – Temp HSS58 and Temp HSS58 – Temp HSS14	> > <=	12 12 12	Kelvin Kelvin Kelvin	Glow plugs Off Reset protection flag P16AE, P101C, P101E P16AD, P101B, P101D	>= = =	30 False Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	Type B, 2 Trips
			PATH 2: Temp µC – Temp HSSnn	>	12	Kelvin	Glow plugs Off Reset protection flag and P16AE, P101C P16AD, P101B or P16AE, P101E P16AD, P101D	>= = = = = =	30 False Not Set Not Set Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	
Glow Plug Control Module Temperature at HSS14 not plausible	P102D	ECM monitors serial data from GPCM for P102D Error Message indicating GPCM detects GPCM temperature sensor (HSS14) plausibility	PATH 1: Temp HSS14 – Temp HSS58	>	15	Kelvin	Glow plugs commanded on P101C, P101E P101B, P101D	= = =	On Not Set Not Set		fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	Type B, 2 Trips

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
			PATH 2: Temp HSS14 – T_HSS58 and Temp HSS14 – Temp µC and Temp HSS58 – Temp µC	> > <=	12 12 12	Kelvin Kelvin Kelvin	Glow plugs Off Reset protection flag and P16AE, P101C, P101E P16AD, P101B, P101D	>= = = =	30 False Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	
			PATH 3:Temp HSS14 – Temp T nn	>	12	Kelvin	Glow plugs Off Reset protection flag and P101C, P16AE P101B, P16AD or P101C, P101E P101B, P101D	>= = = = = =	30 False Not Set Not Set Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	
Glow Plug Control Module Temperature at HSS58 not plausible	P102E	ECM monitors serial data from GPCM for P102E Error Message indicating GPCM detects GPCM temperature sensor (HSS58) plausibility	PATH 1: Temp HSS58 – Temp HSS14	>	15	Kelvin	Glow plugs commanded on P101C, P101E P101B, P101D	= = =	On Not Set Not Set		fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	Type B, 2 Trips
			PATH 2: Temp HSS58 – T_HSS14 and Temp HSS58 – Temp µC and Temp HSS58 – Temp HSS14	>| >| <=	12 12 12	Kelvin Kelvin Kelvin	Glow plugs Off Reset protection flag and P16AE, P101C, P101E P16AD, P101B, P101D	>= = = =	30 False Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
			PATH 3:Temp HSS58 – Temp T nn	>	12	Kelvin	Glow plugs Off Reset protection flag and P101C, P16AE P101B, P16AD or P101C, P101E P101B, P101D	> = = = = =	30 False Not Set Not Set Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	
Glow Plug Control Module Temperature system not plausible	P102F	ECM monitors serial data from GPCM for P102F Error Message indicating GPCM detects GPCM temperature system plausibility	Temp µC – Temp HSS14 and Temp µC – Temp HSS58 and Temp HSS58 – Temp HSS14	>* >* >*	12 12 12	Kelvin Kelvin Kelvin	Glow plugs Off Reset protection flag P16AE, P101C, P101E P16AD, P101B, P101D	>* = = =	30 False Not Set Not Set	sec	fail conditions exist for 2.14 seconds. Monitor runs with 1.64 s rate whenever conditions are met.	Type B, 2 Trips
Glow Plug 1 through 8 diagnostic when glow plugs are performing a heat up procedure (ramp up) after GPCM is powered up	P06C5-P06CC	glow plug low resistance at power up: electronic circuitry determines a fault exists on GP circuit at power up	Glow Plug Resistance and Glow Plug Current and No.of consecutive low resistance measurements	< >= >	0.160 + .003 * N_PWM Cycles 4.00 5	ohm amps	Ignition Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P066A-P068F	= >* = = = =	on 7.0 false false 7.0 false Not set	volts volts	fail conditions exist for 1.0 seconds after end of ramp up. Ramp up ends latest after 0.850 sec. after power up. Monitor runs with 0,06 s rate whenever conditions are met during ramp up.	Type B, 2 Trips

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
		glow plug high resistance at power up: electronic circuitry determines a fault exists on GP circuit at power up	Glow Plug Resistance and Glow Plug Current and No.of consecutive low resistance measurements	> >= >	0.550 + .050 * N_PWM Cycles 4.00 5	ohm amps	Ignition Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P066A-P068F	= > = = < = =	on 7.0 false false 7.0 false Not set	 volts volts	fail conditions exist for 1.0 seconds after end of ramp up. Ramp up ends latest after 0.850 sec. after power up. Monitor runs with 0,06 s rate whenever conditions are met during ramp up.	
		glow plug low resistance gradient: electronic circuitry determines a fault exists on GP circuit	Glow Plug Resistance Gradient and Glow Plug Current	< >=	0.070/0.62 4.00	ohm / sec amps	Ignition Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P066A-P068F	= > = = < = =	on 7.0 false false 7.0 false Not set	 volts volts	fail conditions exist for 1.0 seconds after end of ramp up. Ramp up ends latest after 0.850 sec. after power up. Monitor runs with 0,06 s rate whenever conditions are met during ramp up.	
		glow plug resistance gradient low range: electronic circuitry determines a fault exists on GP circuit	Glow Plug Resistance Gradient and Glow Plug Current	< >=	0.088/0.524 4.00	ohm/ sec amps	Ignition Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P066A-P068F	= > = = < = =	on 7.0 false false 7.0 false Not set	 volts volts	fail conditions exist for 1.0 seconds after end of ramp up. Ramp up ends latest after 0.850 sec. after power up. Monitor runs with 0,06 s rate whenever conditions are met during ramp up.	

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
		glow plug resistance gradient range high: electronic circuitry determines a fault exists on GP circuit	Glow Plug Resistance Gradient and Glow Plug Current	> 0.800/0.524 >= 4.00	ohm/ sec amps		Ignition Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P066A-P068F	= > 7.0 = = < 7.0 = =	on false false false Not set	volts volts volts volts	fail conditions exist for 1.0 seconds after end of ramp up. Ramp up ends latest after 0.850 sec. after power up. Monitor runs with 0,06 s rate whenever conditions are met during ramp up.	
Glow Plug 1 through 8 Hot resistance fault	P1338-P133F	glow plug hot resistance low: electronic circuitry determines a fault exists on GP circuit	Glow Plug Hot Resistance and Glow Plug Current	< 0.500 >= 4.00	ohm amps		Afterrun Characterization Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P06Cx	= > 7.0 = = < 7.0 = =	True false false Not Set	volts volts sec	Diagnostic performed after characterization: failure status stored in EEPROM, will be reported after 1.0 sec. after start up.	Type B, 2 Trips
		glow plug hot resistance: electronic circuitry determines a fault exists on GP circuit	Glow Plug Hot Resistance and Glow Plug Current	> 1.830 >= 4.00	ohm amps		Afterrun Characterization Battery voltage at GPCM over temperature condition over voltage condition abs[Battery supply at GPCM - IGN voltage at GPCM] Reset protection flag P06Cx	= > 7.0 = = < 7.0 = =	True false false Not Set	volts volts sec	Diagnostic performed after characterization: failure status stored in EEPROM, will be reported after 1.0 sec. after start up.	
Glow plug control module over temperature	P263E	Glow plug control module over temperature	GPCM temperature - glow plug resistance gradients - glow plug Rhot resistance - failure status of Rhot resistance +E136	> 123	deg C		Glow plugs are commanded on coolant temp coolant temp	= < 60 =	On Valid	deg C	As long as fail conditions exist. Monitor runs with 6.50 s rate whenever enable conditions are met.	Type B, 2 Trips

Summary Parameter Tables -- GPCM

OBD GROUP: MGMXOBDG04B **TEST GROUP: MGMXT03.0351** **EMISSION STDS: CAL-ULEV125; FED-BIN125**

Component / System	Fault Code	Monitor Strategy Description	Primary Malfunction Criteria	Threshold Logic and Value			Secondary Parameters	Enable Conditions			Time Required	MIL Illum.
Glow plug control module unable to complete GP ini	P1337	GP unable to complete characterization	PATH 1: Checksum error EEPROM: Resistance gradients or PATH 2: Checksum error EEPROM: hot resistance or PATH 3: Faulty status in hot resistance	= = =	YES YES YES		MEC	=	0		Perfomed only at power up. Will be reported after 1.0 sec. whenever enabled conditions are met.	Type B, 2 Trips
Lost Communication with CGM	P18E1	Lost of communication CGM -> GPCM: CGM monitors serial data from GPCM. Error Message indicating GPCM is not receiving the CGM signal.	Timeout of message $3CF	>	.250	sec	Engine_type Ignition 1 battery voltage at GPCM	= >> >	L5P 3.9 9	 volts volts	fail conditions exists for 11 seconds. monitor runs with 10 s rate whenever enable conditions are met.	Type B, 2 Trips

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Brake Booster Internal Power Driver									
Brake Booster Internal Power Driver Range/Performance	C0595	This monitoring checks if the B6 Bridge Driver ASIC does not answer properly to the uC test during initialization.	B6 Bridge Driver ASIC is not fault free during the initial test	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks the B6 Bridge Driver ASIC during operational mode and short circuit bits of B6 bridge MOSFETS.	B6 Bridge Driver ASIC is not fault free during the operational mode OR ASIC is not in valid operation mode OR MOSFET Short circuit failure bit is set	= True = True = True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if the voltage drops at actuated MOSFET is too high.	Voltage drops at actuated MOSFET	> -210 [mV]	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Circuit Range/Performance	C0582	This monitoring checks if the measured voltage on an idle MOSFET is not in mid-level.	The measured voltage on an idle MOSFET is not in mid-level	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if MOSFETs of Bridge Driver can be controlled and actuated properly.	BMS_MON to UBB Ratio is at low level in case of BMS switched ON OR BMS_MON to UB6 Ratio is at low level in case of BMS_RVP is switched ON OR BMS_MON is at high level in case of BMS is switched OFF OR BMS_MON is at high level in case of BMS_RVP is switched OFF	= True = True = True = True	Ignition state ON	= True	5 [s]	Once	Type A, 1 Trip
Brake Booster Temperature Sensor A									
Brake Booster Temperature Sensor "A" Circuit High	P25C7	This monitoring checks if the BLM Temperature Signal 1 is shorted to Supply.	BLM Temperature Signal 1 AND Number of times when line high voltage is consecutively detected	> 3.27 [V] >= 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor "A" Circuit Low	P25C6	This monitoring checks if the BLM Temperature Signal 1 is shorted to Ground.	BLM Temperature Signal 1 AND Number of times when line low voltage is consecutively detected	< 0.2 [V] >= 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor B									
Brake Booster Temperature Sensor "B" Circuit High	C057A	This monitoring checks if the BLM Temperature Signal 2 is shorted to Supply.	BLM Temperature Signal 2 AND Number of times when line high voltage is consecutively detected	> 3.14 [V] >= 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor "B" Circuit Low	C0579	This monitoring checks if the BLM Temperature Signal 2 is shorted to Ground.	BLM Temperature Signal 2 AND Number of times when line low voltage is consecutively detected	< 0.03 [V] >= 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Master Cylinder Pressure Sensor									
Brake Master Cylinder Pressure Sensor Communication Failure	C2A16	This monitoring checks if the SENT line is shorted to supply, open or the ground is interrupted.	SENT line is shorted to supply	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the SENT line is shorted to ground or the sensor supply is interrupted.	SENT line is shorted to ground	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is transmission error on SENT line.	Transmission error on SENT line	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Pressure Sensor Out of Range High	C0572	This monitoring checks for Out-of-range high error codes on the Pressure Sensor's Sent Line 2.	Out of range high error code is present on SENT Line 2	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Pressure Sensor Out of Range Low	C0571	This monitoring checks for Out-of-range low error codes on the Pressure Sensor's Sent Line 2.	Out of range low error code is present on SENT Line 2	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Pressure Sensor Performance	C0574	This monitoring checks if the offset value of pressure sensor 1 is correct.	Offset value	> 12 [bar]	Ignition state ON AND Brake Pedal is released AND Acceleration AND Vehicle speed AND No active pressure build up by IPB-system	= True = True > 0 [m/s^2] > 4.47 [mph] = True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if there is transmission error at SENT line.	SENT internal error code is received from sensor	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
Brake Pedal Position Sensor A									
Brake Master Cylinder Piston Position Sensor "A" Circuit Range/Performance	C05CC	This monitoring checks if the offset of channel 1 of the Pedal Travel Sensor is out of defined range.	Push rod stroke offset OR Push rod stroke offset	> 1.1 [mm] < -1.5 [mm]	Ignition state ON AND PTS AND Brake Pedal AND Hydraulic Intervention EPS ACC AND	= True = fault free = completely released = No intervention	0.100 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
					Vehicle velocity AND Acceleration	> Standstill (4.47 mph) > 0 [m/s^2]			
		This monitoring checks if there is transmission error on the SENT line.	SENT internal error code is received from sensor	> 4088	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor 1 Circuit High Voltage	C05CA	This monitoring checks if the Linear Position Sensor sends an 'Out of range high' failure information via the fast channel of the SENT protocol.	Out of range high error message is transmitted	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor 1 Circuit Low Voltage	C05CB	This monitoring checks if the Linear Position Sensor sends an 'Out of range low' failure information via the fast channel of the SENT protocol.	Out of range low error message is transmitted	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Internal Communication Fault with Brake Master Cylinder Piston Position Sensor 1	C2A13	This monitoring checks if the ID of the Linear position sensor is received in time.	ID of the Linear position sensor is not received on time	> 1.5 [s]	Ignition state ON	= True	0.500 [s]	Once	Type A, 1 Trip
		This monitoring checks if the SENT line is shorted to supply.	SENT line is shorted to supply	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the SENT line is shorted to ground.	SENT line is shorted to ground	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is transmission error on SENT line.	Transmission error on SENT line	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
Brake Pedal Position Sensor B									
Brake Master Cylinder Piston Position Sensor "A/B" Correlation	C05D0	This monitoring checks whether the difference between PTS1 and PTS2 signal is too high.	|PTS1 signal - PTS2 signal|	> 1.5 [mm]	Ignition state ON AND Sensor Channel 1 and Channel 2 AND Sensor Channel 1 and Channel 2	= True = initialized = fault free	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the PTS signal is not zero in a released brake pedal position.	Offset compensated PTS signal for released brake pedal OR Brake pedal without any intervention from the driver is NOT released	> 3 [mm] = True	Ignition state ON AND Vehicle speed AND Drive pedal is applied Signal is available and valid	= True > 4.47 [mph] = True	Up to 480 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor "B" Circuit Range/Performance	C05CF	This monitoring checks if the offset of channel 2 of the Pedal Travel Sensor is out of defined range	Push rod stroke offset AND Push rod stroke offset	> 1.1 [mm] < -1.5 [mm]	Ignition state ON AND PTS AND Brake Pedal AND Hydraulic Intervention EPS ACC AND Vehicle velocity AND Acceleration	= True = fault free = completely released = No intervention > Standstill (4.47 mph) > 0 [m/s^2]	0.100 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor "B" Circuit Voltage High	C05CD	This monitoring checks if the PWM line is shorted to supply.	PWM line is shorted to supply OR Interruption of Sensor ground	= True = True	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor "B" Circuit Voltage Low	C05CE	This monitoring checks if the PWM line is shorted to ground.	PWM line is shorted to ground	= True	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
Internal Communication Fault with Brake Master Cylinder Piston Position Sensor 2	C2A14	This monitoring checks if there is transmission error at PWM line.	PWM frequency OR PWM frequency OR PWM duty OR PWM duty	< 900 [Hz] > 1120 [Hz] < 8.5 [%] > 92 [%]	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor									
Brake Pressure Sensor Communication Failure	C2A15	This monitoring checks if the SENT line is shorted to supply, open or the ground is interrupted.	SENT line is shorted to supply	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the SENT line is shorted to ground or the sensor supply is interrupted.	SENT line is shorted to ground	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is transmission error on SENT line.	Transmission error on SENT line	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Brake Pressure Sensor Out of Range High	C053F	This monitoring checks difference between the measured pressure from the plunger pressure sensor and the calculated pressure based on motor torque, angular acceleration and best-case gear efficiency. When the measured pressure is higher than the calculated plus robustness margin then the failure is set.	Difference between the measured pressure and the calculated pressure	> calculated max pressure + 25 [%] from measured pressure. At least 20 [bar] robustness margin.	Ignition state ON AND Motor speed	= True > 3 [rad/s]	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks for Out-of-range high error codes on the Pressure Sensor's Sent Line 1.	Out of range high error code is present on SENT Line 1	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor Out of Range Low	C053E	This monitoring checks for Out-of-range low error codes on the Pressure Sensor's Sent Line 1.	Out of range low error code is present on SENT Line 1	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor Performance	C053D	This monitoring checks if the offset value of pressure sensor 2 is correct.	Offset value	> 12 [bar]	Ignition state ON AND Brake Pedal is released	= True = True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if there is transmission error at SENT line.	SENT internal error code is received from sensor	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
Brake System Plunger Motor									
Brake Booster Motor "A" Over Temperature	C05C2	This monitoring checks if the rotor or ECU temperature is higher than a defined level.	ECU temperature	> 120 [°C]	Ignition state ON AND Brake Booster Temperature Sensors	= True = fault free	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if the rotor or ECU temperature is higher than a defined level.	ECU temperature	> 142 [°C]	Ignition state ON AND Brake Booster Temperature Sensors	= True = fault free	Immediately	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Performance	C0594	This monitoring checks if the plunger can reach the mechanical backward bound.	Plunger travel	> Plunger length	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if motor test detects hardware failure.	Motor test detects HW failure	= True	Ignition state ON AND Motor is actuated	= True = False	0.010 [s]	Cyclically in every 20 [s]	Type A, 1 Trip
