Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Open – Bank 1	P0010	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11.0 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft System Performance – Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Intake cam Bank 1) Cam Position Error > (**P0011_CamPosErrorLimIc1**) deg	System Voltage Engine Running Power Take Off (PTO) active Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs Bundle: **IntakeVVT_Enabled**	> 11.0 Volts = TRUE = FALSE > 0 deg > (**P0011_CamPosErrorLimIc1**) deg AND < (**P0011_PerfMaxIc1**) deg < 3.00 Deg for (**P0011_P05CC_StablePositionTimeIc1**) sec P0010 P2088 P2089 = TRUE (Reference Supporting Tables: **P0011_P0021_P05CC_P05CD_HiEngSpdHiDsblIc** **P0011_P0021_P05CC_P05CD_HiEngSpdLoEnblIc** **P0011_P0021_P05CC_P05CD_LoRpmHiEnblIc** **P0011_P0021_P05CC_P05CD_LoRpmLoDsblIc** **P0011_P0021_P05CC_P05CD_LoPresHiEnblIc**	135.00 failures out of 150.00 samples 100 ms /sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0011_P0021_P05CC_P05CD_LoPresLoDsblIc **P0011_P0021_P05CC_P05CD_EngOilPressEnblIc** **P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning** Reference Fault Bundles: **IntakeVVT_Enabled** **CrankIntakeCamCorrFA** **IntakeCamSensorTFTKO** **CrankSensorTFTKO** **CamLctnIntFA**)		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Open – Bank 1	P0013	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage is within limits Output driver is commanded on Ignition switch is in crank or run position	> 11.0 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft System Performance – Bank 1	P0014	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Exhaust cam Bank 1) Cam Position Error > (**P0014_CamPosErrorLimEc1**) deg	System Voltage Engine Running Power Take Off (PTO) active Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs Bundle: **ExhaustVVT_Enabled**	> 11.0 Volts = TRUE = FALSE > 0 deg > (**P0014_CamPosErrorLimEc1**) deg AND < (**P0014_PerfMaxEc1**) deg < 3.00 Deg for (**P0014_P05CE_StablePositionTimeEc1**) sec P0013 P2090 P2091 = TRUE (Reference Supporting Tables: **P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc** **P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc** **P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc** **P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc** **P0014_P0024_P05CE_P05CF_LoPresHiEnblEc** **P0014_P0024_P05CE_P05CF_LoPresLoDsblEc** **P0014_P0024_P05CE_P**	135.00 failures out of 150.00 samples 100 ms /sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						05CF_EngOilPressEnblEc P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning Reference Fault Bundles: **ExhaustVVT_Enabled CrankExhaustCamCorrFA ExhaustCamSensorTFTKO CrankSensorTFTKO CamLctnExhFA**)		

Component/ System	Fault Code	Monitor 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 more than -10.0 crank degrees before or 10.0 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	 P0335, P0336 P0340,P0341 5VoltReferenceA_FA 5VoltReferenceB_FA < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **"P0016_P0017_ P0018_P0019 Cam Correlation Oil Temperature Threshold"**. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor B	P0017	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position	4 cam sensor pulses more than -10.0 crank degrees before or 10.0 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	 P0335, P0336 P0365,P0366 5VoltReferenceA_FA 5VoltReferenceB_FA < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table **"P0016_P0017_ P0018_P0019 Cam Correlation Oil Temperature Threshold"**. One sample per cam rotation	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0031 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor1	P0031	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground).	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0030 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor1	P0032	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage high during driver on state (indicates short to power).	Short to power: ≤ 0.5 Ω impedance between signal and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit).	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0037 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor2	P0037	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground).	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0036 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor2	P0038	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage high during driver on state (indicates short to power).	Short to power: ≤ 0.5 Ω impedance between signal and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	7.0 < Ω < 13.0	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 0.10 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	7.0 < Ω < 13.0	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P262B IAT_SensorFA < 8.0 ºC > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 0.10 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	This DTC detects a short to ground in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ 150ºC)	< 34 Ohms	Engine run time OR IAT min	> 10.0 seconds ≤ 70.3 °C	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ -60ºC)	> 260,000 Ohms	Engine run time OR IAT min	> 60.0 seconds ≥ -7.0 °C	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp - Engine Coolant Temp (ECT) Correlation (DCRD)	P00B6	This DTC detects a difference between ECT and RCT after a soak condition.	A failure will be reported if any of the following occur: 1) Absolute difference between ECT at power up & RCT at power up is ≥ an IAT based threshold table lookup value(fast fail). 2) Absolute difference between ECT at power up & RCT at power up is > by 20.0 ºC and a block heater has not been detected. 3) ECT at power up > RCT at power up by 20.0 ºC and the time spent cranking the engine without starting is greater than or equal to 0.0 seconds with the LowFuelConditionDiag	See the table named: **P00B6_Fail if power up ECT exceeds RCT by these values** in the Supporting tables section = False	No Active DTC's Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization Test complete this trip Test aborted this trip IAT LowFuelCondition Diag ================== Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time ================== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs. 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is	VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid > 28,800 seconds > 28,800 seconds = Not occurred = False = False ≥ -7 ºC = False ================== > 20.0 ºC < 0.0 Seconds ================== > 0 Seconds with > 0.0 MPH and 0.00 times the seconds with vehicle speed below	1 failure 500 msec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					below 1b as follows: 1d) IAT drops from power up IAT 2a) ECT drops from power up ECT 2b) Engine run time ================== Diagnostic is aborted when 3) or 4) occurs: 3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	1b ≥ 255.0 ºC > 255 ºC Within < 65,535 Seconds =================== > 1800 Seconds ≤ -7.0 ºC		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Flow Insufficient	P00B7	This DTC detects a Insufficient Flow Condition (i.e.. Stuck Closed Thermostat)	Engine Coolant Temp (ECT) is greater than 117 Deg C and Difference between ECT and RCT is greater than 45 Deg C. When above is present for more than 5 seconds, fail counts start.		No Active DTC's Engine run time AND Engine Coolant Temp	THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA > 45 seconds > 70.0 Deg C	30 failures out of 200 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow System Performance (naturally aspirated)	P0101	Determines if the MAF sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s) > 10 grams/sec > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs:	>= 500 RPM <= 8,000 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **MAF Residual Weight Factor based on RPM** and **MAF Residual Weight Factor based on MAF Est** MAP Model 2 Error multiplied by **MAP2 Residual Weight Factor based on RPM** See Residual Weight Factor tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit Low Frequency	P0102	Detects a continuous short to low or a open in either the signal circuit or the MAF sensor	MAF Output	<= 1,832 Hertz (~ 0.26 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit High Frequency	P0103	Detects a high frequency output from the MAF sensor	MAF Output	>= 14,500 Hertz (~ 209.0 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 10.0 Volts >= 1.0 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Performance (naturally aspirated)	P0106	Determines if the MAP sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s) > 20.0 kPa > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs:	>= 500 RPM <= 8,000 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **TPS Residual Weight Factor based on RPM** MAP Model 1 Error multiplied by **MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **MAP2 Residual Weight Factor based on RPM** See Residual Weight Factor tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculations are performed every 12.5 msec	Type B, 2 Trips
			Manifold Pressure OR	< 50.0 kPa	Time between current ignition cycle and the last		4 failures out of 5 samples	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Manifold Pressure	> 115.0 kPa	time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 8.0 seconds EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP	1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to low or open in either the signal circuit or the MAP sensor.	MAP Voltage	< 3.0 % of 5 Volt Range (This is equal to 0.15 Volts or 3.5 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects an open sensor ground or continuous short to high in either the signal circuit or the MAP sensor.	MAP Voltage	> 90.0 % of 5 Volt Range (This is equal to 4.50 Volts, or 115.0 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Performance (no humidity or manifold temperature sensors)	P0111	Detects an IAT sensor that has stuck in range by comparing to engine coolant temperature at startup	ABS(Power Up IAT - Power Up ECT)	> 40 deg C	Time between current ignition cycle and the last time the engine was running Power Up ECT No Active DTCs:	> 28,800 seconds < 60 deg C ECT_Sensor_Ckt_FA IAT_SensorCircuitFA	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Low	P0112	Detects a continuous short to ground in the IAT signal circuit or the IAT sensor	Raw IAT Input	< 62 Ohms (~150 deg C)	Engine Run Time	> 0.00 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit High	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 126,840 Ohms (~-60 deg C)	Engine Run Time	> 0.00 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 IAT signal circuit or IAT sensor	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 125.00 DegC 10 consecutive IAT samples	Continuous		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects ECT temp sensor stuck in mid range.	A failure will be reported if any of the following (1-3) occur after the following soak conditions, Engine off time > 28,800 seconds Propulsion system off time > 28,800 seconds 1) ECT at power up > IAT at power up by an IAT based table lookup value (fast fail). 2) ECT at power up > IAT at power up by 20.0 Deg C and a block heater has not been detected. 3) ECT at power up > IAT at power up by 20.0 Deg C and the time spent cranking the engine without starting is greater than 0.0 seconds with the LowFuelConditionDiag	See the table named: **P0116_Fail if power up ECT exceeds IAT by these values** in the Supporting tables section = False	No Active DTC's Non-volatile memory initization Test complete this trip Test aborted this trip IAT LowFuelCondition Diag ================== Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time ================== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs: 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 1d) IAT drops from power up IAT	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid = Not occurred = False = False ≥ -7 ºC = False ================== > 20.0 ºC < 0.0 seconds ================== > 0 seconds > 0.0 MPH 0.00 times the seconds with vehicle speed below 1b ≥ 255.0 ºC	1 failure 500 msec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					2a) ECT drops from power up ECT 2b) Engine run time ================== Diagnostic is aborted when 3) or 4) occurs: 3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	≥ 255 ºC Within ≤ 65,535 seconds ================= > 1800 seconds ≤ -7 ºC		

Component/ System	Fault Code	Monitor 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 signal circuit or the ECT sensor.	ECT Resistance (@ 150ºC)	< 34 Ohms			5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 signal circuit or the ECT sensor.	ECT Resistance (@ -60ºC)	> 260,000 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ 0.0 °C	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Continuity This DTC detects large step changes in the ECT signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample.	ECT temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. The calculated high and low limits for the next reading use the following calibrations: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last ECT reading was 90 Deg C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 Deg C and the high limit was calibrated to 200 Deg C the caluculated limits are 101 Deg C and 73 Deg C. The next reading (after the 90 Deg C reading) must be between 73 Deg C and 101 Deg C to be valid.	15.0 seconds -80.0 Deg C 200.0 Deg C	No Active DTC's	ECT_Sensor_Ckt_FP	3 failures out of 4 samples 1 sec/ sample Continuous	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position Sensor Performance (naturally aspirated)	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	> 125 kPa*(g/s) > 10 grams/sec <= 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs:	>= 500 RPM <= 8,000 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **MAF Residual Weight Factor based on RPM** and **MAF Residual Weight Factor based on MAF Est** See Residual Weight Factor tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage <	0.3250		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639 / 1,279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit High	P0123	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage >	4.750		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639 / 1,279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Below Stat Regulating Temperature) (energy based "Deluxe" method	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault	Energy is accumulated after the first conbustion event using Range #1 or #2 below: Thermostat type is divided into normal (non-heated) and electrically heated. For this application the "type" cal (KeTHMG_b_TMS_ElecThstEquipped) = 1 If the type cal is equal to one, the application has an electrically heated t-stat, if equal to zero the the application has an non heated t-stat. See appropiate section below. **************************** Type cal above = 1 (Electrically heated t-stat) == == == == Range #1 (Primary) ECT reaches Commanded temperature minus 11 °C when Ambient min is ≤ 52 °C and > 10 °C. Note: Warm up target for range #1 will be at least 74 °C == == == == Range #2 (Alternate) ECT reaches Commanded temperature minus 30 °C when Ambient min is ≤ 10 °C and > -7 °C. Note: Warm up target for range #2 will be at least	See the two tables named: **P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary** and **P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate** in the Supporting tables section. This diagnostic models the net energy into and out of the cooling	No Active DTC's Engine not run time (soaking time before current trip) Engine run time Fuel Condition Distance traveled *************************** If T-Stat Heater commanded duty cycle for this time period The diagnostic test for this key cycle will abort *************************** ECT at start run	ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA OAT_PtEstFiltFA IAT_SensorCircuitFA MAF_SensorFA THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA ETQR_IndTorqInaccurate ≥ 1,800 seconds 10 ≤ Eng Run Tme ≤ 1,400 seconds Ethanol ≤ 87 % ≥ 0.00 km *************************** > 50.0 % duty cycle > 5.0 seconds *************************** -60 ≤ ECT ≤ 69 °C	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			55 °C ***************************** Type cal above = 0 (non - heated t-stat) == == == == Range #1 (Primary) ECT reaches 74 °C when Ambient min is ≤ 52 °C and > 10 °C. == == == == Range #2 (Alternate) ECT reaches 55 °C when Ambient min is ≤ 10 °C and > -7 °C. *****************************	system during the warm-up process. The five energy terms are: heat from combustion, heat from after-run, heat loss to enviroment, heat loss to cabin and heat loss to DFCO.				

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50.0 mVolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State All of the above met for	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9912 < ratio < 1.0400 50 < mgram < 500 = Closed Loop = TRUE Enabled (On) Ethanol ≤ 87 % DFCO not active > 5.0 seconds	285 failures out of 350 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1,050 mvolts	== Open Test Criteria == No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition ==================== No Active DTC's Low Fuel Condition Diag Fuel Condition Initial delay after Open Test Criteria met (cold start condition) Initial delay after Open Test Criteria met (not cold start condition) Equivalence Ratio Air Per Cylinder Fuel Control State	=================== TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol ==================== MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 45.0 seconds when engine soak time > 28,800 seconds > 45.0 seconds when engine soak time ≤ 28,800 seconds 0.9912 ≤ ratio ≤ 1.0400 50 ≤ mgram ≤ 500 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for	> 5.0 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Slow Response Bank 1 Sensor 1) (For use with ESPD	P0133	This DTC determines if the O2 sensor response time is degraded.	Fault condition present when the average response time is caluclated over the test time, and compared to the threshold. OR Slope Time L/R Switches OR Slope Time R/L Switches	Refer to **P0133_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold table"** in the Supporting Tables tab < 3 < 3 The test averages the signal response time over 60.0 seconds when the signal is transitioning between 300 mvolts and 600 mvolts. An average rich to lean time and lean to rich time are each calculated separately.	No Active DTC's Bank 1 Sensor 1 DTC's not active System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 (if applicable)	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						in Supporting Tables tab.		
					O2 Heater on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 90 seconds		
					Time since any AFM status change	> 2.0 seconds		
					Time since Purge On to Off change	> 2.0 seconds		
					Time since Purge Off to On change	> 2.0 seconds		
					Engine airflow	17 ≤ grams/second ≤ 40		
					Engine speed	1,000 <= RPM <= 3,500		
					Fuel Condition	< 87 % Ethanol		
					Baro	> 70 kpa		
					Air Per Cylinder	≥ 150 mGrams		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	≤ 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	≥ 0.0 %		
					=================	=================		
					All of the above met for	> 1.0 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 < Amps < 2.5	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 2 tests per trip 30 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State All of the above met for	TPS_ThrottleAuthority DefaultedMAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9912 ≤ ratio ≤ 1.0400 50 ≤ mgrams ≤ 500 = Closed Loop = TRUE Enabled (On) Ethanol <= 87 %DFCO not active > 5.0 seconds	285 failures out of 350 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1,050 mvolts	== Open Test Criteria == No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Fuel Condition ================== No Active DTC's Low Fuel Condition Diag Fuel Condition Initial delay after Open Test Criteria met (cold start condition) Initial delay after Open Test Criteria met (not cold start condition) Equivalence Ratio Air Per Cylinder Fuel Control State	================== TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds ≤ 87 %Ethanol ================== MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 105.0 seconds when engine soak time > 28,800 seconds > 105.0 seconds when engine soak time ≤ 28,800 seconds 0.9912 ≤ ratio ≤ 1.0400 50 ≤ mgrams ≤ 500 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for	> 5.0 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Rich to Lean voltages range during Rich to Lean transition. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units > 74.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell (Decel) Crankshaft Torque	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013B, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False = enabled < 200.0 Nm	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTC's Passed ================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	P2270 (and P2272 if applicable) P013E (and P014A if applicable) ==================		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Lean to Rich voltages range during Lean to Rich transition. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units > 120 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts)	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA
					B1S2 DTC's Not Active this key cycle	P013A, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 < Volts < 32.0		
					Learned heater resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.		
					Green Cat System Condition	= Not Valid, System is not valid until accumulated airflow is greater than		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Diag Post fuel cell	= False = enabled		
					DTC's Passed	P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable) P013F (and P014B if applicable)		
					=================== After above conditions are met: Fuel Enrich mode continued.	==================		
					================= During this test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is greater or equal to	> 450 mvolts > 33 grams > 1 secs > 2 grams	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips
					B1S2 DTC's Not Active this key cycle	P013A, P013B, P013F, P2270 or P2271		
					System Voltage	10.0 < Volts < 32.0		
					Learned heater resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell (Decel)	= enabled		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Crankshaft Torque DTC's Passed Number of fueled cylinders ================== After above conditions are met: DFCO mode entered (wo driver initiated pedal input).	< 200.0 Nm P2270 (and P2272 if applicable) ≤ 3 cylinders ==================		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 120 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Green Cat System Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P2270 or P2271 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = Not Valid, System is not valid until accumulated airflow is greater than	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						360,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Diag Post fuel cell	= False = enabled		
					DTC's Passed	P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable)		
					Number of fueled cylinders	≥ 1 cylinders		
					================== After above conditions are met: Fuel Enrich mode entered. ================ During this test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	=================		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0140	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 > amps > 2.5	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 2 tests per trip 30 seconds delay between tests and 1 second execution rate.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1	P015A	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized R2L time delay value OR [The Accumulated time monitored during the R2L Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is	> 0.6 EWMA (sec) ≥ 2.5 Seconds > 550 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 90 seconds		
					Engine Speed to initially enable test	1,425 ≤ RPM ≤ 2,600		
					Engine Speed range to keep test enabled (after initially enabled)	1,400 ≤ RPM ≤ 2,700		
					Engine Airflow	14 ≤ gps ≤ 24		
					Vehicle Speed to initially enable test	24.9 ≤ MPH ≤ 82.0		
					Vehicle Speed range to keep test enabled (after initially enabled)	21.7 ≤ MPH ≤ 87.0		
					Closed loop integral	0.84 ≤ C/L Int ≤ 1.07		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 100.0 sec		
					Predicted Catalyst temp	600 ≤ ºC ≤ 1,000		
					Fuel State	= DFCO possible		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					=================== All of the above met for at least 3.0 seconds, and then the Force Cat Rich intrusive stage is requested. =================== Pre O2S voltage B1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders =================== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).	=================== =================== ≥ 690 mvolts = DFCO active ≤ 3 cylinders ===================		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1	P015B	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.6 EWMA (sec) ≥ 2.5 Seconds < 350 mvolts < 690 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					   O2 Heater (pre sensor) on for Learned Htr resistance Engine Coolant IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp	the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. ≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 50 ºC > -40 ºC > 90 seconds 1,425 ≤ RPM ≤ 2,600 1,400 ≤ RPM ≤ 2,700 14 ≤ gps ≤ 24 24.9 ≤ MPH ≤ 82.0 21.7 ≤ MPH ≤ 87.0 0.84 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode = enabled = not active = not active ≥ 100.0 sec 600 ≤ ºC ≤ 1,000		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fuel State Number of fueled cylinders ================ When above conditions are met: Fuel Enrich mode is entered. ================ During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec must be :	= DFCO inhibit ≥ 1 cylinders ================== ================== 3 ≤ gps ≤ 60 ≤ 1,000.0 gps		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Lean Bank 1	P0171	Determines if the fuel control system is in a lean condition, based on the filtered long-term and short-term fuel trim.	The filtered long-term fuel trim metric AND The filtered short-term fuel trim metric (Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria)	>= 1.295 >= 0.100	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis Closed Loop Long Term FT EGR Diag. Catalyst Diag. Post O2 Diag.	400 <rpm< 6,100 > 70 kPa -38 <°C< 130 15 <kPa< 255 -20 <°C< 150 1.0 <g/s< 512.0 > 10 % or if fuel sender is faulty the diagnostic will bypass the fuel level criteria. > 24.0 seconds of data must accumulate on each trip, with at least 15.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made. (Please see "**Long-Term Fuel Trim Cell Usage**" in Supporting Tables for a list of cells utilized for diagnosis) Enabled Enabled (Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables.) Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Device Control EVAP Diag. No active DTC:	Not Active “tank pull down” Not Active IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPrgePsbl_FA Ethanol Comp Snsr FA FuelInjectorCkt_FA EngMisfireDetected_FA EGRValvePerf_FA EGRValveCkt_FA MAP_EngVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2Snsr_B1_Snsr_1_FA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision can be made up until the time that purge is first enabled. From that point forward, rich faults can only be detected by turning purge off intrusively. Intrusive Test: If the filtered Purge Long Term Fuel Trim metric > 0.760 , the test passes without intrusively checking the filtered Non-Purge Long Term Fuel Trim metric. However if the filtered Purge Long Term Fuel Trim metric is <= 0.760 , purge is ramped off to determine if excess purge vapor is the cause of the rich condition. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions,	Passive Test: The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) Intrusive Test: For 2 out of 3 intrusive segments, the filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (Note: any value above 1.05 effectively nullifies the short-term fuel trim criteria) Segment Def'n: Segments can last up to 35 seconds and are separated by the lesser of 30 seconds of purge-on time or enough time to	<= 0.755 <= 2.000 <= 0.760 <= 0.755 <= 2.000		Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and the execution frequency of other diagnostics.	purge 5 grams of vapor. A maximum of 3 completed segments or 25 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 299 seconds to allow sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.760 for at least 150 seconds, indicating that the canister has been purged.					

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Open Circuit (PFI) - 3 DTC Implmentation	P0201	This DTC Diagnoses Injector 1 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0261 may also set (Injector 1 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Open Circuit (PFI) - 3 DTC Implmentation	P0202	This DTC Diagnoses Injector 2 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0264 may also set (Injector 2 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Open Circuit (PFI) - 3 DTC Implmentation	P0203	This DTC Diagnoses Injector 3 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0267 may also set (Injector 3 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Open Circuit (PFI) - 3 DTC Implmentation	P0204	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0270 may also set (Injector 4 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage <	0.250		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639 / 1,279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit High	P0223	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage >	4.590		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639 / 1,279 counts; 153 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to ground (PFI)	P0261	This DTC Diagnoses Injector 1 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0201 may also set (Injector 1 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to power (PFI)	P0262	This DTC Diagnoses Injector 1 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to ground (PFI)	P0264	This DTC Diagnoses Injector 2 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0202 may also set (Injector 2 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to power (PFI)	P0265	This DTC Diagnoses Injector 2 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Low side circuit shorted to ground (PFI)	P0267	This DTC Diagnoses Injector 3 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0203 may also set (Injector 3 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Low side circuit shorted to power (PFI)	P0268	This DTC Diagnoses Injector 3 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to ground (PFI)	P0270	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0204 may also set (Injector 4 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to power (PFI)	P0271	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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	P0300 P0301 P0302 P0303 P0304	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.	Deceleration Value 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 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. Misfire Percent Emission Failure Threshold Misfire Percent Catalyst Damage	[(>**IdleSCD_Decel** AND > **IdleSCD_Jerk**) OR (>**SCD_Decel** AND > **SCD_Jerk**) OR (>**IdleCylModeDecel** AND > **IdleCylModeJerk)** OR (>**CylMode_Decel** AND > **CylMode_Jerk**) OR (>**RevMode_Decel**) OR WHILE in Cylinder Deactivation mode: (> **AFM_Decel**)] - see details on Supporting Tables Tab (P0300 Section) ≥ 0.63 % P0300 > **Catalyst_Damage_ Misfire_Percentage** in Supporting Tables	Engine Run Time Engine Coolant Temp Or If ECT at startup Then ECT 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.) (at low speed/loads, one cylinder may not cause cat damage)	> 2 crankshaft revolution -7 ºC < ECT < 125 ºC < -7 ºC 21 ºC < ECT < 125 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 (1) 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 any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	whenever secondary conditions are met. ≤ 0 FTP rpm AND ≤ 0 FTP % load	Engine Speed Engine Load Misfire counts	> 0 rpm AND > 0 % load AND < 180 counts on one cylinder	Continuous	
				disable conditions:	Engine Speed	1,250 < rpm < ((Engine Over Speed Limit) - 50 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 CrankSensorTFTKO CrankSensorFA CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus	4 cycle delay	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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** in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	 ≤ 2 % > 318 mph	4 cycle delay	
					EGR Intrusive test	Active	12 cycle delay	
					Manual Trans	Clutch shift	0 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 100.00 %	0 cycle delay	
					Driveline Ring Filter active			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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: Stop filter early: Abnormal engine speed oscillations: (Rough road etc) Off Idle, number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation) TPS Engine Speed Veh Speed Consecutive decels while in SCD Mode Cyl Mode Rev Mode Misfire Crankshaft Pattern Recognition checks each "misfire" candidate in 100 engine Cycle test to see if it looks like real misfire, or some disturbance like rough road. The check is	> "**Ring Filter**" # of engine cycles after misfire in Supporting Tables > "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab > 1 % > 1,000 rpm > 0 mph > **Abnormal SCD Mode** > **Abnormal Cyl Mode** > **Abnormal Rev Mode** in Supporting Tables		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					based on a multiplier times the ddt_jerk value used to detect misfire at that speed and load. At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Pattern Recog Enabled:	Disabled		
					Engine Speed	700 < rpm < 3,000		
					Veh Speed	> 0.6 mph		
					"misfire" unrecognized if: Crankshaft snap after:			
					isolated "misfire"	> **Min_PatternMultiplier**		
					repetative "misfire"	> **Max_PatternMultiplier** in Supporting Tables		
					Ratio of Unrecog/Recog	> 1.00	discard test	
					Rough Road:			
					Non-Crankshaft based:	Disabled		
					Rough Road Source	TOSS		
					IF Rough Road Source = WheelSpeedInECM			
					ABS/TCS	active	discard test	
					Wheel speed noise	> WSSRoughRoadThres		
					VSES	active		
					IF Rough Road Source = "FromABS"			
					ABS/TCS	active	discard test	
					RoughRoad	detected		
					VSES	active		
					IF Rough Road Source = "TOSS"			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					TOSS dispersion	>**TOSSRoughRoadThres** in supporting tables	discard test	
					AND No Active DTCs	Transmission Output Shaft Angular Velocity Validity TransmissionEngagedState_FA (Auto Trans only) Clutch Sensor FA (Manual Trans only)	4 cycle delay	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors. Each Cylinder pair shares one compensation factor. A perfect factor would be 1.0000. Unlearned factors are defaulted out of range so the sum of factors would be out of range.	≥ 2.0400 OR ≤ 1.9960	OBD Manufacturer Enable Counter	MEC = 0	0.50 seconds Frequency Continuous100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to: 1. Excessive knock or 2. Abnormal engine noise or 3. Flat signal	Common Enable Criteria (Applies to all 3 parts of the performance diag)		Diagnostic Enabled?	Yes		Type B, 2 Trips
					Engine Run Time	≥ 2.0 seconds		
					Engine Speed	≤ 8,500 RPM		
					Engine Air Flow	≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder		
					ECT	≥ -40 deg's C		
					IAT	≥ -40 deg's C		
			Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:				First Order Lag Filters with Weight Coefficients	
			- - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - -	
			1. Excessive Knock Diag: Filtered Knock Intensity VaKNKD_k_PerfCylKnockIntFilt (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> 4.00 (no units)	Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 600 RPM ≥ 100 Revs	Excessive Knk Weight Coefficient = 0.0400 Updated each engine event	
			- - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - -	
			2. Abnormal Noise Diag: Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background noise)	< **P0324_P0326_P0331_AbnormalNoise_Threshold** (Supporting Table)	Individual Cylinders enabled for Abnormal Noise Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key	**P0324_P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) ≥ 8,500 RPM ≥ 400 Revs	Abn Noise Weight Coefficient = 0.0100 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - -	cycle) - - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - -	
			3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock) VaKNKD_k_PerfCylFlatFiltInt	< 0.008 (no units)	Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle)	≥ 8,000 RPM ≥ 400 Revs	Flat Signal Weight Coefficient = 0.010 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit There are two possible methods used: 1. 20 kHz 2. Normal Noise See **Supporting Tables** for method definition: **P0325_P0330_OpenMethod** Typical implementations: A. Use 20 kHz method at all RPM (used when acceptable separation achieved at all RPM) or B. Use 20 kHz method at low/medium RPM and Normal Noise at high RPM	**Open Circuit Method chosen** (2 possible methods: 20 kHz or Normal Noise): **Thresholds for OpenMethod = 20 kHZ** Filtered FFT Output **Thresholds for OpenMethod = NormalNoise:** Filtered FFT Output	Supporting Table: **P0325_P0330_OpenMethod** (See Supporting Tables) **> P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)** **> P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)**	Diagnostic Enabled? Engine Run Time Engine Speed Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≥ 600 RPM and ≤ 8,500 RPM ≥ 100 revs ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis, due to 1. Excessive knock or 2. Abnormal engine noise or 3. Flat signal	Common Enable Criteria (Applies to all 3 parts of the performance diag)		Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≤ 8,500 RPM ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C		Type B, 2 Trips
			Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:				First Order Lag Filters with Weight Coefficients	
			1. Excessive Knock Diag: Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> 2.41 (no units)	Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 8,500 RPM ≥ 100 Revs	Excessive Knk Weight Coefficient = 0.0100 Updated each engine event	
			2. Abnormal Noise Diag: Filtered FFT Intensity: (where 'FFT Intensity' = Non-knocking, background noise)	< **P0324_P0326_P0331_AbnormalNoise_Threshold** (Supporting Table)	Individual Cylinders enabled for Abnormal Noise Engine Speed Cumlative Number of Engine Revs Above Min	**P0324_P0326_P0331_AbnormalNoise_CylsEnabled** (Supporting Table) ≥ 2,000 RPM ≥ 100 Revs	Abnormal Noise Weight Coefficient = 0.0100 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Eng Speed (per key cycle)			
			- - - - - - - - - - - - - - - - - - - 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock)	- - - - - - - - - - - - - - - - - < 0.008 (no units)	- - - - - - - - - - - - - - - - - - - Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle)	- - - - - - - - - - - - - - - - - - - ≥ 8,000 RPM ≥ 100 Revs	- - - - - - - - - - - - - Flat Signal Weight Coefficient = 0.010 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input or Return Signal Line	< 8.0 Percent (of 5 V reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input or Return Signal Line	> 39.0 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	 = FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			No crankshaft pulses received	>= 0.7 seconds	Engine is Running Starter is not engaged No DTC Active:	 5VoltReferenceB_FA	Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366	2 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor 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:	>= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335	Continuous every 250 msec	Type B, 2 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged No DTC Active:	5VoltReferenceB_FA	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 (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 51 > 65	Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor 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 (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged No DTC Active:	5VoltReferenceA_FA	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:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor 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:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT - for 3 DTC implementation only	P0351	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for an Open Circuit fault.	High impedance during driver high state (indicates open circuit)	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT - for 3 DTC implementation only	P0352	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for an Open Circuit fault.	High impedance during driver high state (indicates open circuit)	$\geq$30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT - for 3 DCT implementation only	P0353	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for an Open Circuit fault.	High impedance during driver high state (indicates open circuit)	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT - for 3 DTC implementation only	P0354	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for an Open Circuit fault.	High impedance during driver high state (indicates open circuit)	$\geq$ 30 kΩ impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Determines if a fault exists with the cam position bank 1 sensor B 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 (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	 = FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged No DTC Active:	5VoltReferenceA_FA	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:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Determines if a performance fault exists with the cam position bank 1 sensor B 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:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Incorrect Airflow	P0411	Detects an insufficient flow condition.This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open). Leaks downstream of the valve are detected via an evaluation of average pressure error and average "String Length"(SL) – a term that represents the absolute pressure delta accumulated every 6.25ms, then averaged over the duration of the test. Low SL values are indicative of downstream leaks or blockages.	Average Pressure Error or OR the following String Length (SL) Test: Average Pressure Error or and the Average String Length NOTE: Average Pressure Error is the average difference between the predicted pressure and the measured pressure	> 8.0 kPa < -8.0 kPa > 5.0 kPa < -1.0 kPa < **SL Threshold Bank 1 Table**	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not SL Stability time SL RPM range No active DTCs:	> 60 kPa > -12.0 deg C > -12.0 deg C < 38.0 > 10.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 3,000 RPM > 50 gm/s for 3.0 sec > 4.0 seconds < 3,000 RPM > 3,600 AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 1 Conditional test weight > 7.0 seconds Total 'String Length' accumulation time > 10.0 sec Frequency: Once per trip when AIR pump is commanded On Conditional test weight is calculated by multiplying the following Factors: **Phase 1 Baro Test Weight Factor, Phase 1 MAF Test Weight Factor, Phase 1 System Volt Test Weight Factor, Phase 1 Ambient Temp Test Weight Factor** (see Supporting Tables)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit Open - For 3 DTC implementation only	P0412	Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: >= 200K Ohms impedance between signal and controller ground	Powertrain Relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P041F may also set (Secondary AIR solenoid control circuit low voltage)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit Open- For 3 DTC implementation only	P0418	Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: >= 200K Ohms impedance between signal and controller ground	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P2257 may also set (Secondary AIR pump control circuit low voltage)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit Low Voltage	P041F	Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P0412 may also set (Secondary AIR solenoid control circuit Open)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Catalyst System Low Efficiency Bank 1	P0420	NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen StorageThe catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value (EWMA filtered)	< 0.40	All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. General Enable Criteria In addition to the p-codes listed under P2270, the following DTC's shall also not be set:	> 0.45 < 0.38 18 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 6 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part. Refer to the **P0420_WorstPassingOSCTableB1** and **P0420_BestFailingOSCTableB1** in the Supporting Tables tab for details The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (P2270). Several conditions must be met in order to execute this test. These conditions and their related values are listed in the "Secondary						

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Parameters" and "Enable Conditions" section of this document for P2270 (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)						

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Reference Orifice Low Flow (ELCP Sealed Fuel System)	P043E	A plugged ELCP reference orifice is detected.	While performing 1st 0.020" reference orifice vacuum measurement for or 2nd 0.020" reference orifice vacuum measurement for If the difference between the ELCP pressure sensor (absolute) reading taken before the end of the reference measurement and the final ELCP pressure sensor (absolute) reading is then a stabilized 0.020" reference orifice vacuum measurement could not be obtained and the DTC fails. Or If 1st 0.020" reference orifice vacuum measurement is after then a plugged ELCP reference orifice is detected and the DTC fails. Or If 2nd 0.020" reference orifice vacuum measurement is after then a plugged ELCP reference orifice is	360 seconds 30 seconds 10 seconds > 220 Pa > 4,000 Pa 360 seconds > 4,510 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			detected and the DTC fails.		No Active DTC's	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P0451 P145C P145D P145E P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Reference Orifice High Flow (ELCP Sealed Fuel System)	P043F	A missing ELCP reference orifice is detected.	If 1st 0.020" reference orifice vacuum measurement is after then a missing ELCP reference orifice is detected and the DTC fails. Or If 2nd 0.020" reference orifice vacuum measurement is after then a missing ELCP reference orifice is detected and the DTC fails.	< 1,180 Pa 360 seconds < 1,180 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Active DTC's	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P0451 P145C P145D P145E P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Small Leak Detected (ELCP Sealed Fuel System)	P0442	A small leak (≥ 0.020") is detected in the EVAP system between the fuel cap, purge solenoid, and diurnal control valve (DCV).The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created in the fuel tank to determine if a leak exists.The diagnostic has fast pass capability. If the Fuel Tank Pressure (FTP) sensor measures a fuel tank system pressure greater than 1,276 Pa or a fuel tank system vacuum greater than -1,278 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump.The Fast Pass Full Test Sequence is conducted on the 0 th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge. The Fast Pass Reduced Test Sequence	If the ELCP pressure sensor (gauge) vacuum reading is less than the 0.020" reference orifice vacuum measurement times a plus a offset for then the fuel tank system has a small leak and the DTC fails.	1.00 multiplier 200 Pa 400 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds FuelLevelDataFault IAT_SensorFA	Once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		includes the following diagnostics: ELCP Pump Stuck On (P145D), ELCP Sensor Performance (P1458), FTP Sensor Performance (P0451), DCV Stuck Closed (P2422), DCV Stuck Open (P2421), Small Leak (P0442) and Large Leak (P0455) diagnostics.				ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P145C P145D P145E P145F P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Open Circuit (ELCP Sealed/ Vented Fuel System)	P0443	Diagnoses the canister purge solenoid low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedence between signal and controller ground	PT Relay Voltage	Voltage ≥ 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0458 may also set (Canister Purge Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Vent Solenoid Control Open Circuit (ELCP Sealed Fuel System)	P0449	Diagnoses the vent solenoid low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedence between signal and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0498 may also set (Vent Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit High Voltage	P044F	Diagnoses the Secondary AIR Solenoid Control Low Side Driver circuit for circuit faults	Voltage high during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Performance Diagnostic (ELCP Sealed Fuel System)	P0451	Fuel Tank Pressure (FTP) sensor correlation diagnostic.	After a delay time of and a stabilization time of This section of the diagnostic can both pass and fail IF 1) the FTP sensor reading is and the FTP sensor is in a readable range. OR 2) the ELCP pressure sensor (gauge) reading is and the ELCP pressure sensor indicates that the FTP sensor is in a readable range. THEN If the average difference between the FTP sensor reading and ELCP pressure sensor (gauge) reading is after then a FTP sensor correlation failure has been detected and the DTC fails. This section of the diagnostic can only pass IF 1) the FTP sensor reading is and	2 seconds 3 seconds > -3,811 Pa < 3,388 Pa, > -3,736 Pa < 3,313 Pa, > 1,021 Pa 5 seconds < -3,811 Pa > 3,388 Pa,	Propulsion System Not Active Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT MaxIAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds	Once per trip with Propulsion System Not Active, for each required wake-up event Once per trip with Propulsion System Active and Engine On 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			the FTP sensor is outside its readable range. AND 2) the ELCP pressure sensor (gauge) reading is and the ELCP pressure sensor indicates that the FTP sensor is outside its readable range. THEN after the correlation is confirmed and the DTC passes.	 < -3,736 Pa > 3,313 Pa, 5 seconds	No Active DTC's No Active DTC's TFTKO Propulsion System Active and Engine On Min baro Max baro Min OAT Max OAT Vehicle not in assembly plant (value must = 0) Engine Running Run/Crank Voltage Purge is not enabled ELCP switching valve is activated (pump position) Abort Conditions:	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P145D P24B9 ≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C 0 ≥ 11 volts		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Refueling request button pressed Device control exceeds No Active DTC's	0.5 seconds MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0452 P0453 P0455 P0458 P0459 P0498 P0499 P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450 P24B9 P24BA P24BB		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (ELCP Sealed/ Vented Fuel System)	P0452	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (~ -3757 Pa) to 4.5 volts (~ 3329 Pa).	< 0.15 volts (3 % of Vref or ~ -4,377 Pa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (ELCP Sealed/ Vented Fuel System)	P0453	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (~ -3757 Pa) to 4.5 volts (~ 3329 Pa).	> 4.85 volts (97 % of Vref or ~ 3,950 Pa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Large Leak Detected (ELCP Sealed Fuel System)	P0455	A large leak (>> 0.020”) is detected in the EVAP system between the fuel cap, purge solenoid, and diurnal control valve (DCV) after a refueling event has been detected.The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created in the fuel tank to determine if a leak exists.The diagnostic has fast pass capability. If the Fuel Tank Pressure (FTP) sensor measures a fuel tank system pressure greater than 1,276 Pa or a fuel tank system vacuum greater than -1,278 Pa then both the small leak and large leak diagnostics pass without using the ELCP vacuum pump.The Fast Pass Full Test Sequence is conducted on the 0 th consecutive fast pass. All other times, the Fast Pass Reduced Test Sequence is conducted to conserve battery state of charge. The Fast Pass Reduced	After a refueling event has been detected and the small/large leak diagnostics have not passed. A refueling event is detected when there is a fuel level increase ≥ 10 % for ≥ 5 seconds. If the ELCP pressure sensor (gauge) vacuum reading is less than the 0.020" reference orifice vacuum measurement times a plus a offset times a for then the fuel tank system has a large leak and the DTC fails.	1.00 multiplier 200 Pa 0.20 multiplier 400 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Refueling request active true Abort Conditions: Min fuel level slosh Max fuel level slosh	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Once per trip after a refueling event has been detected, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Test Sequence includes the following diagnostics: ELCP Pump Stuck On (P145D), ELCP Sensor Performance (P1458), FTP Sensor Performance (P0451), DCV Stuck Closed (P2422), DCV Stuck Open (P2421), Small Leak (P0442) and Large Leak (P0455) diagnostics.			Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145E P145F P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Circuit Low (ELCP Sealed/ Vented Fuel System)	P0458	Diagnoses the canister purge solenoid low side driver circuit for circuit faults	Voltage low during driver off state (indicates short to ground)	Short to ground: ≤ 0.5 Ω impedence between signal and controller ground	PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0443 may also set (Canister Purge Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Circuit High (ELCP Sealed/ Vented Fuel System)	P0459	This DTC checks for short to high voltage circuit failures during operation.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedence between signal and controller power	PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 fuel sender stuck in range in the primary fuel tank.	Delta fuel volume change over an accumulated 149 miles.	< 3 liters	Engine Running No active DTCs:	 VehicleSpeedSensor_FA	250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a fuel sender stuck out of range low in the primary fuel tank.	Fuel level Sender % of 5V range	< 10 %			100 failures out of 125 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a fuel sender stuck out of range high in the primary fuel tank.	Fuel level Sender % of 5V range	> 60 %			100 failures out of 125 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Low Purge Flow Diagnostic (ELCP Sealed Fuel System)	P0497	Low purge flow is detected	After an initial time delay of when the Fuel Tank Pressure (FTP) sensor reading is or after an initial time delay of when the FTP sensor reading is plus an ELCP switching valve delay time of if the ELCP pressure sensor (gauge) indicates a vacuum change for then a low purge flow failure has been detected and the DTC fails.	3 seconds ≥ 299 Pa 3 seconds < 299 Pa 0.2 seconds, < 2,000 Pa 20 seconds	Min baro Max baro Min OAT Max OAT Engine RPM to enable Engine RPM to re-enable Engine vac to enable Engine vac to re-enable Engine airflow to enable Engine airflow to re-enable Purge flow to enable Purge flow to re-enable Purge DC to enable Purge DC to re-enable Requested purge flow to enable Delivered purge flow to re-enable Delivered purge flow to enable Vehicle not in assembly plant (value must = 0) Engine Running Run/Crank Voltage Purge is enabled ELCP switching valve is activated (pump position) Abort Conditions: Refueling request button pressed Device control exceeds Fuel tank protection active when FTP sensor for No Active DTC's	≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C 1,500 ≤ RPM ≤ 3,400 1,600 ≤ RPM ≤ 3,300 10 kPa ≤ vac ≤ 37 kPa 11 kPa ≤ vac ≤ 35 kPa 9 gps ≤ airflow ≤ 34 gps 10 gps ≤ airflow ≤ 32 gps ≥ 0.13 gps ≥ 0.14 gps ≥ 15.0 % ≥ 16.0 % ≥ 1.45 % ≥ 1.40 % ≥ 1.10 % 0 ≥ 11 volts 0.5 seconds < -24,909 Pa 5.0 seconds MAP_SensorFA	Once per trip with Propulsion System Active and Engine On 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0442 P0443 P0449 P0451 P0452 P0453 P0455 P0458 P0459 P0498 P0499 P145D P145E P2400 P2401 P2402 P2418 P2419 P2420 P2422 P2450 P24B9 P24BA P24BB		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Vent Solenoid Control Circuit Low (ELCP Sealed Fuel System)	P0498	Diagnoses the vent solenoid low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short to ground)	Short to ground: ≤ 0.5 Ω impedence between signal and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0449 may also set (Vent Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Vent Solenoid Control Circuit High (ELCP Sealed Fuel System)	P0499	Diagnoses the vent solenoid low side driver circuit for circuit faults. If the P0499 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedence between signal and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Sensor Performance	P0531	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is stuck or biased in range	**Engaged Test** <u>Primary Enable Conditons:</u>		Compressor Type = Electric Driven Diagnostic status Engaged Test status Enable with Key Off No active DTC's	Electric Driven Enabled Enabled Enabled Fault bundles: ACHighSidePressSnsrCkt FA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm		Type B, 2 Trips
			<u>To fail a currently passing Engaged test:</u> The filtered, weighted ratio between measured Delta and predicted delta (a function of ambient temp, coolant temp, vehicle speed, and fan speed.):	Measured Test Delta Pressure / Predicted Engaged Test Filtered Weighted Pressure) * first order filter coefficient < 0.1494 Predicted Engaged Test Filtered Weighted Pressure = (**P0531_Coolant_Weighting_Factor** * **P0531_FanSpeed_Weighting_Factor** * **P0531_Delta_Predicted_ Pressure** *	Use First Order Filter = TRUE Quality or weighting factor values less than "1" indicate that we don't have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Regions where diagnosis is possible have a quality or weighting factor values:	Compressor Speed > 300 RPM **Delta Predicted Weighting Factor** > 0.1 and **Coolant Weighting Factor** > - 0.4 AND < 2.0 and **FanSpeed Weighting Factor** > - 0.4 AND < 2.0	Performed every 100 msec 2 FIR tests must complete before	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				P0531_Delta_Predicted_Quality_Factor) with a first order filter coefficient = (P0531 Engage Test Details on Supporting Tables Tab)	0.60 Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to Initial response test ratio: FIR Test Ratio = 1.00 with an initial response first order filter: FIR Test Filter = 0.60 Rapid Step Response (RSR): RSR will trigger if the ratio result from the last test is < 32.00 AND the delta from the last filtered ratio by > 32.00 Once triggered, the RSR filtered ratio is reset to: RSR Test Ratio = 1.00 with an rapid step response first order filter: RSR Test Filter = 0.60		the diagnostic can report. 2 RSR tests must complete before the diagnostic can report.	
			<u>To pass a currently failing Engaged test:</u> The filtered, weighted	Measured Test Delta	Use First Order Filter = TRUE	Compressor Speed > 300 RPM	Performed every 100 msec # of Test	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			ratio between measured delta and predicted delta (a function of ambient temp, coolant temp, vehicle speed and fan speed.):	Pressure / Predicted Engaged Test: Filtered Weighted Pressure) * first order filter coefficient => 0.1494 Predicted Engaged Test Filtered Weighted Pressure = (**P0531_Coolant_Weighting_Factor** * **P0531_FanSpeed_Weighting_Factor** * **P0531_Delta_Predicted_ Pressure** * **P0531_Delta_Predicted_Quality_Factor**) with a first order filter coefficient = (P0531 Engage Test Details on Supporting Tables Tab)	Quality or weighting factor values less than "1" indicate that we don't have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Regions where diagnosis is possible have a quality or weighting factor values: 0.60 Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to Initial response test ratio: FIR Test Ratio = 1.00 with an initial response first order filter: FIR Test Filter = 0.60 Rapid Step Response (RSR):	**Delta Predicted Qualtiy Factor** > 0.1 and **Coolant Weighting Factor** > - 0.4 AND < 2.0 and **FanSpeed Weighting Factor** > - 0.4 AND < 2.0	Samples = 100 2 FIR tests must complete before the diagnostic can report. 2 RSR tests must complete before the diagnostic can report.	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					RSR will trigger if the ratio result from the last test is < 32.00 AND the delta from the last filtered ratio by > 32.00 Once triggered, the RSR filtered ratio is reset to: RSR Test Ratio = 1.00 with an rapid step response first order filter: RSR Test Filter = 0.60			
			On Test: The pressure sensor has to be less than a threshold value when engaged (a function of ambient temp)	On Test Pressure < On_Test_Threshold **P0531_On_Test_Threshold** (function of ambient temperature). (P0531 On Test Details on Supporting Tables:)	Diagnostic status On Test status AC On Time No active DTC's	Enabled Enabled Delay Time > 10 Sec. Fault bundles: ACHighSidePressSnsrCktFA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm	80 failures out of 100 samples Performed every 100 msec	
			Cold Test: The pressure sensor has to be greater than a threshold value when propulsion system is off for a ambient stabilization time	Cold Test Pressure > Cold_Test_Threshold **P0531_Cold_Test_Threshold** (function of ambient temperature). ~~(P0531 Cold Test~~	Diagnostic status Cold Test status AC has been enabled this Trip Enable Timer	Enabled Disabled FALSE Enabled Time > 0.1 Sec.	80 failures out of 100 samples Report Once per trip	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Details on Supporting Tables)	AC Soak Timer - the soak timer can be established (via calibration enable) to be minimum of the Engine Off Time, and/or the Propulsion System Off Time, and/or the Battery Thermal Conditioning Off Time Difference between Coolant Temperature and Air Temperature No active DTC's	Minimum Soak Time => 28,800 Sec. Use Engine Off Soak Time = TRUE Use Propulsion Off Soak Time= TRUE Use Battery Off Soak Time = TRUE Temp Diff < 15.0 Deg C Fault bundles: ACHighSidePressSnsrCkt FA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm ECT_Sensor_DefaultDete cted		
			Off Test: The pressure sensor has to be greater than a threshold value when Ac is off (a function of ambient temp)	Off Test Pressure > Off_Test_Threshold **P0531_Off_Test_Thre shold** (function of ambient temperature). (P0531 Off Test Details on Supporting Tables:)	Diagnostic status Off Test status AC Off Time No active DTC's	Enabled Enabled Delay Time > 20 Sec. Fault bundles: ACHighSidePressSnsrCkt FA ACFailedOnSD ACThrmlRefrigSpdVld ACCMLostComm	80 failures out of 100 samples Performed every 100 msec	

Component/ System	Fault Code	Monitor 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 B, 2 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor 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	> 85 percent	AC HSP Sensor Installed Diagnostic status	Yes Enabled	80 failures out of 100 samples Performed every 25 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 illegal range	Cruise Control analog circuit voltage must be in an "illegal range" or "between ranges" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control On Switch Circuit	P0565		Cruise Control On switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 20.00 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	Cruise Control Resume switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 90.000 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	Cruise Control Set switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 90.000 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Input Circuit	P0575	Detects rolling count or protection value errors in Cruise Control Switch Status serial data signal	If x of y rolling count / protection value faults occur, disable cruise for duration of fault		Cruise Control Switch Serial Data Error Diagnostic Enable	1.00	10 / 16 counts	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	Cruise Control analog circuit voltage must be in an "Open Short To Ground" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-function Circuit High Voltage	P0581		Cruise Control analog circuit voltage must be in an "Short To Power" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Thermostat Heater Control Open Circuit	P0597	Diagnoses the T-stat Heater low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground.	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Open Circuit Test	= True = True = True =================== = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers P0598 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Thermostat Heater Control Circuit Low	P0598	Diagnoses the T-stat Heater low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Ground Short Circuit Test	= True = True = True ================ = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	Type B, 2 Trips Note: In certian controllers P0597 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Thermostat Heater Control Circuit High	P0599	Diagnoses the T-stat Heater low side driver circuit for circuit faults.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power.	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Power Short Circuit Test	= True = True = True ================== = not Indeterminate	15 failures out of 30 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 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.	
			The Secondary 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 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	
				In all cases, the failure count is cleared when controller shuts down				

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor 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 ECU is a service part that has not been programmed.	Service (reflash) controller calibration present	= 1		none	Diagnostic runs at powerup and once per second continuously after that	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error at controller power-up	Checksum at power-up does not match checksum at power-down				Diagnostic runs at powerup Diagnostic reports a fault if 1 failure occurs	Type A, 1 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor 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	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 >	0.47856 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor 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)	
			Indicates that the secondary processor is unable to correctly read data from or write data to system 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)	

Component/ System	Fault Code	Monitor 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	Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was received by the Primary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved		Run/Crank voltage >= 6.41 or Run/Crank voltage >= 11.00 , else the failure will be reported for all conditions	In the primary processor, 159 / 399 counts intermittent or 39 counts continuous; 39 counts continuous @ initialization. 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was received by the Secondary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved			In the secondary processor, 20 / 200 counts intermittent or 0.1875 s continuous; 0.4750 s continuous @ initialization. 12.5 ms /count in the ECM secondary processor	
			Checks for stack over or underflow in secondary processor by looking for corruption of known pattern at stack boundaries. Checks number of stack over/ under flow since last powerup reset >=	5		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys	2 incorrect seeds within 8 messages, 0.2000 seconds		ignition in Run or Crank	150 ms for one seed continually failing	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			received > or Secondary processor has not received a new within time limit					
			Time new seed not received exceeded			always running	0.450 seconds	
			MAIN processor receives seed in wrong order			always running	3 / 17 counts intermittent. 50 ms/count in the ECM main processor	
			2 fails in a row in the Secondary processor's ALU check			KePISD_b_ALU_TestEnbld == 1 Value of KePISD_b_ALU_TestEnbld is: 1 . (If 0, this test is disabled)	25 ms	
			2 fails in a row in the Secondary processor's configuration register masks versus known good data			KePISD_b_ConfigRegTestEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 1 . (If 0, this test is disabled)	12.5 to 25 ms	
			Secondary processor detects an error in the toggling of a hardware discrete line controlled by the MAIN processor: number of discrete changes > = or < = over time window(50ms)	7 17		KePISD_b_MainCPU_SOH_FltEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 1 . (If 0, this test is disabled) time from initialization >= 0.4875 seconds	50 ms	
			memory and complement memory do not agree				0.19 seconds	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Software background task first pass time to complete exceeds			Run/Crank voltage > 6.41	360.000 seconds	
			2 fails in a row in the MAIN processor's ALU check			KePISD_b_ALU_TestEnbld == 1 Value of KePISD_b_ALU_TestEnbld is: 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			KePISD_b_ConfigRegTestEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 1 . (If 0, this test is disabled)	12.5 to 25 ms	
			Checks number of stack over/under flow since last powerup reset >=	5		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		KePISD_b_A2D_CnvrtrTestEnbld == 1 Value of KePISD_b_A2D_CnvrtrTestEnbld is: 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	3 (results in MIL), 5 (results in MIL and remedial action)		KeMEMD_b_FlashECC_CktTestEnbl == 1 Value of KeMEMD_b_FlashECC_CktTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			controller initialization. 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)		KeMEMD_b_RAM_ECC_CktTestEnbl == 1 Value of KeMEMD_b_RAM_ECC_CktTestEnbl is: 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			KePISD_b_DMA_XferTestEnbld == 1 Value of KePISD_b_DMA_XferTestEnbld is: 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.		Table, f(Loop Time). See supporting tables: **Program Sequence Watch Enable f(Loop Time)** (If 0, this Loop Time test is disabled)	Fail Table, f(Loop Time). See supporting tables: **PSW Sequence Fail f (Loop Time)** / Sample Table, f (Loop Time)See supporting tables: **PSW Sequence Sample f(Loop Time)** counts 50 ms/count in	

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Open	P0627	Diagnoses the fuel pump relay control high side driver circuit for circuit faults	Voltage high during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0629 may also set (Fuel Pump Relay Control Short to Power)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Low Voltage	P0628	Diagnoses the fuel pump relay control high side driver circuit for circuit faults	Voltage low during driver on state (indicates short to ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit High Voltage	P0629	Diagnoses the fuel pump relay control high side driver circuit for circuit faults	Voltage high during driver off state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0627 may also set (Fuel Pump Relay Control Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	The next write to NVM will not succeed or the assembly calibration integrity check failed.		Ignition State	= unlock/accessory, run, or crank	1 test failure Diagnostic runs once at powerup	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
VIN Not Programmed or Mismatched - Engine Control Module (ECM)	P0630	This DTC checks that the VIN is correctly written	At least one of the programmed VIN digits	= 00 or FF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor 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	ECM Vref1 < or ECM Vref1 > or the difference between ECM filtered Vref1 and Vref1 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open - For 3 DTC implementation only	P0650	Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults.	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 volts	50 failures out of 63 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 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	ECM Vref2 < or ECM Vref2 > or the difference between ECM filtered Vref2 and Vref2 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) Open - For 3 DTC implementation only	P0685	Diagnoses the powertrain relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω ohms impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	8.00 failures out of 10.00 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0686 may also set (Powertrain Relay Control Short to Ground).

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) Low	P0686	Diagnoses the powertrain relay control low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	8.00 failures out of 10.00 samples 250 ms / sample	Type B, 2 Trips Note: In certain controllers P0685 may also set (Powertrain Relay Control Open Circuit).

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) High	P0687	Diagnoses the powertrain relay control low side driver circuit for circuit faults	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Run/Crank Voltage	Voltage ≥ 11 volts	8.00 failures out of 10.00 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Feedback Circuit High	P0690	This DTC is a check to determine if the Powertrain relay is functioning properly.	Powertrain Relay Voltage	>= 4.0 volts will increment the fail counter	Powertrain relay commanded “OFF” No active DTCs:	>= 2.00 seconds PowertrainRelayStateOn_FA	50.00 failures out of 63.00 samples 100ms / Sample	Type B, 2 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor 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	ECM Vref3 < or ECM Vref3 > or the difference between ECM filtered Vref3 and Vref3 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Control Module (FPCM) Requested MIL Illumination	P069E	Monitors the FPCM MIL request line to determine when the FPCM has detected a MIL illuminating fault.	Fuel Pump Control Module Emissions-Related DTC set			Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor 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	ECM Vref4 < or ECM Vref4 > or the difference between ECM filtered Vref4 and Vref4 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit Diagnostic	FFT Diagnostic Output	> **P06B6_P06B7_OpenTestCktThrshMin** **AND** < **P06B6_P06B7_OpenTestCktThrshMax** See Supporting Tables	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes ≥ 2.0 seconds > 600 RPM and < 5,000 RPM ≥ 200 Revs ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Wake-up Circuit Performance Diagnostic (ELCP Sealed/ Vented Fuel System)	P06E4	VICM Wake-up events were not received	Whenever the propulsion system goes active, the diagnostic reads its internal timer and evaluates the results from the wake-up events that could have occurred. For each wake-up event the status can be: Pass – the wake-up event occurred within a window Indeterminate – the ECM was already awake at the time the wake-up event could have occurred Fail – the wake-up event occurred outside a window or did not occur at all If the 5.0 hour wake-up event did not occur from to then a failure has occurred. If the 7.0 hour wake-up event did not occur from to then a failure has occurred. If the 9.5 hour wake-up event did not occur from to then a failure has occurred. At Propulsion System Active, if any of the wake-up events indicate a	4.3 hours 5.8 hours 6.0 hours 8.1 hours 8.2 hours 11.0 hours	Distance since assembly plant Drive distance Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 No Active DTC's	≥ 9.9 miles ≥ 0.1 miles ≥ 0 hours ≥ 0 hours VehicleSpeedSensor_FA ModuleOffTime_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA	Once per each wake-up event when Propulsion System is not active Final decision is made when Propulsion System is Active 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			failure then the DTC fails.					

Component/ System	Fault Code	Monitor 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 line to determine when the TCM has detected a MIL illuminating fault.	Transmission Emissions-Related DTC set			Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor 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 EBTCM is valid	Serial Communication 2's complement message - ($140 for PPEI2 or $1C7/1C9 for engine torque, $1CA/$1C6 for axle torque) OR Serial Communication message ($140 for PPEI2 or $1C7/$1C9 for engine torque, $1CA/$1C6 for axle torque) rolling count value OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period OR Torque request greater than torque request diagnostic maximum threshold	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one Requested torque intervention type toggles from not increasing request to increasing request > 250 Nm for engine torque based traction torque system, OR > 1,150 Nm for axle torque based traction torque system	Serial communication to EBTCM (U0108) Power Mode Engine Running Status of traction in GMLAN message ($4E9)	No loss of communication = Run = True = Traction Present	>= 10 failures Performed on every received message 6 rolling count failures out of 10 samples Performed on every received message >= 3 multi-transitions out of 5 samples. Performed every 200 ms >= 4 out of 10 samples Performed on every received message	Type C, No MIL Special Type C

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Powertrain Control Module (HPC) Requested MIL Illumination	P0AC4	Monitors the HPC MIL request line to determine when the HPC has detected a MIL illuminating fault.	HPC Emissions-Related DTC set			Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Inlet Airflow System Performance (naturally aspirated)	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	Filtered Throttle Model Error AND (ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 125 kPa*(g/s) > 10 grams/sec > 20.0 kPa) > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs:	>= 500 RPM <= 8,000 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by **TPS Residual Weight Factor based on RPM** Modeled Air Flow Error multiplied by **MAF Residual Weight Factor based on RPM** and **MAF Residual Weight Factor Based on MAF Est** MAP Model 1 Error multiplied by **MAP1 Residual Weight Factor based on RPM** MAP Model 2 Error multiplied by **MAP2 Residual Weight Factor based on RPM** See Residual Weight Factor tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Pending DTCs:	IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow A Supply Voltage Control Circuit	P121A	Diagnoses the Mass Air Flow Power Supply Circuit low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit: >= 200K Ohms impedance between signal and controller ground	Mass Air Flow Power is commanded on Powertrain Relay Voltage	 >= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips Note: In certain controllers P121B may also set (Mass Air Flow A Supply Voltage Control Circuit Low)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow A Supply Voltage Control Circuit Low	P121B	Diagnoses the Mass Air Flow Power Supply Circuit low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground or open circuit)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200K Ohms impedance between signal and controller ground	Mass Air Flow Power is commanded on Powertrain Relay Voltage	 >= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips Note: In certain controllers P121A may also set (Mass Air Flow A Supply Voltage Control Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow A Supply Voltage Control Circuit High	P121C	Diagnoses the Mass Air Flow Power Supply Circuit low side driver circuit for circuit faults	Voltage low during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Mass Air Flow Power is commanded off Powertrain Relay Voltage	 >= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst) Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst) (EWMA filtered) Average Power = output of **P1400_EngineSpeedResidual_Table** * output of **P1400_SparkResidual_Table** NOTE: Desired accumulated power would use the desired catalyst light off spark and desired engine speed and the actual accumuated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details	< -3.85 KJ/s (high RPM failure mode) > 5.30 KJ/s (low RPM failure mode)	To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following: Catalyst Temperature AND Engine Run Time OR Engine Run Time OR Barometric Pressure	 < 350.00 degC > -12.00 degC <= 180.00 degC >= 70.00 KPa >= 550.00 degC >= 50.00 seconds > **CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. < 70.00 KPa	Runs once per trip when the cold start emission reduction strategy is active Frequency: 100ms Loop Test completes after 15 seconds of accumulated qualified data.	EWMA Based - Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Other Enable Criteria:			
					OBD Manufacturer Enable Counter	0		
					Vehicle Speed	< 621.37 MPH		
					Allow diagnostic to calculate residual in an off-idle state. If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal	1 (A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)		
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore when the:			
					Pedal Close Delay Timer	> 2.00 seconds		
					the diagnostic will continue the calculation.			
					For Manual Transmission vehicles:	> 12.00 %		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Clutch Pedal Position Clutch Pedal Position	< 75.00 %		
					The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period.			
					The time weighting factor must be :	> 0 These are scalar values that are a function of engine run time. Refer to **ColdStartDiagnosticDelayBasedOnEngineRunTime** and the cal axis, **ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis** in the "Supporting Tables" for details.		
					General Enable:			
					DTC's Not Set:	AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFP CrankSensorFaultActive FuelInjectorCircuit_FA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						MAF_SensorFA MAP_SensorFA EngineMisfireDetected_FA Clutch Sensor FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA 5VoltReferenceMAP_OOR_Flt TransmissionEngagedState_FA EngineTorqueInaccurate		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Performance /Stuck Off (ELCP Sealed Fuel System)	P145C	This DTC will detects an ELCP vacuum pump that is stuck off.	When the ELCP vacuum pump is commanded on during the 1st 0.020" reference orifice vacuum measurement, if the stabilized ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck off and the DTC fails. When the ELCP vacuum pump is commanded on during the 2nd 0.020" reference orifice vacuum measurement, if the stabilized ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck off and the DTC fails.	< 100 Pa 360 seconds < 100 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds FuelLevelDataFault	Up to twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					                    No Active DTC's TFTKO	IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145D P145E P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Stuck On (ELCP Sealed Fuel System)	P145D	This DTC detects an ELCP vacuum pump that is stuck on.	The 1st time in the test sequence when the ELCP vacuum pump is commanded off, after the ELCP switching valve transitions from vent to pump position, if the difference between an initial ELCP pressure sensor (absolute) reading and a second ELCP pressure sensor (absolute) reading is after then the ELCP vacuum pump is stuck on and the DTC fails. The 2nd time in the test sequence when the ELCP vacuum pump is commanded off, if the ELCP pressure sensor (gauge) vacuum reading is after then the ELCP vacuum pump is stuck on and the DTC fails.	> 1,000 Pa 8 seconds > 1,180 Pa 14 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Once or twice per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTK	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145E P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Leak Between Vent Control Valve and Leak Detection Pump (ELCP Sealed Fuel System)	P145E	A small leak (≥0.020") is detected in the EVAP system between the Diurnal Control Valve (DCV) and the ELCP vacuum pump. This includes a leak through the DCV.The ELCP vacuum pump creates a vacuum across a 0.020" reference orifice. This reference vacuum is then compared to the vacuum level created between the Diurnal Control Valve (DCV) and the ELCP leak detection pump to determine if a leak exists.	If the ELCP pressure sensor (gauge) vacuum reading is less than the 1st 0.020" reference orifce vacuum measurement times a plus a offset for then a small leak is detected between the DCV and ELCP vacuum pump and the DTC fails.	1.00 multiplier 200 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressed Service bay test active Device control exceeds No Active DTC's No Active DTC's TFTKO	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Reference Orifice Performance (ELCP Sealed Fuel System)	P145F	1st and 2nd 0.020" reference orifice vacuum measurements do not correlate.	If the difference between the 1st 0.020" reference orifice vacuum measurement and the 2nd 0.020" reference orifice vacuum measurement is after then the 1st and 2nd reference orifice vacuum measurements do not correlate and the DTC fails.	> 510 Pa 30 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds No Active DTC's	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 % 0.5 seconds FuelLevelDataFault	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFT KO LostCommBCM_FA LostCommBusB_VICM_F A CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P145C P145D P145E P2421 P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Output Circuit (ODM) (EREV/ PHEV only) Open	P1485	Diagnoses the cooling fan 1 output low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery voltage to enable Battery voltage to remain enabled Accessory line is high for No Active DTC's	≥ 11 volts ≥ 10 volts > 5 seconds P2537	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P1486 may also set (Cooling Fan 1 Output Circuit Short to Ground).

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Output Circuit Low Voltage (ODM) (EREV/ PHEV only)	P1486	Diagnoses the cooling fan 1 output low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Battery voltage to enable Battery voltage to remain enabled Accessory line is high for No Active DTC's	≥ 11 volts ≥ 10 volts > 5 seconds P2537	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips Note: In certain controllers P1485 may also set (Cooling Fan 1 Output Circuit Open Circuit).

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Output Circuit High Voltage (ODM) (EREV/ PHEV only)	P1487	Diagnoses the cooling fan 1 output low side driver circuit for circuit faults	Voltage high during driver on state (indicates short to power).	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Battery voltage to enable Battery voltage to remain enabled Accessory line is high for No Active DTC's	≥ 11 volts ≥ 10 volts > 5 seconds P2537	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Steady State Actuation Fault	P1516	Detect an inablity to maintain a steady state throttle position	The absolute difference between desired and indicated throttle position is >	2.00 percent		Run/Crank voltage > 6.41 Ignition voltage failure is false (P1682) TPS minimum learn is not active and Throttle is being Controlled Throttle is considered in a steadystate condition when the desired throttle position over a 12.5 ms period is < 0.25 percent for a settling time period > 4.00 s	0.49 ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Switch State Undertermin ed	P155A	Detects when cruise switch state cannot be determined, such as low voltage conditions	cruise switch state remains undetermined for greater than a calibratable time				fail continuously for greater than 15.5 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid	1. Serial Communication 2's complement not equal for message $181 for Strong Hybrid or Mild Hybrid Applications OR 2. Serial Communication rolling count value shall be + 1 from previous $181 message for Strong Hybrid or Mild Hybrid Applications	Message <> 2's complement of Engine Torque Signal and if Mild Hybrid: Message <> 2's complement of Motor Torque Signal OR Message rolling count value <> previous message rolling count value plus one	Secondary High Speed Bus is Present and No Serial communication loss to HCP (U1817) Run Crank Active Ingintion Voltage No Serial communication loss to HCP (U1817) Hybrid Type = Mild or Strong If Mild Hybrid Only: Torque source type = Crankshaft Torque	No loss of communication >= 0.20 Sec > 6.41 = Strong = Trans Output Torque	1. >= 10 Protect errors out of 15 samples OR 2. >= 10 Rolling count errors out of 15 samples Pass diagnostic if samples >= 15 Performed every received message	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Control Speed Request Circuit	P15F9	Determines if torque request from the HCP is valid	1. Serial Communication 2's complement not equal for message $281 OR 2. Serial Communication rolling count value shall be + 1 from previous $281 message	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one	Secondary High Speed Bus is Present No Serial communication loss to HCP (U1817)		>= 10.00 Password Protect errors out of 16.00 samples OR >= 10.00 Rolling count errors out of 16.00 samples Pass diagnostic if samples >= 16.00	Type B, 2 Trips
					Run Crank Active	>= 0.50 Sec	Performed every 12.5 msec	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Signal Message Counter Incorrect	P15FB	Detects rolling count or protection value errors in Chassis Brake Pedal Position Emissions Related serial data signal	If x of y rolling count / protection value faults occur, default brake pedal positiion to zero for duration of fault		Chassis Brake Pedal Position Emissions Related Serial Data Error Diagnostic Enable	1.00	10.00 / 16.00 counts	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Alarm Clock Signal Not Received (ELCP Sealed/ Vented Fuel System)	P162D	ECM could not set VICM Alarm Clock	Whenever the propulsion system goes active, the diagnostic reads its internal timer and evaluates the results from the wake-up events that could have occurred. If the ECM did not receive feedback from the VICM that the alarm clock was set, the 5.0 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred. If the ECM did not receive feedback from the VICM that the alarm clock was set, the 7.0 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred. If the ECM did not receive feedback from the VICM that the alarm clock was set, the 9.5 hour wake-up event did not occur, and the ECM did not wake up for any reason from to then a failure has occurred.	4.3 hours 5.8 hours 6.0 hours 8.1 hours 8.2 hours 11.0 hours	Distance since assembly plant Drive distance Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 No Active DTC's Abort Conditions: Service bay test active	≥ 9.9 miles ≥ 0.1 miles ≥ 0 hours ≥ 0 hours VehicleSpeedSensor_FA ModuleOffTime_FA LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA	Once per each wake-up event when Propulsion System is not active Final decision is made when Propulsion System is Active 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			At Propulsion System Active, if any of the wake-up events indicate a failure then the DTC fails.					