		This monitoring checks if the motor movement is sufficient according to the expected pressure value.	Pressure sensor 2 value AND Calculated pressure - Pressure sensor 2 value	> 10 [bar] > 40 [bar]	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the motor movement is sufficient according to the expected pressure value.	Calculated pressure - Pressure sensor 2 value OR Pressure sensor 2 value - Calculated pressure	> 40 [bar] > 108 [bar]	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Circuit/Open	C057F	This monitoring checks the motor coil resistance value.	Measured motor coil resistance	> 0.20358 [Ohm]	Ignition state ON	= True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the motor coil resistance value.	Measured motor coil resistance	< 0.01258 [Ohm]	Ignition state ON	= True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the voltage vector is plausible.	Actual voltage vector - Calculated voltage vector	> 1.5 [V]	Ignition state ON	= True	0.020 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Current High	C0590	This monitoring checks the offset (current value during no actuation) of the motor current measurement.	Current during idle mode	> 38 [A]	Ignition state ON AND Motor is actuated	= True = False	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the offset (current value during no actuation) of the motor current measurement.	Current during idle mode	> 38 [A]	Ignition state ON AND Motor is actuated	= True = False	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks that the motor current is not clamping at high threshold.	Phase Current 1	> 200 [A]	Ignition state ON	= True	0.300 [s]	Continuous	Type A, 1 Trip
		This monitoring checks that the motor current is not clamping at high threshold.	Phase Current 2	> 200 [A]	Ignition state ON	= True	0.300 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Current Low	C0591	This monitoring checks the offset (current value during no actuation) of the motor current measurement.	Current during idle mode	< -38 [A]	Ignition state ON AND Motor is actuated	= True = False	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the offset (current value during no actuation) of the motor current measurement.	Current during idle mode	< -38 [A]	Ignition state ON AND Motor is actuated	= True = False	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks that the motor current is not clamping at low threshold.	Phase Current 1	< -200 [A]	Ignition state ON	= True	0.300 [s]	Continuous	Type A, 1 Trip
		This monitoring checks that the motor current is not clamping at low threshold.	Phase Current 2	< -200 [A]	Ignition state ON	= True	0.300 [s]	Continuous	Type A, 1 Trip
Brake System Plunger Motor Position Sensor									
Brake Booster Motor "A" Position Sensor Circuit High	C0589	This monitoring checks if the RPS cosine signal is out of range high.	Raw Cos ADC Value (Cos+ or Cos-) OR Sum Raw Cos ADC Values (Cos+ and Cos-)	> 2795 > 4327	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the RPS Sinus signal is out of range high.	Raw Sin ADC Value (Sin+ or Sin-) OR Sum Raw Sin ADC Values (Sin+ and Sin-)	> 2795 > 4327	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Position Sensor Circuit Low	C0588	This monitoring checks if the RPS cosine signal is out of range low.	Raw Cos ADC Value (Cos+ or Cos-) OR Sum Raw Cos ADC Values (Cos+ and Cos-)	< 1300 < 3876	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the RPS Sinus signal is out of range low.	Raw Sin ADC Value (Sin+ or Sin-) OR Sum Raw Sin ADC Values (Sin+ and Sin-)	< 1300 < 3876	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Position Sensor Circuit Range/Performance	C058A	This monitoring checks if there is a noise in the RPS vector length.	Oscillation of vector	>= 0.1025	Ignition state ON AND Motor is actuated	= True = True	0.015 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the vector length value of RPS is out of range high	Calculated vector length (sin^2+cos^2)	> 1.2996	Ignition state ON AND Motor is actuated	= True = True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the vector length value of RPS is out of range low.	Calculated vector length (sin^2+cos^2)	< 0.6889	Ignition state ON AND Motor is actuated	= True = True	0.010 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
CAN Bus A									
Control Module Communication Bus "A" Off	U0073	This monitoring checks if the CAN controller is in a Bus Off state.	BusOff status has been detected	= True	Ignition state ON	= True	0.240 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if there is a timeout failure caused by HW-Error.	Expected action has not occurred within its allowed time	= True	Ignition state ON AND A CAN controller request has been issued	= True = True	Immediately	Continuous	Type B, 2 Trips
Lost Communication With ECM/PCM "A"	U0100	This monitoring checks if the message ETRS_General_Request_2_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Drv_Pref_Mode_Switch_Status_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Engine_General_Status_1_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage) AND Start_Stop function is inactive	= True = True True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Engine_General_Status_4_HS from ECM_HS is received within a time range.	Message is not received for time	>= 1.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	1.25 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Engine_General_Status_6_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Engine_Torque_Status_2_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Engine_Torque_Status_3_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Propulsion_Gen_Stat_1_HS from HCP_HS/ ECM_HS/ BCP_HS/ HCP_B_HS/ HCP_T_HS is received within a time range.	Message is not received for time	>= 0.500 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.500 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Propulsion_Sys_Gen_Status from ECM_HS is received within a time range.	Message is not received for time	>= 1.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	1.25 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Torque_Request_Status_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage) AND Start_Stop function is inactive	= True = True True	0.250 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Trans_General_Status_2_HS from ECM_HS is received within a time range.	Message is not received for time	>= 0.500 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage) AND Start_Stop function is inactive	= True = True True	0.500 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Vehicle_Speed_and_Distance_HS from ECM_HS is received within a time range.	Message is not received for time	>= 2.5 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	2.5 [s]	Continuous	Type B, 2 Trips
Lost Communication With Gateway "A"	U0146	This monitoring checks if the message PPEI_CGM_General_Status_HS from CGM_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
Lost Communication With TCM	U0101	This monitoring checks if the message PPEI_Trans_General_Status_2_HS from TCM_HS is received within a time range.	Message is not received for time	>= 0.500 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage) AND Start_Stop function is inactive	= True = True True	0.500 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if the message PPEI_Transmission_Otpt_Rot_Stat_HS from TCM_HS/ HCP_T_HS is received within a time range.	Message is not received for time	>= 0.250 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.250 [s]	Continuous	Type B, 2 Trips
CAN Bus E									
Control Module Communication Bus "E" Off	U0077	This monitoring checks if the CAN controller is in a Bus Off state.	BusOff status has been detected	= True	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.090 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if there is a timeout failure caused by HW-Error.	Expected action has not occurred within its allowed time	= True	Ignition state ON AND	= True	Immediately	Continuous	Type B, 2 Trips

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
					A CAN controller request has been issued	= True			
Controller									
ABS Valves Supply Voltage Circuit/Open	C053B	This monitoring checks if the VLV Supply line is able to drive an actuation.	Resistivity of valve path supply line	> 3 [Ohm]	Ignition state ON AND Vehicle speed AND Brake Pedal	= True > 9.32 [mph] = not actuated	20 [s]	Once	Type A, 1 Trip
		This monitoring checks if the voltage is high enough for initial valve relay switch-on test.	UVR (Valve path supply voltage)	< 4.6 [V]	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks if the VLV Supply line is able to drive an actuation.	Resistivity of valve path supply line	> 3 [Ohm]	Ignition state ON AND Vehicle speed AND Brake Pedal	= True > 9.32 [mph] = not actuated	20 [s]	Once	Type A, 1 Trip
		This monitoring checks if the voltage is high enough for initial valve relay switch-on test.	UVR (Valve path supply voltage)	< 4.6 [V]	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
Brake Bleed Not Complete	C15C7	This monitoring checks if the IPB is in assembly mode during initialization or diagnosis.	NVM item for 'IPB Assembly Mode' is set	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Circuit Range/Performance	C0582	This monitoring checks if the two sensor voltages have plausible values.	(Sum of the BLM Temperature Signal 1 and Signal 2 OR Sum of the BLM Temperature Signal 1 and Signal 2) AND Times implausible values detected)	> 3.43 [V] < 2 [V] >= 5	Ignition state ON	= True	0.600 [s]	Continuous	Type A, 1 Trip
Brake System Plunger Motor Position Sensor Not Learned	C2A1C	This monitoring checks the consistency between the version of the RPS calibration data and the version in SW.	Inconsistency between RPS calibration data version and SW version	= True	IPB State	= Init phase	Immediately	Once	Type A, 1 Trip
Control Module	U3000	This monitoring checks if assertion failed error occurred according to the ANSI C standard at SW development.	Assertion failed	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if the test of the charge pump has detected a failure.	Capacity of charge pump is restricted OR Performance of charge pump is insufficient OR Output voltage of charge pump is out of range	= True = True = True	Ignition state ON	= True	Immediately	Cyclically in every 19 [s]	Type A, 1 Trip
		This monitoring checks if there is DMA transfer error due to timeouts.	Transfer error occurred during DMA transfer	= True	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the reference voltage of the ADC is in a proper range.	ADC reference voltage OR ADC reference voltage	< 1.145 [V] > 1.345 [V]	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if MRG path is working.	MRG path test fails	= True	Ignition state ON	= True	0.080 [s]	Once	Type A, 1 Trip
		This monitoring checks if the system chip internal decouple bits are reset within the expected time.	Decouple bit is reset	= False	Ignition state ON AND Fail-safe logic test is running	= True = True	0.080 [s]	Once	Type A, 1 Trip
		This monitoring checks if the BIST can switch off electrically if wrong BIST commands have been received.	Number of wrong BIST commands after BIST did not switch off electrically	>= 3	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if ClockIn monitor works properly (test of test).	ClockIn failure status is not as expected	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the ECU electrical enable line can be switched ON by the software.	ECU internal electrical enable line has a short to ground OR The ECU internal electrical enable line cannot be switched ON by the software	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the ECU electrical enable line can be switched OFF by the software.	ECU internal electrical enable line has a short to supply voltage OR The ECU internal electrical enable line cannot be switched OFF by the software	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the ECU internal hydraulic enable line can be switched ON by the software.	ECU internal hydraulic enable line has a short to ground OR The ECU internal hydraulic enable line cannot be switched ON by the software	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the ECU internal hydraulic enable line can be switched OFF by the software.	ECU internal hydraulic enable line has a short to supply voltage OR The ECU internal hydraulic enable line cannot be switched OFF by the software	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the enable line is set properly.	Missing low level enable signal of ECU internal hydraulic line is detected for time OR Missing low level enable signal of ECU internal electrical line is detected for time	> 0.05 [s] > 0.05 [s]	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the enable line is set properly (second ASIC).	Missing low level enable signal of ECU internal hydraulic line is detected for time OR Missing low level enable signal of ECU internal electrical line is detected for time	> 0.05 [s] > 0.05 [s]	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the Errorpin event counter works properly.	Errorpin event counter does not increment on error pin event	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if a missing watchdog trigger causes hydraulic/electric shutdown.	Missing BIST trigger does not switch off hydraulic/electrical path	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks whether the system chip switches off the gate actuation when it detects a missing watchdog trigger.	Valve relay gate is not switched off due to missing watchdog trigger	= True	Ignition state ON AND Fail-safe logic test is running	= True = True	1 [s]	Once	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if the valve relay gate actuation is properly switched off via a Serial Peripheral Interface (SPI) command during the Fail-Safe Logic Test.	Valve relay gate is not switched off via SPI	= True	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks the status of the watchdog at initialization state.	Watchdog status differs from the expected status	= True	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks the status of the watchdog.	Watchdog status differs from the expected status	= True	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the status of the watchdog (second ASIC).	Watchdog status differs from the expected status	= True	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the watchdog BIST state machine can detect a wrong BIST command value.	Watchdog of the system chip is triggered by a wrong BIST command value	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if a switched on valve relay is reported as off (system chip internal status).	Valve relay gate does not switch on (or simply the feedback of system chip is wrong)	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the GTM time base which is used for e.g. WSS works properly.	Reference frequency from system ASIC OR Reference frequency from system ASIC	< 3.8 [kHz] > 4.2 [kHz]	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the 4 kHz reference frequency signal from system ASIC is in correct range.	Obtained frequency signal from system ASIC OR Obtained frequency signal from system ASIC	< 3.8 [kHz] > 4.2 [kHz]	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if System ASIC CLKIN input signal is outside of the specified frequency range.	ASIC internal CLKIN failure bit is set	= True	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if System 2nd ASIC CLKIN input signal is outside of the specified frequency range.	ASIC internal CLKIN failure bit is set	= True	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the ASIC can detect the failure test frames and therefore set corresponding failure flags.	ASIC could not detect the failure frames	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the 2nd ASIC can detect the failure test frames and therefore set corresponding failure flags.	Second ASIC could not detect the failure frames	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the internal ASIC oscillator works properly.	ASIC SPI register bit for Oscillator failure is set to	= 1	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the internal 2nd ASIC oscillator works properly.	Second ASIC SPI register bit for Oscillator failure is set to	= 1	Ignition state ON	= True	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the SPI communication with B6 Bridge Driver ASIC.	B6 Bridge Driver ASIC could detect failure frames via SPI	= False	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is short circuit between Qx pin and MRAuC pin.	Short circuit between Qx pin and MRAuC pin	= True	Ignition state ON AND VR is not yet switched ON AND Hydraulic enable line is switched ON	= True = True = True	Immediately	Once	Type A, 1 Trip
		This monitoring checks the SPI communication between ASIC and the microcontroller.	Length of received data does not match the length of sent data OR Calculated parity does not match the received parity bit OR Transmitted bit does not match bit in register OR Error frame is transmitted	= True = True = True = True	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the SPI communication between 2nd ASIC and the microcontroller.	Length of received data does not match the length of sent data OR Calculated parity does not match the received parity bit OR Transmitted bit does not match bit in register OR Error frame is transmitted	= True = True = True = True	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks for non-resolvable overcurrent events in the System ASIC.	Overcurrent bit of ASIC was set multiple times AND GPIO switched off until the next power cycle	= True = True	Ignition state ON	= True	60 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if U5V is out of range.	U5V undervoltage bit is set OR U5V overvoltage bit is set	= True = True	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the ASIC internal test of the U5V voltage regulator.	U5V voltage comparator test did not finished in a defined timeslot	> 0.100 [s]	Ignition state ON	= True	0.100 [s]	Once	Type A, 1 Trip
		This monitoring checks if the voltage regulator configuration of the ASIC matches the software configuration.	Voltage regulator configuration of the ASIC does not match configuration in SW	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the ASIC internal current reference is out of range.	Current reference failure bit is set	= True	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a voltage divider drift failure (UB_RD_INT voltage).	Difference between UB_Valve and UB_RD_INT	> 3 [V]	Ignition state ON	= True	0.180 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the NMI mechanism is running properly.	No NMI occurred OR Not expected NMI occurred	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if tests of the safety logic of uC works as expected.	Microcontroller safety logic tests fail	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the supply voltage of the microcontroller is out of range.	Failure bit for microcontroller supply out of range is set	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if the valve driver configuration was successful.	Valve driver configuration data read back from ASIC does not match the written data	= True	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the valve driver configuration was successful.	Valve driver configuration data read back from ASIC does not match the written data	= True	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if all Watchdog commands have been scheduled.	At least one WD trigger was not scheduled	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if there is too many wrong watchdog trigger pattern are received by system ASIC.	Number of the received watchdog error	> 3	Ignition state ON	= True	0.040 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if the watchdog BIST state machine can detect a wrong BIST command value.	Watchdog of the system chip is triggered by a wrong BIST command value	= True	Ignition state ON	= True	0.030 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if System IC test does not work due to hardware malfunction.	WSS HW Test in System IC failed	= True	Ignition state ON	= True	0.015 [s]	Once	Type A, 1 Trip