Component/ System	Fault Code	Monitor 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 & the Powertrain Relay Ignition Voltage	|Run/Crank – PT Relay Ignition| >	3.00 Volts		Powertrain commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage > 5.50) AND Run/Crank voltage > 5.50 .	240 / 480 counts or 0.4750 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance	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.	Desired Throttle Area calculated does not equal its redundant calculation	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	Type A, 1 Trips
			Equivance Ratio torque compensation exceeds threshold	-19,999,999,961,012, 900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold	19,999,999,961,012,9 00,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	19,999,999,961,012,900,000.00 mg	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range	1,023.98 degrees		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 2,048 ms continuous, 0.5 down time multipier	
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 8,192 rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	19,999,999,961,012,900,000.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1,151.00 Nm Low Threshold -1,726.50 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1,151.00 Nm Low Threshold -1,726.50 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 19,999,999,961,012,900,000.000	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 7,800.00 or 7,900.00 rpm (hysteresis pair)	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Rate limited vehicle speed and its dual store do not equal	N/A		Time since first CAN message with vehicle speed >= 0.500 sec	5 / 8 counts; 25.0msec/count	
			Preload Throttle Area and its dual store do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			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 2,048 ms continuous, 0.5 down time multipier	
			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 2,048 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							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	5 / 15 counts; 25.0msec/count	
			TOS to wheel speed conversion factor and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	10 / 16 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cylinders active greater than commanded	32,767 cylinders		Engine run flag = TRUE > 409.59 s Number of cylinder events since engine run > 65,535 No fuel injector faults active	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Transfer case neutral request from four wheel drive logic does not match with operating conditions	N/A	Ignition State	Accessory, run or crank Transfer case range valid and not over-ridden FWD Apps only	32 / 0 counts; 25.0msec/count	
			Transfer case neutral and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	5 / 15 counts; 25.0msec/count	
			Driver progression mode	N/A	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			and its dual store do not equal				175 ms continuous, 0.5 down time multipier	
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). See supporting tables + 19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Immediate Request Without Motor is	19,999,999,961,012,900,000.00	Ignition State	Accessory, run or crank	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			greater than its redundant calculation plus threshold	Nm			ms continuous, 0.5 down time multipier	
			Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold	164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Request is greater than its redundant	164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous,	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			calculation plus threshold				0.5 down time multipier	
			Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold	19,999,999,961,012,900,000.00 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	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Regeneration Brake Assist is not within a specified range	Brake Regen Assist < 0 Nm or Brake Regen Assist > 1,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	19,999,999,961,012,900,000.00 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			1. Cylinder Torque Offset exceeds step size threshold	1. 19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR 2. Sum of Cylinder Torque Offset exceeds sum threshold	2. 19,999,999,961,012,900,000.00 Nm			down time multipier	
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Engine Off is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Capacity Minimum Engine Immediate Without Motor is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (event based) calculation does	N/A		Engine speed greater than 0rpm	Up/down timer 2,048 ms continuous.	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			not equal its redundant calculation				0.5 down time multipier	
			Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque request exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 19,999,999,961,012,900,000.00 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	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil**	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			calculated torque limit	**Temp, RPM)** + 19,999,999,961,012,900,000.00 Nm			down time multipier	
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1,151.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	1,151.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Immediate Request is greater than its redundant calculation plus	1,151.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous,	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			threshold OR Commanded Immediate Request is less than its redundant calculation minus threshold				0.5 down time multipier	
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Difference between Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	143.88 Nm		Cruise has been engaged for more than 4.00 seconds	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Desired engine torque request greater than redundant calculation plus threshold	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine min capacity above threshold	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			No fast unmanaged retarded spark above the applied spark plus the threshold	Table, f(RPM,APC). See supporting tables: **Delta Spark Threshold f (RPM,APC)**		Engine speed greater than 0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of adjustment factor based	19,999,999,961,012,900,000.00	Ignition State	Accessory, run or crank	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			on temperature and its dual store above threshold	m/s			ms continuous, 0.5 down time multipier	
			1. Absolute difference of redundant calculated engine speed above threshold	19,999,999,961,012,900,000 RPM		Engine speed greater than 0 RPM	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			After throttle blade pressure 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	
			Speed Control's Preditcted Torque Request 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	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine oil temperature 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	
			Desired throttle position greater than redundant calculation plus threshold	19,999,999,961,012,900,000.00 percent	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	19,999,999,961,012,900,000.00 kpa	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Throttle desired torque above desired torque plus	164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			threshold				ms continuous, 0.5 down time multipier	
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Torque feedback proportional term is out of allowable range or its dual store copy does not match	High Threshold 19,999,999,961,012,900,000.00 Nm Low Threshold -19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store copy do not match	High Threshold 19,999,999,961,012,900,000.00 Nm Low Threshold -19,999,999,961,012,900,000.00 Nm Rate of change threshold 19,999,999,961,012,900,000.00 Nm/loop	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold - 164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of torque desired throttle area and its redundant calculation is out of bounds given by threshold range	High Threshold 0.50 % Low Threshold - 0.50 %	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 19,999,999,961,012,900,000.0000000 Low Threshold - 19,999,999,961,012,900,000.0000000	Ignition State	Accessory, run or crank	Up/down timer 2,048 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 164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold - 164.43 Nm			multipier	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AC friction torque is greater than commanded by AC control software or less than threshold limit	High Threshold 0.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold - 164.43 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Generator friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				0.00 Nm				
			Supercharger friction torque is out of bounds given by threshold range	High Threshold 164.43 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Filtered Torque error magnitude or its increase rate of change is out of allowable range or its dual store copy do not match	High Threshold 19,999,999,961,012,900,000.00 Nm Low Threshold -19,999,999,961,012,900,000.00 Nm		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Rate of change threshold 19,999,999,961,012,9 00,000.00 Nm/loop				
			Torque error compensation is out of bounds given by threshold range	High Threshold 19,999,999,961,012,9 00,000.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 19,999,999,961,012,9 00,000.00 Nm Low Threshold	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				-19,999,999,961,012, 900,000.00 Nm				
			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 exeed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	1. 19,999,999,961,012,9 00,000.00 Nm 2. N/A 3. 19,999,999,961,012,9 00,000.00 Nm 4. 19,999,999,961,012,9 00,000.00 Nm	3. & 4.: Ignition State	1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 19,999,999,961,012,900, 000.00 Nm 3. & 4.: Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Vacuum and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							down time multipier	
			Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time event is greater than threshold	Table, f(Desired Engine Torque). See supporting tables: **Delta MAP Threshold f(Desired Engine Torque)**		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Min. Axle Torque Capacity is greater than threshold	-2,520.00 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	1,151.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			threshold					
			Cold Delta Friction 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	
			Predicted torque for zero pedal determination is greater than calculated limit.	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 19,999,999,961,012,900,000.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							down time multipier	
			Steady State Estimated Engine Torque and its dual store are not equal	N/A		AFM not changing from Active to Inactive and preload torque not changing and one loop after React command Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	19,999,999,961,012,900,000.00		Engine run flag = TRUE > 409.59 s	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	1,023.98 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	1,023.98 degrees		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	19,999,999,961,012,900,000.00 Nm		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	19,999,999,961,012,900,000.00 Nm		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference of desired spark advance for	1,023.98 degrees		Torque reserve (condition when spark control	Up/down timer 2,048	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			managed torque and its redundant calculation is out of bounds given by threshold range			greater than optimum to allow fast transitions for torque disturbances) > 19,999,999,961,012,900, 000.00 Nm	ms continuous, 0.5 down time multipier	
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	19,999,999,961,012,9 00,000.00 Nm		Engine speed >0rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			One step ahead calculation of air-per-cylinder greater than two step ahead calculation by threshold for time	Threshold: Dynamically calculated based on current engine conditions Fault Pending Threshold: 19,999,999,961,012,9 00,000 ms		Engine speed > 8,192 rpm	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Rate limited cruise axle torque request and its dual store do not match within a threshold	143.88 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 and its dual store do not equal OR	1. 5.00 % 2. N/A 3. N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	1,151.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded axle torque is less than its redundant calculation by threshold	-863.25 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Preload timer and its redundant calculation do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AC friction torque is greater than commanded by AC control software	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 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 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant cacluation is greater than a threshold	1,023.98 degrees		Engine speed >0rpm	Up/down timer 2,048 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	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of the predicted motor torque ACS and its redundant cacluation is greater than a threshold	0.01 Nm			Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of maximum throttle area and its redundant cacluation is greater than a threshold	15 mm2			Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of Desired TIAP and its redundant cacluation is greater than a threshold	25.00 kPa			Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Digital Mode Switch Signal Circuit Include for programs that are NOT hybrid start stop conventional	P1762	Vehicles that are not hybrid start stop conventional applications, this diagnoses the digital mode switch(s) signal circuit (BCM to ECM Rolling Count check)	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	≥ 200 RPM ≤ 7,500 RPM ≥ 5.0 seconds ≤ 318.14 MPH ≥ 5.0 seconds	> 3 error counts for > 10.0 seconds 100 ms / sample	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Driver Intended Brake Torque Fault	P1B12	Detect a rolling count or protection value error in Driver Intended Brake Torque serial data	X of Y failure, or continuous criteria have been met for rolling count or protection errors for Driver Intended Brake Torque.			Propulsion System is active KeBRKI_b_TrqSerialDataFailEnbl == 1 Value of KeBRKI_b_TrqSerialDataFailEnbl is: 1 . (If 0, this test is disabled) Manufacturer Enable Counter is 0	10 / 16 counts or 0.488 seconds continuous; 25 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Powertrain Control Module (HPC) 2 Requested MIL Illumination	P1E00	Monitors the HPC 2 MIL request line to determine when the HPC has detected a MIL illuminating fault.	HPC 2 Emissions-Related DTC set			Time since power-up ≥ 3 seconds	Continuous	Type A, No MIL

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Low– Bank 1	P2088	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.	Short to ground: ≤ 0.5 Ω to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.0 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit High – Bank 1	P2089	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.0 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Low – Bank 1	P2090	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.	Short to ground: ≤ 0.5 Ω to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.0 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit High – Bank 1	P2091	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage Output driver is commanded on Ignition switch is in crank or run position	> 11.0 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System Low Limit Bank 1 (Too Rich)	P2096	Determines if the post catalyst O2 sensor based fuel control system has utilized all or most of it's low limit authority, indicating a rich emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too rich, the post catalyst O2 integral offset control is decreased. This results in lean bias fuel control in an attempt to correct the rich condition. A perfectly balanced control system (no rich or lean bias required) is represented by an integral offset value of “0” and a post catalyst O2 sensor that is within it's optimal operating range (neither rich nor lean). An integral offset value < 0 is indicative of the control system reacting to a rich post catalyst O2 sensor. If the failure is such that the control system utilizes all or most of its available authority, then P2096 will set.	Rich Fail counter High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 15 % for >= 10.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= 700 counts per 875 sample counts Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again.	The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control Long Term Secondary Fuel Trim Enabled (see "**Long Term Secondary Fuel Trim Enable Criteria**" in Supporting Tables) High Vapor Conditions No Fault Active for:	 No No Yes Yes Yes >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 0 kPa <= 200 >= -20 deg. C <= 200 >= -20 deg. C Not Active Not Active Not Present AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSnsrCkt_FA	Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						EvapPurgeSolenoidCircuit_FA EvapSmallLeak_FA EvapVentSolenoidCircuit_FA FuelInjectorCircuit_FA MAF_SensorFA MAF_SensorTFTKO MAP_SensorFA MAP_EngineVacuumStatus EngineMisfireDetected_FA A/F Imbalance Bank1 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA		
					The above general enable conditions must be true for:	> 0.0 seconds		
					Minimum accumulated counts in each cell required before counters will increment for that cell:			
					Deceleration	300		
					Idle	300		
					Cruise	260		
					Light Acceleration	260		
					Heavy Acceleration	260		
					(Note: A value in any of the above operating "cells" that is an order of magnitude (or more) higher than other cells is an indication that the diagnostic is not capable of diagnosing in that cell).			
					For the cells identified as			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions column), the fail counter will increment if the sample counter increments AND Post oxygen sensor control integral offset (in mV) is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration (Note: A value in any of the above operating "cells" that is greater than 900mV is an indication that the diagnostic is not capable of diagnosing in that cell).	<= -60 (control min.= -100) -60 (control min.= -100) -375 (control min.= -415) -375 (control min.= -415) -375 (control min.= -415) > 760 mV 760 mV 760 mV 760 mV 760 mV		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System High Limit Bank 1 (Too Lean)	P2097	Determines if the post catalyst O2 sensor based fuel control system has utilized all or most of it's high limit authority, indicating a lean emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too lean, the post catalyst O2 integral offset control is increased. This results in rich bias fuel control in an attempt to correct the lean condition. A perfectly balanced control system (no rich or lean bias required) is represented by an integral offset value of “0” and a post catalyst O2 sensor that is within it's optimal operating range (neither rich nor lean). An integral offset value > 0 is indicative of the control system reacting to a lean post catalyst O2 sensor. If the failure is such that the control system utilizes all or most of its available authority, then P2097 will set.	Lean Fail counter High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 15 % for >= 10.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.	>= 700 counts per 875 sample counts Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again.	Same as P2096 except for the following: For the cells identified as enabled (i.e. those containing a "Yes" at the beginning of the Enable Conditions for P2096), the fail counter will increment if the sample counter increments AND Post oxygen sensor control integral offset (in mV) is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration (Note: A value in any of the above operating "cells" that is less than 100mV is an indication that the diagnostic is not capable of diagnosing in that cell).	>= 15 (control max.= 100) 15 (control max.= 100) 330 (control max.= 415) 330 (control max.= 415) 330 (control max.= 415) < 731 mV 731 mV 731 mV 731 mV 731 mV	Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error2) Throttle control is driving the throttle in the incorrect direction3) Throttle control exceeds the reduced power limit	Difference between measured throttle position and modeled throttle position > OR Difference between modeled throttle position and measured throttle position >	10.00 percent 10.00 percent	TPS minimum learn is not active and Throttle is being Controlled and (Engine Running or Ignition Voltage > or Ignition Voltage >) Ignition voltage failure is false (P1682)	Run/Crank voltage > 6.41 Ignition voltage failure is false (P1682) TPS minimum learn is not active and Throttle is being Controlled AND ((Engine Running AND Ignition Voltage > 5.50) OR Ignition Voltage > 11.00)	39 counts; 12.5 ms/count in the primary processor	Type A, 1 Trips
			Throttle Position >	37.60 percent		Powertrain Relay voltage > 6.41 TPS minimum learn is active	11 counts; 12.5 ms/count in the primary processor	
			Throttle Position >	100.00 percent		Powertrain Relay voltage > 6.41 Reduced Power is True	11 counts; 12.5 ms/count in the primary processor	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage <	0.4625		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (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 Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage >	4.7500		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (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 Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage <	0.3250		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (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 Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage >	2.6000		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (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 Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	Difference between TPS1 displaced and TPS2 displaced >	7.022 % offset at min. throttle position with a linear threshold to 9.664 % at max. throttle position		Run/Crank voltage > 6.41 No TPS sensor faults (P0122, P0123, P0222, P0223) No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639 / 1,279 counts or 154 counts continuous; 3.125 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref		Run/Crank voltage > 6.41 No TPS sensor faults (P0122, P0123, P0222, P0223) No 5V reference error or fault for # 4 5V reference circuit (P06A3)	639 / 1,279 counts or 154 counts continuous; 3.125 ms/count in the main processor	

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Vehicle Speed – Output Shaft Speed Correlation	P215B	Detect invalid vehicle speed source.	The absolute difference between wheel speed vehicle speed and TOS vehicle speed greater than > OR Secure vehicle speed source is unavailable	6.21 mph		Time since first CAN activity > 0.5000 s Secure vehicle speed source is TOS vehicle speed or wheel speed vehicle speed Trans engaged state is equal to engaged.	400 / 800 counts for wheel speed correlation or 400 / 800 counts for TOS correlation; 25ms/count	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Minimum Throttle Position Not Learned	P2176	TP sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS Voltage > AND Number of learn attempts >	0.9550 10 counts		Run/Crank voltage > 6.41 TPS minimum learn is active	2.0 secs	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling System Performance	P2181	This DTC detects thermostat malfunction (i.e. stuck open)	This diagnostic can be calibrated to fail in one of two methods based on the following calibration. This application has been calibrated as a Type 1 . Type 0 - Airflow Method: Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is ≤ than 2.00 . When above is present for more than 5 seconds, fail counts start. == Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 100.0 grams. Type 1 - Energy Method: Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is ≤ than 7.00 . When above is present for more than 5 seconds, fail counts start. == Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by predicted energy.		No Active DTC's Engine not run time Engine run time Fuel Condition ECT at Power Up IAT min T-Stat Heater duty cycle commanded Type 0: Airflow range to accumulate Type 1: Minumum energy to enable	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA ≥ 14,400 seconds 50 ≤ Time ≤ 1,370 seconds Ethanol ≤ 86 % -10.0 ≤ ECT ≤ 59.0 °C -7 °C ≤ IAT ≤ 60 °C. ≤ 50 % 1.0 ≤ Airflow ≤ 100.0 gps 0.0 kJ	70 failures out of 100 samples 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Bank 1 Air-Fuel Ratio Imbalance	P219A	This monitor determines if a cylinder-to-cylinder air-fuel ratio imbalance is present on bank 1.	Filtered Ratio > Note: The input to this metric is the pre catalyst oxygen sensor voltage. This voltage is used to generate a Variance metric that represents the statistical variation of the O2 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). Multiple samples are collected in making a decision. The observed Variance is dependant on engine speed and load and so each result is normalized for speed and load by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (Supporting Table "**Variance Threshold Bank1**") and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table	0.49 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.25 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 0.49 .	System Voltage Fuel Level Engine Coolant Temperature Cumulative engine run time Diagnostic enabled at Idle (regardless of other operating conditions) Engine speed range Engine speed delta during a short term sample period Mass Airflow (MAF) range Cumulative delta MAF during a short term sample period Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF = 0.050 Air Per Cylinder (APC) APC delta during short term sample period Filtered APC delta between samples	no lower than 10.0 Volts for more than 0.2 seconds > 10.0 percent AND no fuel level sensor fault > -20 degrees C > 40.0 seconds No 1,200 to 3,800 RPM < 100 RPM 0 to 10,000 g/s < 5 g/s < 0.20 g/s 120 to 400 mg/cylinder < 75 mg/cylinder < 5.00 percent	Minimum of 1 test per trip, up to 8 tests per trip during RSR or FIR. The front O2 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 9.00 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(Supporting Table "**Normalizer Bank1**"). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (Supporting Table "**Quality Factor Bank1**"). This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the		Note: first order lag filter coefficient applied to APC = 1.000 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (Supporting Table "**Quality Factor Bank1**"). QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Fuel Control Status Closed Loop and Long Term FT Enabled for: AIR pump not on CASE learn not active EGR - no device control, no intrusive diagnostics EVAP - no device control, no intrusive diagnostics Engine OverSpeed	 5 to 55 degrees 0 to 200 percent 0 to 25 degrees 0 to 25 degrees >= 0.99 >= 1.2 seconds (Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables)	made within 5 minutes of operation. For RSR or FIR, 16 tests must complete before the diagnostic can report.	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature.		Protection Not Active Idle speed control normal PTO Not Active Injector base pulse width above min limit O2 Learned htr resistance Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by Once triggered, the filtered ratio is reset to: Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to: No Fault Active for:	 = Valid (the O2 heater resistance has learned since NVM reset) >= 0.20 >= 0.50 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit Low Voltage	P2257	Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips Note: In certain controllers P0418 may also set (Secondary AIR pump control circuit open)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit High Voltage	P2258	Diagnoses the Secondary AIR Pump Control Low Side Driver circuit for circuit faults	Voltage high during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain relay Voltage	>= 11.00 volts	20 failures out of 25 samples 250ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	This DTC determines if the post catalyst O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test (during coast) which increases the delivered fuel to achieve the required rich threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 850 mvolts > 120 grams	No Active DTC's B1S2 DTC's Not active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Pedal position Engine Airflow Closed loop integral Closed Loop Active Evap Ethanol	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False ≤ 100.0 % 14 ≤ gps ≤ 24 0.84 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Post fuel cell (Decel) Crankshaft Torque EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State ================= All of the above met for at least 2.0 seconds, and then check the following Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) ================= All of the above met for at least 3.0 seconds, and then the Force Cat Rich intrusive stage is requested. ================= During Stuck Lean test the following must stay TRUE or the test will abort: 0.95 ≤ Commanded Fuel EQR ≤ 1.10	= enabled < 200.0 Nm = not active = not active ≥ 100.0 sec 600 ≤ ºC ≤ 1,000 = DFCO possible ================== 1,425 ≤ RPM ≤ 2,600 1,400 ≤ RPM ≤ 2,700 24.9 ≤ MPH ≤ 82.0 21.7 ≤ MPH ≤ 87.0		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 100 mvolts > 36 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed Engine Airflow Vehicle Speed Closed loop integral Closed Loop Active Evap Ethanol	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F or P2270 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False 1,425 ≤ RPM ≤ 2,600 14 ≤ gps ≤ 24 24.9 ≤ MPH ≤ 82.0 0.84 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Power Take Off EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State DTC's Passed ================== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	= not active = not active = not active ≥ 100.0 sec 600 ≤ ºC ≤ 1,000 DFCO possible = P2270 (and P2272 if applicable) = P013E (and P014A if applicable) = P013A (and P013C if applicable) =================		

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT LOW - for 3 DTC implementation only	P2300	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Ground fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage low during driver high state (indicates short-to-ground)	 ≤ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

15 OBDG01 ECM Summary Tables - Initial DTCs

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT High - for 3 DTC implementation only	P2301	Diagnoses Cylinder #1 Ignition Control (EST) output driver circuit for a Short to Power fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage high during driver low state (indicates short-to-power)	$\leq$ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT Low - for 3 DTC implementation only	P2303	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Ground fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage low during driver high state (indicates short-to-ground)	 ≤ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT High - for 3 DTC implementation only	P2304	Diagnoses Cylinder #2 Ignition Control (EST) output driver circuit for a Short to Power fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage high during driver low state (indicates short-to-power)	 ≤ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT Low - for 3 DTC implementation only	P2306	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Ground fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage low during driver high state (indicates short-to-ground)	 ≤ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT High - for 3 DTC implementation only	P2307	Diagnoses Cylinder #3 Ignition Control (EST) output driver circuit for a Short to Power fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage high during driver low state (indicates short-to-power)	≤ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	> 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT Low - for 3 DTC implementation only	P2309	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Ground fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage low during driver high state (indicates short-to-ground)	$\leq$ 100 Ω impedance between signal and controller ground	Engine running Ignition Voltage	> 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT High - for 3 DTC implementation only	P2310	Diagnoses Cylinder #4 Ignition Control (EST) output driver circuit for a Short to Power fault	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match. Voltage high during driver low state (indicates short-to-power)	 ≤ 100 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 6.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Control Open Circuit (ELCP Sealed Fuel System)	P2400	Diagnoses the leak detection pump low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedence between signal and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Control Circuit Low (ELCP Sealed Fuel System)	P2401	Diagnoses the leak detection pump low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short to ground)	Short to ground: ≤ 0.5 Ω impedence between signal and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Control Circuit High (ELCP Sealed Fuel System)	P2402	Diagnoses the leak detection pump low side driver circuit for circuit faults. If the P2402 is active, an intrusive test is performed with the pump commanded on for 15 seconds.	Voltage low during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedence between signal and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Switching Valve Control Open Circuit (ELCP Sealed Fuel System)	P2418	Diagnoses the switching valve low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedence between signal and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Switching Valve Control Circuit Low (ELCP Sealed Fuel System)	P2419	Diagnoses the switching valve low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short to ground)	Short to ground: ≤ 0.5 Ω impedence between signal and controller ground			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Switching Valve Control Circuit High (ELCP Sealed Fuel System)	P2420	Diagnoses the switching valve low side driver circuit for circuit faults. If the P2420 is active, an intrusive test is performed with the switching valve commanded on for 15 seconds.	Voltage low during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedence between signal and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP System Vent Valve Stuck Closed (ELCP Sealed Fuel System)	P2422	This DTC detects a Diurnal Control Valve (DCV) that is stuck closed.There are two ways to run this diagnostic depending on the amount of pressure or vacuum in the fuel tank system.	When sufficient pressure or vacuum exists in the fuel tank system When the Fuel Tank Pressure (FTP) sensor indicates a pressure or a vacuum With the DCV commanded opened, if the change in the FTP sensor reading is after then the DCV is stuck closed and the DTC fails. When no pressure or vacuum exists in the fuel tank system When the FTP sensor indicates a pressure or a vacuum With the DCV commanded opened, the ELCP switching valve in the pump position and the ELCP vacuum pump commanded on, if the 0.020" reference orifice vacuum measurement minus the ELCP pressure sensor (gauge) vacuum reading is	> 697 Pa < -697 Pa. < 249 Pa 10 seconds < 697 Pa > -697 Pa. < 300 Pa	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			after then the DCV is stuck closed and the DTC fails.	5 seconds	Refueling request button pressed Service bay test active Device control exceeds No Active DTC's	 0.5 seconds FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA P043E P043F P0451 P145C P145D P145F P2422 P2450 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Bank 1	P2430	This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on.	Average Pressure Error AND Signal Variation	< 0.50 kPa < 1.00 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not No active DTCs:	> 60 kPa > -12.0 deg C > -12.0 deg C < 38.0 > 10.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 3,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHi FA ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Stuck in range cumulative time > 5.0 seconds Frequency: Once per trip when SAI pump is commanded On	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Performance Bank 1	P2431	This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison.	Difference between AIR pressure sensor and BARO (Pump Commanded Off) or OR Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 14.0 kPa < -10.0 kPa > 50.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Transfer Case not in 4WD Low Run/crank active No active DTCs:	> 60 kPa > -12.0 deg C > -12.0 deg C < 38.0 > 10.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 3,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA MAF_SensorFA EngineMisfireDetected_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Skewed sensor cumulative test weight > 15.0 seconds Continuous 6.25ms loop Skewed sensor cumulatative test weight is based on distance from the last Baro update. See **Baro Skewed Sensor Weight Factor** table.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 1	P2432	This DTC detects an out of range low AIR pressure sensor signal	AIR Pressure Sensor signal	< 6 % of 5Vref for 800 failures out of 1,000 samples	No active DTCs:	ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA	1,000 samples (6.25 ms per sample) Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Hi Voltage Bank 1	P2433	This DTC detects an out of range high AIR pressure sensor signal	AIR Pressure Sensor signal	> 94 % of 5Vref for 800 failures out of 1,000 samples	No active DTCs:	ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA	1,000 samples (6.25 ms per sample) Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Shut-off Valve Stuck Open	P2440	This DTC detects if the AIR system control valve is stuck openThis test is run during Phase 2 (Pump commanded On, valve commanded closed)	Average Pressure Error or	< **Bank 1 Valve Pressure Error** table > 32 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Stability Time AIR diagnostic Phase 1 passed No active DTCs:	> 60 kPa > -12.0 deg C > -12.0 deg C < 38.0 > 10.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 3,000 RPM > 50 gm/s for 3.0 sec > 0.5 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFAAmbientAirDefault_NA IAT_SensorFAECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 2 Conditional test weight > 1.5 sec Frequency: Once per trip when AIR pump commanded On Conditional test weight is calculated by multiplying the following Factors: **Phase 2 Baro Test Weight Factor, Phase 2 MAF Test Weight Factor, Phase 2 System Volt Test Weight Factor, Phase 2 Ambient Temp Test Weight Factor** (see Supporting Tables)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pump Stuck On	P2444	This DTC detects if the SAI pump is stuck On. This test is run during Phase 3 (Pump commanded Off, valve commanded closed)	Average Pressure Error or	> **Bank 1 Pump Pressure Error** table < -32 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Stability Time AIR diagnostic Phase 1 passed AIR diagnostic Phase 2 passed No active DTCs:	> 60 kPa > -12.0 deg C > -12.0 deg C < 38.0 > 10.0 seconds > 10.0 Volts < 32.0 < 20 kPa for > 2.0 sec. < 3,000 RPM > 50 gm/s for > 3.0 sec. > 4.0 seconds Phase 3 cumulatative test weight is based on the distance from the last Baro update. See **Baro Skewed Sensor Weight Factor** table. AIRSystemPressureSensorFA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 3 Cumlatative test weight > 2.0 sec. Frequency: Once per trip when AIR pump commanded On	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ELCP Switching Valve Control Performance (ELCP Sealed Fuel System)	P2450	This DTC detects a ELCP switching valve that is stuck.	When the ELCP vacuum pump is commanded on and the ELCP switching valve transitions from vent to pump position, if the difference between the 1st 0.020” orifice reference vacuum measurement and the ELCP pressure sensor (gauge) vacuum reading is after then the ELCP switching value is stuck and the DTC fails.	< 400 Pa 5 seconds	Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh Max fuel level slosh Key up during test Refueling request button pressed Service bay test active	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 % ≤ 200 %	Up to once per trip, for each required wake-up event 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Device control exceeds	0.5 seconds		
					No Active DTC's	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P145C P145D P2422 P24B9		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Performance Diagnostic (ELCP Sealed Fuel System)	P24B9	ELCP Pressure Sensor Correlation Diagnostic	Propulsion System Not Active If the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter. This diagnostic runs for	> 3,000 Pa 14 seconds.	Propulsion System Not Active Propulsion system not active time Distance since assembly plant Drive distance Min baro Max baro Min fuel level Max fuel level ECT Min IAT Max IAT Time since last test when passing P0442/P0455 Time since last test when failing P0442/P0455 Voltage Vehicle speed Vehicle not in assembly plant (value must = 0) Propulsion system not active time Previous propulsion system active time Abort Conditions: Min fuel level slosh	4.3 ≤ time ≤ 5.8 hours or 6.0 ≤ time ≤ 8.1 hours or 8.2 ≤ time ≤ 11.0 hours ≥ 9.9 miles ≥ 0.1 miles ≥ 70 kPa ≤ 110 kPa ≥ 10 % ≤ 90 % ≤ 40 °C ≥ 4 °C ≤ 45 °C ≥ 0 hours ≥ 0 hours ≥ 10 volts ≤ 3 MPH 0 ≥ 0 seconds ≥ 0 seconds ≥ 190 %	Once or twice per trip with Propulsion System Not Active, for each required wake-up event First time diagnostic runs, 50 failures out of 63 samples Second time diagnostic runs, 50 failures out of 63 samples 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Max fuel level slosh Key up during test Refueling request button pressed Service bay test active Device control exceeds	≤ 200 % 0.5 seconds		
					No Active DTC's	FuelLevelDataFault IAT_SensorFA ECT_Sensor_FA VehicleSpeedSensor_FA AmbientAirDefault VentCircuit_FA ELCPCircuit_FA FTP_SensorCircuit_FA ELCP_PumpCircuit_FA ELCP_SwitchCircuit_FA VICM_WakeupDiag_FA VICM_WakeupDiag_TFTKO LostCommBCM_FA LostCommBusB_VICM_FA CommBusAOff_VICM_FA CommBusBOff_VICM_FA AccCktLo_FA ModuleOffTime_FA		
					No Active DTC's TFTKO	P043E P043F P0451 P145C P145D P145E P145F P2421 P2422 P2450		
			Propulsion System Active		Propulsion System Active			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			After a stabilization time of When a recent barometric pressure update has occurred within the last if the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter. When a recent barometric pressure update has not occurred within the last if the difference between the ELCP pressure sensor (absolute) reading and the barometric pressure value from the MAP sensor is then increment the fail counter.	10 seconds. 0.06 miles, > 15,000 Pa 0.06 miles, > 20,000 Pa	Min baro Max baro Min OAT Max OAT Vehicle not in assembly plant (value must = 0) Run/Crank Voltage Purge is not enabled Abort Conditions: Refueling request button pressed Device control exceeds FTP correlation diagnostic (P0451) is running Purge Low Flow diagnostic (P0497) is running No Active DTC's	≥ 70 kPa ≤ 110 kPa ≥ 4 °C ≤ 35 °C 0 ≥ 11 volts 0.5 seconds MAP_SensorFA EnginePowerLimited AmbientAirDefault OAT_EstAmbTemp_FA P0443 P0458 P0459 P145D P2400 P2401 P2402 P2418 P2419 P2420 P2450 P24BA P24BB	When Propulsion System Active 50 failures out of 63 samples 100 msec loop	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit Low Voltage (ELCP Sealed/ Vented Fuel System)	P24BA	This DTC will detect an ELCP pressure sensor signal that is too low out of range.	ELCP pressure sensor signal	< 0.70 volts (14 % of Vref or ~ 47 kPa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Leak Detection Pump Pressure Sensor Circuit High Voltage (ELCP Sealed/ Vented Fuel System)	P24BB	This DTC will detect an ELCP pressure sensor signal that is too high out of range.	ELCP pressure sensor signal	> 4.85 volts (97 % of Vref or ~ 123 kPa)			640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Accessory Position Circuit Low (EREV/ PHEV only)	P2537	This DTC checks for short to low voltage circuit failures during operation.	The ECM detects that the state of the accessory line is low when it should be high. The diagnostic is evaluated when Propulsion System Active time is > 5.0 seconds. Diagnostic fails when pass counts are	< 8 counts.			12.5 ms / sample Once per trip	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position Signal Output Circuit Low	P2618	Diagnoses the Crankshaft Position Signal Output low side driver circuit for circuit faults	Voltage low during driver off state (indicates short-to-ground or open circuit)	Short to ground: <= 0.5 Ohms impedance between signal and controller ground Open Circuit: >= 200 K Ohms impedance between signal and controller ground	Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded high	>= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips Note: In certain controllers P2617 may also set (Crankshaft Position Signal Output Circuit / Open)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position Signal Output Circuit High	P2619	Diagnoses the Crankshaft Position Signal Output low side driver circuit for circuit faults	Voltage low during driver on state (indicates short-to-power)	Short to power: <= 0.5 Ohms impedance between signal and controller power	Powertrain Relay Voltage Engine is not cranking Crankshaft Position Output is commanded low	>= 11.00 Volts	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor 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 > 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 Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Low	P263A	Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11 volts	50 failures out of 63 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 Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) High	P263B	Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults.	Voltage high during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11 volts	4 failures out of 5 samples 50 ms / sample	Type B, No MIL NO MIL

Component/ System	Fault Code	Monitor 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 exceeds	4 counts (equivalent to 0.05 seconds)	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type A, 1 Trips
					U0073	Not Active on Current Key Cycle		
			before the sample time of is reached	0.56 seconds	Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCAND_b_OffKeyCycleDiagEnbl	= 0 (1 indicates enabled)		
					Ignition Accessory Line and Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds			
					CAN hardware is bus OFF for	> 0.1125 seconds		

Component/ System	Fault Code	Monitor 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 exceeds before the sample time of is reached	4 counts (equivalent to 0.05 seconds) 0.56 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds CAN hardware is bus OFF for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00 > 0.1125 seconds	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor 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 Message $0AB Message $0BD Message $0C7 Message $0F9 Message $189 Message $199 Message $19D Message $1AF Message $1BE Message $1BF Message $1F5 Message $4C9	 ≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U0101	Not Active on Current Key Cycle		
					TCM	is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Fuel Pump Control Module	U0109	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for Message $1EB Message $4D9	 ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U0109	Not Active on Current Key Cycle		
					Fuel Pump Control Module	is present on the bus		

Component/ System	Fault Code	Monitor 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 (OBD Module ID 7E5).	Message is not received from controller for Message $0C1 Message $0C5 Message $0D1 Message $1C6 Message $1C7 Message $1E9 Message $2F1 Message $2F9	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for	> 0.4000 seconds		
					U0129	Not Active on Current Key Cycle		
					Brake System Control Module	is present on the bus		

Component/ System	Fault Code	Monitor 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	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type C, No MIL "Special Type C"

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for			
					U0140	Not Active on Current Key Cycle		
					Body Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Electric A/C Compressor Control Module	U016B	This DTC monitors for a loss of communication with the Electric A/C Compressor Control Module.	Message is not received from controller for Message $222	≥ 10.00 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					not active for U016B Electric A/C Compressor Control Module	 Not Active on Current Key Cycle is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module	U0293	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module.	Message is not received from controller for Message $0B4 Message $0D3 Message $164 Message $186 Message $1DF Message $3C1	 ≥ 10.0 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Network Management is not active for	> 0.4000 seconds		
					U0293	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module B	U179A	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B	Message is not received from controller for	≥ 10.0 seconds	General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					U0073	Not Active on Current Key Cycle		
					Normal CAN transmission on Bus A	Enabled		
					Device Control	Not Active		
					High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
					Ignition voltage	>= 11.00 or >= 6.41		
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCAND_b_OffKeyCycleDiagEnbl	= 0 (1 indicates enabled)		
					Ignition Accessory Line and Battery Voltage	= Active > 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds			
					Power Mode is in			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U179A	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B	is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module on Bus B	U1817	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B	Message is not received from controller for Message $0A7 Message $0A9 Message $181 Message $1D3 Message $1D7 Message $1E3 Message $281 Message $291	 ≥ 0.5 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 0.5 seconds ≥ 0.5 seconds ≥ 0.5 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for >	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					3.0000 seconds			
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for	> 0.4000 seconds		
					U1817	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module	is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Hybrid Powertrain Control Module B on Bus B	U182D	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module B on Bus B	Message is not received from controller for		General Enable Criteria:		Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
					U0074	Not Active on Current Key Cycle		
			Message $1D8	≥ 10.0 seconds	Normal CAN transmission on Bus B	Enabled		
			Message $3C5	≥ 10.0 seconds	Device Control	Not Active		
			Message $3DA	≥ 10.0 seconds	High Voltage Virtual Network Management	Not Active		
					Ignition Voltage Criteria:			
			Message $3FF	≥ 10.0 seconds	Ignition voltage	>= 11.00 or >= 6.41		
			Message $4C2	≥ 10.0 seconds				
					Power Mode	= run		
					Off Cycle Enable Criteria:			
					KeCAND_b_OffKeyCycleDiagEnbl	= 0 (1 indicates enabled)		
					Ignition Accessory Line and	= Active		
					Battery Voltage	> 11.00		
					General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds			
					Power Mode is in accessory or run or crank and High Voltage Virtual			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Network Management is not active for	> 0.4000 seconds		
					U182D	Not Active on Current Key Cycle		
					Hybrid Powertrain Control Module B (VICM)	is present on the bus		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-Function Input B Circuit	P0589	Detect when cruise control multi-function switch circuit B (analog) voltage is in an illegal range	Cruise Control analog circuit B voltage must be in an "illegal range" or "between ranges" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	MIL: Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-Function Input B Circuit Low	P0592	detects short to ground failure for cruise multi-function switch circuit B	Cruise Control analog circuit B voltage must be in an "Open Short To Ground" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi-Function Input B Circuit High	P0593		Cruise Control analog circuit B voltage must be in an "Short To Power" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 2.00 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	If x of y rolling count / protection value faults occur, disable adaptive cruise control for duration of fault		Adaptive Cruise Control Command Serial Data Error Diagnostic Enable	1.00	10 / 16 counts	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set/ Coast Signal 2 Circuit	P155B	Detects a failure of the cruise set 2 switch in a continously applied state	Cruise Control Set 2 switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	Cruise Control Resume 2 switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 89.000 seconds	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	If x of y rolling count / protection value faults occur, disable collision preparation system for duration of fault		Front Object Detection Module Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	If x of y rolling count / protection value faults occur, disable rear virtual bumper or collision preparation system for duration of fault		Automatic Braking Engine Torque Request Serial Data Error Diagnostic Enable	1.00	4 / 10 counts	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor 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	 ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycleDiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type C, No MIL Special Type C

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Network Management is not active for	> 0.4000 seconds		
					U0104	Not Active on Current Key Cycle		
					Cruise Control Module	is present on the bus		

Closed Loop Enable Clarification: Calibration values are in the Supporting Tables

Engine run time greater than
KtFSTA_t_ClosedLoopAutostart **(HYBRID ONLY)**

AutoStart Coolant	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Close Loop Enable Time	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11

and
KtFSTA_t_ClosedLoopTime

Start-Up Coolant	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Close Loop Enable Time	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11

and pre converter 02 sensor voltage less than
KfFULC_U_O2_SensorReadyThrsh Lo

Voltage < *XXXX* milliVolts

for
KcFULC_O2_SensorReadyEvents

Time (events * 12.5 milliseconds) > *XXXX* events

and
COSC (Converter Oxygen Storage Control) not enabled
and
Consumed AirFuel Ratio is stoichiometry i.e. not in component protection
and
POPD or Catalyst Diagnostic not intrusive
and
Turbo Scavenging Mode not enabled
and
All cylinders whose valves are active also have their injectors enabled
and
O2S_Bank_ 1_TFTKO, O2S_Bank_ 2_TFTKO, FuelInjectorCircuit_FA and CylnderDeacDriverTFTKO = False

Long Term FT Enable Criteria

Closed Loop Enable Clarification: Calibration values are in the Supporting Tables

Closed Loop Enable and Coolant greater than KfFCLL_T_AdaptiveLoCoolant

Coolant > *XXXX* Celcius

or less than KfFCLL_T_AdaptiveHiCoolant

Coolant < *XXXX* Celcius

and
KtFCLL_p_AdaptiveLowMAP_Limit

Barometric Pressure	X1	X2	X3	X4	X5	X6	X7	X8	X9
Manifold Air Pressure	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9

and
TPS_ThrottleAuthorityDefaulted = False
and
Flex Fuel Estimate Algorithm is not active
and
Excessive fuel vapors boiling off from the engine oil algorithm (BOFR) is not enabled
and
Catalyst or EVAP large leak test not intrusive

Secondary Fuel Trim Enable Criteria

Closed Loop Enable and KfFCLP_U_O2ReadyThrshLo

Voltage < *XXXX* milliVolts

for
KcFCLP_Cnt_O2RdyCyclesThrsh

Time (events * 12.5 milliseconds) > *XXXX* events

Long Term Secondary Fuel Trim Enable Criteria

KtFCLP_t_PostIntglDisableTime

Closed Loop Enable Clarification: Calibration values are in the Supporting Tables

Start-Up Coolant X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Post Integral Enable Time Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11

Plus
KtFCLP_t_PostIntglRampInTime

Start-Up Coolant X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Post Integral Ramp In Time Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11

and
KeFCLP_T_IntegrationCatalystMax
Modeled Catalyst Temperature < *XXXX*Celcius
and
KeFCLP_T_IntegrationCatalystMin
Modeled Catalyst Temperature > *XXXX*Celcius
and
PO2S_Bank_1_Snsr_2_FA and
PO2S_Bank_2_Snsr_2_FA = False
and
(KeFCLP_Pct_CatAccuSlphrPostDsbl

Modeled converter sulfur percent < XXXX Percent

and
Post Integral < KaFCLP_U_SlphrIntglOfst_Thrsh)

X axis: Post O2 Sensor
Y axis: Post O2 Mode
Z: Post Integral threshold

Initial Supporting table - Multiple DTC Use_Green Sensor Delay Criteria - Airflow

Description: This Calibration is the airflow (in gps) above which the green airflow is acculmulated to expire the condition.