		This monitoring checks line issues between ASIC and uC.	Wheel speed sensor signal and multiplexed wheel speed sensor signal are not identical	= True	Ignition state ON AND WSS Test has been finished AND Vehicle speed	= True = True > 12.42 [mph]	0.100 [s]	Continuous	Type A, 1 Trip
		This monitoring checks the UB6 to UBB ratio together with the UBB Voltage.	UBB voltage measurement AND Ratio between UB6 and UBB	> 4 [V] > 25 [%]	(Ignition state ON OR Ignition state OFF (Postrun)) AND Motor is actuated)	= True = True = True	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a hard undervoltage measured at UBB main supply line.	UB6 voltage AND UBB-UB6 voltage	< 3.22 [V] > 1.04 [V]	Ignition state ON AND Motor is actuated	= True = True	0.200 [s]	Continuous	Type A, 1 Trip
Control Module Processor	P0606	This monitoring checks if a third party software access into restricted RAM area is detected	Restricted area was tried to be accessed by DMC	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if the PBC access to the actuators does not violate the rules.	Case 1: PBC release access time during not allowed situation	> 10 [s]	Case 1: Ignition state OFF	= True	10 [s]	Continuous	Type A, 1 Trip
			Case 2: PBC lock access time during not allowed situation	> 30 [s]	Case 2: Ignition state ON AND Vehicle speed	= True > 9.32 [mph]	30 [s]		
		This monitoring checks if the memory access area is correct.	PBC is accessing a forbidden memory area	= True	Ignition state ON AND PBC is active	= True = True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the hardware components are supported by the software.	Device ID of ASIC is in the list of supported device IDs OR Software version ID of ASIC is in the list of supported software version IDs OR Microcontroller device ID is in the list of supported device IDs OR Microcontroller software version ID is in the list of supported SW version IDs	= False = False = False = False	Ignition state ON	= True	0.030 [s]	Once	Type A, 1 Trip
		This monitoring checks if there is a microcontroller exception.	Data abort occurred OR Pre-fetch abort occurred OR Undefined instruction occurred	= True = True = True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks that each task is activated and executed within its designated timeslot.	OS detects that a task was not activated in expected time OR OS detects that a task was not executed within its timeslot	= True = True	Ignition state ON	= True	It depends on the cycle time of the faulty	Continuous	Type A, 1 Trip
		This monitoring checks the error hooks (exceptions) occurring in the Operating System.	Software program execution failure is detected	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if the microcontroller stack is not changed by other tasks.	Checkword at the beginning or end of stack has been overwritten	= True	Ignition state ON	= True	0.080 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if an interrupt fault has occurred.	Not supported software interrupt occurred OR Invalid interrupt occurred OR Interrupt lock release is called without previous lock OR Not all interrupts are released OR Interrupt lock time	= True = True = True = True > 0.001 [s]	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if there is a task runtime overload.	Jitter time of 5 msec task	> 5 [%]	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if there is an overload situation.	Task did not finish within its cycle time	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		This monitoring checks if cyclically test execution of SVDT in hardware is not stopped.	Stop response from hardware does not work or the test is not stopped	= True	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks that the task system of the microcontroller and the one of the ASIC stay synchronized or at least get resynchronized again.	Resynchronization between task system of microcontroller and ASIC fails	= True	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if cyclically test execution of SVDT in hardware is not stopped.	Stop response from hardware does not work or the test is not stopped	= True	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks that the task system of the microcontroller and the one of the ASIC stay synchronized or at least get resynchronized again.	Resynchronization between task system of microcontroller and ASIC fails	= True	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks for UVR leakage current due to ohmic side circuit by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Leakage current (UVR leakage current comparator bit is set) OR UVR goes from 0 [V] over 1.26 [V] within	> 0.0063 [A] = 0.06 [s]	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks the valve-coil resistance measurement path by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Driver ASIC internal current source	<> 0.04 [A] +/-5 % (required source current)	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is short between VR and GND.	High ohmic short to GND bit in ASIC	= 1	Ignition state ON AND Valve Relay is switched OFF	= True = True	0.185 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is short between VR and GND.	Short to GND bit in ASIC is set to	= 1	Ignition state ON AND Valve Relay is switched OFF	= True = True	0.025 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the feedback of VRG actuation is plausible.	State of VRG Status via SPI does not fit to logical switch state	= True	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched OFF.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	0.065 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if the Valve Relay can be switched OFF during the initial test.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched ON.	Valve Relay can be switched ON	= False	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched ON during the initial test.	Valve Relay can be switched ON	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched OFF by redundant safety switch.	Valve Relay can be switched OFF by redundant safety switch	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks for UVR leakage current due to ohmic side circuit by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Leakage current (UVR leakage current comparator bit is set) OR UVR goes from 0 [V] over 1.26 [V] within	> 0.0063 [A] = 0.06 [s]	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks the valve-coil resistance measurement path by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Driver ASIC internal current source	<> 0.04 [A] +/-5 % (required source current)	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is short between VR and GND.	High ohmic short to GND bit in ASIC	= 1	Ignition state ON AND Valve Relay is switched OFF	= True = True	0.185 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is short between VR and GND.	Short to GND bit in ASIC is set to	= 1	Ignition state ON AND Valve Relay is switched OFF	= True = True	0.025 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the feedback of VRG actuation is plausible.	State of VRG Status via SPI does not fit to logical switch state	= True	Ignition state ON	= True	0.050 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched OFF.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	0.065 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched OFF during the initial test.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched ON.	Valve Relay can be switched ON	= False	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched ON during the initial test.	Valve Relay can be switched ON	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks if the Valve Relay can be switched OFF by redundant safety switch.	Valve Relay can be switched OFF by redundant safety switch	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		This monitoring checks if Core 1 and Core 2 SW-BIST signatures are different.	Core 1 and Core 2 SW BIST signatures are different	= True	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the task scheme is proper.	A 5 ms task is not executed in every 5 ms	= True	Ignition state ON	= True	0.010 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS Mode software configuration stored in a register and the hardware configuration	= True	Ignition state ON	= True	0.200 [s]	Once	Type A, 1 Trip
		This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS Mode software configuration stored in a register and the hardware configuration	= True	Ignition state ON	= True	0.200 [s]	Once	Type A, 1 Trip
		This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS Mode software configuration stored in a register and the hardware configuration	= True	Ignition state ON	= True	0.200 [s]	Once	Type A, 1 Trip
		This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS Mode software configuration stored in a register and the hardware configuration	= True	Ignition state ON	= True	0.200 [s]	Once	Type A, 1 Trip
		This monitoring checks if ASW configuration takes too long.	ASW current states stay in initialized state	= True	Ignition state ON	= True	5 [s]	Continuous	Type A, 1 Trip
Control Module Programming Error	P0602	This monitoring checks if the ECU exchange was not proper.	Mismatch between the stored and the real LiPS ID	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the IPB has not been programmed with calibration data set.	5th Byte in internal customer data from any of the 5 pieces of calibration block	= ASCII 'D'	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the configuration of the wheel speed sensor type is possible.	Wheel speed sensor type value OR Wheel speed sensor type value OR NVM item is corrupted	> 29 < 0 = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
EBCM Overtemperature	C127E	This monitoring checks if there is an overtemperature at the external power supply line in the direction of LiPS.	Overtemperature situation detected by system ASIC at external LiPS power supply line	= True	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
Internal Control Module A/D Processing Performance	P060B	This monitoring checks if there are general ADC errors of the operational conversion.	Parity error is registered OR ID error is registered OR Operational scan group has completed its conversion in time OR All operational results have been written before they are read	= True = True = False = False	Ignition state ON	= True	0.080 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there are open bonds or pins.	ADC open bond failure bit is set for number of times	>= 3	Ignition state ON	= True	0.080 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the converted internal test voltages are in a defined range.	ADC selftest failure bit is set for number of times	>= 3	Ignition state ON	= True	0.070 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if ADC register bits are set to the expected values.	An ADC register bit is flipped OR An ADC register bit is stuck	= True = True	Ignition state ON	= True	0.080 [s]	Continuous	Type A, 1 Trip
Internal Control Module EEPROM Error	P062F	This monitoring checks if LiPS-related NvM item can be written.	LiPS-related NvM item can not be written	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if there are too many read/write requests.	Number of read/write requests	> 100	Ignition state ON	= True	0.250 [s]	Continuous	Type A, 1 Trip
Internal Control Module Keep Alive Memory (KAM) Error	P0603	This monitoring checks if HW Parameter(s) can be read from EEPROM correctly.	Reading the HW Parameters from EEPROM is not successful	= True	Ignition state ON AND ECU Startup	= True = True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the NVM item for the front axle can be read or valid.	NVM item can be read OR NVM item is valid	= False = False	Ignition state ON AND Battery voltage	= True = between 9..16 [V]	Immediately	Once	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if the Linear position sensor related NVM item can be read, or the item is valid.	LiPS-related NvM item is empty OR LiPS-related NvM item is invalid	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks the write result at the end of the EEPROM write procedure.	Invalid cell result received during read back after writing to the EEPROM	= True	Ignition state ON	= True	0.020 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the gear ratio information can be read out from the non-volatile memory.	Gear ratio information can be read out from the NVM OR Gear ratio information is correct	= False = False	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the motor size information can be read out from the non-volatile memory.	Motor Size information can be read out from the NVM OR Motor Size information is correct	= False = False	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks if the NvM items: RPS_Offset, RPS_Rescalling, RPS_CorrAmplitudes and the RPS_Version are readable.	Offset read failure occurred OR Rescaling read failure occurred OR Correction Amplitudes read failure occurred OR Version read failure occurred OR Orthogonality read failure occurred	= True = True = True = True = True	IPB State	= Init phase	Immediately	Once	Type A, 1 Trip
Internal Control Module Memory Checksum Error	P0601	This monitoring checks proper functionality of Flash.	Uncorrectable Flash ECC fault occurred OR Number of Flash ECC correctable bit faults OR Flash checksum verification failed	= True > 3 = True	Ignition state ON	= True	0.080 [s]	Continuous	Type A, 1 Trip
Internal Control Module Random Access Memory (RAM) Error	P0604	This monitoring checks if the LBIST and MBIST are working properly.	Test result bits set do no match reference register value OR Signature register values do no match reference register value	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		This monitoring checks proper functionality of RAM.	Uncorrectable RAM ECC fault occurred OR Number of RAM ECC correctable bit faults OR Coupling between neighbouring RAM cells OR RAM addressing fault occurred	= True > 2 = True = True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
System Voltage High	P0563	This monitoring checks if the supply voltage is too high for the actuation.	Power supply voltage	> 16.5 [V]	Actuation (apply or release) has been requested	= True	2 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if there is an overvoltage measured at UBB supply line.	Measured UBB voltage	> 16 [V]	Ignition state ON	= True	0.200 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if there is an overvoltage measured at UBB supply line.	Measured UBB voltage	> 20 [V]	Ignition state ON	= True	0.200 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if there is an overvoltage measured at UBB supply line.	Measured UBB voltage	> 27 [V]	Ignition state ON	= True	0.200 [s]	Continuous	Type B, 2 Trips
		This monitoring checks if there is an existing overvoltage situation and this is only a replacement failure instead of other NET failures.	Network voltage AND Another NET failure has been detected	> 16 [V] = True	Ignition state ON	= True	Immediately	Continuous	Type B, 2 Trips
		This monitoring checks if the power supply at valve path is too high.	UB_VR	> 16.5 [V]	Ignition state ON	= True	1.02 [s]	Continuous	Type B, 2 Trips
System Voltage High	P0563	This monitoring checks if there is an existing overvoltage situation while other LIN failure is present.	ECU Supply voltage AND Another LIN failure has been detected	> 16 [V] = True	Cranking	= False	Immediately	Continuous	Type B, 2 Trips
Wheel Speed Sensor Frequency	C10EE	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer is in "overflow" state OR Buffer transfer error occurred	= True = True	Ignition state ON AND WSS Test has been finished	= True = True	0.030 [s]	Continuous	Type A, 1 Trip
Hydraulic Valves									
Brake Booster Performance	C0021	This monitoring checks if the pressure in plunger circuit is too low.	Target pressure AND Pressure sensor 2 value	> 60 [bar] < 30 [bar]	Ignition state ON AND Braking is requested (either by driver or by external) AND BBF System state	= True = True = Full	0.300 [s]	Continuous	Type A, 1 Trip
		This monitoring checks with goodcheck if the pressure in plunger circuit is too low.	Target pressure AND Pressure sensor 2 value	> 60 [bar] < 30 [bar]	Ignition state ON AND Braking is requested (either by driver or by external)	= True = True	0.300 [s]	Continuous	Type A, 1 Trip
Brake Hydraulic Circuit "C" Leak	C05B0	This monitoring checks if there is air in the plunger. It checks the system during three situation: - during replenishment (Replenishment air detection, RAD) - during TAD (Transition to idle air Detection, TAD) - active test after power on (Fluid level indicator Plausibility aur detection, FAD).	Case 1 - RAD: Calculated volume deviation (based on Pressure sensor 2 value and plunger position) AND For time	> 2 [cm^3] > 1 [s]	Case 1: BBF System state AND Replenishment is active AND Pressure sensor 1 value AND Ignition state ON	= Circuit separation OR One circuit = True > 10 [bar] = True	0.020 [s]	RAD: At each slow replenishment in degraded state. TAD: At each pressure based TTI in degraded state. FAD: At least once per power cycle.	Type A, 1 Trip
			Case 2 - TAD: Calculated volume deviation (based on Pressure sensor 2 value and plunger position) AND For time	> 1.5 [cm^3] > 5 [s]	Case 2: BBF System state AND TTI (Transition to Idle) is active for the plunger AND Pressure sensor 1 value AND Ignition state ON	= Full system OR Degraded pedal feel OR Circuit separation OR One circuit = True > 10 [bar] = True	0.020 [s]		

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Case 3 - FAD: Calculated volume deviation (based on Pressure sensor 2 value and plunger position) AND For time	> 1.5 [cm^3] > 10 [s]	Case 3: BBF System state AND Braking is requested (either by driver or by external) AND Vehicle speed AND Pressure sensor 1 value AND Ignition state ON	 = Full system OR Degraded pedal feel OR Hydraulic backup with actuators = False = 9.32..43.5 [mph] > 10 [bar] = True	0.020 [s]		
Brake Hydraulic Circuit Blocked	C12F9	This monitoring checks if circuit stiffness in the plunger circuit is too high.	Pressure sensor 2 value	> target pressure + 50 bar [bar]	BBF System state AND Braking is requested (either by driver or by external) AND Pressure sensor 2 value	= Full system OR Degraded pedal feel OR Circuit separation OR One circuit = True > 3 [bar]	0.200 [s]	Continuous depending on the brake cycle	Type A, 1 Trip