Notes: Used for: P0133, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P0153, P015A, P015B, P015C, P015D, P1133, P1153, P2270, P2271, P2272 and P2273. The specific diagnostic (from summary table) will not be enabled until the next ignition cycle after the airflow criteria below (by sensor location) has been met:

y/x	1
1	22

Initial Supporting table - Multiple DTC Use_Green Sensor Delay Criteria - Limit

Description: This Calibration is the acculmulated airflow (in grams) limit above which the green condition is expired

Notes: Used for: P0133, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P0153, P015A, P015B, P015C, P015D, P1133, P1153, P2270, P2271, P2272 and P2273. Note: This feature is only enabled when the vehicle is new and cannot be enabled in service

y/x	CiOXYR_O2_Bank1_Sensor1	CiOXYR_O2_Bank1_Sensor2	CiOXYR_O2_Bank2_Sensor1	CiOXYR_O2_Bank2_Sensor2
1	120,000	120,000	120,000	120,000

Initial Supporting table - P0011_CamPosErrorLimIc1

Description: P0011 - Cam Position Error Limit for performance diagnostic

Notes: KtPHSD_phi_CamPosErrorLimIc1

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,200	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,600	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,000	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,200	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,600	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,000	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,200	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,600	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,000	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Initial Supporting table - P0011_P0021_P05CC_P05CD_EngOilPressEnblIc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

Notes: KtPHSC_t_EngOilPressEnblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8	8	8	4	2	1	1	1	1	1	1	1	1	1	1	1	2

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdHiDsblIc

Description: Intake cam is disabled when engine speed exceeds this value

Notes: KtPHSC_n_HiEngSpdHiDsblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdLoEnblIc

Description: Intake cam is enabled when engine speed remains below this value

Notes: KtPHSC_n_HiEngSpdLoEnblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresHiEnblIc

Description: Intake cam is enabled when oil pressure exceeds this value

Notes: KtPHSC_p_LoPresHiEnblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoPresLoDsblIc

Description: Intake cam is disabled when oil pressure falls below this value

Notes: KtPHSC_p_LoPresLoDsblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmHiEnblIc

Description: Intake cam is enabled when engine speed exceeds this value.

Notes: KtPHSC_n_LoRpmHiEnblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200

Initial Supporting table - P0011_P0021_P05CC_P05CD_LoRpmLoDsblIc

Description: Intake cam is disabled when engine speed is below this value.

Notes: KtPHSC_n_LoRpmLoDsblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	1,100	1,100	1,100	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,100	1,100	1,100	1,100

Initial Supporting table - P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning

Description: Engine running time must be greater than this threshold during a cold start to enable cam phasing

Notes: KtPHSR_t_ColdStartEngRunning

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8	8	4	0	0	0	0	0	1	1	1	1	1	1	1	1	2

Initial Supporting table - P0011_P05CC_StablePositionTimeIc1

Description: P0011 - Delay after transient move

Notes: KtPHSD_t_StablePositionTimeIc1

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	51.5	41.5	11.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P0011_PerfMaxIc1

Description: P0011 - Range of phaser travel where diagnostic cannot make a decision if both desired & measured positions are greater than this value

Notes: From Calculation Table CalcPerfMaxIc1: <KePHSD_phi_MaxTravelInt>-<KtPHSD_phi_CamPosErrorLimIc1>

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
2	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
3	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
4	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
6	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
7	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
8	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
9	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
10	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
11	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
12	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
13	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
14	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
15	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
16	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
17	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5

Initial Supporting table - P0014_CamPosErrorLimEc1

Description: P0014 - Cam Position Error Limit for performance diagnostic

Notes: KtPHSD_phi_CamPosErrorLimEc1

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,200	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1,600	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,000	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
2,800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,200	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3,600	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,000	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
4,800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,200	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
5,600	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,000	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,400	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6,800	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Initial Supporting table - P0014_P0024_P05CE_P05CF_EngOilPressEnblEc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met

Notes: KtPHSC_t_EngOilPressEnblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8	8	8	4	2	1	1	1	1	1	1	1	1	1	1	1	2

Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc

Description: Exhaust cam is disabled when engine speed exceeds this value

Notes: KtPHSC_n_HiEngSpdHiDsblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000

Initial Supporting table - P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc

Description: Exhaust cam is enabled when engine speed remains below this value

Notes: KtPHSC_n_HiEngSpdLoEnblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresHiEnblEc

Description: Exhaust cam is enabled when oil pressure exceeds this value

Notes: KtPHSC_p_LoPresHiEnblIc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoPresLoDsblEc

Description: Exhaust cam is disabled when oil pressure falls below this value

Notes: KtPHSC_p_LoPresLoDsblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc

Description: Exhaust cam is enabled when engine speed exceeds this value.

Notes: KtPHSC_n_LoRpmHiEnblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200

Initial Supporting table - P0014_P0024_P05CE_P05CF_LoRpmLoDsblEcv

Description: Exhaust cam is disabled when engine speed is below this value.

Notes: KtPHSC_n_LoRpmLoDsblEc

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,050	1,000	1,000	1,000	1,000	1,100	1,100	1,100	1,100

Initial Supporting table - P0014_P05CE_StablePositionTimeEc1

Description: P0014 - Delay after transient move

Notes: KtPHSD_t_StablePositionTimeEc1

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	20.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	51.5	41.5	11.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P0014_PerfMaxEc1

Description: P0014 - Range of phaser travel where diagnostic cannot make a decision if both desired & measured positions are greater than this value

Notes: From Calculation Table CalcPerfMaxEc1: <KePHSD_phi_MaxTravelExh>-<KtPHSD_phi_CamPosErrorLimEc1>

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	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	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	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	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
5	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
6	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
7	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
8	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
9	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
10	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
11	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
12	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
13	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
14	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
15	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
16	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
17	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 - P00B6_Fail if power up ECT exceeds RCT by these values

Description: KtTHMD_T_DCRD_FastFailTempDiff

Notes: X axis is IAT Temperature at Power up (° C), Z axis is the Fast Failure temp difference (° C) The 17 X-axis breakpoints for the table below are (L to R) -40, -28, -16, -4, 8, 20, 32, 44, 56, 68, 80, 92, 104, 116, 128, 140 and 152. Note: Remove for applications with single coolant sensor

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

Initial Supporting table - P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on MAF Est

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on MAF Est

Notes:

y/x	0	50	70	73	76	79	82	85	89	95	100	110	120	150	200	280	350
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on RPM

Notes:

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,500
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

Notes:

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,500
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

Notes:

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,500
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Notes:

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,500
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0116_Fail if power up ECT exceeds IAT by these values

Description: KtECTD_T_HSC_FastFailTempDiff

Notes: X axis is IAT Temperature at Power up (° C), Z axis is the Fast Failure temp difference (° C)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

Initial Supporting table - P0128_Maximum Total Energy transferred to Cooling System for IAT and Start-up ECT conditions (Alt Test)

Description: KaECTD_E_EnergyLevelStartRun_kJ[1]

Notes: Z axis is the cooling system energy failure threshold (grams), X axis is ECT Temperature at Power up (° C) Note: Remove for applications with dual coolant sensor (Old Energy based version)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80
1	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000	1,000	500

Supporting table - P0128_Maximum Total Energy transferred to Cooling System for IAT and Start-up ECT conditions (Primary Test)

Description: KaECTD_E_EnergyLevelStartRun_kJ[0]

Notes: Z axis is the cooling system energy failure threshold (grams), X axis is ECT Temperature at Power up (° C) Note: Remove for applications with dual coolant sensor (Old Energy based version)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80
1	10,000	9,000	8,000	7,000	6,000	5,000	4,000	3,000	2,000	1,000	500

Initial Supporting table - P0133_O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold table"v

Description: KaEOSD_x_ST_ResponseLimRS1[x][y]

Notes: X axis is Lean to Rich response time (in sec), Please see the table below named "KnEOSD_t_ST_LRC_LimRS1" for the 17 X axis table breakpoints. Y axis is Rich to Lean response time (sec), Please see the cal table below named "KnEOSD_t_ST_RLC_LimRS1" for the 17 Y axis table breakpoints. Z axis is the pass/fail result, Note: If the cell contains a "0" then the fault is indicated, if it contains a "1" a fault is not indicated.

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
3	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
13	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
14	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
15	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage

Description: Identifies which Long Term Fuel Trim Cell I.D.s are used for diagnosis. Only cells identified as "CeFADD_e_NonSelectedCell" are not used for diagnosis.

Notes: DTCs: P0171, P0172, P0174, P0175; Calibration Name: KaFADD_e_SelectCellSet; Axis is Long Term Fuel Trim Cell I.D.

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_NonSelectedCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_NonSelectedCell

Initial Supporting table - P0300 EngineOverSpeedLimit

Description: Engine OverSpeed Limit versus gear

Notes: Used for P0300-P0308. Cal Name: KaEOSC_n_EngOvrspdLimitGear

P0300 EngineOverSpeedLimit - Part 1

y/x	CeTGRR_e_TransGr1	CeTGRR_e_TransGr2	CeTGRR_e_TransGr3	CeTGRR_e_TransGr4	CeTGRR_e_TransGr5	CeTGRR_e_TransGr6
1	4,900	4,900	4,900	4,900	4,900	4,900

P0300 EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGrEVT1	CeTGRR_e_TransGrEVT2	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	
1	4,900	4,900	2,000	2,000	2,000	

Initial Supporting table - P0300 Number of Normals

Description: 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.

Notes: Used for P0300-P0308. Cal Name: KaMSFD_Cnt_NumOfNormalsFil

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 - P0300 Ring Filter

Description: 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.

Notes: Used for P0300-P0308. Cal Name: KaMSFD_Cnt_RingFilter

y/x	0	1	2	3	4	5	6	7	8
1	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Initial Supporting table - P0300_Abnormal Cylinder Mode

Description: Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Cylinder Mode Equation)

Notes: Used for P0300-P0308. Cal Name: KaMSFD_Cnt_CylAbnormal

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 - P0300_Abnormal Rev Mode

Description: Abnormal Rev Mode Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (Rev Mode Equation)

Notes: Used for P0300-P0308. Cal Name: KaMSFD_Cnt_RevAbnormal

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 - P0300_Abnormal SCD Mode

Description: Number of consecutive number of decelerating cylinders after the misfire that would be considered abnormal. (SCD Mode Equation)

Notes: Used for P0300-P0308. Cal Name: KaMSFD_Cnt_SCD_CylAbnormal

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 - P0300_AFM_Decel

Description: Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_DoDCylinderMode

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500
0	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
13	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
19	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
25	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
31	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
38	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
44	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
50	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
56	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
63	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
69	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
75	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
81	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
88	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
94	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
100	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 - P0300_Catalyst_Damage_Misfire_Percentage

Description: Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.

Notes: Used for P0300-P0308. Cal Name: KtMSFD_Pct_CatalystMisfire

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
0	24.6	24.6	24.6	24.6	12.1	7.9	7.9	7.9
10	24.6	24.6	24.6	24.6	12.1	7.9	7.9	7.9
20	24.6	24.6	24.6	12.1	12.1	7.9	7.9	7.9
30	12.1	12.1	12.1	12.1	7.9	5.9	5.9	5.9
40	12.1	12.1	12.1	12.1	5.9	4.6	4.6	4.6
50	12.1	12.1	12.1	7.9	4.6	4.6	4.6	4.6
60	12.1	12.1	12.1	4.6	4.6	4.6	4.6	4.6
70	12.1	12.1	12.1	4.6	4.6	4.6	4.6	4.6
80	12.1	12.1	12.1	4.6	4.6	4.6	4.6	4.6
90	12.1	12.1	12.1	4.6	4.6	4.6	4.6	4.6
100	12.1	12.1	12.1	4.6	4.6	4.6	4.6	4.6

Initial Supporting table - P0300_CylMode_Decel

Description: Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_CylinderMode

y/x	400	500	600	700	800	900	1,000	1,100	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	6,500	7,000
8	5,000	5,000	4,000	2,500	2,500	2,000	800	800	800	550	380	300	145	140	120	90	85	70	25	20	15	15	15	15	15	15
9	5,000	5,000	4,000	2,500	2,500	2,000	750	750	750	475	310	285	138	130	100	80	75	60	16	12	11	10	10	10	10	10
11	5,000	5,000	4,000	2,500	2,500	2,000	700	700	700	475	250	245	127	123	95	70	55	50	18	13	12	8	8	8	8	8
12	5,000	5,000	4,000	2,500	2,500	2,000	750	750	750	475	260	255	130	125	98	70	55	50	20	14	13	9	9	9	9	9
13	5,000	5,000	4,000	2,500	2,500	2,000	800	800	800	533	285	280	135	130	100	70	55	50	22	15	14	9	9	9	9	9
15	5,000	5,000	4,000	2,500	2,500	2,000	850	850	850	535	290	285	150	140	105	75	55	50	23	18	18	9	9	9	9	9
17	5,000	5,000	4,000	2,500	2,500	2,000	1,100	1,100	1,100	575	388	310	160	160	110	80	65	55	25	19	18	10	10	10	10	10
19	5,000	5,000	4,000	2,500	2,500	2,000	1,200	1,200	1,200	650	390	315	210	180	125	90	70	65	30	20	19	11	11	11	11	11
22	5,000	5,000	4,000	2,500	2,500	2,000	1,400	1,400	1,400	825	400	325	235	200	140	100	75	75	35	23	20	12	12	12	12	12
25	5,000	5,000	4,000	2,500	2,500	2,000	1,450	1,450	1,450	850	450	390	240	235	200	125	100	85	40	24	21	12	12	12	12	12
29	5,000	5,000	4,000	2,500	2,500	2,000	1,500	1,500	1,500	950	550	390	310	270	200	125	120	90	40	30	23	15	15	15	15	15
33	5,000	5,000	4,000	2,500	2,500	2,000	1,600	1,600	1,600	1,000	600	390	315	295	210	125	120	90	40	33	24	18	18	18	18	18
38	5,000	5,000	4,000	2,500	2,500	2,000	1,800	1,800	1,800	1,050	650	390	315	310	210	125	120	120	60	33	30	23	23	23	23	23
42	5,000	5,000	4,000	2,500	2,500	2,000	1,900	1,900	1,900	1,400	800	500	320	320	210	125	120	120	69	44	40	28	28	28	28	28
48	5,000	5,000	4,000	2,500	2,500	2,000	2,000	2,000	2,000	1,425	900	525	320	320	315	220	130	130	80	53	42	34	34	34	34	34
54	5,000	5,000	4,000	2,500	2,500	2,000	2,000	2,000	2,000	1,450	1,000	525	360	360	350	250	235	145	90	56	46	41	41	41	41	41
61	5,000	5,000	4,000	2,500	2,500	2,000	2,000	2,000	2,000	1,800	1,300	855	450	375	365	300	260	150	100	65	60	44	44	44	44	44

Initial Supporting table - P0300_CylMode_Jerk

Description: Crankshaft jerk threshold. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_ddt_CylinderMode

y/x	400	500	600	700	800	900	1,000	1,100	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	6,500	7,000
8	5,000	5,000	4,000	2,500	2,500	2,000	1,300	1,300	1,300	600	400	350	250	240	160	140	120	90	45	35	30	25	25	25	25	24
9	5,000	5,000	4,000	2,500	2,500	2,000	1,250	1,250	1,250	475	350	300	240	220	150	120	100	80	38	27	24	17	17	17	17	16
11	5,000	5,000	4,000	2,500	2,500	2,000	1,200	1,200	1,200	475	300	275	220	180	135	105	90	70	39	28	24	17	17	17	17	16
12	5,000	5,000	4,000	2,500	2,500	2,000	1,200	1,200	1,200	600	305	280	220	190	140	110	95	77	40	29	24	17	17	17	17	16
13	5,000	5,000	4,000	2,500	2,500	2,000	1,200	1,200	1,200	752	310	285	225	220	165	125	105	78	40	30	24	17	17	17	17	16
15	5,000	5,000	4,000	2,500	2,500	2,000	1,200	1,200	1,200	775	325	290	225	220	170	130	110	85	40	33	24	19	19	19	19	18
17	5,000	5,000	4,000	2,500	2,500	2,000	1,450	1,450	1,450	800	400	350	230	225	175	130	115	88	40	33	26	21	21	21	21	20
19	5,000	5,000	4,000	2,500	2,500	2,000	1,600	1,600	1,600	925	500	360	235	230	180	130	120	92	40	33	30	26	26	26	26	25
22	5,000	5,000	4,000	2,500	2,500	2,000	1,700	1,700	1,700	935	600	375	240	235	190	130	120	94	40	33	33	30	30	30	30	29
25	5,000	5,000	4,000	2,500	2,500	2,000	1,750	1,750	1,750	950	650	400	245	240	200	130	120	95	40	33	33	33	33	33	33	32
29	5,000	5,000	4,000	2,500	2,500	2,000	1,775	1,775	1,775	975	750	400	315	300	210	130	120	95	40	33	33	33	33	33	33	32
33	5,000	5,000	4,000	2,500	2,500	2,000	1,800	1,800	1,800	1,050	850	400	320	300	210	130	120	95	40	33	33	33	33	33	33	32
38	5,000	5,000	4,000	2,500	2,500	2,000	1,900	1,900	1,900	1,100	950	400	320	315	210	130	120	120	60	33	33	33	33	33	33	32
42	5,000	5,000	4,000	2,500	2,500	2,000	2,000	2,000	2,000	1,425	1,275	700	320	320	210	130	120	120	69	44	40	40	40	40	40	39
48	5,000	5,000	4,000	2,500	2,500	2,500	2,100	2,100	2,100	1,450	1,325	770	320	320	320	220	130	130	80	53	42	42	42	42	42	41
54	5,000	5,000	4,000	2,500	2,500	2,500	2,200	2,200	2,200	1,500	1,350	775	375	375	370	355	245	145	90	56	46	46	46	46	46	45
61	5,000	5,000	4,000	2,500	2,500	2,500	2,300	2,300	2,300	1,850	1,400	860	625	550	510	360	260	150	100	65	60	58	58	58	58	57

Initial Supporting table - P0300_IdleCylModeDecel

Description: Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMSFD_dt_IdleCylinderMode

y/x	1,250	1,300	1,350	1,375	1,400	1,425	1,450	1,500	1,600	1,700	1,800	1,900	2,000
8	600	550	550	550	550	550	550	380	380	300	300	145	145
9	800	500	500	500	500	500	500	310	310	285	285	138	138
11	750	500	500	500	500	500	500	250	250	245	245	127	127
12	700	500	500	500	500	500	500	260	260	255	255	130	130
13	750	500	500	500	500	500	500	285	285	280	280	135	135
15	800	500	500	500	500	500	500	290	290	285	285	150	150
17	850	500	500	500	500	500	500	388	388	310	310	160	160
19	1,100	250	250	250	250	250	250	390	390	315	315	210	210
22	1,200	400	400	400	400	400	400	400	400	325	325	235	235
25	1,400	480	480	480	480	480	480	450	450	390	390	240	240
29	1,700	495	495	495	495	495	495	550	550	390	390	310	310
33	2,300	650	650	650	650	650	650	600	600	390	390	315	315
38	2,800	750	750	750	750	750	750	650	650	390	390	315	315
42	3,000	825	825	825	825	825	825	800	800	500	500	320	320
48	3,400	850	850	850	850	850	850	900	900	525	525	320	320
54	3,700	875	875	875	875	875	875	1,000	1,000	525	525	360	360
60	3,800	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	855	855	450	450

Initial Supporting table - P0300_IdleCylModeJerk

Description: Crankshaft jerk threshold. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMSFD_ddt_IdleCylinderMode

y/x	1,250	1,300	1,350	1,375	1,400	1,425	1,450	1,500	1,600	1,700	1,800	1,900	2,000
8	1,300	550	550	550	550	550	550	400	400	350	350	250	250
9	1,250	500	500	500	500	500	500	350	350	300	300	240	240
11	1,200	500	500	500	500	500	500	300	300	275	275	220	220
12	1,300	500	500	500	500	500	500	305	305	280	280	220	220
13	1,400	500	500	500	500	500	500	310	310	285	285	225	225
15	1,500	500	500	500	500	500	500	325	325	290	290	225	225
17	1,600	500	500	500	500	500	500	400	400	350	350	230	230
19	1,800	500	500	500	500	500	500	500	500	360	360	235	235
22	2,000	525	500	500	500	500	500	600	600	375	375	240	240
25	2,500	600	600	600	600	600	600	650	650	400	400	245	245
29	3,500	610	610	610	610	610	610	750	750	400	400	315	315
33	4,500	675	675	675	675	675	675	850	850	400	400	320	320
38	5,000	800	800	800	800	800	800	950	950	400	400	320	320
42	5,500	825	825	825	825	825	825	1,275	1,275	700	700	320	320
48	5,600	850	850	850	850	850	850	1,325	1,325	770	770	320	320
54	5,750	875	875	875	875	875	875	1,350	1,350	775	775	375	375
60	4,000	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	860	860	625	625

Initial Supporting table - P0300_IdleSCD_Decel

Description: Crankshaft decel threshold while in SCD mode. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_dt_SCD_IdleMode
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)

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
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
9	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
11	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
13	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
15	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
17	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
19	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
25	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
29	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
33	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
38	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
42	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
48	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
54	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

Initial Supporting table - P0300_IdleSCD_Jerk

Description: Crankshaft jerk threshold while in SCD mode. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_ddt_SCD_IdleMode

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
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
9	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
11	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
13	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
15	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
17	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
19	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
25	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
29	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
33	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
38	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
42	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
48	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
54	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

Initial Supporting table - P0300_Max_PatternMultiplier

Description: Crankshaft should return to normal after the misfire. If crankshaft snap value after the misfire being evaulated is larger than the misfire's Jerk threshold times this multiplier, its not a real misfire. However, if random misfire occurs every engine cycle, more noise is allowed to be considered "normal" since the crankshaft does not have time to fully return to normal before the next misfire occurs.

Notes: Used for P0300-P0308. Cal Name: KtMSFD_K_SCD_MaxPttrnRecogMult

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Initial Supporting table - P0300_Min_PatternMultiplier

Description: Crankshaft should return to normal after the misfire. If crankshaft snap value after single isolated misfire being evaulated is larger than the misfire's Jerk threshold times this multiplier, its not a real misfire.

Notes: Used for P0300-P0308. Cal Name: KtMSFD_K_SCD_MinPttrnRecogMult

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85

Initial Supporting table - P0300_RevMode_Decel

Description: Crankshaft decel threshold. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_RevolutionMode

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
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
9	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
11	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
13	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
15	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
17	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
19	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
25	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
29	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
33	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
38	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
42	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
48	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
54	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
61	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 - P0300_SCD_Decel

Description: Crankshaft decel threshold.   SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_dt_SCD_OffIdleMode

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
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
9	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
11	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
13	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
15	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
17	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
19	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
25	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
29	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
33	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
38	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
42	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
48	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
54	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
61	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 - P0300_SCD_Jerk

Description: Crankshaft jerk threshold. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Notes: Used for P0300-P0308. Cal Name: KtMISF_ddt_SCD_OffIdleMode

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
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
9	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
11	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
13	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
15	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
17	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
19	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
25	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
29	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
33	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
38	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
42	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
48	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
54	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
61	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 - P0300_TOSSRoughRoadThres

Description: Only used if Rough Road source = TOSS: dispersion value on Transmission Output Speed Sensor above which rough road is indicated present

Notes: Used for P0300-P0308. Cal Name: KtRRDI_a_RoughRoadThresh

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	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
500	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
700	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
800	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
900	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - P0300_WSSRoughRoadThres

Description: Only used if Wheel speed from ABS is used.   If difference between wheel speed readings is larger than this limit, rough road is present

Notes: Used for P0300-P0308. Cal Name: KtRRDI_a_WhlSpdRoughRoadLim

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04

Initial Supporting table - P0300_ZeroTorqBaro

Description: adjusts zero torque for altitude

Notes: Used for P0300-P0308. Cal Name: KtMSFD_K_ZeroTorqBaro

y/x	65	70	75	80	85	90	95	100	105
1	0.85	0.87	0.89	0.91	0.94	0.96	0.98	1.00	1.02

Initial Supporting table - P0300_ZeroTorqDoD

Description: Zero torque engine load while in Active Fuel Management

Notes: Used for P0300-P0308. Cal Name: KtMSFD_ZeroTorqDoD

y/x	400	500	600	700	800	900	1,000	1,100	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	6,500	7,000
1	10.70	9.90	9.25	8.70	8.30	8.20	8.10	8.10	8.10	8.10	8.20	8.25	8.30	8.35	8.40	8.45	8.60	8.65	10.99	13.33	15.67	18.01	20.36	22.70	25.04	27.38

Initial Supporting table - P0300_ZeroTorqueEngLoad

Description: %air load that represents Zero Brake torque along the Neutral rev line. The Zero torque threshold is adjusted for Baro via P0300_ZeroTorqueBaro

Notes: Used for P0300-P0308. Cal Name: KtMISF_ZeroTorqSpd

y/x	400	500	600	700	800	900	1,000	1,100	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	6,500	7,000
1	5.79	5.79	5.79	5.79	5.79	5.73	5.58	5.28	5.63	5.75	7.20	7.80	8.10	8.15	8.30	8.40	8.50	8.60	12.21	14.61	17.00	19.40	21.79	24.19	26.58	28.98

Initial Supporting table - P0324_P0326_P0331_AbnormalNoise_CylsEnabled

Description: Specifies which cylinders will be used for the Abnormal Noise portion of the performance diagnostics (1 = cylinder used, 0 = cylinder not used)

Notes: Used for P0324, P0326 and P0331. Cal name: KaKNKD_b_PerfAbnIncludeCyl. x-axis = Cylinder number in firing order (i.e. Cyl 0 = first cylinder in firing order, Cyl 1 = second cylinder in firing order....)

A cal value = 1 specifies the cylinder is used for the Abnormal Noise diagnostic. A cal value = 0 specifies the cylinder is not used. Only the first four values in the table are relavent for a four-cylinder engine and only the first six values in the table are relavent for a six-cylinder engine.

Typically, all cylinders are used. Cylinders are only excluded if the signal from that cylinder is weak and there is no separation between normal and faulted conditions (can occur if the sensor location results in poor signal-to-noise ratio for a given cylinder).

y/x	0	1	2	3	4	5	6	7
1	1	1	1	1	0	0	0	0

Initial Supporting table - P0324_P0326_P0331_AbnormalNoise_Threshold

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic

Notes: Used for P0324, P0326 and P0331. Cal Name: KtKNKD_k_PerfAbnLimitLo. X-axis = Engine Speed (RPM). Diagnostic fails when VaKNKD_k_PerfCylAbnFiltIntnsity < KtKNKD_k_PerfAbnLimitLo

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.195	0.195	0.195	0.203	0.247	0.338	0.378	0.450	0.421	0.510	0.510	0.510	0.510	0.510	0.510	0.510	0.510

Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)

Description: Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)

Notes: Used for P0325 and P0330. Cal name: KtKNKD_k_OpenMax20K. x-axis = Engine Speed (RPM).

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.: KtKNKD_k_OpenMin20K < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMax20K.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	18.9473	18.9473	18.9473	18.4883	18.3750	18.4395	18.5195	18.4473	18.0586	17.1875	15.6699	13.3398	13.3398	13.3398	13.3398	13.3398	13.3398

Initial Supporting table - P0325_P0330_OpenCktThrshMax (Normal Noise)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

Notes: Used for P0325 and P0330. Cal name: KtKNKD_k_OpenMaxNN. x-axis = Engine Speed (RPM)

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.: KtKNKD_k_OpenMinNN < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMaxNN.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.0371	0.0410	0.0488	0.0566	0.0664	0.0762	0.0859	0.0957	0.1094	0.1309	0.1406	0.1504	0.1602	0.1699	0.1797	0.1895	0.2012

Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the 20 kHz method (see "OpenMethod" description)

Notes: Used for P0325 and P0330. Cal name: KtKNKD_k_OpenMin20K. x-axis = Engine Speed (RPM)

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.: KtKNKD_k_OpenMin20K < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMax20K.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	6.1602	6.1602	6.1602	6.0293	5.9980	6.0215	6.0566	6.0625	5.9902	5.8027	5.4531	4.8984	4.8984	4.8984	4.8984	4.8984	4.8984

Initial Supporting table - P0325_P0330_OpenCktThrshMin (Normal Noise)

Description: Knock Open Circuit Diagnostic Minimum Threshold when using the Normal Noise method (see "OpenMethod" description): When using the Normal Noise method (see "OpenMethod" description).

Notes: Used for P0325 and P0330. Cal name: KtKNKD_k_OpenMinNN. x-axis = Engine Speed (RPM)

Diagnostic fails when the filtered diagnostic output is between the OpenCktThrshMin and OpenCktThrshMax:
i.e.: KtKNKD_k_OpenMinNN < VaKNKD_k_OpenFiltIntensity < KtKNKD_k_OpenMaxNN.

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Initial Supporting table - P0325_P0330_OpenMethod

Description: Defines which Knock Open Circuit Diagnostic method to use.

Notes: Used for P0325 and P0330. Cal name: KtKNKD_e_OpenMethod. x-axis = Engine Speed Index, 500 to 8500 (RPM) by 500 rpm increments.

Selects 1 of 3 available methods: "20kHz Method", "Normal Noise Method," or "Disabled." The mode chosen dictates which set of threshold tables are used. Typically, either: A) the 20 kHz Method is used for all RPM or B) the 20 kHz Method is used for low/medium RPM and the Normal Noise Method is used for high RPM.

P0325_P0330_OpenMethod - Part 1

y/x	0	1	2	3	4
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod - Part 2

y/x	5	6	7	8	9
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod - Part 3

y/x	10	11	12	13	14
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz

P0325_P0330_OpenMethod - Part 4

y/x	15	16			
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz			

Initial Supporting table - P0531_Cold_Test_Threshold

Description: AC High Side Pressure Sensor Rationality Cold Test Threshold

Notes: For P0531: KtACCD_p_HSPRat_ColdTestTarget with X Axis is defined by KnACCD_T_HSPRat_ColdTestTarget

y/x	-20	0	20	60	100
1	150	250	600	1,300	1,500

Initial Supporting table - P0531_Cold_Test_Threshold_Axis

Description: Ambeint Temperature Axis for the Cold Test

Notes: For P0531: KnACCD_T_HSPRat_ColdTestTarget

y/x	1	2	3	4	5
1	-20	0	20	60	100

Initial Supporting table - P0531_Coolant _Weighting_Factor_Axis

Description: Coolant Weighting Factor Axis for Delta Predicted AC Pressure

Notes: For P0531: KnACCD_T_HSPRat_EngageTstCool

y/x	1	2	3	4	5	6	7	8	9
1	-40	-20	0	20	40	60	80	100	120

Initial Supporting table - P0531_Coolant_Weighting_Factor

Description: Coolant Weighting Factor for Delta Predicted AC Pressure

Notes: For P0531: KtACCD_k_HSPRat_EngageCoolCoeff with X Axis is Engine Coolant defined by KnACCD_T_HSPRat_EngageTstCool to weight the Delta Predicted Pressure

y/x	-40	-20	0	20	40	60	80	100	120
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Initial Supporting table - P0531_Delta_Predicted_ Pressure

Description: AC High Side Pressure Sensor Sensor Engage Test Predicted Delta Pressure

Notes: For P0531: KtACCD_p_HSPR_DeltaPredicted with X Axis is defined by KnACCD_T_HSPRat_EngageTstAmb and Y Axis is defined by KnACCD_v_HSPRat_EngageTstVehSpd

y/x	0	20	30	40	50	60	70	80	100
0	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
20	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
40	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
60	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
80	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
100	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
120	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
140	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00
160	40.00	50.00	60.00	70.00	75.00	80.00	100.00	100.00	100.00

Initial Supporting table - P0531_Delta_Predicted_Quality_Factor

Description: Delta Predicted Qualtiy Factor for the Engage Test

Notes: For P0531: KtACCD_k_HSPR_QualFactor with X Axis is defined by KnACCD_T_HSPRat_EngageTstAmb and Y Axis is defined by KnACCD_v_HSPRat_EngageTstVehSpd

y/x	0	20	30	40	50	60	70	80	100
0	0.05000	0.25800	0.42999	0.46333	0.53000	0.63000	0.71666	0.83667	0.99001
20	0.05000	0.23500	0.38000	0.42667	0.49333	0.58000	0.67334	0.80667	0.99001
40	0.05000	0.16000	0.28000	0.31334	0.39000	0.50999	0.61667	0.75999	0.95000
60	0.05000	0.14999	0.25999	0.28999	0.34666	0.44000	0.53999	0.69333	0.92999
80	0.05000	0.13750	0.25000	0.28334	0.33667	0.41000	0.49001	0.63000	0.88000
100	0.05000	0.12250	0.23000	0.26334	0.31334	0.38000	0.46001	0.57666	0.78000
120	0.05000	0.09999	0.20000	0.25333	0.29666	0.33000	0.40334	0.52000	0.73000
140	0.05000	0.09000	0.18500	0.22000	0.24666	0.28000	0.34666	0.39667	0.48000
160	0.05000	0.08499	0.17999	0.19333	0.20999	0.23000	0.28333	0.32666	0.41000

Initial Supporting table - P0531_Delta_Predicted_Weighting_Factor_X_Axis

Description: Ambient Temperature Axis for Delta Predicted AC Pressure

Notes: For P0531: KnACCD_T_HSPRat_EngageTstAmb used in both the Quality Factor and Delta Predicted table lookup

y/x	1	2	3	4	5	6	7	8	9
1	0	20	30	40	50	60	70	80	100

Initial Supporting table - P0531_Delta_Predicted_Weighting_Factor_Y_Axis

Description: Vehicle Speed Axis for Delta Predicted AC Pressure

Notes: For P0531: KnACCD_v_HSPRat_EngageTstVehSpd used in both the Quality Factor and Delta Predicted table lookup

y/x	1	2	3	4	5	6	7	8	9
1	0	20	40	60	80	100	120	140	160

Initial Supporting table - P0531_FanSpeed_Weighting_Factor

Description: FanSpeed Weighting Factor for Delta Predicted AC Pressure

Notes: For P0531: KtACCD_k_HSPRat_EngageFanCoeff with X Axis is Fan Speed as desfined by KnACCD_Pct_HSPRat_EngageTestFan to weight the Delta Predicted Pressure

y/x	10	20	30	40	50	60	70	80	95
1	1	1	1	1	1	1	1	1	0

Initial Supporting table - P0531_FanSpeed_Weighting_Factor_Axis

Description: FanSpeed Weighting Factor Axis for Delta Predicted AC Pressure

Notes: For P0531: KnACCD_Pct_HSPRat_EngageTstFan

y/x	1	2	3	4	5	6	7	8	9
1	10	20	30	40	50	60	70	80	95

Initial Supporting table - P0531_Off_Test_Threshold

Description: AC High Side Pressure Sensor Rationality Off Test Threshold

Notes: For P0531: KtACCD_p_HSPRat_OffTestPresMax with X Axis is defined by KnACCD_T_HSPRat_OffTestPresMax

y/x	0	20	40	60	100
1	1,000	1,400	1,800	2,000	2,300

Initial Supporting table - P0531_Off_Test_Threshold_Axis

Description: Ambeint Temperature Axis for the Off Test

Notes: For P0531: KnACCD_T_HSPRat_OffTestPresMax

y/x	1	2	3	4	5
1	0	20	40	60	100

Initial Supporting table - P0531_On_Test_Threshold

Description: AC High Side Pressure Sensor Rationality On Test Threshold

Notes: For P0531: KtACCD_p_HSPRat_OnTestPresMin with X Axis is defined by KnACCD_T_HSPRat_OnTestPresMin

y/x	0	20	40	60	100
1	65.0	195.0	260.0	325.0	455.0

Initial Supporting table - P0531_On_Test_Threshold_Axis

Description: Ambient Temperature Axis for the On Test

Notes: For P0531: KnACCD_T_HSPRat_OnTestPresMin

y/x	1	2	3	4	5
1	0	20	40	60	100

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.

Notes: P0606, KaPISD_t_LastSeedTimeout[x]

y/x	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
1	0.175	0.175	0.175	409.594

Initial Supporting table - P0606_Program Sequence Watch Enable f(Loop Time)

Description: The enabling flags for the program sequence watch as a function of operating loop time sequence.

Notes: P0606, KaPISD_b_ProgSeqWatchEnbl

y/x	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
1	1	1	1	1

Initial Supporting table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Notes: P0606, KaPISD_Cnt_SequenceFail[x]

y/x	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
1	3	3	3	3

Initial Supporting table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Notes: P0606, KaPISD_Cnt_SequenceSmpl[x]

y/x	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
1	4	4	4	4

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMax

Description: Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

Notes: Used for P0325 and P0330. Cal name: KtKNKD_k_OpenTestCktMax. x-axis = Engine Speed (RPM).

Diagnostic fails when the filtered diagnostic output is between the OpenTestCktThrshMin and OpenTestCktThrshMax:
i.e. KtKNKD_k_OpenTestCktMin < VaKNKD_k_OpenTestCktIntFilter < KtKNKD_k_OpenTestCktMax

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.275	0.275	0.275	0.275	0.328	0.379	0.531	0.732	0.988	1.303	1.678	2.119	2.631	3.219	3.883	4.631	5.465

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMin

Description: Knock Open Circuit Minimum Threshold for Internal Circuit Diagnostic. Used only when the 20 kHz method is being used (see "OpenMethod" description). The Open Test Circuit ensures that the internal circuit used to generate the 20 kHz signal for the Open Circuit diags (P0325, P0330) is within range.

Notes: Used for P0325 and P0330. Cal name: KtKNKD_k_OpenTestCktMin. x-axis = Engine Speed (RPM).

Diagnostic fails when the filtered diagnostic output is between the OpenTestCktThrshMin and OpenTestCktThrshMax:
i.e. KtKNKD_k_OpenTestCktMin < VaKNKD_k_OpenTestCktIntFilter < KtKNKD_k_OpenTestCktMax

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.074	0.074	0.074	0.084	0.104	0.133	0.170	0.211	0.258	0.307	0.355	0.402	0.447	0.488	0.523	0.551	0.568

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.

Notes: P1682, KtPMDD_U_PT_RelayPullInEnbl

y/x	23.00	85.00	95.00	105.00	125.00
1.00	7.00	8.70	9.00	9.20	10.00

Initial Supporting table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

Description: Engine Sync based and Time based delta pressure threshold above which Torque Security error is reported.

Notes: P16F3, KtMAPI_p_ES_TB_MAP_DeltaThresh

y/x	1,000.00	2,000.00	3,000.00	4,000.00	5,000.00	6,000.00
1.00	256.00	256.00	256.00	256.00	256.00	256.00

Initial Supporting table - P16F3_Delta Spark Threshold f(RPM,APC)

Description: Threshold for determining when the difference between commanded spark and applied spark exceeds the torque security requirement. It is a function of engine rpm and APC.

Notes: P16F3, KtSPRK_phi_DeltTorqueScrtyAdv

y/x	500.00	980.74	1,461.48	1,942.23	2,422.97	2,903.71	3,384.45	3,865.20	4,345.94	4,826.68	5,307.42	5,788.16	6,268.91	6,749.65	7,230.39	7,711.13	8,191.88
80.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
160.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
240.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
320.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
400.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
480.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
560.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
640.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
720.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
800.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
880.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
960.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
1,040.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
1,120.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
1,200.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
1,280.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98
1,360.00	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98	1,023.98

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.

Notes: P16F3, KtSPDC_M_ExternalLoad

y/x	-40.00	-20.00	-10.00	0.00	50.00	90.00
700.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00
900.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00	4,096.00
1,100.00	70.00	70.00	70.00	70.00	60.00	50.00
1,400.00	45.00	42.00	38.00	35.00	35.00	35.00
1,600.00	32.89	29.44	27.18	25.55	18.09	15.26
1,800.00	34.82	31.10	28.67	26.92	19.35	16.51
2,000.00	37.64	32.56	30.68	29.85	21.71	18.36
2,200.00	40.80	35.20	33.13	32.22	23.24	19.84
2,500.00	43.58	39.76	37.58	36.01	26.21	23.06
2,700.00	42.72	38.90	36.72	35.15	25.34	22.19
3,000.00	40.65	36.83	34.65	33.08	23.27	20.13
3,300.00	36.87	33.05	30.87	29.30	19.49	16.35
3,500.00	13.41	9.58	7.41	5.84	-3.97	-7.12
3,700.00	7.50	3.67	1.50	-0.08	-9.88	-13.03
4,000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
4,500.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28
5,000.00	4.25	0.43	-1.75	-3.32	-13.13	-16.28

Initial Supporting table - P219A Normalizer Bank1 Table

Description: Bank 1 Normalizer table used in the calculation of the Ratio for the current sample period.

Notes: DTCs: P219A; Calibration Name: KtFABD_U_Normalizer1; Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

y/x	1,000	1,200	1,350	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,650	3,800	4,000	4,200
40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
80	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
120	15.00	1.75	1.75	0.25	0.25	15.00	0.75	0.75	1.00	1.00	15.00	0.50	0.50	0.00	0.00	15.00	15.00
160	15.00	1.75	1.75	0.25	1.25	2.00	0.75	0.75	1.00	1.00	0.75	0.75	0.50	0.00	0.00	15.00	15.00
200	15.00	4.50	4.50	3.25	2.00	2.75	2.50	2.25	2.00	1.50	0.75	1.00	1.50	1.00	1.00	15.00	15.00
240	15.00	5.50	5.50	3.75	2.50	3.25	2.50	2.00	2.50	2.50	2.00	1.75	1.50	1.25	1.25	15.00	15.00
275	15.00	6.00	6.00	3.75	2.75	3.25	3.00	1.75	3.50	3.00	1.75	2.25	1.75	1.75	1.75	15.00	15.00
330	15.00	7.00	7.00	4.25	3.25	3.50	2.25	3.25	3.25	2.50	2.50	1.00	1.00	1.50	1.50	15.00	15.00
380	15.00	7.00	7.00	4.25	3.25	3.25	3.00	2.00	2.25	3.00	2.50	1.75	1.75	1.50	1.50	15.00	15.00
400	15.00	15.00	15.00	15.00	15.00	3.00	3.00	2.00	2.25	3.00	2.50	2.00	1.75	1.50	1.50	15.00	15.00
440	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
480	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
520	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
560	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
640	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
720	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
800	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - P219A Quality Factor Bank1 Table

Description: Bank 1 lookup table of Quality Factors used in the calculation of the Ratio for the current sample period

Notes: DTCs: P219A; Calibration Name: KtFABD_K_QualFactor1; Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

y/x	1,000	1,200	1,350	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,650	3,800	4,000	4,200
40	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	0.00	0.00	0.00	0.00
80	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	0.00	0.00	0.00	0.00
120	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	0.00	0.00	0.00	0.00
160	0.00	0.00	1.00	0.75	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.95	0.80	0.00	0.00	0.00
200	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.80	1.00	1.00	0.80	0.00	0.00	0.00
240	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
275	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	0.80	0.00	0.00	0.00
330	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
380	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
400	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	0.00	0.00	0.00	0.00
440	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	0.00	0.00	0.00	0.00
480	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	0.00	0.00	0.00	0.00
520	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	0.00	0.00	0.00	0.00
560	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	0.00	0.00	0.00	0.00
640	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	0.00	0.00	0.00	0.00
720	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	0.00	0.00	0.00	0.00
800	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	0.00	0.00	0.00	0.00

Initial Supporting table - P219A Variance Threshold Bank1 Table

Description: Bank 1 lookup table of Variance metric used to calculate the Ratio for the current sample period

Notes: DTCs: P219A; Calibration Name: KtFABD_U_VarThresh1; Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

y/x	1,000	1,200	1,350	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200	3,400	3,650	3,800	4,000	4,200
40	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
80	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
120	15.00	1.25	1.25	2.00	2.00	15.00	0.75	0.75	0.75	0.75	15.00	0.75	0.75	1.00	1.00	15.00	15.00
160	15.00	1.25	1.25	2.00	2.25	2.50	0.75	0.75	0.75	0.75	2.75	1.50	0.75	1.00	1.00	15.00	15.00
200	15.00	2.25	2.25	2.50	2.50	2.00	1.75	1.25	1.50	3.00	2.75	2.50	1.25	1.50	1.50	15.00	15.00
240	15.00	3.75	3.75	3.25	3.25	1.75	2.00	2.50	2.00	3.50	2.50	2.25	1.75	2.00	2.00	15.00	15.00
275	15.00	4.25	4.25	3.50	3.50	2.50	2.50	3.75	2.75	3.00	3.75	1.75	1.75	1.75	1.75	15.00	15.00
330	15.00	2.75	2.75	2.75	2.50	2.25	4.50	3.50	3.25	3.50	3.00	3.50	3.00	2.00	2.00	15.00	15.00
380	15.00	2.75	2.75	2.75	2.50	2.50	2.50	3.25	2.50	2.00	2.00	2.50	1.75	1.50	1.50	15.00	15.00
400	15.00	15.00	15.00	15.00	15.00	2.50	2.50	3.25	2.50	2.00	2.00	2.00	1.75	1.50	1.50	15.00	15.00
440	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
480	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
520	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
560	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
640	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
720	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
800	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - Closed Loop Enable Clarification - KaFCLP_U_SlphrIntglOfst_Thrsh

Description: Integral Offset voltage thresholds (bank and cell specific cals) used with KeFCLP_Pct_CatAccuSlphrPostDsbl to check for sulphur poisoning.

Notes: millivolts

y/x	CiOXYR_O2_PostCat1	CiOXYR_O2_PostCat2
CiFCLP_Decel	2,048	2,048
CiFCLP_Idle	2,048	2,048
CiFCLP_Cruise	2,048	2,048
CiFCLP_LightAccel	2,048	2,048
CiFCLP_HeavyAccel	2,048	2,048

Initial Supporting table - Closed Loop Enable Clarification - KcFCLP_Cnt_O2RdyCyclesThrsh

Description: Number of post catalyst oxygen sensor samples which must be outside not ready window before post oxygen sensor is READY.

Notes: Time (events * 12.5 milliseconds)

y/x	1
1	80

Initial Supporting table - Closed Loop Enable Clarification - KcFULC_O2_SensorReadyEvents

Description: Number of times an oxygen sensor value must be in range before declaring it ready

Notes: Time (events * 12.5 milliseconds)

y/x	1
1	25

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_Pct_CatAccuSlphrPostDsbl

Description: Sulphur percent threshold above which post integral learning is disabled if the threshold criteria KaFCLP_U_SlphrIntglOfst_Thrsh is also met.

Notes: Percent

y/x	1
1	255

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax

Description: Maximum allowed estimated catalytic converter temperature for post O2 integral terms to be updated.

Notes: Modeled catalyst Temperature in Celcius

y/x	1
1	1,000

Initial Supporting table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMin

Description: Minimum allowed estimated catalytic converter temperature to begin using post O2 integration correction terms. Converter temperature must remain above this threshold to ramp-in the post O2 integration adjustments. Once the ramp-in has started, a converter temperature below this threshold will freeze the ramp-in multiplier. Post O2 integration will not be allowed below this converter temperature

Notes: Modeled catalyst Temperature in Celcius

y/x	1
1	300

Initial Supporting table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveHiCoolant

Description: LTM learning is inhibited if the engine coolant temperature is above this calibration.

Notes: Degrees Celcius

y/x	1
1	120

Initial Supporting table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveLoCoolant

Description: LTM learning is inhibited if the engine coolant temperature is below this calibration.

Notes: Degrees Celcius

y/x	1
1	40

Initial Supporting table - Closed Loop Enable Clarification - KfFCLP_U_O2ReadyThrshLo

Description: Lower threshold defining not ready window for post oxygen sensor voltage.

Notes: Voltage in millivolts

y/x	1
1	1,100

Initial Supporting table - Closed Loop Enable Clarification - KfFULC_U_O2_SensorReadyThrshLo

Description: Lower limit checked against when determining if an oxygen sensor is in range

Notes: Voltage in millivolts

y/x	1
1	1,100

Initial Supporting table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit

Description: KtFCLL_p_AdaptiveLowMAP_Limit

Notes: MAP in KPa

y/x	65	70	75	80	85	90	95	100	105
1	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglDisableTime

Description: Disable integral offset after engine start for this amount of time.

Notes: Time in seconds

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	100.0	100.0	100.0	60.0	60.0	50.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglRampInTime

Description: Time required to ramp integral offset to desired value.

Notes: Time in seconds

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopAutostart

Description: Engine run time following an autostart, as a function of begin run coolant, which must be exceeded to enable CLOSED LOOP.

Notes: Time in seconds: Hybrid use Only

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Initial Supporting table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopTime

Description: Engine run time, as a function of startup coolant temperature, which must be exceeded to enable CLOSED LOOP.

Notes: Time in seconds

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	155.0	140.0	135.0	50.0	22.0	15.0	14.0	14.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - P0411 Phase 1 Amb Temp Test Weight Factor

Description: SAI Flow (Phase 1) Test ambient temperature weight factor.

Notes: DTC: P0411; Cal: KtAIRD_K_SAI_TstTempDsbld; Axis is Ambient (IAT) Temp (C).

y/x	-30	-20	-10	0	10	20	30	40	50
1	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - P0411 Phase 1 Baro Test Weight Factor

Description: SAI Flow (Phase 1) Test baro weight factor.

Notes: DTC: P0411; Cal: KtAIRD_K_SAI_TstBaroDsbld; Axis is atmospheric pressure (kPa)

y/x	40	50	60	70	80	90	100	110	120
1	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0	0.0

Initial Supporting table - P0411 Phase 1 MAF Test Weight Factor

Description: KtAIRD_K_SAI_TstMAF_Dsbld: SAI Flow (Phase 1) Test MAF weight factor.

Notes: Axis is Mass Airflow (g/sec).

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P0411 Phase 1 System Volt Test Weight Factor

Description: SAI Flow (Phase 1) Test system voltage weight factor.

Notes: DTC: P0411; Cal: KtAIRD_K_SAI_TstVoltDsbld; Axis is system voltage (V).

y/x	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.5	0.5	0.5

Initial Supporting table - P0411 SL Threshold Bank 1 Table

Description: Bank 1 SAI Flow (Phase 1) Test Average String Length failure threshold versus MAF (g/sec).

Notes: DTCs: P0411; Cal: KtAIRD_dp_SAI_SL_ThrshBank1

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	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 - P0411 SL Threshold Bank 2 Table

Description: Bank 2 SAI Flow (Phase 1) Test Average String Length failure threshold versus MAF (g/sec).

Notes: DTCs: P0411; Cal: KtAIRD_dp_SAI_SL_ThrshBank2: For dual valve SAI systems only.

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	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 - P0420_BestFailingOSCTableB1

Description: This table is a 9x17 table of baseline Best Failing (e.g. threshold converter) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow,the BestFailing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the WorstPassing value) to calculate the Normalized Ratio for that specific test. The values in this table are based on the measured OSC for the identified BPU converter that is used for MIL illumination across the specific temp and airflow range for a given program.

Notes: KtCATD_t_1_OSC_BestFailing - Used for P0420 norm ratio calculation

y/x	1.94	2.17	2.40	2.63	2.87	3.09	3.33	3.56	3.80	4.02	4.26	4.49	4.72	4.95	5.19	5.41	5.65
641.08	0.11	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
678.20	0.12	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08
715.34	0.12	0.12	0.11	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08
752.47	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
789.59	0.14	0.13	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09
826.72	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
863.86	0.15	0.14	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.10
900.98	0.16	0.15	0.14	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11
938.11	0.16	0.15	0.15	0.14	0.14	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11

Initial Supporting table - P0420_WorstPassingOSCTableB1

Description: This table is a 9x17 table of WorstPassing (e.g. 120k) OSC times for catalyst Bank 1. The axis' for this table include the average airflow and the catalyst temperature. After OSC is measured for a specific temp and airflow, the WorstPassing OSC value is found within this table for the measured temp and airflow and is used along with the OSC_TimeRaw (and the BestFailing OSC value) to calculate the Normalized Ratio for that specific test.The values in this table are based on the measured OSC for the WPA part across the temp and airflow range.

Notes: KtCATD_t_1_OSC_WorstPassing - Used for P0420 norm ratio calculation

y/x	1.94	2.17	2.40	2.63	2.87	3.09	3.33	3.56	3.80	4.02	4.26	4.49	4.72	4.95	5.19	5.41	5.65
641.08	2.43	2.02	1.73	1.53	1.38	1.26	1.17	1.10	1.03	0.98	0.94	0.90	0.87	0.84	0.81	0.79	0.77
678.20	2.50	2.08	1.79	1.58	1.42	1.30	1.21	1.13	1.07	1.01	0.97	0.93	0.89	0.86	0.84	0.82	0.79
715.34	2.57	2.14	1.84	1.62	1.46	1.34	1.24	1.16	1.10	1.04	1.00	0.96	0.92	0.89	0.86	0.84	0.82
752.47	2.65	2.20	1.89	1.67	1.51	1.38	1.28	1.20	1.13	1.07	1.02	0.98	0.95	0.92	0.89	0.86	0.84
789.59	2.73	2.26	1.95	1.72	1.55	1.42	1.32	1.23	1.16	1.10	1.05	1.01	0.98	0.94	0.92	0.89	0.87
826.72	2.81	2.33	2.01	1.77	1.60	1.46	1.35	1.27	1.20	1.14	1.09	1.04	1.00	0.97	0.94	0.92	0.89
863.86	2.89	2.40	2.07	1.82	1.64	1.50	1.39	1.31	1.23	1.17	1.12	1.07	1.03	1.00	0.97	0.94	0.92
900.98	2.98	2.47	2.13	1.88	1.69	1.55	1.44	1.34	1.27	1.21	1.15	1.10	1.06	1.03	1.00	0.97	0.95
938.11	3.06	2.54	2.19	1.93	1.74	1.60	1.48	1.38	1.31	1.24	1.19	1.14	1.10	1.06	1.03	1.00	0.97

Initial Supporting table - P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit

Description: Exit Catalyst Warm-up mode if Engine Run Time is greater than this value. This table is based on percent ethanol (x-axis) and catmon's NormRatio_EWMA value (y-axis). The NormRatio_EWMA value determines the state of the catalyst. Typically, NormRatio_EWMA values below 0.35 (0 is bad and 1 is good) represent catalysts that have degraded. The emission performance of these degraded catalysts can be improved by extending catalyst light off of GetE85R_Pct_FFS_CompAtEngFloat.

Notes: KtCSEC_t_ExtendedEngineExit. Used for both P050D and P1400.

y/x	0	25	50	75	100
0.000	50	50	50	50	50
0.125	50	50	50	50	50
0.250	50	50	50	50	50
0.375	50	50	50	50	50
0.500	50	50	50	50	50
0.625	50	50	50	50	50
0.750	50	50	50	50	50
0.875	50	50	50	50	50
1.000	50	50	50	50	50

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTime

Description: Quality weight-based on engine run time. This allows adjustment of the weighting factors at various engine run times in order to prevent the updating of the cumulative quality timer or to change the value of the average qualified residual energy calculation to prevent false Fails of the diagnostic under circumstances inappropriate to update the calculation of the average qualified residual value.

Notes: KtCSED_K_TimeWght - This is used for P1400.

y/x	0	2	3	3	10	15	20	23	28
1	0	0	1	1	1	1	1	1	1

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis

Description: This is the x-axis for the KtCSED_K_TimeWght calibration table. Refer to the description for KtCSED_K_TimeWght for details.

Notes: KnCSED_t_TimeWght - This is used for P1400.

y/x	1	2	3	4	5	6	7	8	9
1	0	2	3	3	10	15	20	23	28

Initial Supporting table - P1400_EngineSpeedResidual_Axis

Description: This calibration is used as the x-axis for KtCSED_dm_Exh. An engine speed value will be chosen from this axis based on the value of VeSPDR_n_EngDsrd or actual engine speed. Subsequently, the engine speed value chosen from KnCSED_n_Exh determines the appropriate exhaust airflow value from the KtCSED_dm_Exh calibration table.

Notes: KnCSED_n_Exh - Used in P1400

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	100	300	500	700	800	850	880	925	980	1,025	1,050	1,100	1,300	1,500	1,800	2,000	2,200

Initial Supporting table - P1400_EngineSpeedResidual_Table

Description: This 1x17 table of engine exhaust flow values is used to calculate both the desired and the actual engine exhaust flow based on desired and actual engine speed. The desired engine exhaust flow is gathered from the desired engine speed (VeSPDR_n_EngDsrd). The value used for the actual engine exhaust flow is based on the actual engine RPM value.

Notes: KtCSED_dm_Exh - Used in P1400

y/x	100	300	500	700	800	850	880	925	980	1,025	1,050	1,100	1,300	1,500	1,800	2,000	2,200
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Initial Supporting table - P1400_SparkResidual_Axis

Description: Calibratible axis into KtCSED_E_ExhEngyPerUnitMass.   This is a table of spark values. Spark value used for desired spark is the desired spark during cat light off. Actual spark value used is the final commanded spark.

Notes: KnCSED_phi_ExhEngyPerUnitMass - Used in P1400

y/x	1	2	3	4	5	6	7	8	9
1	-15.00	-13.00	-11.00	13.00	15.00	16.00	18.00	20.00	25.00

Initial Supporting table - P1400_SparkResidual_Table

Description: Predicted engine-out energy potential based on either the desired cold start spark advance value or the actual spark advance value. ExhEngyPerUnitMass calibration is used to calculate both desired exhaust energy and actual energy. The desired and actual exhaust energy per unit mass values are used in part to calculate the desired exhaust energy per unit time and actual exhaust energy per unit time. Both desired and actual go into the residual exhaust energy per unit time calculation.

Notes: KtCSED_E_ExhEngyPerUnitMass - Used with P1400

y/x	-15	-13	-11	13	15	16	18	20	25
1	20.00	10.50	9.00	8.80	7.80	6.21	2.47	1.44	1.00

Initial Supporting table - P2431_P2436 Baro Skewed Sensor Weight Factor

Description: The AIR Pressure Sensor Test quality factor based on the distance traveled since the last unthrottled ambient pressure update.

Notes: DTCs: P2431 & P2436; Cal: KtAIRD_K_APPD_BaroQlty; P2436 is applicable on dual valve applications only. Axis is distance traveled from last Baro update in Km (1Km = 0.62 Miles).

y/x	0.0	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0
1.0	1.0	0.8	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P2440 Bank 1 Valve Pressure Error

Description: Sensor 1 minimum average pressure error (kPa) threshold for the valve-shut (Phase 2) test .

Notes: DTCs: P2440; Cal: KaAIRD_p_VlvTstPresErrMin[CeAIRR_e_PresSnsrOne]; Axis is Conditional Test Weight Time in seconds.

y/x	0	1	2	3	4	5	6	7	8
1	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0

Initial Supporting table - P2440 Phase 2 Amb Temp Test Weight Factor

Description: Ambient Temperature component of the conditional test weight for the valve-shut (Phase 2) test.

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstTempDsbld; Axis is ambient temperature (IAT) in Deg C.

y/x	-30	-20	-10	0	10	20	30	40	50
1	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - P2440 Phase 2 Baro Test Weight Factor

Description: Ambient pressure component of the conditional test weight for the valve-shut (Phase 2) test .

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstBaroDsbld; Axis is ambient pressure (kPa).

y/x	40	50	60	70	80	90	100	110	120
1	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0	0.0

Initial Supporting table - P2440 Phase 2 MAF Test Weight Factor

Description: Mass Airflow (MAF) component of the conditional test weight for the valve-shut (Phase 2) test.

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstMAF_Dsbld; Axis is mass airflow (g/s).

y/x	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0
1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0

Initial Supporting table - P2440 Phase 2 System Volt Test Weight Factor

Description: System Voltage component of the conditional test weight for the valve-shut (Phase 2) test.

Notes: DTCs: P2440; Cal: KtAIRD_K_VlvTstVoltDsbld; Axis is system volts (V).

y/x	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.5	0.5	0.5

Initial Supporting table - P2444 Bank 1 Pump Pressure Error

Description: Sensor 1 maximum average pressure error threshold for the pump-off (Phase 3) test.

Notes: DTCs: P2444; Cal: KaAIRD_p_PmpTstPresErrMax[CeAIRR_e_PresSnsrOne]; Axis is Conditional Test Weight Time in seconds.

y/x	0	1	2	3	4	5	6	7	8
1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Bundle Name: 5VoltReferenceA_FA
P0641
Bundle Name: 5VoltReferenceB_FA
P0651
Bundle Name: 5VoltReferenceMAP_OOR_Flt
P0697
Bundle Name: A/F Imbalance Bank1
P219A
Bundle Name: A/F Imbalance Bank2
P219B
Bundle Name: AAP_SnsrCktFA
Naturally aspirated: P2228, P2229. Turbocharged: P0237, P0238
Bundle Name: AAP_SnsrCktFP
Naturally aspirated: P2228, P2229. Turbocharged: P0237, P0238
Bundle Name: AAP_SnsrFA
Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238.
Bundle Name: AAP_SnsrTFTKO
Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238.
Bundle Name: AAP2_SnsrCktFA
P2228, P2229
Bundle Name: AAP2_SnsrCktFP
P2228, P2229
Bundle Name: AAP2_SnsrFA
P2227, P2228, P2229, P2230
Bundle Name: AAP2_SnsrTFTKO
P2227, P2228, P2229, P2230
Bundle Name: AAP3_SnsrCktFA
P222C, P222D
Bundle Name: AAP3_SnsrCktFP
P222C, P222D
Bundle Name: AccCktLo_FA
P2537
Bundle Name: AcceleratorPedalFailure
P2122, P2123, P2127, P2128, P2138, P0697, P06A3
Bundle Name: ACCMLostComm
U016B
Bundle Name: ACFailedOnSD
See ACCM Document

Bundle Name: ACHighSidePressSnsrCktFA
P0532, P0533
Bundle Name: ACThrmlRefrigSpdVld
See ACCM Document
Bundle Name: AfterThrottlePressTFTKO
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.
Bundle Name: AfterThrottlePressureFA
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.
Bundle Name: AfterThrottleVacuumTFTKO
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.
Bundle Name: AIR System FA
P0411, P2440, P2444
Bundle Name: AIRPumpControlCircuit FA
P0418, P2257, P2258
Bundle Name: AIRSystemPressureSensor FA
P2430, P2431, P2432, P2433, P2435, P2436, P2437, P2438
Bundle Name: AIRValveControlCircuit FA
P0412, P041F, P044F
Bundle Name: AllTwoStepDrvr_TFTKO
P16CF, P16D2, P16D3, P2645, P2648, P2649
Bundle Name: AllVCE_Driver_TFTKO
P16CF, P16D2, P16D3, P2645, P2648, P2649
Bundle Name: AmbientAirDefault
Baro Sensor Present: P2227, P2228, P2229, P2230. No Baro Sensor Present: P0101, P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0114, P0121, P0122, P0123, P012B, P012C, P012D, P0222, P0223, P1221
Bundle Name: AmbPresDfltdStatus
Baro Sensor Present: P2227, P2228, P2229, P2230. No Baro Sensor Present: P0101, P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0114, P0121, P0122, P0123, P012B, P012C, P012D, P0222, P0223, P1221
Bundle Name: AmbPresSnsr2_CktFA
P222C, P222D
Bundle Name: AmbPresSnsrCktFA
P2228, P2229
Bundle Name: AmbPresSnsrCktFP
P2228, P2229
Bundle Name: AnyCamPhaser_FA
P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024, P2088, P2089, P2090, P2091, P2092, P2093, P2094, P2095, P05CC, P05CD, P05CE, P05CF, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF

Bundle Name: AnyCamPhaser_TFTKO
P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024, P2088, P2089, P2090, P2091, P2092, P2093, P2094, P2095, P05CC, P05CD, P05CE, P05CF, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF
Bundle Name: BrakeBoosterSensorCktFA
P0557, P0558
Bundle Name: BrakeBoosterSensorFA
P0556, P0557, P0558
Bundle Name: BrakeBoosterVacuumValid
P0556, P0557, P0558
Bundle Name: BSTR_b_BoostSnsrFA
P0236, P0237, P0238
Bundle Name: BSTR_b_ExcsvBstFA
P226B
Bundle Name: BSTR_b_ExcsvBstTFTKO
P226B
Bundle Name: BSTR_b_IC_Pmp_EffPerfTFTKO
P026A
Bundle Name: BSTR_b_IC_PmpCktFA
P023A, P023C
Bundle Name: BSTR_b_PCA_CktFA
P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_CktLoFA
P0034, P0047, P0245, P0249
Bundle Name: BSTR_b_PCA_CktLoTFTKO
P0034, P0047, P0245, P0249
Bundle Name: BSTR_b_PCA_CktTFTKO
P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_FA
P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_PstnSnsrFA
P003A, P2564, P2565
Bundle Name: BSTR_b_PCA_PstnSnsrTFTKO
P003A, P2564, P2565
Bundle Name: BSTR_b_PCA_TFTKO
P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250
Bundle Name: BSTR_b_PresCntrlTooHiFA
P0234
Bundle Name: BSTR_b_PresCntrlTooHiTFTKO

P0234
Bundle Name: BSTR_b_PresCntrlTooLoFA
P0299
Bundle Name: BSTR_b_PresCntrlTooLoTFTKO
P0299
Bundle Name: BSTR_b_PstnCntrlFA
P166D, P166E
Bundle Name: BSTR_b_PstnCntrlTooHiFA
P166E
Bundle Name: BSTR_b_PstnCntrlTooHiTFTKO
P166E
Bundle Name: BSTR_b_PstnCntrlTooLoFA
P166D
Bundle Name: BSTR_b_PstnCntrlTooLoTFTKO
P166D
Bundle Name: BSTR_b_TurboBypassA_StkFA
P2261
Bundle Name: BSTR_b_TurboBypassCktFA
P0033, P0034, P0035, P00C0, P00C1, P00C2
Bundle Name: BSTR_b_TurboBypassCktTFTKO
P0033, P0034, P0035, P00C0, P00C1, P00C2
Bundle Name: BSTR_b_TurboBypB_CktFA
P00C0, P00C1, P00C2
Bundle Name: BSTR_b_TurboBypB_CktTFTKO
P00C0, P00C1, P00C2
Bundle Name: CamLctnExhFA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: CamLctnIntFA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: CamSensor_FA
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensor_TFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorAnyLctnTFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorAnyLocationFA
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorFA

P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorTFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: Catalyst Warmup Enabled
N/A
Catalyst Warmup Enabled - Other Definitions: To enable the Cold Start Emission Reduction Strategy: Catalyst Temperature < 350.00 degC AND Engine Coolant > -12.00 degC AND Engine Coolant <= 180.00 degC AND Barometric Pressure>= 70.00 KPa AND DTC's Not Set: ECT_Sensor_FA MAP_SensorFA The Cold Start Emission Reduction Strategy will remain active until: Engine Run Time > **P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit** This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. OR Catalyst Temperature >= 550.00 degC AND Engine Run Time >= 50.00 seconds OR Barometric Pressure < 70.00 KPa
Bundle Name: CatalystSysEfficiencyLoB1_FA
P0420
Bundle Name: CatalystSysEfficiencyLoB2_FA
P0430
Bundle Name: Clutch Sensor FA
P0806, P0807, P0808
Bundle Name: ClutchPositionSensorCircuitHi FA
P0808

Bundle Name: ClutchPositionSensorCircuitLo FA
P0807
Bundle Name: ClutchPstnSnsr FA
P0806, P0807, P0808
Bundle Name: ClutchPstnSnsrCktHi FA
P0808
Bundle Name: ClutchPstnSnsrCktLo FA
P0807
Bundle Name: ClutchPstnSnsrNotLearned
P080A
Bundle Name: CommBusAOff_VICM_FA
U0073
Bundle Name: CommBusBOff_VICM_FA
U0074
Bundle Name: CoolingFanSpeedTooHigh_FA
P0495
Bundle Name: CrankCamCorrelationTFTKO
P0016, P0017, P0018, P0019
Bundle Name: CrankExhaustCamCorrelationFA
P0017, P0019
Bundle Name: CrankExhaustCamCorrFA
P0017, P0019
Bundle Name: CrankIntakeCamCorrelationFA
P0016, P0018
Bundle Name: CrankIntakeCamCorrFA
P0016, P0018
Bundle Name: CrankSensor_FA
P0335, P0336
Bundle Name: CrankSensor_TFTKO
P0335, P0336
Bundle Name: CrankSensorFA
P0335, P0336
Bundle Name: CrankSensorFaultActive
P0335, P0336
Bundle Name: CrankSensorTestFailedTKO
P0335, P0336
Bundle Name: CrankSensorTFTKO
P0335, P0336

Bundle Name: CylDeacAllDriverFault
P3401, P03403, P03404, P3409, P03411, P03412, P3417, P3419, P3420, P3425, P3427, P3428, P3433, P3435, P3436, P3441, P3443, P3444, P3449, P3451, P3452, P3457, P3459, P3460
Bundle Name: CylDeacDriverFault
P3401, P03403, P03404, P3409, P03411, P03412, P3417, P3419, P3420, P3425, P3427, P3428, P3433, P3435, P3436, P3441, P3443, P3444, P3449, P3451, P3452, P3457, P3459, P3460
Bundle Name: CylDeacSystemTFTKO
P3400
Bundle Name: ECT_Sensor_Ckt_FA
P0117, P0118
Bundle Name: ECT_Sensor_Ckt_FP
P0117, P0118
Bundle Name: ECT_Sensor_Ckt_High_FP
P0118
Bundle Name: ECT_Sensor_Ckt_Low_FP
P0117
Bundle Name: ECT_Sensor_Ckt_TFTKO
P0117, P0118
Bundle Name: ECT_Sensor_Ckt_TPTKO
P0117, P0118
Bundle Name: ECT_Sensor_DefaultDetected
P0116, P0117, P0118, P0119, P111E
Bundle Name: ECT_Sensor_FA
P0116, P0117, P0118, P0119, P0128, P111E
Bundle Name: ECT_Sensor_Perf_FA
P0116, P111E
Bundle Name: ECT_Sensor_TFTKO
P0116, P0117, P0118, P0119, P0128, P111E
ECT_Sensor_TFTKO - Other Definitions:
Bundle Name: EGRValve_FP
P0405, P0406, P042E
Bundle Name: EGRValveCircuit_FA
P0403, P0404, P0405, P0406, P0489, P0490, P042E
Bundle Name: EGRValveCircuit_TFTKO
P0403, P0404, P0405, P0406, P0489, P0490
Bundle Name: EGRValvePerformance_FA
P0404, P042E
Bundle Name: EGRValvePerformance_TFTKO

P0404, P042E
Bundle Name: ELCP_PumpCircuit_FA
P2400, P2401, P2402
Bundle Name: ELCP_SwitchCircuit_FA
P2418, P2419, P2420
Bundle Name: ELCPCircuit_FA
P24BA, P24BB
Bundle Name: EngineMetalOvertempActive
P1258
Bundle Name: EngineMisfireDetected_FA
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308
Bundle Name: EngineMisfireDetected_TFTKO
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308
Bundle Name: EngineModeNotRunTimer_FA
P262B
Bundle Name: EngineModeNotRunTimerError
P262B
Bundle Name: EnginePowerLimited
P0068, P00C8, P00C9, P00CA, P0090, P0091, P0092, P0122, P0123, P0191, P0192, P0193, P0222, P0223, P0601, P0604, P0606, P0697, P06A3, P06DB, P06DE, P0A1D, P1104, P127A, P127C, P127D, P15F2, P160D, P160E, P1682, P16A0, P16A1, P16A2, P16F3, P2100, P2101, P2102, P2103, P2122, P2123, P2127, P2128, P2135, P2138, P215B, P2176, P228C, P228D, U0073, U0074, U0293, U1817
Bundle Name: EngineTorqueEstInaccurate
EngineMisfireDetected_FA, FuelInjedtorCircuit_FA, FuelInjedtorCircuit_TFTKO, FuelTrimSystemB1_FA, FuelTrimSystemB2_FA, MAF_SensorTFTKO, MAP_SensorTFTKO, EGRValuePerforamnce_FA, P16F3
EngineTorqueEstInaccurate - Other Definitions: P16F3 with GetXOYR_b_SecurityFlt (CeXOYR_e_MAPR_AfterThrotPresFlt, CeXOYR_e_MAPR_EngineVacuumFlt, CeXOYR_e_MAPR_IntkMnfdPresFlt, CeXOYR_e_MAFR_Ahead1vs2FinalFlt)
Bundle Name: EngModeNotRunTmErr
P262B
Bundle Name: EngOilModeledTempValid
ECT_Sensor_FA, IAT_SensorCircuitFA
Bundle Name: EngOilPressureSensorCktFA
P0522, P0523
Bundle Name: EngOilPressureSensorFA
P0521, P0522, P0523
Bundle Name: EngOilTempFA
EngOilTempSensorCircuitFA, EngOilModeledTempValid, P16F3
EngOilTempFA - Other Definitions: P16F3 with GetXOYR_b_SecurityFlt(CeXOYR_e_EOTR_SecurityFlt)