		This monitoring checks if circuit stiffness in the plunger circuit is too high.	Pressure sensor 2 value	> target pressure + 50 bar [bar]	BBF System state AND Braking is requested (either by driver or by external) AND Pressure sensor 2 value AND STF_HardCircuit is set	= One circuit = True > 3 [bar] = True	0.200 [s]	Continuous depending on the brake cycle	Type A, 1 Trip
Brake Hydraulic Circuit Excessive Compliance - Level 2	C2A20	This monitoring checks if there is a leakage in Circuit 1.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a leakage in Circuit 1.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a leakage in Circuit 2.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a leakage in Circuit 2.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a leak in the remaining single circuit.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external)	= One circuit = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a leak in the plunger circuit.	Calculated leakage based on pressure sensor 2 value and plunger position	> 2000 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external)	= Full = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Cut Off Valve	C05D5	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] << 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has	Voltage at lowside in off-state (Open Load feedback bit is set)	< 2 [V]	Ignition state ON	= True	0.03 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		interruption.	OR Current (Under Current feedback bit is set)	 > 0.075 - 0.125 [A]	AND Any valve test is activated	 = False			
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Brake Pedal Feedback Pressure Solenoid Circuit	C0024	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
BSCM/EBBC Hydraulic Unit Performance	C055F	This monitoring checks if there is a leakage in the Master Cylinder.	Calculated leakage	> 200 [mm^3/s]	BBF System state AND Brake Pedal AND Pressure sensor 1 value	= Full = applied > 3 [bar]	Immediately	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks for signs of an inoperable or blocked Test Separation, Circuit Separation or Plunger Separation valve.	Active System Test (component STS) detects an unexpected pressure build-up	= True	System State AND BBF System state AND Braking is requested (either by driver or by external)	= Postrun = Full OR Degraded pedal feel = False	8 [s]	Once in Postrun	Type A, 1 Trip
		This monitoring checks if brake boosting capability is lost.	Calculated air volume (based on Pressure sensor AC value and plunger position) AND Calculated leakage	>= 8 [cm^3] > 800 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external) AND Vehicle speed	= Full OR Degraded pedal feel = False < 156.6 [mph]	4 [s]	Once immediately after start of a new Power Cycle	Type A, 1 Trip
		This monitoring checks if the pressure build capability is reduced.	Calculated air in plunger	> 5 [cm^3]	BBF System state AND Braking is requested (either by driver or by external) AND Vehicle speed	= Full OR Degraded pedal feel = False < 156.6 [mph]	4 [s]	Once immediately after start of a new Power Cycle	Type A, 1 Trip
		This monitoring checks if the pressure build capability is reduced.	Calculated leakage	> 800 [mm^3/s]	BBF System state AND Braking is requested (either by driver or by external) AND Vehicle speed	= Full OR Degraded pedal feel = False < 156.6 [mph]	4 [s]	Once	Type A, 1 Trip
		This monitoring checks if the pressure build up during replenishment is possible.	Pressure sensor 2 value gradient AND Plunger volume	< 300 [bar] > plunger volume at start of replenishment + 1 cm^3	Ignition state ON AND Replenishment is active	= True = True	0.200 [s]	Continuous	Type A, 1 Trip
Driver Applied Pressure Higher Than Expected	C05D3	This monitoring checks if the current pressure sensor value is too high for the current Pedal Travel Sensor value.	Pressure sensor value* OR Pedal Travel Sensor value	> too high < too low	Ignition state ON AND ESP or ABS intervention	= True = No intervention	0.200 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the current pressure sensor value is too high for the current Pedal Travel Sensor value.	Pressure sensor value* OR Pedal Travel Sensor value	> too high < too low	Ignition state ON AND ESP or ABS intervention	= True = No intervention	0.200 [s]	Continuous	Type A, 1 Trip
Left Front Inlet Control	C0010	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
					Hydraulic request is set AND Any valve test is activated	= False = False			
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Left Front Outlet Control	C0011	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Left Rear Inlet Control	C0018	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]					
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Left Rear Outlet Control	C0019	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON	= True	20 [s]	Cyclically every 20	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		valve-output-driver stage after valve actuation.			AND Hydraulic request is set AND Any valve test is activated	 = False = False		[s]	
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Right Front Inlet Control	C0014	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Right Front Outlet Control	C0015	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]					
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Right Rear Inlet Control	C001C	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR	= True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Failure in PWM compare unit	= True					
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Right Rear Outlet Control	C001D	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "A" Valve 1	C0001	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]					
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement	= True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			OR Failure in PWM compare unit	 = True					
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "A" Valve 2	C0002	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR	< 2 [V] < 0.075 - 0.125 [A] > 5 - 8 [A]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND	= True > 6.9 [V] = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Hydraulic request is set	= False			
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "B" Valve 1	C0003	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside	Failure in actuation logic and actuation compare logic OR	= True	Ignition state ON AND	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		valve driver ADC unit.	Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True	Outside of valve control	= True			
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has interruption.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set)	< 2 [V] > 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "B" Valve 2	C0004	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at lowside in off-state (Open Load feedback bit is set) OR Current (Under Current feedback bit is set) OR Current through low-side driver (Over Current feedback bit is set) OR Temperature (Over Temperature feedback bit is set) OR Voltage drop between PGND at the low-side driver and ECU-Gnd (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2 [V] < 0.075 - 0.125 [A] > 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage (35 .. 40) - (0.6 .. 2.2) [V] > 20 [%]	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ON/OFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		This monitoring checks continuously if the valve-coil path has	Voltage at lowside in off-state (Open Load feedback bit is set)	< 2 [V]	Ignition state ON	= True	0.03 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		interruption.	OR Current (Under Current feedback bit is set)	> 0.075 - 0.125 [A]	AND Any valve test is activated	= False			
		This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in LS ADC measurement OR Failure in HS ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks if there is leakage current through valve-output-driver stage after valve actuation.	Leakage current through valve (masurement done ASIC-internally)	> 0.1 [A]	Ignition state ON AND Hydraulic request is set AND Any valve test is activated	= True = False = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC Valve Driver Failure crosstalk OR Stuck at failure between or inside one ASIC Valve Driver actuation register OR Unexpected ASIC Valve Driver feedback	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Hydraulic request is set	= True > 6.9 [V] = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Ignition Switch Run Crank Line									
Ignition On/Start Switch Circuit High Voltage	P2535	This monitoring checks if the Ignition Switch Circuit is short to Battery.	Hardwired ignition switch circuit AND Engine controller run crank terminal status from CAN	> 4.5 [V] = Low	None	None	2.5 [s]	Continuous	Type A, 1 Trip
Ignition On/Start Switch Circuit Low Voltage	P2534	This monitoring checks if the Ignition Switch Circuit is interrupted or short to GND.	Hardwired ignition switch circuit AND Engine controller run crank terminal status from CAN	< 2 [V] = High	None	None	2.5 [s]	Continuous	Type A, 1 Trip
Ingition/ACC									
Ignition Switch Accessory Position Circuit Low	P2537	This monitoring checks if the Ignition Switch Accessory Circuit is interrupted or short to GND.	Run Crank Wakeup line AND Accessory Line	= High < 2 [V]	None	None	0.5 [s]	Once	Type B, 2 Trips
Wheel Speed Sensors									
Left Front Wheel Speed Sensor Circuit High	C0503	This monitoring checks if there is a short circuit of the WSS Front Left signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a short circuit of the WSS Front Left supply line to the battery.	Current at sensor supply line AND ASIC revision ID	> 0.0336 [A] < "DA"	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Circuit Low	C0502	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current Value Monitoring detects failure AND Supply Line Monitoring detects failure AND Voltage Value Monitoring detects failure AND Signal is valid	= False = False = False = False	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is supply line short to ground or interruption failure in case of WSS Front Left.	Current at sensor supply line OR Current at sensor supply line	< 0.055 [A] > 0.16 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Circuit/Open	C0500	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Front Left line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Incorrect Component Installed	C0555	This monitoring checks if a wrong Wheel Speed Sensor type is mounted.	Stop pulse according to WSS protocol is detected	= False	Ignition state ON AND WSS Test has been finished	= True = True	3 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if a wrong Wheel Speed Sensor type is mounted.	Stop pulse according to WSS protocol is detected	= True	Ignition state ON AND WSS Test has been finished	= True = True	3 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Intermittent/Erratic	C0504	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer is in "overflow" state OR Buffer transfer error occurred	= True = True	Ignition state ON AND WSS Test has been finished	= True = True	0.030 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if a wrong parity bit is received from WSS Front Left.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON	= True	1 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Range/Performance	C0501	This monitoring checks if there is an incorrect air gap between the rotation wheel and the FL sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND WSS test is finished AND Vehicle speed	= True = True > 1.24 [mph]	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type A, 1 Trip
		This monitoring checks if a missing stop pulse from WSS Front Left detected.	Missing stop pulse is detected	= True	Ignition state ON AND WSS Test has been finished AND Sensor supply voltage	= True = True > 6 [V]	3.6 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.	ECU supply line AND WSS supply line	< 9 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.	ECU supply line AND WSS supply line	< 9.3 [V] < 5.65 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.	ECU supply line AND WSS supply line	< 7.2 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the system can recognize a WSS FL line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.050 [s]	Once	Type A, 1 Trip
		This monitoring checks the amount of the magnetic poles of the WSS FL tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type A, 1 Trip
		This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s^2] = 2 < 1.2 [s] > 500 [m/s^2] > 4 >= 3 = 0.005 [s]	Ignition state ON	= True	20 [s]	Continuous	Type A, 1 Trip
		This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the difference between the wheel speed sensor signals and WSS FL is within a valid range.	Case 1: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 1: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type A, 1 Trip
			Case 2: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 2: Ignition state ON AND Vehicle speed AND Curve driving	 = True > 12.43 [mph] < 20 [deg/s]	9-18 [s]		
			Case 3: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 3: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 62.13 [mph] > 20 [deg/s]	9-18 [s]		
			Case 4: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 4: Ignition state ON AND Vehicle speed	 = True >= 62.13 [mph]	9-18 [s]		
			Case 5: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 5: (Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	 = True > 2 = True > 3 = True	72 [s]		
		This monitoring checks if there is a lost Wheel Speed Sensor signal.	Case 1: (Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	 = 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Case 1: Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	 = True = False = True	0.500 [s]	Continuous	Type A, 1 Trip
			Case 2: Speed of one wheel AND Vehicle speed increase	 = 0 [mph] > 11.18 [mph]	Case 2: Ignition state ON AND ABS TCS EBD control	 = True = False	Immediately		
			Case 3: Wheel acceleration	< -300 [m/s^2]	Case 3: Ignition state ON AND	 = True	0.080 [s]		

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
					Vehicle speed AND Aquaplaning	> 34.67 [mph] = False			
Left Rear Wheel Speed Sensor Circuit High	C050F	This monitoring checks if there is a short circuit of the WSS Rear Left signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a short circuit of the WSS Rear Left supply line to the battery.	Current at sensor supply line AND ASIC revision ID	> 0.0336 [A] < "DA"	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Circuit Low	C050E	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current Value Monitoring detects failure AND Supply Line Monitoring detects failure AND Voltage Value Monitoring detects failure AND Signal is valid	= False = False = False = False	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is supply line short to ground or interruption failure in case of WSS Rear Left.	Current at sensor supply line OR Current at sensor supply line	< 0.055 [A] > 0.16 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Circuit/Open	C050C	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Rear Left line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Incorrect Component Installed	C0557	This monitoring checks if a wrong Wheel Speed Sensor type is mounted.	Stop pulse according to WSS protocol is detected	= False	Ignition state ON AND WSS Test has been finished	= True = True	3 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Intermittent/Erratic	C0510	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer is in "overflow" state OR Buffer transfer error occurred	= True = True	Ignition state ON AND WSS Test has been finished	= True = True	0.030 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if a wrong parity bit is received from WSS Rear Left.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON	= True	1 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Range/Performance	C050D	This monitoring checks if there is an incorrect air gap between the rotation wheel and the RL sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND WSS test is finished AND Vehicle speed	= True = True > 1.24 [mph]	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type A, 1 Trip
		This monitoring checks if a missing stop pulse from WSS Rear Left detected.	Missing stop pulse is detected	= True	Ignition state ON AND WSS Test has been finished AND Sensor supply voltage	= True = True > 6 [V]	3.6 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Rear Left Supply Line.	ECU supply line AND WSS supply line	< 9 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Rear Left Supply Line.	ECU supply line AND WSS supply line	< 9.3 [V] < 5.65 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Rear Left Supply Line.	ECU supply line AND WSS supply line	< 7.2 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the system can recognize a WSS RL line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.050 [s]	Once	Type A, 1 Trip
		This monitoring checks the amount of the magnetic poles of the WSS RL tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type A, 1 Trip
		This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s^2] = 2 < 1.2 [s] > 500 [m/s^2] > 4 >= 3 = 0.005 [s]	Ignition state ON	= True	20 [s]	Continuous	Type A, 1 Trip
		This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the difference between the wheel speed sensor signals and WSS RL is within a valid range.	Case 1: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 1: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Case 2: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 2: Ignition state ON AND Vehicle speed AND Curve driving	= True < 12.43 [mph] < 20 [deg/s]	9-18 [s]		
			Case 3: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 3: Ignition state ON AND Vehicle speed AND Curve driving	= True < 62.13 [mph] > 20 [deg/s]	9-18 [s]		
			Case 4: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 4: Ignition state ON AND Vehicle speed	= True >= 62.13 [mph]	9-18 [s]		
			Case 5: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 5: (Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	= True > 2 = True > 3 = True	72 [s]		
		This monitoring checks if there is a lost Wheel Speed Sensor signal.	Case 1: (Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	= 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Case 1: Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	= True = False = True	0.500 [s]	Continuous	Type A, 1 Trip
			Case 2: Speed of one wheel AND Vehicle speed increase	= 0 [mph] > 11.18 [mph]	Case 2: Ignition state ON AND ABS TCS EBD control	= True = False	Immediately		
			Case 3: Wheel acceleration	< -300 [m/s^2]	Case 3: Ignition state ON AND Vehicle speed AND Aquaplaning	= True > 34.67 [mph] = False	0.080 [s]		
Right Front Wheel Speed Sensor Circuit High	C0509	This monitoring checks if there is a short circuit of the WSS Front Right signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a short circuit of the WSS Front Right supply line to the battery.	Current at sensor supply line AND ASIC revision ID	> 0.0336 [A] < "DA"	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Circuit Low	C0508	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current Value Monitoring detects failure AND Supply Line Monitoring detects failure AND Voltage Value Monitoring detects failure AND Signal is valid	= False = False = False = False	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is supply line short to ground or interruption failure in case of WSS Front Right.	Current at sensor supply line OR Current at sensor supply line	< 0.055 [A] > 0.16 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Circuit/Open	C0506	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Front Right line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Incorrect Component Installed	C0556	This monitoring checks if a wrong Wheel Speed Sensor type is mounted.	Stop pulse according to WSS protocol is detected	= False	Ignition state ON AND WSS Test has been finished	= True = True	3 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if a wrong Wheel Speed Sensor type is mounted.	Stop pulse according to WSS protocol is detected	= True	Ignition state ON AND WSS Test has been finished	= True = True	3 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Intermittent/Erratic	C050A	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer is in "overflow" state OR Buffer transfer error occurred	= True = True	Ignition state ON AND WSS Test has been finished	= True = True	0.030 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if a wrong parity bit is received from WSS Front Right.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON	= True	1 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Range/Performance	C0507	This monitoring checks if there is an incorrect air gap between the rotation wheel and the FR sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND WSS test is finished AND Vehicle speed	= True = True > 1.24 [mph]	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if a missing stop pulse from WSS Front Right detected.	Missing stop pulse is detected	= True	Ignition state ON AND WSS Test has been finished AND Sensor supply voltage	= True = True > 6 [V]	3.6 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Front Right Supply Line.	ECU supply line AND WSS supply line	< 9 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Front Right Supply Line.	ECU supply line AND WSS supply line	< 9.3 [V] < 5.65 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Front Right Supply Line.	ECU supply line AND WSS supply line	< 7.2 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the system can recognize a WSS FR line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.050 [s]	Once	Type A, 1 Trip
		This monitoring checks the amount of the magnetic poles of the WSS FR tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type A, 1 Trip
		This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s^2] = 2 < 1.2 [s] > 500 [m/s^2] > 4 >= 3 = 0.005 [s]	Ignition state ON	= True	20 [s]	Continuous	Type A, 1 Trip
		This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the difference between the wheel speed sensor signals and WSS FR is within a valid range.	Case 1: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 1: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type A, 1 Trip
			Case 2: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 2: Ignition state ON AND Vehicle speed AND Curve driving	 = True > 12.43 [mph] < 20 [deg/s]	9-18 [s]		
			Case 3: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 3: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 62.13 [mph] > 20 [deg/s]	9-18 [s]		
			Case 4: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 4: Ignition state ON AND Vehicle speed	 = True >= 62.13 [mph]	9-18 [s]		
			Case 5: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 5: (Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	 = True > 2 = True > 3 = True	72 [s]		
		This monitoring checks if there is a lost Wheel Speed Sensor signal.	Case 1: (Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	 = 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Case 1: Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	 = True = False = True	0.500 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Case 2: Speed of one wheel AND Vehicle speed increase	 = 0 [mph] > 11.18 [mph]	Case 2: Ignition state ON AND ABS TCS EBD control	 = True = False	Immediately		
			Case 3: Wheel acceleration	< -300 [m/s^2]	Case 3: Ignition state ON AND Vehicle speed AND Aquaplaning	 = True > 34.67 [mph] = False	0.080 [s]		
Right Rear Wheel Speed Sensor Circuit High	C0515	This monitoring checks if there is a short circuit of the WSS Rear Right signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a short circuit of the WSS Rear Right supply line to the battery.	Current at sensor supply line AND ASIC revision ID	> 0.0336 [A] < "DA"	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Circuit Low	C0514	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current Value Monitoring detects failure AND Supply Line Monitoring detects failure AND Voltage Value Monitoring detects failure AND Signal is valid	= False = False = False = False	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is supply line short to ground or interruption failure in case of WSS Rear Right.	Current at sensor supply line OR Current at sensor supply line	< 0.055 [A] > 0.16 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Circuit/Open	C0512	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Rear Right line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND WSS Test has been finished	= True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Incorrect Component Installed	C0558	This monitoring checks if a wrong Wheel Speed Sensor type is mounted.	Stop pulse according to WSS protocol is detected	= False	Ignition state ON AND WSS Test has been finished	= True = True	3 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Intermittent/Erratic	C0516	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer is in "overflow" state OR Buffer transfer error occurred	= True = True	Ignition state ON AND WSS Test has been finished	= True = True	0.030 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if a wrong parity bit is received from WSS Rear Right.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON	= True	1 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Range/Performance	C0513	This monitoring checks if there is an incorrect air gap between the rotation wheel and the RR sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND WSS test is finished AND Vehicle speed	= True = True > 1.24 [mph]	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type A, 1 Trip
		This monitoring checks if there is a missing stop pulse from WSS Rear Right detected.	Missing stop pulse is detected	= True	Ignition state ON AND WSS Test has been finished AND Sensor supply voltage	= True = True > 6 [V]	3.6 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Rear Right Supply Line.	ECU supply line AND WSS supply line	< 9 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Rear Right Supply Line.	ECU supply line AND WSS supply line	< 9.3 [V] < 5.65 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if there is an undervoltage on the WSS Rear Right Supply Line.	ECU supply line AND WSS supply line	< 7.2 [V] < 5.15 [V]	Ignition state ON	= True	0.060 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the system can recognize a WSS RR line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.050 [s]	Once	Type A, 1 Trip
		This monitoring checks the amount of the magnetic poles of the WSS RR tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type A, 1 Trip
		This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s^2] = 2 < 1.2 [s] > 500 [m/s^2] > 4 >= 3 = 0.005 [s]	Ignition state ON	= True	20 [s]	Continuous	Type A, 1 Trip
		This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5 [s]	Continuous	Type A, 1 Trip

System/ Component	Fault Code	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		This monitoring checks if the difference between the wheel speed sensor signals and WSS RR is within a valid range.	Case 1: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 1: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type A, 1 Trip
			Case 2: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 2: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 12.43 [mph] < 20 [deg/s]	9-18 [s]		
			Case 3: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 3: Ignition state ON AND Vehicle speed AND Curve driving	 = True < 62.13 [mph] > 20 [deg/s]	9-18 [s]		
			Case 4: |Difference between maximum and minimum wheel speed|	> 6.5 [%] of the vehicle speed	Case 4: Ignition state ON AND Vehicle speed	 = True >= 62.13 [mph]	9-18 [s]		
			Case 5: |Difference between maximum and minimum wheel speed|	> 4.02 [mph]	Case 5: (Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	 = True > 2 = True > 3 = True	72 [s]		
		This monitoring checks if there is a lost Wheel Speed Sensor signal.	Case 1: (Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	 = 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Case 1: Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	 = True = False = True	0.500 [s]	Continuous	Type A, 1 Trip
			Case 2: Speed of one wheel AND Vehicle speed increase	 = 0 [mph] > 11.18 [mph]	Case 2: Ignition state ON AND ABS TCS EBD control	 = True = False	Immediately		
			Case 3: Wheel acceleration	< -300 [m/s^2]	Case 3: Ignition state ON AND Vehicle speed AND Aquaplaning	 = True > 34.67 [mph] = False	0.080 [s]		
Vehicle Speed - Wheel Speed Correlation	P215A	This monitoring checks if sensor signals seem to be affected by temporary failure suspicion at the same time to ensure the proper working of ABS functionality.	Number of sensor signal monitoring fault suspicions detected	> 2	Ignition state ON	= True	0.500 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if the source of the invalid signal can be found.	|Difference between maximum and minimum wheel speed|	> 52.12 [mph]	Ignition state ON AND Vehicle speed	= True > 3.1 [mph]	9 - 72 [s]	Continuous	Type A, 1 Trip
		This monitoring checks if sensor signals seem to be affected by temporary failure suspicion at the same time to ensure the proper working of Vehicle Dynamic Control functionality.	Number of sensor signal monitoring fault suspicions detected	> 1	Ignition state ON	= True	0.100 [s]	Continuous	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/Start Position Circuit Stuck Low Detected	B2B0D	This monitoring checks if the hardwired Run/Crank analog signal matches the value of the Run/Crank Terminal Status message received from the ECM. This fault is set if the two signals do not match where the hardwired signal is set to INACTIVE while the serial data signal is set to ACTIVE.	Run/Crank Analog Signal State **AND** Run/Crank Terminal Status **AND** X **OUT OF** Y	<= 1.5V = ACTIVE = 80 = 100	ECM Timed Out	= FALSE	0.8 [Sec]	Type B 2 Trips
Ignition Switch Run/Start Position Circuit Stuck High Detected	B2B0E	This monitoring checks if the hardwired Run/Crank analog signal matches the value of the Run/Crank Terminal Status message received from the ECM. This fault is set if the two signals do not match where the hardwired signal is set to ACTIVE while the serial data signal is set to INACTIVE.	Run/Crank Analog Signal State **AND** Run/Crank Terminal Status **AND** X **OUT OF** Y	>=5.5V = INACTIVE = 80 = 100	ECM Timed Out	= FALSE	0.8 [Sec]	Type B 2 Trips
Bus-Off detected on the HS Primary bus (Bus A)	U2413	This fault is set if the HS Primary bus enters the Bus-Off state	Bus Off Event Occurred on HS Primary	= TRUE	Run/Crank Analog Signal State **OR** Comm Enable Hardwire Line **AND** System Voltage	>= 5.5V >= 4.5V > 5.5V	25[usec] for pass 10[usec] for fail	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal memory failure on the CGM Detected	B2B12	This monitoring checks whether a double bit ECC error has occurred in code flash or RAM. This fault is set if an ECC error has occurred.	ECC Error Detected	= TRUE	Guarded Read Flag	= FALSE	50ms	Type B 2 Trips
		This monitoring checks and sets a fault if a defect in the data flash (NVM) is detected.	NVM Fault Detected	= TRUE	N/A	N/A	1.5 us	
Microcontroller Performance Failure Detected	B2B13	This monitoring shall check whether the ALU in the microcontroller is functioning correctly by running an algorithm and checking the results against an expected value. If the result is incorrect the fault shall be set.	Test Result 1 **AND** Test Result 2	!= Expected Result 1 != Expected Result 2	N/A	N/A	1.5 us	Type B 2 Trips
		This monitoring shall check whether any clock monitoring interrupts have occurred. If any clock monitoring interrupts have occurred this fault shall be set.	Clock Monitoring Interrupt Occurred	= TRUE	N/A	N/A		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Loss of Communication with the ECM Detected	U18D5	This monitoring shall check a supervised message from the ECM to check the communication status. If the CGM has not received the supervised message from the ECM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 62.5[ms] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	>= 5.5V >= 7V	4.0625 [sec]	Type B 2 Trips
Loss of Communication with the TCM Detected	U18D7	This monitoring shall check a supervised message from the TCM to check the communication status. If the CGM has not received the supervised message from the TCM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 2.5[sec] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	= ACTIVE >= 7V	6.5 [sec]	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Loss of Communication with the EBCM Detected	U18DC	This monitoring shall check a supervised message from the EBCM to check the communication status. If the CGM has not received the supervised message from the EBCM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 2.5[sec] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	= ACTIVE >= 7V	6.5 [sec]	Type B 2 Trips
Loss of Communication with the GPCM Detected	U18DE	This monitoring shall check a supervised message from the GPCM to check the communication status. If the CGM has not received the supervised message from the GPCM for 2.5x of its periodic rate, a secondary counter shall be enabled and decremented. When the secondary timer reaches zero, this fault shall be set if the message still has not been received.	Supervised Message has not been received in 250[ms] **THEN** Secondary Timer (4 sec)	= TRUE = 0 sec	Run/Crank Analog Signal State **AND** System Voltage	= ACTIVE >= 7V	4.25 [sec]	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control Module Sensor Reference Voltage 1 Low Voltage	P1018	This monitoring checks if the UTLC Sensor 5V supply is lower than expected	Quality sensor power supply voltage	≤ 4.75V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.2s Failure out of 20 samples Time basis = 0.01s	Type A, 1 Trip
Reductant Control Module Sensor Reference Voltage 1 High Voltage	P1019	This monitoring checks if the UTLC Sensor 5V supply is higher than expected	Quality sensor power supply voltage	≥ 5.25V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.2s Failure out of 20 samples Time basis = 0.01s	Type A, 1 Trip
Engine Diagnostic Status Signals Message Counter Incorrect	P10C6	The diagnostic monitor detects an alive rolling count error or checksum error in any of the Sensor Bus 1 CAN frames $1E2,$2C6, $2F6, $2F7,and $4CA sent by ECM that is received by Reductant Control Module (DEFC).	If the frames counter value increments in the order (0->1->2->3->0->...), with wrap-around after 3, then the diagnostic reports pass. If any value is not in the order listed for any of the frames, then the diagnostic reports fail. OR if any of the frames checksum	 ≠ computed cheksum	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	5s Failure out of 10 to 200 samples (depending on the CAN Frame IDs transmit rate) Diagnostics check every received message (0.025s or 0.1s or 0.5s)	Type A, 1 Trip
Reductant Control Module Sensor Reference Voltage 2 Low Voltage	P10C9	This monitoring checks if the reductant pressure sensor 5V supply is lower than expected	Pressure sensor power supply voltage	≤ 4.75V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4s Failure out of 40 samples Time basis = 0.01s	Type A, 1 Trip
Reductant Control Module Sensor Reference Voltage 2 High Voltage	P10CA	This monitoring checks if the reductant pressure sensor 5V supply is higher than expected	Pressure sensor power supply voltage	≥ 5.25V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4s Failure out of 40 samples Time basis = 0.01s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 1 Control Circuit Shorted	P10D9	This monitoring checks if at least one heater high side and low side are shorted together. The 3 reductant heaters (2 tank heaters, and 1 supply line heater) share a low side driver, and therefore cannot pinpoint which heater is faulted. While heaters are commanded off, shorted high side to low side faults are indistinguishable to an unfaulted heater. Upon the presence of certain heater circuit faults, the heater driver hardware will enter a self-protection mode and will shut off automatically. Other heater circuit diagnostics can be diagnosed while the heaters are off. If no fault is confirmed after sufficient time with the heaters off, the heaters are commanded back on. A shorted high side to low side fault is confirmed after the heaters have automatically shut off via hardware protection sufficient times without confirming the presence of any other circuit faults.	Heater driver hardware protection has shut off heaters due to the following conditions: [Low side FET drain OR load current] AND Error Counter <u>Note1</u>: The control system will determine that other circuit faults are not detected, and the heaters will be commanded back on when the following criteria are met: ADC voltage on high side AND ADC voltage high side AND ADC voltage low side AND ADC voltage low side <u>Note2:</u> A fault is confirmed when the Error Counter (based on number of heater transitions between the on and off states) exceeds the Error counter threshold.	> 0.45 V > 95 A > 4 < 0.909V > 0.767V < 0.613V > 0.487V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Heater power supply voltage Proplusion System [Heater 1 PWM Command OR Heater 2 PWM Command OR Heater 3 PWM Command] No DCU internal fault <u>Note:</u> Heaters PWM command is set to zero in response to a fault on the: Tank temperature sensor Tank temperature power supply Heater 1 Heater 2 Heater 3 Heater power supply CAN communication Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 5.7V = ACTIVE > 0% > 0% > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P21DD & P20BB & P20BC & P20B9 & P20BA P221C & P221D & P20C0 & P20BE & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	Up to 1.2 s Failure out of 4 samples Success out of 12 samples Time basis = 0.2s Recovery only at next driving cycle Note: The Error counter is incremented by 6 each time the heater is turned off and back on, but decremented by 1 each time loop that the heater is on.	Type A, 1 Trip