Bundle Name: EngOilTempSensorCircuitFA
P0197, P0198
Bundle Name: Ethanol Composition Sensor FA
P0178, P0179, P2269
Bundle Name: EvapEmissionSystem_FA
P0455, P0446
Bundle Name: EvapExcessPurgePsbl_FA
ELCP sealed/vented fuel system, P0442, P0455, P0458 OR Conventional fuel system, P0442, P0455, P0458, P0496
Bundle Name: EvapFlowDuringNonPurge_FA
P0496
Bundle Name: EvapPurgeSolenoidCircuit_FA
P0443, P0458, P0459
Bundle Name: EvapReducedPurgePsbl_FA
ELCP sealed/vented fuel system, P0443, P0446, P0449, P0459, P0497, P0499, P1463, P2419, P2422 OR Conventional fuel system, P0443, P0446, P0455, P0459, P0498
Bundle Name: EvapSmallLeak_FA
P0442
Bundle Name: EvapVentSolenoidCircuit_FA
P0449, P0498, P0499
Bundle Name: ExhaustCamSensor_FA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustCamSensor_TFTKO
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustCamSensorFA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustCamSensorTFTKO
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustVVT_Enabled

ExhaustVVT_Enabled - Other Definitions:
ExhaustVVT_Enabled = TRUE if:

CrankExhaustCamCorrelationFA diagnostic has executed and passed AND
Cam Edge Locations have been learned AND
CrankSensor_TFTKO = False AND
ExhaustCamSensorTFTKO = False AND
CamLctnExhFA = False AND
(**IntakeVVT_Enabled** = True OR Intake Park Position (CePHSR_e_Advanced) = CePHSR_e_Retarded) AND
Engine Mode Run = True AND
Engine Power Requested = True AND
ExhEngineSpeed is Enabled AND
ExhOilPressure is Enabled AND

ExhEngineOilTemp is Enabled AND
(Engine Power Requested = True
OR
CSER_Enabled AND Engine Speed > 1,200.00 AND
Engine Run Time > **P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning**)

****

ExhEngineSpeed is Enabled if:
P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc < Engine RPM <**P0014_P0024_P05CE_P05CF_HiEngSpdLoEnblEc**

ExhEngineSpeed Disables if:
Engine RPM < **P0014_P0024_P05CE_P05CF_LoRpmLoDsblEc**
OR
Engine RPM > **P0014_P0024_P05CE_P05CF_HiEngSpdHiDsblEc**

****

ExhOilPressure is Enabled if:
(Oil Pressure Sensor In Use (0.00) = 1.00 (Note: 1.00 equals TRUE) AND
Oil Pressure Sensor Present (0.00) = 1.00 (Note: 1.00 equals Present) AND
Oil Pressure > **P0014_P0024_P05CE_P05CF_LoPresHiEnblEc**
for **P0014_P0024_P05CE_P05CF_EngOilPressEnblEc** sec)
OR
(Engine RPM > **P0014_P0024_P05CE_P05CF_LoRpmHiEnblEc**
for **P0014_P0024_P05CE_P05CF_EngOilPressEnblEc** sec)

ExhOilPressure Disables if:
Oil Pressure Sensor In Use (0.00) = 1.00 (Note: 1.00 equals TRUE) AND
Oil Pressure Sensor Present (0.00) = 1.00 (Note: 1.00 equals Present) AND
Oil Pressure < **P0014_P0024_P05CE_P05CF_LoPresLoDsblEc**)

****

ExhEngineOilTemp is Enabled if:
-12.00 < Engine Oil Temp < 155.00

ExhEngineOilTemp Disables if:
Engine Oil Temp < -13.00
OR
Engine Oil Temp > 165.00

Bundle Name: FanOutputDriver_FA

P0480, P0481, P0482, P0691, P0692, P0693, P0694, P0695, P0696, P1485 (EREV), P1486 (EREV), P1487 (EREV)

Bundle Name: FHPD_b_FRP_SnsrCkt_FP

P0192, P0193, P16E4, P16E5, P128F, P128A

Bundle Name: FHPD_b_HPC_PresErrNeg_FA

P228D

Bundle Name: FHPD_b_HPC_PresErrNeg_TFTKO

P228D
Bundle Name: FHPD_b_HPC_PresErrPos_FA
P228C
Bundle Name: FHPD_b_HPC_PresErrPos_TFTKO
P228C
Bundle Name: FHPD_b_HPC_Windup_ TFTKO
P0089
Bundle Name: FHPD_b_HPC_Windup_FA
P0089
Bundle Name: FHPD_b_PumpCurr_FA
P163A
Bundle Name: FHPD_b_PumpCurr_TFTKO
P163A
Bundle Name: FHPR_b_FRP_SnsrCkt_FA
P0192, P0193, P127C, P127D, P16E4, P16E5, P128F, P128A, P128B
Bundle Name: FHPR_b_FRP_SnsrCkt_TFTKO
P0192, P0193, , P127C, P127D, P16E4, P16E5, P128F, P128A, P128B
Bundle Name: FHPR_b_FRP_SnsrPerfDiag_FA
P0191, P127A
Bundle Name: FHPR_b_FRP_SnsrPerfDiag_TFTKO
P0191, P127A
Bundle Name: FHPR_b_PumpCkt_FA
P0090, P0091, P0092, P00C8, P00C9, P00CA
Bundle Name: FHPR_b_PumpCkt_TFTKO
P0090, P0091, P0092, P00C8, P00C9, P00CA
Bundle Name: FourWheelDriveLowStateInvalid
P2771
Bundle Name: FPSR_b_SENT_WaveForm_FPBndl
P128F, P16E4, P16E5
Bundle Name: FTP_SensorCircuit_FA
P0452, P0453
Bundle Name: FuelInjectorCircuit_FA
PFI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 SIDI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F
Bundle Name: FuelInjectorCircuit_TFTKO
PFI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 SIDI: P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262,

P0265, P0268, P0271, P0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F
Bundle Name: FuelLevelDataFault
P0461, P0462, P0463, P2066, P2067, P2068
Bundle Name: FuelPumpRlyCktFA
P0627, P0628, P0629
Bundle Name: FuelTankPressureSnsrCkt_FA
P0452, P0453
Bundle Name: FuelTrimSystemB1_FA
P0171, P0172
Bundle Name: FuelTrimSystemB1_TFTKO
P0171, P0172
Bundle Name: FuelTrimSystemB2_FA
P0174, P0175
Bundle Name: FuelTrimSystemB2_TFTKO
P0174, P0175
Bundle Name: HumidityFA
P0097, P0098, P11C2, P11C3, P2227, P2228, P2229, P2230
Bundle Name: HumTempSnsrCktFA
P0097, P0098
Bundle Name: HumTempSnsrCktFP
P0097, P0098
Bundle Name: HumTempSnsrFA
P0096, P0097, P0098, P0099
Bundle Name: IAC_SystemRPM_FA
P0506, P0507
Bundle Name: IAT_ContCorrFA
P2199
Bundle Name: IAT_SensorCircuitFA
P0112, P0113
Bundle Name: IAT_SensorCircuitFP
P0112, P0113
Bundle Name: IAT_SensorCircuitTFTKO
P0112, P0113
Bundle Name: IAT_SensorFA
P0111, P0112, P0113, P0114
Bundle Name: IAT_SensorTFTKO
P0111, P0112, P0113, P0114

Bundle Name: IgnitionOffTimer_FA
P262B
Bundle Name: IgnitionOffTimeValid
P262B
Bundle Name: IgnitionOutputDriver_FA
P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, P2316, P2318, P2319, P2321, P2322
Bundle Name: IntakeCamSensor_FA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeCamSensor_TFTKO
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeCamSensorFA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeCamSensorTFTKO
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeVVT_Enabled

IntakeVVT_Enabled - Other Definitions:
IntakeVVT_Enabled = TRUE if:

CrankIntakeCamCorrelationFA diagnostic has executed and passed AND
Cam Edge Locations have been learned AND
CrankSensor_TFTKO = False AND
IntakeCamSensorTFTKO = False AND
CamLctnIntFA = False AND
Engine Mode Run = True AND
Engine Power Requested = True AND
IntEngineSpeed is Enabled AND
IntOilPressure is Enabled AND
IntEngineOilTemp is Enabled AND
(Engine Power Requested = True
OR
CSER_Enabled AND Engine Speed > 1,200.00 AND
Engine Run Time > **P0011_P0021_P05CC_P05CD_P0014_P0024_P05CE_P05CF_ColdStartEngRunning**)

****

IntEngineSpeed is Enabled if:
P0011_P0021_P05CC_P05CD_LoRpmHiEnblIc < Engine RPM < **P0011_P0021_P05CC_P05CD_HiEngSpdLoEnblIc**

IntEngineSpeed Disables if:
Engine RPM < **P0011_P0021_P05CC_P05CD_LoRpmLoDsblIc**
OR
Engine RPM > **P0011_P0021_P05CC_P05CD_HiEngSpdHiDsblIc**

****
IntOilPressure is Enabled if:
(Oil Pressure Sensor In Use (0.00) = 1.00 (Note: 1.00 equals "TRUE") AND
Oil Pressure Sensor Present (0.00) = 1.00 (Note: 1.00 equals "Present") AND
Oil Pressure > **P0011_P0021_P05CC_P05CD_LoPresHiEnblIc**
for **P0011_P0021_P05CC_P05CD_EngOilPressEnblIc** sec)
OR
(Engine RPM > **P0011_P0021_P05CC_P05CD_LoRpmHiEnblIc**
for **P0011_P0021_P05CC_P05CD_EngOilPressEnblIc** sec)

IntOilPressure Disables if:
Oil Pressure Sensor In Use (0.00) = 1.00 (Note: 1.00 equals "TRUE") AND
Oil Pressure Sensor Present (0.00) = 1.00 (Note: 1.00 equals "Present") AND
Oil Pressure < **P0011_P0021_P05CC_P05CD_LoPresLoDsblIc**)
****
IntEngineOilTemp is Enabled if:
-10.00 < Engine Oil Temp < 155.00

IntEngineOilTemp Disables if:
Engine Oil Temp < -13.00
OR
Engine Oil Temp > 165.00

Bundle Name: IntkCamPhaser_FA
P0010, P0011, P0020, P0021, P05CC, P05CD, P2088, P2089, P2092, P2093, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF
Bundle Name: IntkCamPhsrCircuit_TFTKO
P0010, P0020, P2088, P2089, P2092, P2093, P25CA, P25CB, P25CC, P25CD, P25CE, P25CF
Bundle Name: KS_Ckt_Perf_B1B2_FA
P0324, P0325, P0326, P0327, P0328, P0330, P0332, P0333, P06B6, P06B7
Bundle Name: LostCommBCM_FA
U0140
Bundle Name: LostCommBusB_VICM_FA
U182D
Bundle Name: LowFuelConditionDiagnostic
LowFuelConditionDiagnostic - Other Definitions: Flag set to TRUE if the fuel level < 10.0 % AND No Active DTCs: FuelLevelDataFault, P0462, P0463 for at least 30.0 seconds
Bundle Name: MAF_SensorCircuitFA
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorCircuitTFTKO
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorFA

P0101, P0102, P0103, P010B, P010C, P010D
Bundle Name: MAF_SensorFP
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorPerfFA
P0101
Bundle Name: MAF_SensorPerfTFTKO
P0101
Bundle Name: MAF_SensorTFTKO
P0101, P0102, P0103, P010B, P010C, P010D
Bundle Name: MAF_Snsr1_FA
P0101, P0102, P0103
Bundle Name: MAF_Snsr2_FA
P010B, P010C, P010D
Bundle Name: MAF_SnsrCktFA
P0102, P0103, P010C, P010D
Bundle Name: MAF_SnsrCktTFTKO
P0102, P0103, P010C, P010D
Bundle Name: MAP_EngineVacuumStatus
P0106, P0107, P0108 Fault Active OR P0107, P0108 Fault Pending
Bundle Name: MAP_SensorCircuitFA
P0107, P0108
Bundle Name: MAP_SensorCircuitFP
P0107, P0108
Bundle Name: MAP_SensorFA
P0106, P0107, P0108
Bundle Name: MAP_SensorPerfFA
P0106
Bundle Name: MAP_SensorPerfTFTKO
P0106
Bundle Name: MAP_SensorTFTKO
P0106, P0107, P0108
Bundle Name: MnfdTempSensorCktFA
Turbocharged or Supercharged, with Humidity sensor: P112C, P112D. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.
Bundle Name: MnfdTempSensorCktFP
Turbocharged or Supercharged, with Humidity sensor: P112C, P112D. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.
Bundle Name: MnfdTempSensorCktTFTKO
Turbocharged or Supercharged, with Humidity sensor: P112C, P112D. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.
Bundle Name: MnfdTempSensorFA

Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: MnfdTempSensorTFTKO
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: ModuleOffTime_FA
P262B
Bundle Name: ModuleOffTimeErr
P262B
Bundle Name: O2S_Bank_ 1_TFTKO
P0131, P0132, P0134, P2A00
Bundle Name: O2S_Bank_ 2_TFTKO
P0151, P0152, P0154, P2A03
Bundle Name: O2S_Bank_1_Sensor_1_FA
P2A00, P0131, P0132, P0133, P0134, P0135, P0053, P1133, P015A, P015B, P0030
Bundle Name: O2S_Bank_1_Sensor_2_FA
P013A, P013B, P013E, P013F, P2270, P2271, P0137, P0138, P0140, P0141, P0054, P0036
Bundle Name: O2S_Bank_2_Sensor_1_FA
P2A03, P0151, P0152, P0153, P0154, P0155, P0059, P1153, P015C, P015D, P0050
Bundle Name: O2S_Bank_2_Sensor_2_FA
P013C, P013D, P014A, P014B, P2272, P2273, P0157, P0158, P0160, P0161, P0060, P0056
Bundle Name: OAT_AmbientFilteredFA
ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: not applicable. All other cases: not applicable.
Bundle Name: OAT_AmbientSensorFA
ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: not applicable. All other cases: not applicable.
Bundle Name: OAT_EstAmbTemp_FA
ELCP sealed/vented fuel system, P0071, P0072, P0073, P0502, P0503, P0722, P0723 OR Conventional fuel system, P0071, P0072, P0073, P0074, P262B
Bundle Name: OAT_PtEstFiltFA
ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: VehicleSpeedSensor_FA, IAT_SensorFA, MAF_SensorFA. All other cases: EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected.
Bundle Name: OAT_PtEstRawFA
ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: IAT_SensorFA. All other cases: IAT_SensorFA, ECT_Sensor_DefaultDetected.
Bundle Name: OilPmpCktFA
P06DA, P06DB, P06DC
OilPmpCktFA - Other Definitions: Output Driver Codes

Bundle Name: OilPmpFA
P06DA, P06DB, P06DC, P06DD, P06DE
OilPmpFA - Other Definitions: FA only for Output Driver and rationality
Bundle Name: OilPmpStuckHigh
P06DA, P06DB, P06DD
OilPmpStuckHigh - Other Definitions: TFTKO and FA
Bundle Name: OilPmpStuckLow
P06DC, P06DE
OilPmpStuckLow - Other Definitions: TFTKO and FA
Bundle Name: OilPmpTFTKO
P06DA, P06DB, P06DC, P06DD, P06DE
OilPmpTFTKO - Other Definitions: TFTKO only for Output Driver and rationality
Bundle Name: OilSenDiagBndl_TFTKO
P055B, P055C, P055D
Bundle Name: PO2S_Bank_1_Snsr_2_FA
P0137, P0138, P0140, P0036, P0054, P0141, P2270, P2271
Bundle Name: PO2S_Bank_2_Snsr_2_FA
P0157, P0158, P0160, P0056, P0060, P0161, P2272, P2273
Bundle Name: PostCatFuelTrimHiB1
P2097
Bundle Name: PostCatFuelTrimHiB2
P2099
Bundle Name: PostCatFuelTrimLoB1
P2096
Bundle Name: PostCatFuelTrimLoB2
P2098
Bundle Name: PowertrainRelayFault
P1682
Bundle Name: PowertrainRelayStateOn_Error
P0685
Bundle Name: PowertrainRelayStateOn_FA
P0685
Bundle Name: PPS1_OutOfRange
P2122, P2123
Bundle Name: PPS1_OutOfRange_Composite

P2122, P2123, P06A3
Bundle Name: PPS2_OutOfRange
P2127, P2128
Bundle Name: PPS2_OutOfRange_Composite
P2127, P2128, P0697
Bundle Name: SCIAP_SensorCircuitFA
P012C, P012D
Bundle Name: SCIAP_SensorCircuitFP
P012C, P012D
Bundle Name: SCIAP_SensorFA
P012B, P012C, P012D
Bundle Name: SCIAP_SensorPerfFA
P012B
Bundle Name: SCIAP_SensorPerfTFTKO
P012B
Bundle Name: SCIAP_SensorTFTKO
P012B, P012C, P012D
Bundle Name: SuperchargerBypassValveFA
P2261
Bundle Name: SystemVoltageHigh_FA
P0563
Bundle Name: SystemVoltageLow_FA
P0562
Bundle Name: TC_BoostPresSnsrCktFA
P0237, P0238
Bundle Name: TC_BoostPresSnsrFA
P0236, P0237, P0238
Bundle Name: TCM_EngSpdReqCkt
P150C
Bundle Name: THMR_AHV_FA
P2681, P26A3, P26A6, P26A7, P26A9
THMR_AHV_FA - Other Definitions:
Bundle Name: THMR_AWP_AuxPumpFA
B269A, B269C, B269D
Bundle Name: THMR_ECT_Sensor_Ckt_FA
P0116, P0117, P0118, P0119, P111E
Bundle Name: THMR_Insuff_Flow_FA

P00B7
Bundle Name: THMR_RCT_Sensor_Ckt_FA
P00B3, P00B4
Bundle Name: THMR_SWP_Control_FA
P261A, P261D, P261C
Bundle Name: THMR_SWP_FlowStuckOn_FA
P261A, P261D, P261E
Bundle Name: THMR_SWP_NoFlow_FA
P261B, P261C
Bundle Name: THMR_Therm_Control_FA
P0597, P0598, P0599
Bundle Name: ThrotTempSensorFA
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: ThrotTempSensorTFTKO
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: ThrottlePositionSnsrPerfFA
P0121
Bundle Name: ThrottlePositionSnsrPerfTFTKO
P0121
Bundle Name: TIAP_SensorPerfFA
P0236
Bundle Name: TPS_FA
P0122, P0123, P0222, P0223, P16A0, P16A1, P16A2, P2135
Bundle Name: TPS_FaultPending
P0122, P0123, P0222, P0223, P16A0, P16A1, P16A2, P2135
Bundle Name: TPS_Performance_FA
P0068, P0121, P1104, P2100, P2101, P2102, P2103
Bundle Name: TPS_Performance_TFTKO
P0068, P0121, P1104, P2100, P2101, P2102, P2103
Bundle Name: TPS_TFTKO
P0122, P0123, P0222, P0223, P16A0, P16A1, P16A2, P2135
Bundle Name: TPS_ThrottleAuthorityDefaulted
P0068, P0122, P0123, P0222, P0223, P16F3, P16A0, P16A1, P16A2, P1104, P2100, P2101, P2102, P2103, P2135
Bundle Name: TPS1_OutOfRange_Composite
P0122, P0123, P06A3, P16A0, P16A1, P16A2
Bundle Name: TPS2_OutOfRange_Composite

P0222, P0223, P06A3, P16A0, P16A1, P16A2
Bundle Name: Trans Output Rotations Rolling Count Validity
P0722, P0723, P077C, P077D
Bundle Name: TransActualGearValidity
P182E, P1915
Bundle Name: Transfer Pump is Commanded On
Transfer Pump is Commanded On - Other Definitions: Fuel Volume in Primary Fuel Tank < 0.0 liters AND Fuel Volume in Secondary Fuel Tank ≥ 0.0 liters AND Transfer Pump on Time < P0461, P2066, P2636: Transfer Pump Enable (see supporting table for numeric value) AND Transfer Pump had been Off for at least 0.0 seconds AND Evap Diagnostic (Purge Valve Leak Test, Large Leak Test, and Waiting for Purge) is not running AND Engine Running
Bundle Name: Transmission Actual Gear Validity
P182E, P1915
Bundle Name: Transmission Engaged State Validity
P182E, P1915
Bundle Name: Transmission Estimated Gear Validity
P182E, P1915
Bundle Name: Transmission Gear Ratio Validity
P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0
Bundle Name: Transmission Gear Selector Position Validity
P182E, P1915
Bundle Name: Transmission Oil Temperature Validity
P0667, P0668, P0669, P0711, P0712, P0713
Bundle Name: Transmission Output Shaft Angular Velocity Validity
P0722, P0723, P077C, P077D
Bundle Name: Transmission Overall Actual Torque Ratio Validity
P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0, P182E, P1915
Bundle Name: Transmission Overall Estimated Torque Ratio Validity
P0716, P0717, P0722, P0723, P077C, P077D, P07BF, P07C0, P182E, P1915
Bundle Name: Transmission Shift Lever Position Validity
P182E, P1915
Bundle Name: Transmission Turbine Angular Velocity Validity
P0716, P0717, P07BF, P07C0
Bundle Name: TransmissionEngagedState_FA
P182E, P1915
Bundle Name: TransmissionGearDefaulted

P182E, P1915
Bundle Name: TransmissionOutputRotationalStatusValidity
P0722, P0723, P077C, P077D
Bundle Name: TransmissionRatioControlSystemFault
P0751, P0752, P0756, P0757, P0973, P0974, P0976, P0977
Bundle Name: TwoStepMechBndl_FA
P2646, P2647, P16D0, P16D1
Bundle Name: TwoStepMechBndl_TFTKO
P2646, P2647, P16D0, P16D1
Bundle Name: VCER_TorqueSecurity
P16F3
VCER_TorqueSecurity - Other Definitions: P16F3 with GetXOYR_b_SecurityFlt(CeXOYR_e_AFM_PreloadAreaFlt, CeXOYR_e_AFM_PreloadTimerFlt, CeXOYR_e_AFM_DualPreloadAreaFlt, CeXOYR_e_CDAR_SecurityFlt)
Bundle Name: VehicleSpeedSensor_FA
P0502, P0503, P0722, P0723
Bundle Name: VehicleSpeedSensorError
P0502, P0503, P0722, P0723
Bundle Name: VentCircuit_FA
ELCP sealed/vented fuel system, P0449, P0498, P0499
Bundle Name: VICM_WakeupDiag_FA
P06E4
Bundle Name: VICM_WakeupDiag_TFTKO
P06E4
Bundle Name: VITR_LVT_FltBndl
P058B, P058D, P118C, P118D

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Power Moding Diagnostics								
System Voltage Low	P0562	Sets when the low voltage	Ignition Voltage	Ignition Voltage <= 10 Volts	RunCrankActive Engine Speed	= 1 >= 0 RPM	5 seconds in a 6 second	Special
		DTC Pass		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	Ignition Voltage >= 18 Volts	RunCrankActive	= 1	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Shift Solenoid Hydraulic Diagnostics								
Shift Solenoid Hydraulic Diagnostics P0751, P0752, P0756, P0757 have the following common enable criteria	***				Line Pressure Estimate Propulsion System Active	> 325 kpa AND >= 325 kpa FOR > 1 seconds AND > 100 kpa = 1		
Shift Solenoid Valve A Stuck Off	P0751	This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically low position This detection only occurs during an X valve transition	X valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.	X Commanded Hi for > XvalveTurnOnTime + 1 seconds Where XValveTurnOnTime: Trans Fluid Temp Time -40 0.50 -30 0.35 -20 0.250 -10 0.09 20 0.05 140 0.02	X Command X Position	1 0	Fail conditions met for 3 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A
		DTC Pass	X valve completes Low to High transition without failure		X Command X Position	1 1	1 loop execution at 0.0125 seconds	
Shift Solenoid Valve A Stuck On	P0752	This DTC will indicate when Shift Solenoid Valve A (X Valve) is stuck in the hydraulically hi position This DTC is linked to both a steady state and transitional test.	X valve is determined to be in a hydraulically high state when it has been commanded to a low state.	**Transition Case:** X commanded Low for > (XvalveTurnOffTm + 1) seconds Where XValveTurnOffTime: Trans Fluid Temp Time -40 4 -30 2.25 -20 1.4 -10 .5 20 0.265 140 0.0325	X Command X Position	0 1	Fail conditions met for 3 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass (**Transitional Pass**)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	
				Steady State Case: Simultaneous failures occur on both PCS2 and PCS4 monitors	XY state PCS2 and PCS4 faults	EVT Lo **OR** EVT Hi Occur Simultaneously - within (VlvXStckHiSteadyStWindow + 0.1) seconds Where VlvXStckHiSteadyStWindow: Trans Fluid Temp Time -50 0.50 -32 0.50 -24 0.50 -5 0.50 4 0.50 40 0.50	Fail Conditions met for 2 seconds	
		DTC Pass (**Steady State Pass**)	X valve completes High to Low transition without failure		X Command X position PCS2 and PCS4 Monitors	0 0 No Fault Pending	5 seconds	
Shift Solenoid Valve B Stuck Off	P0756	This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically low position This detection only occurs during an Y valve transition	The Y valve is determined to be in a hydraulically Low state when it has been commanded hydraulically High.	Y Commanded Hi for > (Yvalve_TurnOnTm + 1 seconds Where Yvalve_TurnOnTm: Trans Fluid Temp Time -40 15 -30 10 -20 5 -10 0.30 20 0.15 140 0.05	Y Command Y Position	1 0	Fail Conditions met for 4.5 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A
		DTC Pass	Y valve completes Low to High transition without failure		Y command Y Position	1 1 (as indicated by YPSw showing 0 value)	Pass conditions met for 2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid Valve B Stuck On	P0757	This DTC will indicate when Shift Solenoid Valve B (Y Valve) is stuck in the hydraulically hi position This detection only occurs during an Y valve transition	The Y valve is determined to be in a hydraulically Hi state when it has been commanded hydraulically Lo	Y Commanded Lo for > (Yvalve_TurnOffTm + 1) seconds Where Yvalve_TurnOffTm: Trans Fluid Temp Time -40 4 -30 2.7 -20 1.4 -10 .7 20 .2 140 .05	Y Command Y Position	0 1	Fail Conditions met for 4.5 seconds. 3 retries with failure to move solenoid required to set MIL	One Trip, Type A
		DTC Pass	Y valve completes High to Low transition without failure		Y Command Y Position	0 0 (as indicated by YPSw showing 1 value)	Pass conditions met for 2 seconds	
Pressure Control Solenoid Hydraulic Diagnostics								
Pressure Control Solenoid hydraulic diagnostics P0777, P0797, P2715, share these common secondary parameter enable conditions	***				Xvalve transition X Valve Stuck Hi LinePressure Estimate Propulsion System Active	X valve is not in a transition, and hasn't transitioned in the last 0.275 seconds (0.025 + .25) No fault pending > 325 kpa AND >=325 kpa FOR > 1 seconds =1		
Pressure Control (PC) Solenoid B Stuck ON	P0777	This DTC will determine if Pressure Control Solenoid 2 (B) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid B (PCS2) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS2PS (PSw3) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	One Trip, Type A
		DTC Pass	Pass when PCS2PS and PCS2Cmnd are in agreement (Reg Exhaust)	PCS2PS (PSw3) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Pressure Control (PC) Solenoid C Stuck ON	P0797	This DTC will determine if Pressure Control Solenoid 3 (C) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid C (PCS3) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS3PS (PSw1) indicates hi hydraulic pressure	PCS commanded pressure	<=5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay:	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS3PS and PCS3Cmnd are in agreement (Reg Exhaust)	PCS3PS (PSw1) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.5 seconds (40 * 0.0125), more than 10 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Pressure Control (PC) Solenoid D Stuck ON	P2715	This DTC will determine if Pressure Control Solenoid 4 (D) is stuck in the hydraulically hi position. This DTC has two fail cases.	The pressure switch associated with pressure control solenoid D (PCS4) is indicating that the PCS is in the full feed position when the PCS has been commanded regulating exhaust.	**Fail Case 1:** PCS4PS (PSw4) indicates hi hydraulic pressure	PCS commanded pressure *** Common Hydraulic Enables	<= 5 kpa for >= (FFDelay + 0.1) seconds Where FFDelay: Trans Fluid Temp Time -50 4.50 -30 1.40 -18 0.80 -4 0.30 13 0.19 40 0.08	Failure exists for 30 seconds (2400 * 0.0125)	Two Trips, Type B
		DTC Pass	Pass when PCS4PS and PCS4Cmnd are in agreement (Reg Exhaust)	PCS4PS (PSw4) indicates Low hydraulic pressure			1.25 seconds ((2500 - 2400) * 0.0125)	
			The warning threshold for Fail Case 1 has been met 5 times in a single key cycle	**Fail Case 2:** Fail case 1 criteria met for at least 0.2 seconds (16 * 0.0125), more than 5 times in a given key cycle	Same as **Fail Case 1.**		N/A	
Clutch Slip Diagnostics								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Clutch slip diagnostics P079A, P079B, P079C share these common secondary parameter enable conditions	***				LinePressureEstimate	> 235 kpa **AND** > (MinLinePressure - 2) kpa Where MinLinePressure is a lookup table Trans Fluid Temp vs Line Pressure: Temp Kpa -40 1200 -30 1200 -20 1000 -10 700 0 500 10 265		
Clutch 1 Slip	P079A	This DTC sets when excessive	Clutch 1 Slip Speed	C1 Slip > 200 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 200 Nm =1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s **OR** Instantly if >6300 **OR** >9500	One
		DTC Pass	Clutch 1 Slip Speed	C1 Slip < 50 RPM	C1 Pressure Command C1 Torq Estimate C1 Fill detected	> = 1800 kpa > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	
Clutch 2 Slip	P079B	This DTC sets when excessive slip is observed on C2 while commanded on	C2 Slip Speed	C2 Slip > 200 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 200 Nm = 1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	C2 Slip Speed	C2 Slip < 50 RPM	C2 Pressure Command C2 Torq Estimate C2 Fill detected	> = 1800 kpa > = 20 Nm =1	0.125 seconds (10 * 0.0125)	
Clutch 3 Slip	P079C	This DTC sets when excessive slip is observed on C3 while C3 has been commanded on	C3 Slip Speed	C3 Slip > 300 RPM	C3 Pressure Command C3 Torq Estimate C3 Fill detected	> = 1800 kpa > = 200 Nm = 1 Predicted Mtr A spd Predicted Mtr B spd	63 seconds (3 retries * 1s failtime * 30 seconds between attempts **OR** Instantly if >6300 **OR** >9500	One Trip, Type A
		DTC Pass	C3 Slip Speed	C3 Slip < 50 RPM	C3 Pressure Command C3 Torq Estimate C3 Fill detected	> = 1800 kpa > = 20 Nm = 1	0.125 seconds (10 * 0.0125)	
Pressure Control Solenoid Electrical Diagnostics								
All Pressure Control Solenoid electrical diagnostics P0961, P0962, P0963, P0965, P0966, P0967, P0969,	***				Ignition voltage Engine Speed	> = 11 Volts && <= 32 Volts >= 0 RPM && <= 7500 RPM for >= 5 seconds		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
P0970, P0971, P2719, P2720, P2721, P2728, P2729, P2730, P0973, P0974, P0976, P0977 share these common secondary parameter enable conditions					Vehicle Speed PropSysActive	<= 200 mph for >= 5 seconds =1		
Pressure Control (PC) Solenoid A System Performance	P0961	This DTC sets when an invalid voltage in PCS1 control circuit has been detected	PCS1 electrical status	HWIO circutry detects out of range error is present	DTC P0961 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid A Control Circuit Low Voltage	P0962	This DTC sets when the PCS1 control circuit has been detected to be shorted to ground	PCS1 electrical status	HWIO circuitry detects an electrical low pressure error is present	DTC P0962 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid A Control Circuit High Voltage	P0963	This DTC sets when PCS1 has been detected to be shorted to power or open circuited.	PCS1 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0963 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid B System Performance	P0965	This DTC sets when an invalid voltage in PCS2 control circuit has been detected	PCS2 electrical status	HWIO circutry detects out of range error is present.	DTC P0965 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid B Control Circuit Low Voltage	P0966	This DTC sets when the PCS2 control circuit has been detected to be shorted to ground	PCS2 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid B Control Circuit High Voltage	P0967	This DTC sets when PCS2 has been detected to be shorted to power or open circuited.	PCS2 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid C System Performance	P0969	This DTC sets when an invalid voltage in PCS3 control circuit has been detected	PCS3 electrical status	HWIO circutry detects out of range error is present.	DTC P0965 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid C Control Circuit Low Voltage	P0970	This DTC sets when the PCS3 control circuit has been detected to be shorted to ground	PCS3 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0966 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid C Control Circuit High Voltage	P0971	This DTC sets when PCS3 has been detected to be shorted to power or open circuited.	PCS3 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0967 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.2 seconds (16 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 16) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Pressure Control (PC) Solenoid D System Performance	P2719	This DTC sets when an invalid voltage in PCS4 control circuit has been detected	PCS4 electrical status	HWIO circutry detects out of range error is present.	DTC P2719 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid D Control Circuit Low Voltage	P2720	This DTC sets when the PCS4 control circuit has been detected to be open circuit or shorted to power	PCS4 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid D Control Circuit High Voltage	P2721	This DTC sets when PCS4 has been detected to be shorted to ground	PCS4 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid E System Performance	P2728	This DTC sets when an invalid voltage in PCS5 control circuit has been detected	PCS5 electrical status	HWIO circutry detects out of range error is present.	DTC P2719 *** Common Electrical Enables	Not failed this key on	Failure detected for 4 seconds (320 * 0.0125) out of a 5 second (400 * 0.0125) window	Two Trips, Type B
		DTC Pass		HWIO circuitry detects an out of range error is not present			1 second ((400 - 320) * 0.0125)	
Pressure Control (PC) Solenoid E Control Circuit Low Voltage	P2729	This DTC sets when the PCS5 control circuit has been detected to be open circuit or shorted to power	PCS5 electrical status	HWIO circuitry detects an electrical low pressure error is present.	DTC P2720 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical low pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	
Pressure Control (PC) Solenoid E Control Circuit High Voltage	P2730	This DTC sets when PCS5 has been detected to be shorted to ground	PCS5 electrical status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P2721 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32 * 0.0125) out of a 0.5 second (40 * 0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an electrical hi pressure error is not present			0.1 seconds ((40 - 32) * 0.0125)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Shift Solenoid A Control Circuit Low	P0973	This DTC detects a short to power or open circuit in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects an open circuit or short to power error is present.	DTC P0973 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid A Control Circuit High	P0974	This DTC detects a short to ground in the X valve control circuit.	X Valve Electrical Status	HWIO circuitry detects short to ground error is present.	DTC P0974 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects short to ground error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid B Control Circuit Low	P0976	This DTC detects a short to power or open circuit in the Y valve control circuit.	Y Valve Electrical Status	HWIO circuitry detects an electrical low pressure error is present.	DTC P0976 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects an open circuit or short to power error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Shift Solenoid B Control Circuit High	P0977	This DTC detects a short to ground in the Y valve control circuit.	Y Valve Electrical Status	HWIO circuitry detects an electrical hi pressure error is present.	DTC P0977 *** Common Electrical Enables	Not failed this key on	Failure detected for 0.4 seconds (32*0.0125) out of a 0.5 second (40*0.0125) window	One Trip, Type A
		DTC Pass		HWIO circuitry detects short to ground error is not present.			0.1 seconds ((20 - 16) * 0.025)	
Power Moding Diagnostics								
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	Ignition Run Crank line voltage <= 2 Volts	CAN Communication	enabled	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A
					ECM run crank active data	available and active		
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage > 2 Volts			5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	Ignition Run Crank line voltage > 5 V	CAN Communication	enabled	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
					ECM run crank active data	available and false		
		DTC Pass	Run Crank Line Voltage	Ignition Run Crank line voltage < 2V			3 seconds (120 * 0.025)	
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory On	FALSE	P2537	Not Test Failed This Key On and Not Test Passed This Key On	0.2 seconds (8 * 0.025)	One Trip, Type A
					Propulsion System	Active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Active Time	> 0.5 seconds		
		DTC Pass	Accessory On	TRUE			0.2 seconds (8 * 0.025)	
TCM Substrate Temp Sensor								
Transmission Control Module (TCM) Internal Temperature Too High	P0634	The DTC detects the electronic circuitry is at high operating temperature.	Transmission Substrate Temperature OR Ignition Voltage AND Substrate Temperature	≥ 142 °C ≥ 18 V ≥ 50 °C	Transmission Substrate Temperature	-50 °C ≤ Transmission Substrate Temperature ≤ 146 °C for 0.25 seconds	≥ 5 seconds ≥ 2 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 142 °C and Ignition Voltage is ≤ 18 V for 10 seconds **OR** Transm'n Substrate Temp ≤ 50 °C and Ignition Voltage is ≥ 18 V for 10 seconds	One Trip, Type A
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Range/Performance	P0667	The DTC detects the TCM substrate temperature sensor is reporting an incorrect value	Delta between TCM substrate temperature sensor and transmission fluid temperature sensor (TFT)	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once above conditions are removed > 20 seconds, diagnostic is re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B
			AND					
			Delta between TCM substrate temperature sensor and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256	Transmission state Engine Torque Inaccurate	NOT in park/neutral Must be FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				-40 15 -20 15 0 15 30 15 60 15 100 15 149.0 15 149.1 256	Accelerator Position Sensor Failure P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE Engine Speed Vehicle Speed	Must be FALSE NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0668	The DTC detects TCM substrate temperature sensor short to ground error.	TCM Substrate Temperature Sensor	≤ -60 °C	Engine Speed Vehicle Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≥ -55 °C for 4 seconds	Two Trips, Type B
Transmission Control Module (TCM) Substrate Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0669	The DTC detects TCM substrate temperature sensor open or short to power error.	TCM Substrate Temperature Sensor	≥ 160 °C	Engine Speed Vehicle Speed Transmission Output Speed Estimated Motor Power Loss	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds Transmission Output Speed ≥ 200 RPM for 5 seconds cumulative. Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds	≥ 60 seconds	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						cumulative.	**Pass Conditions** Transm'n Substrate Temp ≤ 150 °C for 4 seconds	
TCM Powerup Temp Sensor								
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit Range/Performance	P06AC	The DTC detects the TCM powerup temperature sensor is reporting an incorrect value	Delta between TCM powerup temperature sensor and transmission fluid temperature sensor (TFT)	>Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once conditions are removed > 20 seconds, diagnostic re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B
			AND					
			Delta between TCM powerup temperature sensor and TCM substrate temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 15 -20 15 0 15 30 15 60 15 100 15 149.0 15 149.1 256	Transmission state	NOT in park/neutral		
					Engine Torque Inaccurate	Must be FALSE		
					Accelerator Position Sensor Failure	Must be FALSE		
					P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT Fault Active OR Failed This Key On		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp	< value in fail criteria table			> 70 sec (700 counts at 100ms)	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			sensor					
Transmission Control Module (TCM) Powerup Temperature Sensor Low (Failed at a low temperature - circuit short to ground).	P06AD	The DTC detects TCM powerup sensor short to ground error.	TCM Power Up Temperature Sensor	≤ -59 °C	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips, Type B
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.		
					NOT Fault Active OR Failed This Key On	P0721, P0722, P0723, P215C		
							Pass Conditions Transm'n Substrate Temp ≥ -40 °C for 4 seconds	
Transmission Control Module (TCM) Powerup Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P06AE	The DTC detects TCM powerup sensor open or short to power error.	TCM Power Up Temperature Sensor	≥ 164 °C	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	≥ 60 seconds	Two Trips, Type B
					Vehicle Speed	≤ 124 MPH for 5 seconds		
							Pass Conditions Transm'n Substrate Temp ≤ 150 °C for 4 seconds	
Transmission Fluid Temp Sensor								
Transmission Fluid Temperature Sensor Circuit Range/Performance	P0711	The DTC detects the transmission fluid temperature is reporting an incorrect value	Delta between transmission fluid temperature (TFT) and TCM powerup temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30	IF vehicle speed is < 5 mph and accelerator position is > 20% for more than 7 seconds, then diagnostic is disabled. Once conditions are removed > 20 seconds, diagnostic is re-enabled		> 300 seconds (3000 counts at 100ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				149.0 30 149.1 256				
			AND					
			Delta between transmission fluid temperature (TFT) and TCM substrate temperature sensor	> Highest of transmission temperature sensors Temp Delta -40.1 256 -40 50 -20 30 0 30 30 30 60 30 100 30 149.0 30 149.1 256	Transmission state	NOT in park/neutral		
					Engine Torque Inaccurate	Must be FALSE		
					Accelerator Position Sensor Failure	Must be FALSE		
					P0721, P0722, P0723, P215C, P0658, P0668, P0669, P0712, P0713, P06AD, P06AE	NOT Fault Active OR Failed This Key On		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
		DTC Pass	Transm'n substrate temp delta between powerup temp sensor AND fluid temp sensor	< value in fail criteria table			> 70 sec (700 counts at 100ms)	
Transmission Fluid Temperature Sensor Circuit Low (Failed at a low temperature - circuit short to ground).	P0712	The DTC detects transmission fluid sensor short to ground error.	Transmission Sump Temperature Sensor	≤ -60 °C	P0721, P0722, P0723, P077B, P215C	NOT Fault Active OR Failed This Key On	≥ 60 seconds	One Trip, Type A
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Estimated Motor Power Loss	Estimated Motor Power Loss ≥ 0.4 kW for 200 seconds cumulative.		
							Pass Conditions Transm'n Sump Temp ≥ -50 °C for 4	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							seconds	
Transmission Fluid Temperature Sensor Circuit High (Failed at a high temperature - circuit open or short to power).	P0713	The DTC detects substrate sensor open or short to power error.	Transmission Sump Temperature Sensor	≥ 160 °C	P0721, P0722, P0723, P077B, P215C Engine Speed Vehicle Speed	NOT Fault Active OR Failed This Key On 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds ≤ 124 MPH for 5 seconds	≥ 60 seconds **Pass Conditions** Transm'n Substrate Temp ≤ 149 °C for 4 seconds	One Trip, Type A
Transmission Output Speed Sensor								
Transmission Output Speed (TOS) Sensor Wrong Direction	P0721	The DTC detects incorrect TOS direction.	TOS Raw Direction	TOS Direction Raw is not Forward or Reverse	TOS Sample Period	≠ 0	≥ 2.5 seconds (100 counts at 25ms) **Pass Conditions** TOS Direction Raw = Forward or Reverse for 3.125 seconds (125 counts at 25ms)	One Trip, Type A
Output Speed Sensor Circuit - Direction Error	P077B	The DTC detects if the Transmission Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign	Transmission Output Speed Direction Raw	≠ Motor Direction	CAN Communication Lost With Transmission P215C TOS Hardware Input Output Transmission Hybrid Motor Speed based Estimated Output Speed is Valid	FALSE NOT Fault Active Valid Calculated based on M1 or M2 Speed Equation	0.35 seconds (14 counts at 25ms)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Transmission Output Speed and Motor Output Speed Difference	≤ 50 RPM	**Pass Conditions** Opposite as FAIL for 5 seconds (200 counts at 25ms)	
					Motor Estimated Transmission Output Speed	≥ 50 RPM		
Output Shaft Speed (OSS) - Wheel Speed Correlation	P215C	The DTC Correlates the Transmission Output Speed with the ABS Wheel Speed and Motor Speed to Detect any Failures in the Transmission Output Speed Sensor.	Difference between Transmission Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors	≥ 175 RPM	WHEN Output Speed Calculated from Wheel Speeds AND Output Speed Calculated from Motor Speeds	> 150 RPM	200 ms (8 counts at 25ms)	Two Trips, Type B
					Output Speed Calculated from Motor Speeds AND Output Speed Calculated from Wheel Speeds Difference	≤ 40 RPM	**Pass Conditions** Difference between Transm'n Output Speed and the Calculated Average of Output Speed from the Motors and Wheel Speed Sensors ≤ 125 RPM for 0.5 seconds (20 counts at 25ms)	
					OBD Wheel Speed Sensors	TRUE		
					Driven Wheel Estimated Vehicle Speed Fault	FALSE		
					Propulsion System Active	TRUE		
					Hybrid Motor Speed based Estimated Output Speed is Valid	Calculated based on M1 or M2 Speed Equation		
Transmission Internal Mode Switch								
Internal Mode Switch P Circuit High Voltage	P1824	The DTC monitors if the IMS P Circuit is shorted to a High Voltage	Transmission Direction State	PARK	P1824	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL P Circuit Sensed	Has Not Been Observed Low	Transmission Direction State Fault Active	FALSE	Pass Conditions PRNDL P Circuit Has Been Observed Low for 1.5875 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed < 7500RPM		
Internal Mode Switch A Circuit Low Voltage	P182A	The DTC monitors if the IMS A Circuit is shorted to a Low Voltage	PRNDL State	Transitional 1	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B
			Trans Direction State	DRIVE	P182A	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL A Circuit Has Been Observed High for 1.5875 seconds	
					PRNDL State	PARK		
					PRNDL A Circuit Sensed	PRNDL A Circuit Has NOT Been Observed High for 1 second		
					Trans Direction State Fault Active			
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	< 124 mph for 5 seconds		
					Engine Speed	0 ≤ Engine Speed < 7500RPM		
Internal Mode Switch B Circuit Low Voltage	P182B	The DTC monitors if the IMS B Circuit is shorted to a Low Voltage	Transmission Direction State	PARK	P182B	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL B Circuit Sensed	PRNDL B Circuit Has Not Been Observed High	Transmission Direction State Fault Active	FALSE	**Pass Conditions** PRNDL B Circuit Has Been Observed High for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 32V		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch B Circuit High Voltage	P182C	The DTC monitors if the IMS B Circuit is shorted to a High Voltage	PRNDL State	Transitional 13	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Trans Direction State	DRIVE	P182C	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL B Circuit Has Been Observed Low for 1.5875 seconds	
					PRNDL State	PARK		
					PRNDL B Circuit Sensed	Has Been Observed High for 1 Second		
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 32		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch P Circuit Low Voltage	P182D	The DTC monitors if the IMS P Circuit is shorted to a Low Voltage	PRNDL State	Transitional 8	Automatic Transmission Type	EVT	8 seconds + 1 count at 6.25ms	Two Trips, Type B
			Trans Direction State	DRIVE	P182D	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL P Circuit Has Been Observed High for 1.5875 seconds	
					PRNDL State	PARK		
					PRNDL P Circuit Sensed	Has Been Observed Low for 1 second		
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					Vehicle Speed	≤ 124 MPH for 5 seconds		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch- Invalid Range	P182E	The DTC monitors if the IMS is in an Invalid Range	PRNDL State	Illegal	Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds	5 seconds	Two Trips, Type B
					Vehicle Speed	≤ 124 MPH for 5 seconds	**Pass Conditions** PRNDL State is NOT Illegal for 5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					P182E	NOT Fault Active OR Failed This Key On		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					Vehicle Speed	< 124 mph for 5 sec		
					Engine Speed	0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch C Circuit High Voltage	P182F	The DTC monitors if the IMS C Circuit is shorted to a High Voltage	Transmission Direction State	DRIVE	Automatic Transmission Type	EVT	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL C Circuit Sensed	Has Not Been Observed Low	P182F	NOT Fault Active OR Failed This Key On	**Pass Conditions** PRNDL C Circuit Has Been Observed Low for 4 seconds + 1 count at 6.25ms	
					Trans Direction State Fault Active	FALSE		
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
					TOS Sensor	Not Fault Active		
Internal Mode Switch A Circuit High Voltage	P1838	The DTC monitors if the IMS A Circuit is shorted to a High Voltage	Transmission Direction State	PARK	P1838	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL A Circuit Sensed	Has Not Been Observed Low	Trans Direction State Fault Active	FALSE	**Pass Conditions** PRNDL A Circuit Has Been Observed Low for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
Internal Mode Switch C Circuit Low Voltage	P1839	The DTC monitors if the IMS C Circuit is shorted to a Low Voltage	Transmission Direction State	PARK	P1839	NOT Fault Active OR Failed This Key On	2.5 seconds + 1 count at 6.25ms	Two Trips, Type B
			PRNDL C Circuit Sensed	PRNDL C Circuit Has Not Been Observed High	Trans Direction State Fault Active	FALSE	**Pass Conditions** PRNDL C Circuit Has Been Observed Low for 1.5875 seconds	
					Ignition Voltage	11V < IGN < 31.99		
					Run/Crank Active	TRUE		
Controller Diagnostics								