Reductant Control Module Ignition On/Start Switch Circuit High Voltage	P10DA	This monitoring checks if the Run/Crank wired input on the DEF controller is high, when it is expected to be low	Run/Crank wired input state AND Run/Crank received over CAN	= HIGH = LOW	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	3 s Failure out of 300 samples Time basis = 0.01s	Type A, 1 Trip
Reductant Control Module Ignition On/Start Switch Circuit Low Voltage	P10DB	This monitoring checks if the Run/Crank wired input on the DEF controller is low, when it is expected to be high	Run/Crank wired input state AND Run/Crank received over CAN	= LOW = HIGH	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	3 s Failure out of 300 samples Time basis = 0.01s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control Module Heater Supply Circuit Low	P10DC	This monitoring checks if the reductant tank heater supply voltage is lower than reductant controller permanent power supply voltage	ECU power supply voltage - Tank heater power supply voltage	> 3.3V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Propulstion System Active Time after controller initialization Engine cranking (receieved over CAN) Pump State No DCU internal fault Note 1: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = ACTIVE > 0.51s = FALSE ≠ After-run P20FF & P10F4	0.5s Failure out of 50 samples Time basis = 0.01s	Type B, 2 Trips
Reductant Control Module Heater Supply Circuit High	P10DD	This monitoring checks if the reductant tank heater supply voltage is greater than reductant controller permanent power supply voltage	Tank heater power supply voltage - ECU power supply voltage	> 3.3V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Propulstion System Active Time after controller initialization Engine cranking (receieved over CAN) Pump State No DCU internal fault Note 1: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = ACTIVE > 0.51s = FALSE ≠ After-run P20FF & P10F4	0.5 s Failure out of 50 samples Time basis = 0.01s	Type B, 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 2 Control Circuit Shorted	P10F3	This monitoring checks if at least one heater high side and low side are shorted together. The 3 reductant heaters (2 tank heaters, and 1 supply line heater) share a low side driver, and therefore cannot pinpoint which heater is faulted. While heaters are commanded off, shorted high side to low side faults are indistinguishable to an unfaulted heater. Upon the presence of certain heater circuit faults, the heater driver hardware will enter a self-protection mode and will shut off automatically. Other heater circuit diagnostics can be diagnosed while the heaters are off. If no fault is confirmed after sufficient time with the heaters off, the heaters are commanded back on. A shorted high side to low side fault is confirmed after the heaters have automatically shut off via hardware protection sufficient times without confirming the presence of any other circuit faults.	Heater driver hardware protection has shut off heaters due to the following conditions: [Low side FET drain OR load current] AND Error Counter <u>Note1</u>: The control system will determine that other circuit faults are not detected, and the heaters will be commanded back on when the following criteria are met: ADC voltage on high side AND ADC voltage high side AND ADC voltage low side AND ADC voltage low side <u>Note2:</u> A fault is confirmed when the Error Counter (based on number of heater transitions between the on and off states) exceeds the Error counter threshold.	> 0.45 V > 95 A > 4 < 0.909V > 0.767V < 0.613V > 0.487V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Heater power supply voltage Proplusion System [Heater 1 PWM Command OR Heater 2 PWM Command OR Heater 3 PWM Command] No DCU internal fault <u>Note:</u> Heaters PWM command is set to zero in response to a fault on the: Tank temperature sensor Tank temperature power supply Heater 1 Heater 2 Heater 3 Heater power supply CAN communication Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 5.7V = ACTIVE > 0% > 0% > 0% P20FF, P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P21DD & P20BB & P20BC & P20B9 & P20BA & P10D9 P221C & P221D & P20C0 & P20BE & P20BF & P20BD P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	Up to 1.2 s Failure out of 4 samples Success out of 12 samples Time basis = 0.2s Recovery only at next driving cycle Note: The Error counter is incremented by 6 each time the heater is turned off and back on, but decremented by 1 each time loop that the heater is on.	Type A, 1 Trip
Reductant Control Module Not Programmed	P10F4	This monitoring checks if the ECU is a service part that has not been programmed with application specific software and calibration.	Software Operational Reference Calibration AND MEC <u>Note</u>: Software operational reference calibration is set to true if application specific calibration has been flashed.	= FALSE = 0	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up]	= ACTIVE = ACTIVE = ACTIVE	No debounce applied Once at ECU initialization	Type A, 1 Trip
Reductant Control Module Sensor Reference Voltage 3 Low Voltage	P131B	This monitoring checks if the reductant temperature sensor 5V supply is lower than expected	Reducant temperature sensor power supply voltage	≤ 4.8V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4 s Failure out of 40 samples Time basis = 0.01s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control Module Sensor Reference Voltage 3 High Voltage	P131C	This monitoring checks if the reductant temperature sensor 5V supply is higher than expected	Reducant temperature sensor power supply voltage	≥ 5.3V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4 s Failure out of 40 samples Time basis = 0.01s	Type A, 1 Trip
Reductant Heater 3 Control Circuit Shorted	P143C	This monitoring checks if at least one heater high side and low side are shorted together. The 3 reductant heaters (2 tank heaters, and 1 supply line heater) share a low side driver, and therefore cannot pinpoint which heater is faulted. While heaters are commanded off, shorted high side to low side faults are indistinguishable to an unfaulted heater. Upon the presence of certain heater circuit faults, the heater driver hardware will enter a self-protection mode and will shut off automatically. Other heater circuit diagnostics can be diagnosed while the heaters are off. If no fault is confirmed after sufficient time with the heaters off, the heaters are commanded back on. A shorted high side to low side fault is confirmed after the heaters have automatically shut off via hardware protection sufficient times without confirming the presence of any other circuit faults.	Heater driver hardware protection has shut off heaters due to the following conditions: [Low side FET drain OR load current] AND Error Counter <u>Note1</u>: The control system will determine that other circuit faults are not detected, and the heaters will be commanded back on when the following criteria are met: ADC voltage on high side AND ADC voltage high side AND ADC voltage low side AND ADC voltage low side <u>Note2:</u> A fault is confirmed when the Error Counter (based on number of heater transitions between the on and off states) exceeds the Error counter threshold.	 > 0.45 V > 95 A > 4 < 0.909V > 0.767V < 0.613V > 0.487V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Heater power supply voltage Proplusion System [Heater 1 PWM Command OR Heater 2 PWM Command OR Heater 3 PWM Command] No DCU internal fault <u>Note:</u> Heaters PWM command is set to zero in response to a fault on the: Tank temperature sensor Tank temperature power supply Heater 1 Heater 2 Heater 3 Heater power supply CAN communication Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 5.7V = ACTIVE > 0% > 0% > 0% P20FF & P10F4 P205B &P205C & P205D & P205E P131B & P131C P214F & P21DD & P20BB & P20BC & P20B9 & P20BA & P10D9 P221C & P221D & P20C0 & P20BE & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	Up to 1.2 s Failure out of 4 samples Success out of 12 samples Time basis = 0.2s Recovery only at next driving cycle Note: The Error counter is incremented by 6 each time the heater is turned off and back on, but decremented by 1 each time loop that the heater is on.	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Pump Resistance Performance	P149F	This monitor checks if the reductant pump resistance is too low during the pump heating phase.	Pump driver power supply * duty cycle / measured driver current OR	< 0.23Ω	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump state Measured pump driver current <u>Note</u>: Pump heating is disabled in response to the following faults: Pressure Sensor fault Reductant Pump fault Pressure sensor power supply fault CAN communication fault Hardwired Run/Crank No DCU internal fault <u>Note 1:</u> To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = Heating > 0A P204B & P204C & P204D & P204E P249C & P208B & P20E8 & P20E9 & P2C11 & P214E & P208D & P208C & P208A P10CA & P10C9 P10C6 & U2626 & U2412 P10DA & P10DB P20FF & P10F4	8 s Failure out of 800 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip
		This monitor checks if the reductant pump resistance is too high during the pump heating phase.	Pump driver power supply * duty cycle / measured driver current	> 0.8Ω				
Reductant Level Sensor Circuit Range/Performance	P203B	This monitor checks if reductant level measurements are not available when they are expected to be available. The ultrasonic level sensor transmits a readiness bit with each level measurement to identify when the sensor has low confidence in the fluid height (level) measurement due to a weak, missing, or inconsistent echo returned to the piezo element. This monitor specifically checks if the readiness bit is false when it is expected to be true.	Reductant Level Readiness Bit	= FALSE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Time since last Refill / Draining Estimated DEF Level Reductant tank temperature Reductant UTLC temperature Heater 1 PWM Command Heater 3 PWM Command Slosh Detection Flag Tank Agitation Flag Vehicle speed No Level Sensor voltage fault No SENT communication fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE > 300s > 5L > 0°C > 3°C = 0% = 0% = FALSE = TRUE > 2km/h P203C & P203D U2627 & U2628 & U2630 P20FF & P10F4	200s Failure out of 2000 samples Success out of 6 samples Time basis = 0.1s	Type B, 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Level Sensor Circuit Low Voltage	P203C	This monitor checks if the reductant level sensor signal is out of range low. This computation is performed in the smart UTLC sensor, and a corresponding error flag indicating either piezo excitation voltage faults or piezo circuit faults are detected is transmitted to the DEFC on the SENT bus.	[PZT Excitation Voltage OR PZT Excitation Voltage OR PZT Voltage OORH OR PZT Voltage OORL] Note: 1. All signals are transmitted by UTLC sensor, where it is internally computed. 2. PZT conditions are based on a single diagnosis status bit transmitted by the UTLC sensor	> 5.5V < 4.5V > 2.0V < 0.125V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT Communication Fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	2 s Failure out of 4 samples Time basis = 0.5s	Type B, 2 Trips
Reductant Level Sensor Circuit High Voltage	P203D	This monitor checks if the reductant level sensor signal is out of range high. This computation is performed in the smart UTLC sensor, and a corresponding error flag indicating that the reductant level measurement is greater than the maximum measureable range is transmitted to the DEFC on the SENT bus.	Reductant Level measurement AND Reductant Level readiness bit Note: Reductant Level readiness flag is broadcasted by the smart UTLC sensor to Reductant Control Module	> 400 mm = TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT Communication Fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	6 s Failure out of 12 samples Sucess out of 4 samples Time basis = 0.5s	Type B, 2 Trips
Reductant Pressure Sensor Performance	P204B	This monitor checks if the reductant pressure sensor measure is lower than ambient pressure before the system is pressurized.	Reductant pressure OR Time when pumping internal debounce counter has not reached pass/fail decision maturation	< -36.4 kPa > 1s	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump state No Pressure Sensor fault No DCU internal fault Note: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = Startup P204C & P204D P20FF & P10F4	Up to 33 s (3x1s timeout + 2x15s wait) Malfunction criteria confirmation out of 88 samples Time basis = 0.01s Failure confirmation after two retries Recovery only at next driving cycle Note: See "Repeat Defrost" sheet for retries definition	Type A, 1 Trip
		This monitor checks if the reductant pressure sensor measure is greater than ambient pressure before the system is pressurized.	Reductant pressure OR Time when puming internal debounce counter has not reached pass/fail decision maturation	> 36.4 kPa > 1s				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Pressure Sensor Circuit Low Voltage	P204C	This monitor checks if the reductant pressure sensor is shorted to ground or open circuit by monitoring the pressure sensor output voltage and failing the diagnostic when this voltage is too low. The reductant pressure sensor is an analog pressure sensor in which the voltage across the sensor is proportional to the measured pressure.	Reductant pressure sensor voltage Note: Pressure variable is saturated to -50kPa for 0.35V ≤ Voltages < 0.5V. Additionally, pressure variable is set to 0kPA for Voltages < 0.35V.	< 0.45V (-50 kPa)	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.5 s Failure out of 50 samples Time basis = 10ms	Type A, 1 Trip
Reductant Pressure Sensor Circuit High Voltage	P204D	This monitor checks if the reductant pressure sensor is shorted to power by monitoring the pressure sensor output voltage and failing the diagnostic when this voltage is too high. The reductant pressure sensor is an analog pressure sensor in which the voltage across the sensor is proportional to the measured pressure.	Reductant pressure sensor voltage Note: Pressure variable is saturated to 900kPa for 4.5V < Voltages ≤ 4.75V. Additionally, pressure variable is set to 0kPA for Voltages > 4.75V.	> 4.90V (0 kPa)	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.5 s Failure out of 50 samples Time basis = 10ms	Type A, 1 Trip
Reductant Pressure Sensor Circuit Intermittent/Erratic	P204E	This monitor checks if the reductant pressure signal is erratic. A fail is detected when the change in pressure between two samples is greater than expected.	ABS[Pressure sensor signal(t) - pressure sensor signal (t - sample time)] / sample time	> 10 000kPa/s	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Time after controller initialization No Pressure Sensor fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE > 0.510s P204C & P204D P20FF & P10F4	0.05 s Failure out of 5 samples Time basis = 10ms	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Tank Temperature Sensor Performance	P205B	This monitor checks if, at key on, the reductant temperature sensor is coherent with average value among all the available system temperature sensors (exhaust temperature sensors, coolant temperature sensor, fuel temperature sensor, ambient temperature sensor, intake temperature sensor). The number of sensors used for the average calculation shall be at least 4 but which sensor to use is calibratable and the sensor should not be faulted. The average temperature is calculated at the system start up after a calibratable engine stop when all the temperature sensors are expected to be stabilized.	Latched average system startup reference temperature - reductant tank temperature sensor OR Reductant tank temperature sensor - latched average system startup reference temperature	≥ 30°C ≥ 30°C	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] [Average engine startup reference temperature mask AND Time after controller initialization AND Time during which the cold soak flag is active when cold soak conditions are detected] No Tank Temperature Sensor fault No CAN communication fault No ECU power supply faults No DCU internal fault Note1: Average engine start-up reference temperature mask is set to true if : Engine off time AND At least 4 sensors used in average engine startup reference temperature are: Note2: The malfunction criteria is compared 60s after the first reception of Average engine start-up reference temperature mask if the faults listed in enable conditions are not active.	= ACTIVE = ACTIVE = ACTIVE = "Use Data" > 1s < 3.5 s P205C & P205D & P205E P10C6 & U2626 & U2412 P21CB P20FF and P10F4 ≥ 8hrs = Valid	0.3 s Failure out of 3 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Tank Temperature Sensor Circuit Low Voltage	P205C	This monitor checks if the reductant temperature sensor signal is shorted to ground or open circuit by monitoring the temperature sensor output voltage and failing the diagnostic when this voltage is too low. The reductant temperature sensor is a thermistor in which the voltage across the sensor can be equated to a temperature. A lower voltage is equivalent to a higher temperature.	Reductant temperature sensor signal voltage	< 0.3 V (75°C)	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.5 s Failure out of 50 samples Time basis = 0.01s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Tank Temperature Sensor Circuit High Voltage	P205D	This monitor checks if the reductant temperature sensor signal is shorted to power by monitoring the temperature sensor output voltage and failing the diagnostic when this voltage is too high. The reductant temperature sensor is a thermistor in which the voltage across the sensor can be equated to a temperature. A higher voltage is equivalent to a lower temperature.	Reductant temperature sensor signal voltage	> 4.75V (-40°C)	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.5 s Failure out of 50 samples Time basis = 0.01s	Type A, 1 Trip
Reductant Tank Temperature Sensor Circuit Erratic	P205E	This monitor checks if the reductant temperature signal is erratic. A fail is detected when the change in temperature between two samples is greater than expected.	ABS[Tank temperature sensor signal(t) - tank temperature sensor signal (t - sample time)] / sample time	> 100°C/s	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No Temperature Sensor fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P205C & P205D P20FF & P10F4	0.5 s Failure out of 5 samples Time basis = 0.1s	Type A, 1 Trip
Reductant Quality Sensor Circuit Range/Performance	P206B	This monitor checks if reductant quality measurements are not available when they are expected to be available. The ultrasonic quality sensor transmits a readiness bit with each the quality measurement to identify when the sensor has low confidence in the quality measurement due to a weak, missing, or inconsistent echo returned to the piezo element. This monitor specifically checks if the readiness bit is false when it is expected to be true.	Reductant Quality Readiness Bit	= FALSE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Time since last Refill / Draining Estimated DEF Level Reductant tank temperature Reductant UTLC temperature Heater 1 PWM Command Heater 3 PWM Command Slosh Detection Flag Tank Agitation Flag Vehicle speed No Level Sensor voltage fault No SENT communication fault No DCU internal fault <u>Note</u>: See "Level & Quality Performance" sheet for parameter definitions	= ACTIVE = ACTIVE = ACTIVE > 300s > 5L > 0°C & < 70°C > 3°C = 0% = 0% = FALSE = TRUE > 2km/h P206C & P206D U2627 & U2628 & U2630 P20FF and P10F4	60 s Failure out of 600 samples Success out of 40 samples Time basis = 0.1s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Quality Sensor Circuit Low	P206C	This monitor checks if the reductant quality sensor signal is out of range low. This computation is performed in the smart UTLC sensor, and a corresponding error flag indicating either quality measurement is lower than the minimum measureable range, piezo excitation voltage faults are detected, or piezo circuit faults are detected is transmitted to the DEFC on the SENT bus.	[(UTLC quality measurement AND Quality readiness bit) OR PZT Excitation Voltage OR PZT Excitation Voltage OR PZT Voltage OORH OR PZT Voltage OORL] Note: All related signals are directly transmitted by UTLC sensor, where it is internally computed. 2. PZT conditions are based on a single diagnosis status bit transmitted by the UTLC sensor	< 0% = TRUE > 5.5V < 4.5V > 2V < 0.125V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT Communication Fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	2 s Failure out of 4 samples Time basis = 0.5s	Type A, 1 Trip
Reductant Quality Sensor Circuit High Voltage	P206D	This monitor checks if the reductant quality sensor signal is out of range high. The DEFC receives the quality measurement and corresponding quality readiness bit from the smart UTLC sensor, and performs this check in the DEFC.	Reductant quality measurement AND Reductant Quality readiness bit Note: Reductant Quality readiness flag is broadcasted by the smart UTLC sensor to Reductant Control Module	> 63.25% = TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT Communication Fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	2 s Failure out of 4 samples Time basis = 0.5s	Type A, 1 Trip
Reductant Pump Control Circuit	P208A	This monitor checks if any of the 3 phase pump motor control circuits are open.	Off-line: Reductant Internal Driver device status indicating that Pump Circuit is Open On-line: Fault indication when back EMF is not detected every 60° leads to transition of pump to off-line state. Note: fault cannot be pinpointed in the pump on-state. Therefore, if fault is detected with the pump on, the pump will be commanded off, allowing to pin-point the specific failure mode	= TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4 s Failure out of 40 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Pump Performance	P208B	This monitor checks if the commanded, arbitrated reducant pump speed and the sensed reductant pump speed are coherent.	ABS(Sensed pump speed - pump speed command)	> 712 rpm	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump State No DCU internal fault Note1: The pump will be stopped and this monitor will be disabled when pump state is set to Off in response to a fault on the: Pressure Sensor fault Reductant Pump fault Pressure Sensor power supply fault CAN communication fault Hardwired Run/Crank Note 1: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = Wait Authorization, OR = Priming, OR = Buildup, OR = Closed Loop Control, OR = Purge, OR = Reductant Delivery Performance, OR = AutoStop P20FF & P10F4 P204B & P204C & P204D & P204E P249C & P149F & P20E8 & P20E9 & P2C11 & P214E & P208D & P208C & P208A P10CA & P10C9 P10C6 & U2626 & U2412 P10DA & P10DB	63 s (2x15s fail to stabilize timeout + 2x15s wait time + 3s pump blocked confirmation) Malfunction criteria confirmation out of 300 samples Time basis = 10ms Failure confirmation after two retries. Between two retries, pump is stopped for 15s. When pressure hold is achieved, retries are no longer permitted and an effective retry is counted after 3s with the malfunction criteria met. Success is reported after maximum time that would be required to mature a fault has elapsed. Recovery is possible only on the next driving cycle Note 2: See "Repeat Defrost" sheet for retries definition	Type A, 1 Trip
Reductant Pump Control Circuit Low Voltage	P208C	This monitor checks if any of the 3 phase pump motor control circuits is shorted to ground.	Off-line: Reductant Internal Driver device status indicating that Pump Circuit is low voltage due to short to ground On-line: Fault indication when back EMF is not detected every 60° leads to transition of pump to off-line state. Note: fault cannot be pinpointed in the pump on-state. Therefore, if fault is detected with the pump on, the pump will be commanded off, allowing to pin-point the specific failure mode	= TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4 s Failure out of 40 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Pump Control Circuit High Voltage	P208D	This monitor checks if any of the 3 phase pump motor control circuits is shorted to power.	Off-line: Reductant Internal Driver device status indicating that Pump Circuit is high voltage to due to short to power On-line: Fault indication when back EMF is not detected every 60° leads to transition of pump to off-line state. Note: fault cannot be pinpointed in the pump on-state. Therefore, if fault is detected with the pump on, the pump will be commanded off, allowing to pin-point the specific failure mode	= TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.4 s Failure out of 40 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 1 Control Circuit	P20B9	This monitoring checks if reductant heater 1 (tank heater 1) control circuit high side or low side are open circuit. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	If heater is commanded on: [Low side FET drain OR load current] If heater is commanded off: [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side]	> 0.45V > 95A < 1.083V > 0.926V = 0V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 1 Performance	P20BA	This monitoring checks if the reductant heater 1 (tank heater 1) resistance or power is outside operating limits.	(Reductant heater 1 high side voltage - Reductant heater 1 low side voltage) / Reductant heater 1 current OR	< 1.0Ω	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Reductant heater 1 PWM command No DCU internal fault <u>Note:</u> Heater PWM command is set to zero in response to a fault on the: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 Heater 2 Heater 3 Heater power supply fault CAN communication fault Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P21DD & P20BB & P20BC & P20B9 & P10D9 P221C & P221D & P20C0 & P20BE & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	8 s Failure out of 80 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
			(Reductant heater 1 high side voltage - Reductant heater 1 low side voltage) / Reductant heater 1 current OR	> 1.8Ω				
			Reductant heater 1 power command - Reductant heater 1 power OR	> 45W			10 s Failure out of 100 samples Time basis = 0.1s Recovery only at next driving cycle	
			Reductant heater 1 power - Reductant heater 1 power command	> 45W				
Reductant Heater 1 Control Circuit Low Voltage	P20BB	This monitoring checks if reductant heater 1 (tank heater 1) control circuit high side and or side are shorted to ground. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	<u>If heater is commanded on:</u> [Low side FET drain OR load current] <u>If heater is commanded off:</u> [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side]	 > 0.45V > 95A < 0.601V > 0.506V = 0V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 1 Control Circuit High Voltage	P20BC	This monitoring checks if reductant heater 1 (tank heater 1) control circuit high side or low side are shorted to power. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	If heater is commanded on: [Low side FET drain OR load current] If heater is commanded off: [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side AND ADC voltage low side]	 > 0.45V > 95A < 4.168V > 2.021V < 4.325V > 2.097V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 2 Control Circuit	P20BD	This monitoring checks if reductant heater 2 (line heater) control circuit high side or low side are open circuit. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	If heater is commanded on: [Low side FET drain OR load current] If heater is commanded off: [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side]	 > 0.45V > 95A < 1.083V > 0.926V = 0V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 2 Performance	P20BE	This monitoring checks if the reductant heater 2 (line heater) resistance or power is outside operating limits.	(Reductant heater 2 high side voltage - Reductant heater 2 low side voltage) / Reductant heater 2 current OR	< 2.8Ω	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Reductant heater 2 PWM command No DCU internal fault <u>Note:</u> Heater PWM command is set to zero in response to a fault on the: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 Heater 2 Heater 3 Heater power supply fault CAN communication fault Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P20BA & P21DD & P20BB & P20BC & P20B9 & P10D9 P221C & P221D & P20C0 & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	8 s Failure out of 80 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
			(Reductant heater 2 high side voltage - Reductant heater 2 low side voltage) / Reductant heater 2 current OR	> 7.5Ω				
			Reductant heater 2 power command - Reductant heater 2 power OR	> 21W			10 s Failure out of 100 samples Time basis = 0.1s Recovery only at next driving cycle	
			Reductant heater 2 power - Reductant heater 2 power command	> 21W				
Reductant Heater 2 Control Circuit Low Voltage	P20BF	This monitoring checks if reductant heater 2 (line heater) control circuit high side or low side are shorted to ground. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	<u>If heater is commanded on:</u> [Low side FET drain OR load current] <u>If heater is commanded off:</u> [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side]	 > 0.45V > 95A < 0.601V > 0.506V = 0V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 2 Control Circuit High Voltage	P20C0	This monitoring checks if reductant heater 2 (line heater) control circuit high side or low side are shorted to power. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	<u>If heater is commanded on:</u> [Low side FET drain OR load current] <u>If heater is commanded off:</u> [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side AND ADC voltage low side]	> 0.45V > 95A < 4.168V > 2.021V < 4.325V > 2.097V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 3 Control Circuit/Open	P20C1	This monitoring checks if reductant heater 3 (tank heater 2) control circuit high side or low side are open circuit. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	<u>If heater is commanded on:</u> [Low side FET drain OR load current] <u>If heater is commanded off:</u> [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side]	> 0.45V > 95A < 1.083V > 0.926V = 0V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 3 Control Circuit Performance	P20C2	This monitoring checks if the reductant heater 3 (tank heater 2) resistance or power is outside operating limits.	(Reductant heater 3 high side voltage - Reductant heater 3 low side voltage) / Reductant heater 3 current OR	< 1.5Ω	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Reductant heater 3 PWM command No DCU internal fault <u>Note:</u> Heater PWM command is set to zero in response to a fault on the: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 Heater 2 Heater 3 Heater power supply fault CAN communication fault Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P20BA & P20BB & P20BC & P20B9 & P21DD & P10D9 P20BE & P221D & P20C0 & P20BF & P20BD & P221C & P10F3 P221E & P221F & P20C1 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	8 s Failure out of 80 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
			(Reductant heater 3 high side voltage - Reductant heater 3 low side voltage) / Reductant heater 3 current OR	> 2.6Ω				
			Reductant heater 3 power command - Reductant heater 3 power OR	> 29W			10 s Failure out of 100 samples Time basis = 0.1s Recovery only at next driving cycle	
			Reductant heater 3 power - Reductant heater 3 power command	> 29W				

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 3 Control Circuit Low	P20C3	This monitoring checks if reductant heater 3 (tank heater 2) control circuit high side or low side are shorted to ground. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	If heater is commanded on: [Low side FET drain OR load current] If heater is commanded off: [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side]	 > 0.45V > 95A < 0.601V > 0.506V = 0V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 3 Control Circuit High	P20C4	This monitoring checks if reductant heater 3 (tank heater 2) control circuit high side or low side are shorted to power. A reductant heater control circuit circuit fault can only be pinpointed while the heater is commanded off. Therefore, if a failure is detected while the heater is commanded on, the heater is shut off allowing the diagnostic to mature and pinpoint the specific failure mode.	If heater is commanded on: [Low side FET drain OR load current] If heater is commanded off: [ADC voltage on high side AND ADC voltage high side AND ADC voltage low side AND ADC voltage low side]	 > 0.45V > 95A < 4.168V > 2.021V < 4.325V > 2.097V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	2 s Failure out of 10 samples Time basis = 0.2s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Low Pressure	P20E8	This monitoring checks if reductant pressure is lower than the desired setpoint during closed loop pressure control operation when sufficient fluid in the DEF tank ensures reliable pressure control.	Reductant pressure setpoint - reductant pressure control signal	≥ 63 kPa	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump state DEF Level Estimation No DCU internal fault Note1: The pump will be stopped and this monitor will be disabled when pump state is set to Off in response to a fault on the: No Pressure Sensor fault No Reductant Pump fault No Pressure Sensor power supply fault No CAN communication fault Hardwired Run/Crank Note2: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = Buildup, OR = Closed Loop Control, OR = Reductant Delivery Performance > 3L P20FF & P10F4 P204B & P204C & P204D & P204E P208B & P149F & P20E9 & P2C11 & P214E & P208D & P208C & P208A & P249C P10CA & P10C9 P10C6 & U2626 & U2412 P10DA & P10DB	30 s Failure out of 3000 samples Success out of 400 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant High Pressure	P20E9	This monitoring checks if reductant pressure is greater than the desired setpoint during closed loop pressure control operation when sufficient fluid in the DEF tank ensures reliable pressure control.	Reductant pressure control signal - reductant pressure setpoint	≥ 63 kPa	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump state Engine Auto Stop Active DEF Level Estimation No DCU internal fault Note1: The pump will be stopped and this monitor will be disabled when pump state is set to Off in response to a fault on the: No Pressure Sensor fault No Reductant Pump fault No Pressure Sensor power supply fault No CAN communication fault Hardwired Run/Crank Note2: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = Buildup, OR = Closed Loop Control, OR = Reductant Delivery Performance = False > 3L P20FF & P10F4 P204B & P204C & P204D & P204E P208B & P149F & P20E9 & P2C11 & P214E & P208D & P208C & P208A & P249C P10CA & P10C9 P10C6 & U2626 & U2412 P10DA & P10DB	4 s Failure out of 400 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control Module Performance	P20FF	This monitoring checks if the Reducant Control Module has detected a RAM fault.	After writting a checker-board type pattern of 0's and 1's into the cells of a bit-oriented memory, difference is found between any cells' expected contents Note: this test is executed with RamTst Vector module, using checkerboard algorithm		[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up]	= ACTIVE = ACTIVE = ACTIVE	No debounce applied Once at initialization	Type A, 1 Trip
		This monitoring checks if the Reductant Control Module has detected a dataset version that does not fit the SW version.	Computed checksum OR Software operational reference calibration is incompatible to the application software	≠ stored frame checksum				
		This monitoring checks if the Reductant Control Module has witnessed persistent data error in Non-Volatile Memory	Aborded write operation is detected on applied NVM blocks OR Calculated checksums of related NVM blocks Note: Apply on Application data & IUMPR data NVM blocks	≠ stored checksums				
		This monitoring checks if the Reductant Control Module has detected inconstitancy in data stored in Non-Volatile Memory	Aborded write operation is detected on applied blocks OR Computed data checksum of related NVM blocks OR Heater calibration are not learned during EOL Note: Apply on Heater calibration NVM blocks	≠ stored data checksum				
Reductant Pump High Current	P214E	This monitoring checks if the reductant pump motor output driver current exceeds the maximum operating limit current. Calibrateable over-current thresholds are defined for both pumping and heating modes. The pump can be controlled as a heater to increase frozen DEF defrost performance. Otherwise, the reductant pump motor will spin to move fluid into the reductant supply line at the desired pressure setpoint.	Reducant pump hardware protection OR [If Pump Mode = Heating: Reducant pump motor current Else: Reducant pump motor current]	= ACTIVE > 15A > 7A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	4 s Failure out of 1 sample in case of pump hardware protection is detected. Else, failure out of 400 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 1 High Current	P214F	This monitoring checks if the reductant heater 1 (tank heater 1) output driver current exceeds the maximum operating limit current.	Reductant heater 1 current	> 15A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	4 s Failure out of 40 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Level Sensor 1 Stuck	P21C5	This monitor checks if reductant level measurements are available but stuck. The ultrasonic level sensor transmits a readiness bit with each the level measurement to identify when the sensor has low confidence in the fluid height (level) measurement due to a weak, missing, or inconsistent echo returned to the piezo element. If this readiness bit indicates that the level measurements are available, but the level measurements do not change sufficiently when tank fluid slosh is expected, this monitor will fail.	Reductant level sensor signal(t) - Reductant level sensor signal (t - 1000ms)	< 0.3mm	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Vehicle speed (see note1) Vehicle speed validity Vehicle long. acceleration (see note4) Urea state Filtered readiness flag (see note2) Estimated DEF Level No Level Sensor faults No Tank Temperature Sensor A faults No CAN communication faults No ECU power supply faults No SENT communication faults No DCU internal faults Note1: Vehicle speed shall be FALSE for 2 consecutive samples to disable this condition. Note2: Sensed level readiness bit shall be TRUE for 6 consecutive samples (600ms) to set the filtered readiness flag to TRUE. Sensed level readiness bit shall be FALSE for 1 sample (100ms) to set the filtered readiness flag to FALSE.	= ACTIVE = ACTIVE = ACTIVE ≥ 25km/h = TRUE > 0.1 m/s² = Liquid = TRUE > 5L P203B & P203C & P203D & P131B & P131C P205B & P205C & P205D & P205E P10C6 & U2626 & U2412 P21CB U2627 & U2628 & U2630 P20FF and P10F4	200s to Fail or 10s to Pass (Step-up/down: 1 / 20 Fail/pass count : 2000 / -2000 Time basis = 0.1s Note3: See "Level & Quality Performance" sheet for parameters definition Note4: Long. acc. is computed internally in Reductant Control Module from vehicle speed derivation.	Type B, 2 Trips