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 Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	*This Diagnostic tests for whether a controller has been programmed*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP needs to be programmed	Fails if No Start Calibration is set to true which is only available on a new un-programmed HCP		Ignition Status	= Run or Crank	Runs once at power up	
		DTC Pass:		Enable cal = false				
Control Module Long Term Memory Reset	P0603	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory						
		DTC Fail case 3: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P0604	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from RAM	Data read does not match data written		Ignition Status	Run or Crank	Should finish within 30 seconds at all operating conditions	
Bosch T43 TEHCM Security- Output Disable/IPT Test	P0606	*This Diagnostic tests that the HWIO executes the IPT (Inhibit Path Test) exactly once at every ignition on to test the ability of the external monitoring module (CG122) to shutoff high-side drivers to the transmission hydraulics and reset the main processor.*						One Trip, Type A
		DTC Fail case 1: Abort IPT, because HSD may be short-circuited to ground or to battery voltage	Actuator supply is out of voltage threshold range during more than 40 msec.		IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 2: Abort IPT, because HSD may be short-circuited to ground or to battery	Actuator supply is lower than 90% of Batt. voltage or WD(Watch Dog for TCM main processor) error count is greater AND	or > 5.5 volts	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Output stage is not interlocked AND Actuator supply is out of voltage threshold range.					
		DTC Fail case 3: Abort IPT, because HSD may be short-circuited to ground or to battery voltage	Actuator supply is out of voltage threshold range during more than 40 msec. AND WD error counter is equal or higher than threshold. AND Output stage is interlocked AND Actuator supply is lower than 90% of Batt. Voltage.	- WD error counter: >=5	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 4: WD error counter doesn't reach its desired level (sdi_Ufet = 1)	WD error count is higher than threshold	- WD error count: 0	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 5: WD error counter does not reach its desired level (sdi_Ufet = 4)	WD error count is equal or higher than threshold	- WD error count: 4	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 6: WD error counter does not reach its desired level (sdi_Ufet = 6)	WD error count is equal or higher than threshold	- WD error count: 6	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 7: HSD(High Side Driver) cannot be switched on at WD error counter <= 4	Actuator supply is lower than 90% of Batt. Voltage or WD error count is higher than threshold during more than 40 msec. AND Output stage is not interlocked AND Actuator supply voltage is within range	- WD error counter: > 0 - actuator supply voltage: >1.5 volts and <= 5.5 volts	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 8: DReset line = low level, HSD cannot be switched on (fgtr_DReset = True)	Actuator supply is lower than 90% of Batt. Voltage or WD error count is higher than 0 during more than 40 msec. AND Output stage is interlocked.		IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 9: HSD cannot be switched off at WD error counter >= 5	Actuator supply voltage is out of range or WD error count is lower than threshold during more than 40 msec. AND Output stage is interlocked	- actuator supply voltage: < 1.5 volts or > 5.5 volts -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND Actuator supply voltage is equal or higher than 90% of the Batt. Voltage.					
		DTC Fail case 10: DReset line = high level, HSD cannot be switched off (fgtr_DReset = False)	Actuator supply voltage is out of threshold range during more than 40 msec. AND WD error count is equal or higher than threshold AND Output stage is not interlocked	- actuator supply voltage: < 1.5 volts or > 5.5 volts -WD error counter:<5	IPT test started	end of Initialization	3.125ms loop	
		DTC Fail case 11: Run time of IPT function too long	IPT execution time is equal or greater than time threshold.	- time threshold : 300ms	IPT test started	end of Initialization	3.125ms loop	
Internal Control Module A/D Processing Performance	P060B	*HWIO executes the A/D converter test. This test checks the Vref voltage at 3 levels.*						One Trip, Type A
		DTC Fail case 1: AtoD converter test result is failed	0 x Vref is higher than voltage threshold	> approx. 0.01467 Volts	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	6.25ms	
		DTC Fail case 2: AtoD converter test result is	0.5 x Vref is out of voltage threshold	< approx. 2.479 Volts OR > approx. 2.518 Volts			6.25ms	
		DTC Fail case 3: AtoD converter test result is failed	1.0 x Vref is out of voltage threshold.	< approx. 4.978 Volts OR > approx. 2.518 Volts			6.25ms	
Torque Security								
Control Module Long Term Memory	P062F	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip,
		DTC Fail case 1: Indicates that **DTC Fail case 2:** Indicates that the NVM Error flag **HWIO Bat**	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at	
		DTC Pass:		Dynamic or static Batwritewillnotsucceed = fail				
Internal Control Module Redundant Memory Performance	P16F3	*Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables*						One Trip, Type A
		DTC Fail case 1: Detect the dual store memory fault by comparing the primary Ve signals and the We redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal DependendantX fail counts out of Y sample counts Executes in a Xms loop Detects in 200ms	
Clutch pressure combination / valve commands do not fit to allowed range state	P16F7	*Detects controller faults such that solenoid commands doesn't match with it's expected associated Range State value.*						One Trip, Type A
		DTC Fail case 1:	Control State Request for Clutch 1 is NOT Active AND X Valve Command is 0 AND Y Valve Command is 0 AND	Clutch 1 Pressure > 153kpa time threshold: 200msec	Ignition switch	in crank or run	Executes in a 12.5ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Clutch 1 Pressure Command has been corrupted to higher than threshold					
		DTC Fail case 2:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 0 AND Y Valve Command is 1 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		DTC Fail case 3:	Control State Request for Clutch 1 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 1 Pressure Command has been corrupted to higher than threshold	Clutch 1 Pressure > 153kpa time threshold: 200msec				
		DTC Fail case 4:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		DTC Fail case 5:	Control State Request for Clutch 3 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 0 AND Clutch 3 Pressure Command has been corrupted to higher than threshold	Clutch 3 Pressure > 199kpa time threshold: 200msec				
		DTC Fail case 6:	Control State Request for Clutch 2 is NOT Active AND X Valve Command is 1 AND Y Valve Command is 1 AND Clutch 2 Pressure Command has been corrupted to higher than threshold	Clutch 2 Pressure > 178kpa time threshold: 200msec				
		DTC Fail case 7:	Control State Request for Clutch 3 is NOT Active	Clutch 3 Pressure > 199kpa				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND X Valve Command is 1 AND Y Valve Command is 1 AND Clutch 3 Pressure Command has been corrupted to higher than threshold	time threshold: 200msec				
Alive Rolling Count / Protection Value fault	P179B	*This Diagnostic checks for corruption in signals sent over CAN for the Hybrid Range State*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the Hybrid Range State	Current ARC is not equal to previous ARC + 1 and Primary Value is not equal to protection value		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Pass:		No errors in 1000ms				
Communication Diagnostics								
Control Module Comm'n Bus A Off	U0073	*This diagnostic indicates a bus off condition on HSGMLAN (Bus A)*						One Trip,
		DTC Fail case 1: Detects that	CAN device driver	= bus-off state.	Run/Crank Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec		
Lost Comm'n With ECM/PCM on Bus A	U0100	*This diagnostic indicates a lost communication between the TCM and the ECM on Bus A*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable	> 9.5 Volts =RUN/ACC =FALSE =TRUE =TRUE =FALSE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Brake System Control Module	U0129	*This diagnostic indicates a lost communication between the TCM and the BSCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Communication With Body Control Module	U0140	*This diagnostic indicates a lost communication between the HCP and the BCM on Bus A*						Special Type C
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BCM on Bus A	Missed BCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller	U0293	*This diagnostic indicates a lost communication between the TCM and the HCP*						One Trip, Type A
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					Power Mode	=RUN/ACC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				Crank Pulse Diagnostics				
Crankshaft Position (CKP)	P0335	Detects Lack of Response from	Crank Sync State (Lores Crank	No Activity	HWIO based crank	NOT DisableCrank	5s **Pass Conditions:** Crank Sync State ≠ No Activity	Two
Crankshaft Position (CKP) Sensor A Performance	P0336	Detects Invalid 58X Crank Sensor Signal	Crank Sync State (Lores Crank Compared to Hires Crank)	Verify Sync	HWIO based crank decode status	NOT DisableCrank	5s OR 10 crank re-sync events in a 10 second window **Pass Criteria:** Crank Status = CrankInSync for 10 seconds	Two Trips, Type B
				Idle Speed Diagnostics				
Idle Diagnostics P0506, P0507 have the following common enable criteria	***				No Active DTCs:	Motor A speed faults: P0A3F, P1B03, P0A40, P0C52, P0C53, P0C5C, P0C5D		
					No Active DTCs:	Motor B speed faults: P0A45, P1B04, P0A46, P0C57, P0C58, P0C61, P0C62		
					No Active DTCs:	Vehicle Speed/TOS sensor faults: P0722, P077B, P215C		
					Accelerator pedal position	Not Defaulted		
					Accel Pedal position	<= 1 %		
					Engine State	Running (not starting or stopping states)		
					Vehicle speed Commanded RPM Delta	<= 0.6 mph < 50 RPM		
					IdleConditons present	for >= 5 seconds		
Idle Air Control (IAC) System - RPM Too Low	P0506	This DTC sets when the idle speed is lower than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is greater than fail threshold 75 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is less than fail threshold 50. Filter coefficient for engine speed = 0.002	No Active DTCs: ** Common Enables	P0507	Pass condition met for 15 seconds	
Idle Air Control (IAC) System - RPM Too High	P0507	This DTC sets when the idle speed is higher than the targeted idle speed	Idle speed	Filtered input speed error (desired - actual) is less than fail threshold -150 RPM. Filter coefficient for engine speed = 0.002	** Common Enables		1 loop execution at 100 ms rate	Two Trips, Type B
		DTC Pass	Idle speed		** Common Enables		Pass condition met for 15 seconds	
		DTC RePass after failure	Idle Speed	Filtered input speed error (desired - actual), is greater than fail threshold -140. Filter coefficient for engine speed = 0.00375	No Active DTCs: ** Common Enables	P0506	Pass condition met for 15 seconds	
Power Moding Diagnostics								
System Voltage Low	P0562	Sets when the low voltage system voltage is below a threshold	Ignition Voltage	<= 10 Volts	Ignition Key Status Engine Speed	RUN/CRANK >= 0 RPM	5 seconds in a 6 second window	Special Type C
		DTC Pass		> 10 Volts			1 second	
System Voltage Hi	P0563	Sets when the low voltage system voltage is above a threshold	Ignition Voltage	>= 18 Volts	Ignition Key Status	RUN/CRANK	5 seconds in a 6 second window	Special Type C
		DTC Pass		Ignition Voltage < 18 Volts			1 second	
Ignition Switch Run/Start Position Circuit Low	P2534	Detects a run crank relay open circuit	Runk Crank Line voltage	<= 2 Volts	CAN Communication ECM run crank active data	enabled available and active	60 seconds (2400 * 0.025) in a 65 second window (2600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	> 5 Volts			5 seconds (200 * 0.025)	
Ignition Switch Run/Start Position Circuit High	P2535	Detects a run crank relay short to power	Runk Crank Line voltage	> 5 V	CAN Communication ECM run crank active data	enabled available and false	12 seconds (480 * 0.025) in a 15 second window (600 * 0.025)	One Trip, Type A
		DTC Pass	Run Crank Line Voltage	< 2V			3 seconds (120 * 0.025)	
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory	FALSE	P2537 Propulsion System Propulsion System Active Time	Not Test Failed This Key On and Not Test Passed This Key On Active > 0.5 seconds	0.2 seconds (8 * 0.025)	One Trip, Type A
		DTC Pass	Accessory	TRUE			0.2 seconds (8 * 0.025)	
Stuck Clutch Diagnostics								
Transmission Friction Element A Stuck On	P07A3	Detects an applied or welded clutch (C1)	Clutch slip observed	=0	C1 clutch state Clutch slip	=offgoing <= 30 RPM/s	2s * 3 fail attempts + 2 *30 second wait between 3 time retry strategy	One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	C1 Slip observed	=1	C1 Slip Speed	> 30 RPM		
Transmission Friction Element B Stuck On	P07A5	Detects an applied or welded offgoing clutch (C2) Detects an applied or welded clutch (C2)	Clutch slip observed **OR** Clutch slip ref Clutch slip actual	=0 >360 rpm <100 rpm	C2 clutch state Clutch slip	=offgoing <= 30 RPM/s	.9s 20.6s = (.2s * 3 fail attempts + 2 *10 second wait between attempts)	One Trip, Type A
		DTC Pass	C2 Slip observed Clutch slip reference Clutch slip actual	=1 >360 rpm >200 rpm	C2 Slip Speed	> 30 RPM	.3 s (12*.025s)	
Transmission Friction Element C Stuck On	P07A7	Detects an applied or welded clutch (C2)	Clutch slip ref Clutch slip actual	>360 rpm <100 rpm			20.6s = (.2s * 3 fail attempts + 2 *10 second wait between attempts)	One Trip, Type A
		DTC Pass	Clutch slip reference Clutch slip actual	>360 rpm >200 rpm			.3 s (12*.025s)	
Transm'n Auxilary Oil Pump Diagnostics								
Auxiliary Transmission Fluid Pump Performance	P2797	This diagnostic monitors the aux pump performance based on aux pump filtered desired and actual speed values	Difference between desired and actual aux pump speed	>650 rpm for >.25s	Aux Pump Speed Command RunCrankActive	>= 600 RPM FOR 1 second = 1 for > 0.2 s	Fail Condition met for 3 seconds (120 * 0.025) in a 1.25 second (150 * 0.025) window	One Trip, Type A
		DTC Pass	Aux pump speed	|Aux pump speed - Commanded Aux pump Speed| <= 650 RPM			Pass met for 0.5 seconds ((165-160) * 0.025)	
Transm'n Output Speed Sensor								
Output Speed Sensor Circuit Direction Error	P077B	The DTC detects if the Transmission Output Speed Sensor Direction is Incorrect by Comparing with Calculated Direction from Motor Speed Sign	Transmission Output Speed Direction Raw	≠ Motor Direction	Transmission Output Speed Hybrid Motor Speed based Estimated Output Speed is Valid Transmission Output Speed and Motor Output Speed Difference Motor Estimated Transmission Output Speed	Not FAULT ACTIVE Calculated based on M1 or M2 Speed Equation ≤ 50 RPM ≥ 50 RPM	0.325 seconds (13 counts at 25ms) **Pass Conditions** Opposite of FAIL for 5 seconds (200 counts at 25ms)	One Trip, Type A
Vehicle Speed Output Shaft Speed Correlation	P215B	The DTC Monitors if the Difference between the Transmission Output Speed	Transmission Output Speed and Output Speed Calculated from the Wheel Speed Sensors Difference	6.2 mph	Number of Secured Vehicle Speed Sources	2	10 seconds (400 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		and Output Speed Calculated from the Wheel Speed Sensors			Secured Vehicle Speed Use Transmission Output Speed Secured Vehicle Speed Use Wheel Speed	TRUE TRUE	**Pass Conditions** Opposite of Fail for 20 seconds (800 counts at 25ms)	
Internal Mode Switch 2								
** Common Enable Criteria All IMS Diagnostics have	***				Ignition Voltage Run/Crank Active Vehicle Speed Engine Speed	11V < IGN < 32V TRUE < 124 mph for 5 seconds 0 ≤ Engine Speed ≤ 7500 RPM for 5 seconds		
Internal Mode Switch 2 R1 Circuit Low Voltage	P181C	The DTC Monitors if the IMS R1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 17 R1 Circuit Has Not Been Observed High	Converted Directional IMS AND Directional IMS R1 **Common Enable Criteria	Transitional 2 R1 Circuit NOT High for 5 seconds	2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R1 Circuit High Voltage	P181D	The DTC Monitors if the IMS R1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS R1	Transitional 30 R1 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 R2 Circuit Low Voltage	P181E	The DTC Monitors if the IMS R2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS R2	DRIVE R2 Circuit Has Not Been Observed High	Converted Directional IMS AND Directional IMS R2 Directional IMS R2	PARK R2 Circuit Low for 5 seconds	2.7 seconds (108 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					**Common Enable Criteria		**Pass Conditions** IMS R2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	
Internal Mode Switch 2 R2 Circuit High Voltage	P181F	The DTC Monitors if the IMS R2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS R2	Transitional 14 OR Transitional 29 R2 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS R2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit Low Voltage	P183A	The DTC Monitors if the IMS D1 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 8 OR Transitional 20 D1 Circuit Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D1 Circuit High Voltage	P183B	The DTC Monitors if the IMS D1 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 27 D1 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D1 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D2 Circuit Low Voltage	P183C	The DTC Monitors if the IMS D2 Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS D1	Transitional 24 D2 Circuit Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS D2 Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 D2 Circuit High Voltage	P183D	The DTC Monitors if the IMS D2 Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS D2	Transitional 11 AND Transitional 23 D2 Circuit Has Not Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms)	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							Pass Conditions IMS D2 Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	
Internal Mode Switch 2-Invalid Range	P183E	The DTC Monitors if the IMS is in an Invalid Range	Converted Directional IMS	Illegal (All Circuits Open)	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** Opposite of Fail for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 1-2 Correlation	P183F	The DTC Monitors if the IMS Direction and Range Correlation is Invalid	Converted Directional IMS	Correlation Fault Neutral (With No IMS Faults the Direction IMS and Range IMS Indicate Different Detent Postions)	**Common Enable Criteria		1.25 seconds (50 counts at 25ms) **Pass Conditions** Opposite of Fail for 1.7 seconds (68 counts at 25ms)	One Trip, Type A
Internal Mode Switch 2 S Circuit Low Voltage	P184A	The DTC Monitors if the IMS S Circuit is Shorted to a Low Voltage	Converted Directional IMS AND Directional IMS S Circuit	Transitional 9 Has Not Been Observed High	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS S Circuit Has Been Observed High for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Internal Mode Switch 2 S Circuit High Voltage	P184B	The DTC Monitors if the IMS S Circuit is Shorted to a High Voltage	Converted Directional IMS AND Directional IMS S Circuit AND Directional IMS R1	Transitional 26 AND DRIVE Has Not Been Observed Low R1 Has Been Observed Low	**Common Enable Criteria		2.7 seconds (108 counts at 25ms) **Pass Conditions** IMS S Circuit Has Been Observed Low for 3.125 seconds (125 counts at 25ms)	Two Trips, Type B
Battery Pack Diagnostics								
Hybrid Battery System Discharge Time Too Long	P0C76	High voltage bus discharge time too long	High Voltage Inverter Rationalized Voltage	> 200V after 3.5 seconds	Vehicle Power Mode	= RUN	2 Failures out of 2 Samples Key-Cycle	One Trip, Type A
Discharge Switch Circuit Open	P1A56	High voltage bus discharge circuit failed	High voltage bus voltage delta after commanded discharge circuit event	< 75V after 500ms	Vehicle Power Mode	= RUN	1 Failure	Special Type C

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Discharge circuit status	Unavailable	10 counts			10 discharge unavailable events Frequency: Runs once per key-cycle Pass: High voltage bus delta > 75V after 500ms of a commanded discharge event	
Autostart Diagnostic								
Hybrid System Performance	P0AB9	This diagnostic indicates an autostart or autostop attempt failed.	Engine state	not running	Clutch 3 slip state	Not fault pending or fault active	15s	One Trip, Type A
Engine Performance Diagnostic								
Engine Performance - No Torque Detected	P16E0	This diagnostic indicates that the engine is not producing torque.	Measured Engine Sensed Torque	< 0 Nm	All Secondary Parameters Listed below must be meet for 2 seconds		3.5s out of a 4s window (12.5ms)	One Trip, Type A
			AND Sensed Engine Torque Error	> 50 Nm	Engine Actual Torque Fault	FALSE		
					DTC's not Fault Active	U0100		
					Engine Start Stop State	= Engine Running		
					Engine Torque Command Immediate	≥ 50 Nm		
					Low Fuel Condition	FALSE		
					Fuel Level Data Fault	FALSE		
Controller Diagnostics								
Control Module Read Only Memory (ROM)	P0601	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip,
		DTC Fail case 1:	Calculated Checksum does not		Ignition Status	= Run or Crank	1 failure if it occurs during the	
		DTC Fail case 2: This DTC will be stored if any						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Not Programmed	P0602	*This Diagnostic tests for whether a controller has been programmed*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP needs to be programmed	Fails if No Start Calibration is set to true which is only available on a new un-programmed HCP		Ignition Status	= Run or Crank	Runs once at power up	
		DTC Pass:		Enable cal = false				
Control Module Long Term Memory Reset	P0603	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up			Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2:						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P0604	*This Diagnostic tests that the RAM is functioning correctly*						One Trip, Type A
		DTC Fail case 1: The primary Ye variable does not match the redundant Ya variable **Dual Store** RAM	Ye variable	≠ Ya Variable	Ignition Status	= Run or Crank	Runs real time	
		DTC Fail case 2: Indicates that HCP is unable to correctly write	Memory location is locked	Function is trying to write to that location			1 failure	
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **System** RAM	HWIO detects Fault	= true				
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM	HWIO detects Fault	= true				
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM	HWIO detects Fault	= true				
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module Internal Performance	P0606	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
		DTC Fail case 2: Indicates that the HCP has detected an	Key Value	= Calibration Value	SRAR shutdowns	= False	Detects in 150ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False =False = False = False	Up down counter = 3	
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = false <= 0 MPH = False = off for less than 5 seconds		
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_XferTest	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
Torque Security Diagnostics								
Internal Control Module Torque Performance	P061A	*This Diagnostic tests if the regen is reported accurately to the brake control module*						One Trip,
		DTC Fail case 1:	The Estimated output torque	>The drivers output torque	Regenerative Braking	> 0 Nm	14 fail counts out of 16	
		DTC Pass:		The Estimated output torque Commanded <= The drivers				
Internal Control Module Torque Calculation Performance	P061B	*This Diagnostic tests if the hybrid torque command can create an unintended acceleration/decelerration or wrong direction hazzard*						One Trip, Type A
		DTC Fail case 1: The Estimated output torque Commanded exceeds the upper torque limit To Max Fault	The Estimated output torque Commanded	> Maximum of either the drivers output torque request or zero plus .2g (534Nm)		Runs continuously when a torque source is present	14 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 2: The Estimated output torque Commanded exceeds the lower	The Estimated output torque Commanded	< Minimum of either the drivers output torque request or zero minus .2g (534Nm)				
		DTC Fail case 3: Transmission output torque rationality check violated To Req Rat Fault	Axle torque request is converted to transmission output torque. When this converted output torque violates the rationality check comparison by 1 Nm for greater than 200ms a failure is flagged.	1Nm				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 4: Brake torque request rationality check violated To Req Rat Fault	Brake torque request is converted to transmission output torque. When this converted output torque violates the rationality check comparison by 1 Nm for greater than 200ms a failure is flagged.					
		DTC Fail case 5: Output torque negative when driver request is positive Sign Diff Fault	When the PRNDL equals drive and the driver requested torque is positive while the commanded output torque is negative and below a -0.2g (-534Nm) threshold for greater than 200ms.	-534Nm (equivalent to -0.2g)	Vehicle Speed TOSS sensor fault is active or vehicle speed sensor fault is active	< 7mph		
		DTC Fail case 6: Output torque positive when driver request is negative Sign Diff Fault	When the PRNDL equals reverse and driver requested torque is negative while the commanded output torque is positive and greater than a 0.2g (534Nm) threshold for greater than 200ms.	534Nm (equivalent to 0.2g)				
		DTC Fail case 7: The primary Input Torque Correction does not equal the redundant calculation Ti Corr Fault	When the redundant calculation of the input torque correction is .2g (534Nm)	> or < the primary calculation		Runs continuously when a torque source is present		
		DTC Fail case 8: The Traction Motor torque command exceeds the motor torque capacity Tm Cmd Fault	The Traction Motor torque command	>Maximum motor torque capacity plus .2g (534Nm) or less than the minimum torque capacity minus .2g (534Nm)				
Control Module Long Term Memory Performance	P062F	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition State	= accesory, run, or crank	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO**						
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Torque Management	P06AF	*This Diagnostic checks that the ECM is still functioning correctly*						One