Reductant Control Module Supply Voltage Low Voltage	P21CB	This monitoring checks if measured reductant permanent power supply voltage is low compared to the vehicle system voltage (received by serial data from ECM)	ECM (Serial Data) Voltage - Reductant Permanent Power Supply Voltage	> 3V	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Engine Cranking (serial data) Engine Controller Sensed Powertrain Relay Voltage Mask No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE = False = True P20FF & P10F4	3 s Failure out of 300 samples Time basis = 0.01s	Type B, 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 1 Low Current	P21DD	This monitoring checks if the reductant heater 1 (tank heater 1) output driver current is below the minimum operating limit while the heater is commanded on.	Reductant heater 1 current	< 0.75A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Reductant tank heater 1 PWM command No DCU internal fault <u>Note:</u> Heaters PWM command is set to zero in response to a fault on the: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 fault Heater 2 fault Heater 3 fault Heater power supply fault CAN communication fault Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P20BA & P20BB & P20BC & P20B9 & P10D9 P221C & P221D & P20C0 & P20BE & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	4 s Failure out of 40 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 2 Low Current	P221C	This monitoring checks if the reductant heater 2 (line heater) output driver current is below the minimum operating limit while the heater is commanded on.	Reductant heater 2 current	< 0.75A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Reductant line heater PWM command No DCU internal fault <u>Note:</u> Heaters PWM command is set to zero in response to a fault on the: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 fault Heater 2 fault Heater 3 fault Heater power supply fault CAN communication fault Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P20BA & P20BB & P20BC & P20B9 & P21DD & P10D9 P20BE & P221D & P20C0 & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	4 s Failure out of 40 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 2 High Current	P221D	This monitoring checks if the reductant heater 2 (line heater) output driver current exceeds the maximum operating limit current.	Reductant heater 2 current	> 15A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	4 s Failure out of 40 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 3 Current Too Low	P221E	This monitoring checks if the reductant heater 3 (tank heater 2) output driver current is below the minimum operating limit current while the heater is commanded on.	Reductant heater 3 current	< 0.75A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Reductant tank heater 2 PWM command No DCU internal fault <u>Note:</u> Heaters PWM command is set to zero in response to a fault on the: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 fault Heater 2 fault Heater 3 fault Heater power supply fault CAN communication fault Hardwired Run/Crank	= ACTIVE = ACTIVE = ACTIVE > 0% P20FF & P10F4 P205B & P205C & P205D & P205E P131B & P131C P214F & P20BA & P20BB & P20BC & P20B9 & P21DD & P10D9 P20BE & P221D & P20C0 & P20BF & P20BD & P221C & P10F3 P20C2 & P221F & P20C1 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412 P10DA & P10DB	4 s Failure out of 40 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Heater 3 Current Too High	P221F	This monitoring checks if the reductant heater 3 (tank heater 2) output driver current exceeds the maximum operating limit current.	Reductant heater 3 current	> 15A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	4 s Failure out of 40 samples Time basis = 0.1s Recovery only at next driving cycle	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Excessive Time To Enter Closed Loop Reductant Injection Control	P249C	This monitoring checks if the reductant pressure does not stabilize to the desired setpoint within the expected time. If the control system determines that the DEF tank may be frozen, the pressure build-up command will be delayed until this defrost routine is complete. The defrost time is defined as a function of measured reductant tank temperature at key on. After this defrost time (or immediately, if no defrost routine was necessary) the control system will attempt a calibrateable number of pressure build-up attempts before this diagnostic reports a failure.	Pressure Closed Loop Control AND [Total time from the start of line filling OR Total time from the exit of Start & Stop] Note: See "Repeat Defrost" section for Pressure hold definition	≠ ACTIVE > 15s > 7.5s	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump state Estimated DEF Level No DCU internal fault Note1: Pump is force to stop if: Pressure Sensor fault Reductant Pump fault Pressure Sensor power supply fault CAN communication fault Hardwired Run/Crank Note2: When estimated DEF level is below the diagnostic enable (reporting threshold) noted above and the failure is confirmed after 1 retry, then “Reductant Tank Empty” flag is set, impacting low reductant driver warning and inducement. Note3: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = WaitAuthorization, OR = Priming, OR = Buildup, OR = Closed Loop Control > 3L P20FF & P10F4 P204B & P204C & P204D & P204E P149F & P208B & P20E8 & P20E9 & P2C11 & P214E & P208D & P208C & P208A P10CA & P10C9 P10C6 & U2626 & U2412 P10DA & P10DB	75 s (3x15s timeout + 2x15s wait) Malfunction criteria confirmation out of 1500 samples Time basis = 0.01s Failure confirmation after two retries. Between two retries, pump is stopped for15s. Success is reported as soon as 'Pressure Closed Loop Control' is active. Recovery only at next driving cycle Note: See "Repeat Defrost" sheet for retries definition	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Tank Temperature Sensor B Circuit Range/Performance	P2ADA	This monitor checks if, at key on, the reductant UTLC temperature sensor is coherent with the reductant temperature sensor. This monitor runs only at system start up after a calibratable engine stop is elasped. At this time, all the temperature sensors are expected to be stabilized.	Reductant secondary device temperature information - reductant tank temperature sensor OR	≥ 21°C	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] [(Average engine startup reference temperature mask OR Service Tamper Bay test request) AND Time after controller initialization AND Time during which the cold soak flag is active when cold soak conditions are detected] No Tank Temperature Sensor A fault No Tank Temperature Sensor B fault No SENT communication fault No DCU internal fault <u>Note1:</u> Average engine start-up reference temperature mask is set to "Use Data" if : Engine Off Time Powertrain High Resolution AND At least 4 sensors used in average engine startup reference temperature are) <u>Note2</u>:The malfunction criteria is compared 60s after the first reception of Average engine start-up reference temperature mask if the faults listed in enable conditions are not active.	= ACTIVE = ACTIVE = ACTIVE = "Use Data" > 1s < 3.5 s P205B & P205C & P205D & P205E P2ADD & P2ADB & P2ADC U2627 & U2628 & U2630 P20FF and P10F4 ≥ 8hrs = Valid	3 s Failure out of 6 samples Time basis = 0.5s Recovery only at next driving cycle	Type A, 1 Trip
			Reductant tank temperature sensor - reductant secondary device temperature information	≥ 21°C				
Reductant Tank Temperature Sensor B Circuit Low	P2ADB	This monitor checks if the reductant UTLC temperature sensor signal is out of range low. This computation is performed in the smart UTLC sensor, and a corresponding error flag is transmitted to the DEFC on the SENT bus.	Reductant UTLC temperature measurement	< -50°C	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT communication fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	2 s Failure out of 4 samples Time basis = 0.5ms	Type A, 1 Trip
Reductant Tank Temperature Sensor B Circuit High	P2ADC	This monitor checks if the reductant UTLC temperature sensor signal is out of range high. This computation is performed in the smart UTLC sensor, and a corresponding error flag is transmitted to the DEFC on the SENT bus.	Reductant UTLC temperature measurement	> 90°C	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT communication fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	2 s Failure out of 4 samples Time basis = 0.5s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Tank Temperature Sensor B Circuit Intermittent/Erratic	P2ADD	This monitor checks if the UTLC temperature signal is erratic. A fail is detected when the change in temperature between two samples is greater than expected.	ABS[secondary device temperature sensor signal(t) - secondary device temperature sensor signal (t - 1.3s)]	> 8°C/1.3s	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No SENT communication fault No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE U2627 & U2628 & U2630 P20FF & P10F4	3.9 s Failure out of 3 samples Time basis = 1.3s	Type A, 1 Trip
Reductant Pump Low Current	P2C11	This monitoring checks if the reductant pump motor output driver current is below the minimum operating limit current. Calibrateable under-current thresholds are defined for both pumping and heating modes. The pump can be controlled as a heater to increase frozen DEF defrost performance. Otherwise, the reductant pump motor will spin to move fluid into the reductant supply line at the desired pressure setpoint.	If Pump Mode = Heating: Reducant pump motor current Else if (Pump State = Priming OR Run): Reducant pump motor current	< 0.75A < 0.5A	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Pump State Reductant Pressure Sensor Measurement Pump hardware protection Note1: The pump will be stopped and this monitor will be disabled when pump state is set to Off in response to a fault on the: Pressure Sensor fault Reductant Pump fault Pressure Sensor power supply fault CAN communication fault Hardwired Run/Crank No DCU internal fault Note2: To obtain clear understanding of various pump states & transitions, refer to the "Pump States & Transitions" sheet.	= ACTIVE = ACTIVE = ACTIVE = Pump Heating, OR = Priming, OR = Buildup, OR = Closed Loop Control > 250 kPa = NOT ACTIVE P204B & P204C & P204D & P204E P208B & P20E8 & P20E9 & P149F & P214E & P208D & P208C & P208A & P249C P10CA & P10C9 P10C6 & U2626 & U2412 P10DA & P10DB P20FF & P10F4	4 s Failure out of 400 samples Time basis = 0.01s Recovery only at next driving cycle	Type A, 1 Trip
Reductant Control Module Powertrain Sensor Bus Off	U2412	The diagnostic monitor detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state	Sensor bus CAN transmitter transmission errors count Note: The BusOff state is defined by the CAN controller hardware per ISO 11898	> 255	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.09s Failure out of 9 samples Time basis = 0.01s	Type A, 1 Trip

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control Module Lost Communication With Engine Control Module on Powertrain Sensor CAN Bus	U2626	This monitoring shall check supervised messages from the ECM for communication status. If the DEFC has not received the message for 5 seconds, then this fault shall be set.	Time whenever any CAN1 ($1E2) message has not been received by DEFC OR	> 0.035s	Sensor Bus Wake Up No DCU internal fault	= ACTIVE P20FF & P10F4	5s Failure out of 10 to 200 samples Diagnostic checks every received message (0.025s, 0.1s or 0.5s). Depends on CAN message transmit time.	Type A, 1 Trip
			Time whenever any CAN2 ($2C6) message has not been received by DEFC OR	> 0.11s				
			Time whenever any CAN3 ($2F7) message has not been received by DEFC OR	> 0.11s				
			Time whenever any CAN4 ($4CA) message has not been received by DEFC	> 0.51s				
Reductant Control Module Lost Communication with Reductant Level Sensor	U2627	This monitoring checks if Reductant Control Module is able to detect UTLC Sensor Lost Communication diagnostic failure modes described in SAE "J2716 - SENT: Single Edge Nibble Transmission for Automotive Applications, Section 5.3.3 Received Messages Diagnostics".	Calibration pulse length Calibration pulse length Nibble value Nibble value Successive calibrations pulses differ by Cheksum error Not the expect number of falling edges between calibration pulses OR	< 42 clock ticks > 70 clock ticks > 15 < 0 +/- 1/64 TRUE TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.42 s Failure out of 14 samples Time basis = 0.03s	Type A, 1 Trip
		This monitoring checks if Reductant Control Module is able to detect UTLC Sensor SENT messages nibble counter values are in expected sequence of messages.	Nibble2: Application Counter pattern	≠ {0;1;0;2;0;3;0;4;0;5;0;6;0;7}			1.26 s Failure out of 42 samples Time basis = 0.03s	
Reductant Control Module Lost Communication with Reductant Concentration Sensor	U2628	This monitoring checks if Reductant Control Module is able to detect UTLC Sensor Lost Communication diagnostic failure modes described in SAE "J2716 - SENT: Single Edge Nibble Transmission for Automotive Applications, Section 5.3.3 Received Messages Diagnostics".	Calibration pulse length Calibration pulse length Nibble value Nibble value Successive calibrations pulses differ by Cheksum error Not the expect number of falling edges between calibration pulses OR	< 42 clock ticks > 70 clock ticks > 15 < 0 +/- 1/64 TRUE TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.42 s Failure out of 14 samples Time basis = 0.03s	Type A, 1 Trip
		This monitoring checks if Reductant Control Module is able to detect UTLC Sensor SENT messages nibble counter values are in expected sequence of messages.	Nibble2: Application Counter pattern	≠ {0;1;0;2;0;3;0;4;0;5;0;6;0;7}			1.26 s Failure out of 42 samples Time basis = 0.03s	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Control Module Lost Communication with Reductant Tank Temperature Sensor 2	U2630	This monitoring checks if Reductant Control Module is able to detect UTLC Sensor Lost Communication diagnostic failure modes described in SAE "J2716 - SENT: Single Edge Nibble Transmission for Automotive Applications, Section 5.3.3 Received Messages Diagnostics".	Calibration pulse length Calibration pulse length Nibble value Nibble value Successive calibrations pulses differ by Cheksum error Not the expect number of falling edges between calibration pulses OR	< 42 clock ticks > 70 clock ticks > 15 < 0 +/- 1/64 TRUE TRUE	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] No DCU internal fault	= ACTIVE = ACTIVE = ACTIVE P20FF & P10F4	0.42 s Failure out of 14 samples Time basis = 0.03s	Type A, 1 Trip
		This monitoring checks if Reductant Control Module is able to detect UTLC Sensor SENT messages nibble counter values are in expected sequence of messages.	Nibble2: Application Counter pattern	≠ {0;1;0;2;0;3;0;4;0;5;0;6;0;7}			1.26 s Failure out of 42 samples Time basis = 0.03s	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Reductant Heater 1 Temperature Response Matured Diagnostic	P2D45	This monitoring checks if measured average reductant temperature is deviating from the Reductant Control Module computed estimation of limit part temprature. Reductant Control Module estimates limit acceptable part (WPA) & non-functional heater (BPU) temperatures based on heaters power & external conditions (ambient temperature, tank temperature, and other noise factors such as slosh & wind) in case of tank heaters activation request.	Average temperature - WPA temperature Note: See "Reductant Temperature Too Low" sheet for parameters description and values	≥ 0.1°C	[Sensor Bus Wake Up OR Accessory Wake Up OR Run/Crank Wake Up] Temperature sensor initilization (waiting timer) Temperature sensor validity Secondary temperature sensor validity Ambiant air temperature validity Ambient temperature variation range during trip Vehicule engine off time Refill/Draining Monitoring status set this driving cycle Initial absolute difference between ambient temperature and average temperature Initial absolute difference between average temperature and average loss temperature Average temperature Estimated DEF Level [Tank heater 1 PWM command OR Tank heater 2 PWM command] WPA temperature - BPU temperature No DCU internal fault Note: Tank heaters power command are force to zero if: Tank Temperature Sensor fault Tank Temperature power supply fault Heater 1 fault Heater 2 fault Heater 3 fault Heater power supply fault CAN communication fault	= ACTIVE = ACTIVE = ACTIVE ≥ 150s = TRUE = TRUE = TRUE < 20°C ≥ 28,800s = FALSE < 30°C < 5°C ≤-14°C & ≥-40°C > 5L ≥ 10W ≥ 10W ≥ 2°C P20FF & P10F4 & P10DA & P10DB P205B & P205C & P205D & P205E P131B & P131C P214F & P20BA & P20BB & P20BC & P20B9 & P10D9 & P21DD P221C & P221D & P20C0 & P20BE & P20BF & P20BD & P10F3 P221E & P221F & P20C1 & P20C2 & P20C3 & P20C4 & P143C P10DC & P10DD P10C6 & U2626 & U2412	Time basis = 600s One decision per driving cycle Recovery only at next driving cycle	Type B, 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 0. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	$1F1 (SYSTEM POWER MODE) $0C9 (ENGINE RUN ACTIVE) DIAGNOSTIC ENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 1. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	$1F1 (SYSTEM POWER MODE) $0C9 (ENGINE RUN ACTIVE) DIAGNOSTIC ENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 2. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	$1F1 (SYSTEM POWER MODE) $0C9 (ENGINE RUN ACTIVE) DIAGNOSTIC ENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 3. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	$1F1 (SYSTEM POWER MODE) $0C9 (ENGINE RUN ACTIVE) DIAGNOSTIC ENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors motor sensor 0. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	$1F1 (SYSTEM POWER MODE) $0C9 (ENGINE RUN ACTIVE) DIAGNOSTIC ENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors motor sensor 1. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	$1F1 (SYSTEM POWER MODE) $0C9 (ENGINE RUN ACTIVE) DIAGNOSTIC ENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C