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
System – Forced Engine Shutdown		**DTC Fail case 1:** The main processor monitor ring compares the ECM 2nd pattern (nibble pattern) to known good pattern to determine ECM state of health.	The nibble pattern is incorrect	The pattern does not match (F, 5, B, D, A, 6, 3, 0)	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	8 fail counts out of 12 sample counts Executes in a 12.5 ms Loop Detects in 200ms	Trip, Type A
		DTC Pass:		2nd RX pattern smpl > Smpl Limit				
Supply Voltage Circuit Diagnostics								
Supply Voltage Circuit 2 Low Voltage	P150D							Special Type C
		DTC Fail case 1: Supply	Ignition Voltage	< 8V	Enable Cals	= true	20 Fail count out of 25	
		DTC Pass:		No failure in 2.5s				
Supply Voltage Circuit 1 Low Voltage	P150E							Special Type C
		DTC Fail case 1: Supply Voltage Circuit 1 Low Voltage	Ignition Voltage	< 8V	Enable Cals Diag System Disable	= true = false	20 Fail count out of 25 sample counts Executes in a 100ms loop Detects in 2.5s	
		DTC Pass:		No failure in 2.5s				
Alive Rolling Count Diagnostics								
Alive Rolling Count / Protection Value fault for	P15F0	*This Diagnostic checks for corruption in signals sent over CAN for the Engine Actual Torque Steady State*						One Trip,
		DTC Fail case 1: Detect the	The current alive rolling count value does OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds		
Alive Rolling Count / Protection Value fault for the commanded predicted axle torque	P15F1	*This Diagnostic checks for corruption in signals sent over CAN for the commanded predicted axle torque*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) or Protection Value fault by checking the ARC and Protection Value of the commanded predicted axle torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR The primary signal value does not equal the protection value	Current ARC ≠ Previous ARC +1 Primary Value ≠ Protection Value	Ignition Key Status	Run/Crank for > 0.5 seconds	14 fail counts out of 16 sample counts Executes in a 12.5 ms Loop Detects in 200ms	
Alive Rolling Count / Protection Value fault for the Regenerative Braking Axle Torque	P1B15	*This Diagnostic checks for corruption in signals sent over CAN for the Regenerative Braking Axle Torque*						One Trip, Type A
		DTC Fail case 1: Detect the ARC (Alive Rolling Count) Protection Value fault by checking the ARC and Protection Value of the Regenerative Braking Axle Torque	The current alive rolling count value does not equal the previous alive rolling count value incremented by 1 OR	Current ARC ≠ Previous ARC +1	Ignition Key Status	Run/Crank for > 0.5 seconds	21 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			The primary signal value does not equal the protection value	Primary Value ≠ Protection Value				
Internal Control Module Transmission Direction Range Switch	P16F2	*Detect transmission direction errors by reading the states of the Direction IMS switches as well as determining a transmission direction and comparing it to the transmission direction from the primary controls path.*						One Trip, Type A
		DTC Fail case 1: No direction match with no IMS failures	Read the Direction IMS switches and determine that they represent a valid transmission direction (P,R,N,D) but it does not match the transmission direction determined by the primary controls path.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 2: Multiple transmission directions with no IMS failures	Read the Direction IMS switches and determine that they represent more than one valid transmission direction (P,R,N,D)					
		DTC Fail case 3: No direction match with one IMS failure	Read the Direction IMS switches and determine that one switch has failed and calculate a transmission direction, but it does not match the transmission direction determined by the primary controls path.					
		DTC Fail case 4: Multiple transmission directions with one IMS failure	Read the Direction IMS switches and determine that one switch has failed and calculate a transmission direction and determine that they represent more than one valid transmission direction (P,R,N,D).					
		DTC Fail case 5: Unable to determine transmission direction	Reads the Direction IMS switches and determine that more than one switch has failed and cannot calculate a transmission direction.					
Internal Control Module Redundant Memory Performance	P16F3	*Detect the dual store memory fault by comparing the primary value and the dual store value of the individual variables*						One Trip, Type A
		DTC Fail case 1: Detect the dual store memory fault by comparing the primary Ve signals and the We redundant signals	The primary value and the dual store value are not equal			Runs continuously	Signal DependendantX fail counts out of Y sample counts Executes in a Xms loop **All Detected in 200ms**	
		DTC Fail case 2: Detect the dual store memory fault by comparing the primary Ve				Fail Timer incremented	> 175ms	
		DTC Pass:		No errors in 1000ms				
Internal Control Module Transmission Range Control Performance	P16F4	*Detect transmission range errors by comparing the Direction IMS switches with the Range IMS information from the TCM.*						One Trip, Type A
		DTC Fail case 1: Positive transmission ranges that do not match	The Range IMS and Direction IMS from the primary controls path and both have valid transmission positions (P, R, N, D) but the two do not match.		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 2: Error corrected Direction IMS	The Range IMS has a valid transmission position and the Direction IMS from the					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Range IMS is between valid transmission positions and Direction IMS is error corrected	The Range IMS indicates a transitional PRNDL position and the Direction IMS has an error corrected transmission position.					
		DTC Fail case 4: Range IMS is invalid and Direction IMS is error corrected	The Range IMS is invalid due to a fault or a problem with the TCM, and the Direction IMS has an error corrected transmission position.					
		DTC Fail case 5: Range IMS is between valid transmission positions and Direction IMS is invalid	The Range IMS indicates a transitional PRNDL position and the Direction IMS is invalid due to a fault or a problem with the HCP					
		DTC Fail case 6: Range IMS and Direction IMS are both invalid	The Range IMS is invalid due to a fault or a problem with the TCM, and the Direction IMS is invalid due to a fault or a problem with the HCP					
Internal Control Module Commanded Range State	P16F6	*The Transmission Range State monitor verifies that there are no mismatches in system equations, the transmission range state being executed is valid, and the transmission range state has not performed an invalid transition*						One Trip, Type A
		DTC Fail case 1: Invalid Transmission Range State	The current Transmission Range State being used by the system is detected to be an invalid value within the current Transmission Range State Group.			Runs continuously	1 failure Detected within 25ms of failure	
		DTC Fail case 2: Invalid Transmission Range State Group	The current Transmission Range State Group being used by the system is an invalid value.					
		DTC Fail case 3: Invalid Transmission Range State transition	The current Transmission Range State has changed, and the change in value is not one of the supported transitions from the previous Transmission Range State.					
		DTC Fail case 4: Range Equation mismatches current Transmission Range State	The Range Equation can not be rationalized against the current Transmission Range State.					
		DTC Fail case 5: Torque Determination State mismatches current Transmission Range State	The Torque Determination State can not be rationalized against the current Transmission Range State.					
		DTC Fail case 6: Input Torque Optimization State mismatches current Transmission Range State	The Input Torque Optimization State can not be rationalized against the current Transmission Range State					
Redundant Speed Sensor Circuit Diagnostics								
Control Module Redundant Drive Motor A	P1E4A	*This Diagnostic rationalizes the HCP calculated MTR Aspeed against MCP A calculated MTR A speed*						One Trip,
		DTC Fail case 1:	The difference between Mtr A calculated	> 400	Enable Cal	= true		
Control Module Redundant Drive Motor B	P1E4B	*This Diagnostic rationalizes the HCP calculated MTR B speed against MCP B calculated MTR B speed*						One Trip,

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Speed Sensing Circuit		**DTC Fail case 1:** The difference between Mtr B calculated speed and HCP calculated MTR B speed exceeds a threshold	The difference between Mtr B calculated speed and HCP calculated MTR B speed	> 400	Enable Cal Run/Crank Voltage OR Run/Crank Voltage Secured	= true = true	21 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	Type A
Communication Diagnostics								
Control Module Comm'n Bus A Off	U0073	*This diagnostic indicates a bus off condition on HSGMLAN (Bus A)*						One Trip,
		DTC Fail case 1: Detects that	CAN device driver	= bus-off state.	Run/Crank Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	4 fail counts out of 5 samples	
Control Module Comm'n Bus B Off	U0074	*This diagnostic indicates a bus off condition on the PTE (Bus B)*						One Trip, Type A
		DTC Fail case 1: Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	
Control Module Comm'n	U0077	*This diagnostic indicates a bus off condition on the CE (Bus E)*						One

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Bus E Off		**DTC Fail case 1:** Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.	CAN device driver	= bus-off state.	Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	4 fail counts out of 5 samples counts Executes in a 12.5ms loop Detects in 450 ms	Trip, Type A
					Power Mode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus A	U0100	*This diagnostic indicates a lost communication between the HCP and the ECM on Bus A*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With TCM	U0101	*This diagnostic indicates a lost communication between the HCP and the TCM on Bus A*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	=TRUE =TRUE =FALSE >=3 sec		
Lost Comm'n With Brake System Control Module	U0129	*This diagnostic indicates a lost communication between the HCP and the BSCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the EBCM on Bus A	Missed EBCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN/ACC =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Communication With Body Control Module	U0140	*This diagnostic indicates a lost communication between the HCP and the BCM on Bus A*						Special Type C
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the BCM on Bus A	Missed BCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN/ACC =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Comm'n With Hybrid Powertrain Control Module B	U179A	*This diagnostic indicates a lost communication between the HCP and the VICM on Bus A*						One Trip, Type A
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With ECM/PCM on Bus B	U1818	*This diagnostic indicates a lost communication between the HCP and the ECM on Bus B*						One Trip, Type A
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus B	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Powertrain Control Module B on Bus B	U182D	*This diagnostic indicates a lost communication between the HCP and the VICM on Bus B*						One Trip, Type A
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					Power Mode	=RUN/ACC		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	=TRUE =FALSE >=3 sec		
Lost Comm'n With BSCM on Bus E	U1833	*This diagnostic indicates a lost communication between the HCP and the BSCM on Bus E*						Two Trips
		DTC Fail case 1: Detects that	Missed BSCM Messages		Run/Crank Voltage Power Mode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN/ACC =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Contactor Diagnostics								
High Voltage System	P0A0C	DTC monitors the sensed	HVIL Sensed % of Reference Voltage	< 30%	HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	2 failures out of 2 samples	One
		DTC Pass					25 ms	
High Voltage System Interlock Circuit High	P0A0D	DTC monitors the sensed voltage when the commanded voltage is high and low to determine if the circuit is faulty	HVIL Sensed % of Reference Voltage	> 24%	HVIL Source Status 12V Battery Voltage	Unsourced (0V) > 10.2V	5 failures out of 6 samples 12.5 ms /sample	One Trip, Type A
			OR					
			HVIL Sensed % of Reference Voltage	> 44%	HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	
Hybrid Battery Positive Contactor Circuit Stuck Closed	P0AA1	This DTC detects when the Positive Contactor is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 60%	Bus Voltage Sensor Battery Voltage Sensor Negative Contactor Positive Contactor Precharge FET	Not Failed Not Failed Closed Open for > 8 seconds Off for > 8 seconds	3 failures out of 7 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
		DTC Pass					87.5 ms	
Hybrid Battery Voltage System Isolation Fault	P0AA6	This DTC will determine if the measured resistance between the high voltage bus and chassis ground Is too low which indicates that the internals of the battery are no longer adequately isolated from chassis ground	Case 1 Active Isolation Resistance	< 325 KOhm	P0AA6 Positive Contactor Negative Contactor	DTC Not Active Open for 10 Seconds Open for 10 Seconds	Fail if last resistance measurement is below theshold AND any (5) measurements out of last (10) measurements are below resistance theshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle.	One Trip, Type A
			OR Case 2 Active Isolation Resistance	< 400 KOhm	P0AA6 Positive Contactor Negative Contactor	DTC Active Open for 10 Seconds Open for 10 Seconds		
		DTC Pass					Pass if any single resistance measurement exceeds resistance threshold	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Positive Contactor Control Circuit	P0AD9	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 194 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery Negative Contactor Control Circuit	P0ADD	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 194 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	
Hybrid Battery Precharge Contactor Circuit Stuck Closed	P0AE2	This DTC detects when the Precharge FET is Stuck Closed by comparing the the Bus Voltage to the Battery Voltage.	Bus Voltage / Battery Voltage	> 60%	Positive Contactor	Open for > 8 seconds	3 failures out of 9 samples 12.5 ms /sample Executed Once Per Precharge Event	One Trip, Type A
					Precharge FET	Off for > 8 seconds		
					Bus Voltage Sensor	Not Failed		
					Battery Voltage Sensor	Not Failed		
					Negative Contactor	Closed		
					Multipurpose Contactor	Closed		
		DTC Pass					112.5 ms	
Hybrid Battery Precharge Contactor Control Circuit	P0AE4	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Open Ckt Fault and the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output volage is > (VPWR -0.4V)	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Hybrid Battery System Precharge Time Too Short	P0C77	This DTC sets if Bus Voltage gets too high too fast during contactor precharge.	Bus Voltage / Battery Voltage	> 95% in less than 50 ms from the start of precharge	Battery Current Sensor	Valid	50 ms Executed Once Per Precharge Event	One Trip, Type A
					Bus Voltage	< 40 Volts before the start of precharge		
					Bus Voltage Sensor	Valid		
		DTC Pass					50 ms	
Hybrid Battery System Precharge Time Too Long	P0C78	This DTC sets if either the Bus Voltage does not get high enough in 700 ms or battery current remains too high for too long after the contactor status changes from open to precharge	Bus Voltage / Battery Voltage	has not reached 95% in less than 700 ms from the start of contactor precharge	Battery Voltage Sensor	Valid	700 ms Executed Once Per Precharge Event	One Trip, Type A
					Bus Voltage Sensor	Valid		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			or					
			Battery Current	> Battery Voltage/27.63 for longer than 87.5 ms while waiting for Bus Voltage to reach 95% of Battery Voltage	Battery Current Sensor	Valid	Executed Once Per Precharge Event	
		DTC Pass					700 ms or less	
Battery Charging System Positive Contactor Control Circuit	P0D0A	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Battery Charging System Negative Contactor Control Circuit/Open	P0D11	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					625 ms	
Battery Charging System High Voltage Interlock Circuit Low	P0D17	DTC monitors the sensed voltage when the commanded voltage is high to determine if the circuit is faulty	Charging HVIL Sensed % of Reference Voltage	< 30%	Charging HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	2 failures out of 2 samples 12.5 ms /sample	One Trip, Type A
		DTC Pass					25 ms	
Battery Charging System High Voltage Interlock Circuit High	P0D18	DTC monitors the sensed voltage when the commanded voltage is high and low to determine if the circuit is faulty	Charging HVIL Sensed % of Reference Voltage	> 24%	Charging HVIL Source Status 12V Battery Voltage	Unsourced (0V) > 10.2V	5 failures out of 8 samples 12.5 ms /sample	One Trip, Type A
			OR					
			Charging HVIL Sensed % of Reference Voltage	> 44%	Charging HVIL Source Status 12V Battery Voltage	Sourced (5V) > 10.2V	4 failures out of 6 samples 12.5 ms /sample	
		DTC Pass					75 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Hybrid/EV System Discharge Time Too Long	P0D5E	This DTC stores the result of the OBCM test (refer to OBCM Parameter Page) or when a discharge cannot be confirmed will run an intrusive backup/safety test which checks to see if battery current is flowing through what could be a stuck closed multifunction contactor	Condition A OBCM Status for P0D5E	Fail reported from OBCM			Executed Once Per Charger Discharge Event	One Trip, Type A
			OR					
			Condition B Battery Current	> 2.5 amps (averaged from 6 to 10 sec after discharge while HFET is commanded on for 2 seconds)	OBCM Status for P0D5E Battery Current Sensor	No Confirmed Pass or Fail from OBCM Not Failed	Executed Once 10 seconds after Charger Discharge Event if no status is received from the OBCM for P0D5E	
		DTC Pass					See OBCM Parm Page	
Hybrid/EV Battery Multifunction Contactor Control Circuit	P1EBC	This DTC checks the circuit for electrical integrity during operation.	The HPC2 detects that the commanded state of the driver and the actual state of the control circuit do not match. Exception: It cannot detect the Short to Ground Fault	Open Load detected while OFF and output voltage > 4V. Short to VBATT detected while OFF and output voltage is > (VPWR -0.4V) Open while ON detected when current sense feedback < 57 mA	12V Battery Voltage	> 10.2V	40 failures out of 50 samples 12.5 ms /sample Continuous	Two Trips, Type B
		DTC Pass					625 ms	
Hybrid/EV Battery Multifunction Contactor Stuck Open	P1EBE	This DTC determines if the Multipurpose Contactor is Stuck Open by commanding the heater on for 2 sec and observing the accumulated battery current during the Accumulation Time	Accumulated Battery Current	< 100 A	12V Battery Voltage Battery Current Sensor Charger Current Sensor Charge Control Mode Charge System Mode Main Contactor Status Multifunction Contactor Status Accumulation Time	> 10.2V No Faults No Faults Constant Current or Constant Voltage Not Heat Only AND Not Idle Open Closed = 4 sec	Runs once near the beginning of each Charge Cycle	One Trip, Type A
		DTC Pass					4 sec	
Hybrid/EV Battery Multifunction Contactor Stuck Closed	P1EBF	Sets if Charger Voltage is Too High Too Soon After Charger Positive Contactor Closure	Charger Voltage	Average Charger Voltage >= 133 Volts	Positive Charge Contactor 12V Battery Voltage	Was open for more than 2 seconds but is closed now > 10.2V	300 ms / Runs once during charger precharge	Two Trips, Type B
			OR					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sets if the Absolute Value of Battery Current is Too High During Heater Only Mode	Battery Current	Absolute Value (Battery Current) > 1 A	Charge System Mode 12V Battery Voltage	Heater Only Mode > 10.2V	160 failures out of 240 samples 12.5 ms / sample	
Hybrid/EV Battery System Contactor(s) Stuck Open	P1EC0	This DTC checks for stuck open contactors by comparing Bus Voltage to Battery Voltage after the contactors are closed	Bus Voltage / Battery Voltage	< 80%	Bus Voltage Sensor Battery Voltage Sensor Time since Main Contactors have closed 12V Battery Voltage	No Faults No Faults > 1 sec > 10.2V	6 failures out of 6 samples 12.5 ms /sample Continuous	One Trip, Type A
		DTC Pass					0.5 sec	
Hybrid Battery Pack Heater Transistor Stuck Off	P1EC4	This DTC determines if the Heater FET is Stuck Off by commanding it on for 2 sec and observing the accumulated difference between charger and battery current during the Accumulation Time	Accumulated (Charger Current -Battery Current)	< 200 A	12V Battery Voltage Battery Current Sensor Charger Current Sensor Charge Control Mode Charge System Mode Charge Contactor Status Main Contactor Status Multifunction Contactor Status Accumulation Time	> 10.2V No Faults No Faults Constant Current or Constant Voltage Not Heat Only AND Not Idle Closed Open Closed = 4 sec	Runs once near the beginning of each Charge Cycle	Two Trips, Type B
		DTC Pass					4 sec	
Hybrid Battery Pack Heater Transistor Stuck On	P1EC5	This DTC checks for a stuck on heater transistor by checking for too much Charger Current when the multipurpose contactor and the heater transistor are both commanded off in charger precharge mode.	Charger Current	> 0.4 A	12V Battery Voltage Charger Positive Contactor Charger Negative Contactor Multipurpose Contactor Heater Commanded Duty Cycle Charger Current Sensor Battery Current Sensor Charge Control Mode	> 10.2V Closed Closed Open < 5% for at least 2 seconds No Faults No Faults Precharge	4 failures out of 48 samples 12.5 ms /sample Once per Charge Cycle	One Trip, Type A
		DTC Pass					600 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charging Voltage System Isolation Fault	P0DAA	This DTC will determine if the measured resistance between the high voltage charging bus and chassis ground is too low which indicates that the integrity of the charging bus and/or battery are no longer adequately isolated from chassis ground					Fail if last resistance measurement is below theshold AND any (5) measurements out of last (10) measurements are below resistance theshold. No more than one resistance measurement is taken per HPC2 Wakeup Cycle.	One Trip, Type A
			Active Isolation Resistance	< 325 KOhm	P0DAA Charge Only Mode	DTC Not Active 10 seconds		
			OR Active Isolation Resistance	< 400 KOhm	P0DAA Charge Only Mode	DTC Active 10 seconds		
		DTC Pass					Pass if any single resistance measurement exceeds resistance threshold	
System Isolation / Impact Sensor Fault - Hybrid Battery System Contactors Open	P1F17	This DTC will latch when the HPC1 detects a "passive" isolation fault and due to a variety of additional failures it becomes necessary to latch the contactors open until the vehicle is repaired.	Condition 1				25 ms	One Trip, Type A
			Control Module Hybrid Battery Voltage System Isolation Fault (P1AF0,P1AF2, or P1E22)in HPC1	Active	Rollover or Airbag or Inertial Sensors	Not working		
			Condition 2 Control Module Hybrid Battery Voltage System Isolation Fault (P1AF0,P1AF2, or P1E22)in HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 3 Lost Comm with HPC1	Active	Lost Communication with Inflatable Restraint Sensing and Diagnostic Module on Bus F (U184E)	Active		
			Condition 4 Lost Comm with HPC1	Active	Rollover or Airbag or Inertial Sensors	Not working		
		DTC Pass					Once set, this DTC cannot pass. DTC passes when latch is not set.	
Battery Pack Coolant Valve Diagnostics								
Hybrid/EV Battery Pack Coolant Control Valve A Stuck	P1F56	This performance fault detects if the 4 port valve is not functioning as intended.			System Voltage	>10.2V		Two Trips, Type B
					No active DTCs	P0CE2, P0CE3, P0CE6, P0CE7,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF: Either valve end stop is out of range OR IF: End stop span is out of range OR IF: Feedback spikes out of range during end stop learn procedure IF valve does not reach the endstop	30.28% < Low End Stop < 69.52% OR 50.64% < High End Stop < 69.52% 15% < Span < 33% Feedback > 69.52% OR Feedback < 30.28% <=22s	Propulsion System Active	State A has not already run this key cycle. = True	1 fail / 1 sample at 6.25ms (22s) in State A	
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Performance	P0CE5	If valve has not reached commanded position.	Valve has not reached its commanded position	<=22s	P1F56	not running (or has completed)	1280 fails / 1600 samples at 6.25ms in State B/C	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Performance - Unexpected Position Change Detected	P1F58	If valve feedback has drifted out of position.	Valve feedback position	>3%	P1F56 Valve has not moved for	not running (or has completed) >15s	1280 fails / 1600 samples at 6.25ms in State B/C	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit Low	P0CE2	Valve Motor drive 1 has a short to low fault.	Valve Motor Driver 1 State	LOW	System Voltage Valve	>10.2V must be moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve A Control Circuit High	P0CE3	Valve Motor drive 1 has a short to high fault.	Valve Motor Driver 1 State	HIGH	System Voltage	>10.2V	90 fails / 100 samples at 6.25ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Valve	must be stopped or moving in forward direction		
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit Low	P0CE6	Valve Feedback signal has a out of range low circuit fault	Valve feedback voltage	< 28% of reference voltage	System Voltage	>10.2V	640 fails / 800 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve Position Sensor Circuit High	P0CE7	Valve Feedback signal has a out of range high circuit fault	Valve feedback voltage	> 72% of reference voltage	System Voltage	>10.2V	640 fails / 800 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit Low	P1EC7	Valve Motor drive 2 has a short to low fault.	Valve Motor Driver 2 State	LOW	System Voltage Valve	>10.2V must be moving in forward direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Hybrid/EV Battery Pack Coolant Control Valve B Control Circuit High	P1EC8	Valve Motor drive 2 has a short to high fault.	Valve Motor Driver 2 State	HIGH	System Voltage Valve	>10.2V must be stopped or moving in reverse direction	90 fails / 100 samples at 6.25ms	Two Trips, Type B
Battery Thermal Controls Diagnostics								
Hybrid Battery Pack Coolant Temperature Sensor Circuit Range/Performance	P0C43	Coolant Temp. Sensor 1 is not reading a rational value.	IF RESS Thermal conditioning mode = Active Heat then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>=30C >=30C	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
					No active DTCs:	P1E8C, P1E8D, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, P0A9C,P0A9D,P0A9E,U0111		
					Coolant Pump speed	>= 20% for more than 1 min		
					If RESS Thermal conditioning mode changes then	>= 70 sec has elapsed since the change		
			IF RESS Thermal conditioning mode = IF:	>= 30C >= 30C	System Voltage	>10.2V		
					No active DTCs:	P1E8C, P1E8D, P0C44, P0C47,		
					Coolant Pump speed	>= 20% for more than 1 min		
					If RESS Thermal conditioning mode changes then	>= 70 sec has elapsed since the change		
			IF RESS Thermal conditioning mode = Passive Cool then IF: ABS (RESS Inlet Temperature - RESS Outlet Temperature) AND IF: ABS (RESS Inlet Temperature - Battery Cell Average Temperature Sensor)	>= 55C >= 55C	System Voltage	>10.2V		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No active DTCs:	P1E8C, P1E8D, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8, P0A9C,P0A9D,P0A9E,U0111		
					Coolant Pump speed	>= 20% for more than 1 min		
					If RESS Thermal conditioning mode changes then	>= 70sec has elapsed since the change		
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit Range/Performance	P0CD6	Coolant Temp. Sensor 2 is not reading a rational value.	IF: ABS (RESS Outlet Temperature - RESS Inlet Temperature)	>=20C	System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B
			AND					
			IF: ABS (RESS Outlet Temperature - Battery Cell Average Temperature Sensor)	>=20C				
					No active DTCs:	P1E8C, P1E8D, P0C44, P0C47, P0C45, P0C4A, P0CD7, P0CD8,P0A9C,P0A9D,P0A9E, U0111		
					Coolant Pump speed	>=20% for more than 1 min		
Hybrid Battery Pack Coolant Pump Control Circuit/Open	P0C47	Coolant Pump Control line has a circuit fault	Coolant Pump Control line is open, shorted to voltage or shorted to ground	Board Support Package returns coolant pump control line fault = True	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
					Pump Commanded PWM	Between 5% and 95%		
					Coolant Pump Enable	= High		
Hybrid Battery Pack Coolant Pump Control Performance	P0C4A	Passive Pump determination is enabled first. If not passed them intrusive determination is initiated for final evaluation			Propulsion System Active	If diagnostic did not complete in charge		Two Trips, Type B
					Plugged in Charge	Once per Drive Cycle		
					Charge Mode	Actively Charging		
					RESS Inlet temp	< 50°C and > -20°C		
					RESS Outlet Temp	> -20°C		
					Battery Mininum Cell Temp	> -20°C		
					RESS Valve Learn	Complete in Propulsion System Active		
					No active DTCs:	P1EC5, P1FFB, P1FFC, P1FFD, P1FFE, P0C44, P0C45, P0C43, P1F56, P1F58, P0CE5, P0CE2, P0CE3, P1EC7, P1EC8, P0CE6, P0CE7.		
					Battery Severrity Status	None		
					Battery Discharge Limit	Not Faulted		
					High Voltage SOC Fault	Not Faulted		
		Passive Pump Determination - Pass only			Move Battery Pack Coolant Valve	Radiator for 15s then to Bypass position on for 66s	81s	
					Turn pump on	90% DC for 81s		
					Thermal Mode	Not Active Heat		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass					RESS inlet coolant absolute temperature rate of temperature change>0.2°C/s	
		Intrusive Pump Determiniation	IF: RESS Inlet Coolant Temperature rate of temperature decrease	< 0.05°C/s	RESS inlet coolant absolute temperature rate of temperature change Turn pump on Heater Performance Diagnostic - P1EC6	<0.2°C/s during passive pump determination 90% DC for 24s Diagnostic has completed and passed:	24s	
Hybrid Battery Pack Coolant Pump Enable Circuit Low	P1E8C	Coolant Pump Enable has a circuit fault	Coolant Pump Enable line is shorted to ground		System Voltage Coolant Pump Enable	>10.2V = High	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Coolant Pump Enable Circuit High	P1E8D	Coolant Pump Enable has a circuit fault	Coolant Pump Enable line is open or shorted to voltage		System Voltage Coolant Pump Enable	>10.2V = Low	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid/EV Battery Pack Heater Transistor Control Circuit/Open	P1EC3	Heater Transistor Control Circuit has a circuit fault	Heater Transistor Control Circuit is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Hybrid Battery Pack Heater Performance	P1EC6	Battery Heater is not performing as intended	IF: RESS Inlet Coolant Temperature rate of temperature rise	< 0.15°C/s	Propulsion System Active Plugged in Charge Charge Mode RESS Inlet temp RESS Outlet Temp Battery Mininum Cell Temp MPC Status RESS Valve Learn Passive Pump Determination or RESS Thermal Mode No Test Failed This Key On: Battery Severrity Status Battery Discharge Limit High Voltage SOC Fault Move Battery Pack Turn pump on Turn pump off Turn heater on	If diagnostic did not complete in charge Once per Drive Cycle Actively Charging < 50°C > -20°C > -20°C Closed Complete in Propulsion System Active Not Passed Active Heat P1EC5, P1FFB, P1FFC, P1FFD, P1FFE, P0C44, P0C45, P0C43, P1F56, P1F58, P0CE5, P0CE2, P0CE3, P1EC7, P1EC8, P0CE6, P0CE7. None Not Faulted Not Faulted Radiator for 15s then to Bypass 90% DC for 81s DC based on battery voltage to input 31kJ within 40 seconds	up to 161s	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Turn heater off	Wait 40 second for temperature		
Coolant Level Sensor Diagnostics								
Hybrid/EV Battery Pack Coolant Level Sensor Circuit	P1FFB	DTC monitors the sensed voltage to determine if the circuit is in-range, but invalid	Coolant Level Sensor Sensed Voltage	2.85V < Sensed Voltage < 3.11V	12V Battery Voltage	> 10.2V	40 out of 50 samples at 100ms	One Trip, Type A
Hybrid/EV Battery Pack Coolant Level Sensor Circuit Low Voltage	P1FFC	DTC monitors the sensed voltage to determine if the circuit is out-of-range Low	Coolant Level Sensor Sensed Voltage	Sensed Voltage < 1.4V	12V Battery Voltage	> 10.2V	40 out of 50 samples at 100ms	One Trip, Type A
Hybrid/EV Battery Pack Coolant Level Sensor Circuit High Voltage	P1FFD	DTC monitors the sensed voltage to determine if the circuit is out-of-range High	Coolant Level Sensor Sensed Voltage	Sensed Voltage > 4.0V	12V Battery Voltage	> 10.2V	40 out of 50 samples at 100ms	One Trip, Type A
Hybrid/EV Battery Pack Coolant Level Low	P1FFE	DTC monitors the sensor voltage to determin if the coolant level is low	Coolant Level Sensor Sensed Voltage	1.38V < Sensed Voltage < 2.84V (Low State)	[Vehicle Speed for OR (Propulsion System Off Time AND Vehicle Speed)] AND RESS Outlet Coolant Temperature for	< 1 KPH > 30 s > 30 s < 1 KPH >0°C 30s	16 out of 20 samples at 250ms at least once in 2 out of 3 key cycles (moving window)	One Trip, Type A
					DTC's are not ACTIVE	P0CD6, P0CD7, P0CD8, U185A, TempRationalityFA (see Fault Bundles), U0100, P2610, P0721, P077B, P215C, U0101		
System Isolation / Coolant Level Sensor Fault - Hybrid/EV Battery Charging System Disabled	P1FFF	System level RESS HV isolation monitor. Used to invoke remedial action in the event the RESS HV isolation integrity cannot be guaranteed due to any of the listed Malfunction Criteria (prevents vehicle from charging in the event the RESS may have lost coolant). Once set DTC will not re-pass. Requires a code clear.	RESS coolant level sensor fault (P1FFB, P1FFC, P1FFD) OR RESS coolant level low fault (P1FFE) OR RESS HV active isolation failed OR	= TRUE = TRUE = TRUE			5 sec	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Active isolation check is inhibited due to isolation voltage sensor fault (P1AE6)	= TRUE				
Outside Air Temperature Sensor Diagnostics								
Ambient Air Temperature Sensor Range/Performance	P0071	Outside Air Temperature sensor is not performing as intended	ABS (Outside Air Temperature - Inlet Air Temperature)	> 30°C	System Voltage Power mode Test Complete this trip No active DTCs: ABS(Power Up IAT - Power Up ECT) Propulsion Off Timer Power Electronic Pump off Compressor Off soak time	>10.2V = Run for less than 20 seconds = FALSE P0111, P0112, P0113, P0114, P0116, P0117, P0118, P0119, P0072, P0073, U0100 < 10 degC >21600 seconds >3600 seconds >3600 seconds	32 fails / 40 samples at 250ms	Two Trips, Type B
Ambient Air Temperature Sensor Circuit Low Input	P0072	Outside Air Temperature sensor has an out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Ambient Air Temperature Sensor Circuit High Input	P0073	Outside Air Temperature sensor has an out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Diagnostics								
Cooling Fan 1 Control Circuit	P0480	Engine Cooling Fan has a circuit fault	Engine Cooling Fan line is open, shorted to voltage or shorted to ground		System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Cooling Fan Signal Circuit Performance	P148A	Engine Cooling fan signal is not performing as intended	IF ABS (Hardware I/O Radiator fan period from ECM - 10.0) OR	> 0.2	System Voltage Power mode No active DTCs: If ABS(Current Engine Cooling Fan Speed - Previoius Engine Cooling Fan Speed) Then wait for AND	>10.2V ≠ crank P148B, P148C, U0293 >5% 40sec before Enable	32 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS (Hardware I/O Radiator fan duty cycle from ECM - Engine Cooling Fan Speed from CAN bus)	> 30%	Propulsion system active OR (Propulsion system active AND Energy storage system thermal condition request AND Engine Cooling fan operation enable)	= True for longer than 10 seconds = False = ActiveCool = True for longer than 10 seconds		
Cooling Fan Signal Circuit	P148B	Engine Cooling fan signal has a	HWIO duty cycle (from ECM)	< 3%	System Voltage	>10.2V	16 fails / 20 samples at	Two
Cooling Fan Signal Circuit High	P148C	Engine Cooling fan signal has a out of range high circuit fault	HWIO duty cycle (from ECM)	> 97%	System Voltage Propulsion system active OR (Propulsion system active AND Energy storage system thermal condition request AND Engine Cooling fan operation enable)	>10.2V = True for longer than 10 seconds = False = ActiveCool = True for longer than 10 seconds	16 fails / 20 samples at 250ms	Two Trips, Type B
Power Electronics Cooling Diagnostics								
Hybrid/EV Electronics	P0CE9	Coolant Pump Control line has	Coolant Pump Control line is open,		System Voltage HWIO Pump Control Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = True	16 fails / 20 samples at	Two
Hybrid/EV Electronics Coolant Pump Performance	P0CEA	Power Electronics Coolant Pump is not functioning as intended	IF Vehicle Charging		System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature) OR HV Charger Temperature AND ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature) ELSE ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature)	> KtPCOD_dT_PECL_OBCM_Charge >60C for > 5sec > 5 > KtPCOD_dT_PECL_OBCM_Drive	No active DTCs: Power Electronics Coolant pump speed AND Power Electronics Coolant pump enabled Outside Air Temperature Outside Air Temperature Slope Threshold Outside Air Temperature Stable Time	P0CF1, P0CF0, P1F44, P1F45, P0CE9, P0071, P0072, P0073, P1ED7, P1ED6, P1ED8 >30% to Enable AND <25% to Disable (Hysterisis) >300 s = Valid < 0.4 >300s		
Hybrid/EV Electronics Coolant Pump Enable Circuit Low	P1F44	Coolant Pump Enable signal has a shorted to ground circuit fault	Coolant Pump Enable line is shorted to ground		System Voltage HWIO Pump Enable Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = True	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Pump Enable Circuit High	P1F45	Coolant Pump Enable signal has a shorted to voltage circuit fault	Coolant Pump Enable line is shorted to voltage		System Voltage HWIO Pump Enable Circuit Status Coolant Pump Enable	>10.2V ≠ Indeterminate = False	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics	P0CF0	Power Electronics Coolant	Sensor voltage	< 2% (0.1V) of reference	System Voltage	>10.2V	16 fails / 20 samples at	Two
Hybrid/EV Electronics Coolant Temperature Sensor Circuit High	P0CF1	Power Electronics Coolant Temp Sensor has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 250ms	Two Trips, Type B
Hybrid/EV Electronics Coolant Temperature Sensor Circuit Range/Performance	P0CEF	Power Electronics Coolant Temp Sensor is not functioning as intended			System Voltage	>10.2V	32 fails / 40 samples at 250ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF Power Inverter Module request pump speed, Then ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature), Else ABS (Power Electronics Coolant temperature sensor - High Voltage Charger temperature)	>35°C >35°C	No active DTCs: Power Electronics Coolant pump speed AND Power Electronics Coolant pump enabled High Voltage Charger Temperature	P0CF1, P0CF0, P0CE9, P0CED, P1F44, P1F45, P1ED7, P1ED6, P1ED8 >30% to Enable AND <25% to Disable (Hysterisis) >300 s >-40C		
Engine Coolant Bypass Valve Diagnostics								
Engine Coolant Bypass Valve Control Circuit / Open	P2681	Valve Drive (control) Circuit has a circuit fault	Valve Deive Circuit is open, shorted to voltage or shorted to ground		System Voltage HWIO Valve Drive Circuit Status	>10.2V ≠ Indeterminate	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Stuck	P26A9	Valve is stuck or end position learn failed	Valve end postion learn request Valve has not reached its commanded position THEN attempt valve relearn IF Valve still does not reach its commanded position	=FAIL <=15s up to 3 times <=10s	System Voltage No active DTCs: Engine Coolant Temperature Propulsion system active System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7, P0119; P0118, P0117, P0116, >50C = True >10.2V P2681, P26A6, P26A7 = True	1 fails / 1 samples at 100ms (15s)	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Circuit Low	P26A6	Valve Feedback signal has a out of range low circuit fault	Valve feedback percentage	< 5% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Engine Coolant Bypass Valve Position Sensor Circuit High	P26A7	Valve Feedback signal has a out of range high circuit fault	Valve feedback percentage	> 95% of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Stop/Minimum Stop Performance	P26A5	If valve has not reached commanded position	State A: IF Valve feedback percentage is OR IF Valve feedback percentage is	5% < Feedback percentage < 30% 70% < Feedback percentage < 95%	System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7 = True	3 fails / 5 samples at 100ms	Two Trips, Type B
Engine Coolant Bypass Valve Position Sensor Circuit Range/Performance - Unexpected Position Change Detected	P15C5	If valve feedback has drifted out of position	Valve feedback Drift	>3%	System Voltage No active DTCs: Propulsion system active	>10.2V P2681, P26A6, P26A7 = True	80 fails / 100 samples at 100ms	Two Trips, Type B
Air Conditioning Compressor and Rationality Diagnostics								
Air Conditioner (A/C) Refrigerant Charge Loss	P0534	Cooling performance not adequate/Low charge/Plugged refrigerant line.	CASE 1		System Voltage	>10.2V		Two Trips, Type B
			IF Power mode AND Pump Performance diagnostic OR Power mode THEN	=Run Mode AND =Complete = Not Run Mode				
			Start Timer if Energy Storage System Thermal conditioning request = Active Cooling	>2s				
			THEN					
			Start Total Run Timer THEN	=491s	No active DTCs:	P0CE0; P0CE2; P0CE3; P0CE6; P0CE7; P1CE7; P1CE8		
			Override Flag THEN	=TRUE				
			RESS Thermal Valve Position THEN	=100% Chill				
			For Secondary Run Timer Coolant Pump Duty Cycle AND For Secondary Run Timer Coolant Pump Duty Cycle AND	<= 180 =35% > 180 =53%	No active DTCs:	P0C47; P0C4A; P1E8C, P1E8D		
			For this Active Cooling cycle, one time check if Compressor RPM has been	>2200				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Continuous Compressor RPM check	>2250RPM to Enable <2200RPM to Disable (Hysterisis)	No active DTCs:	P0C44, P0C45, P0C43		
			Start Secondary Run Timer THEN	=300s	Inlet Temperature sensor validity	= Valid		
			RESS Coolant Outlet Temperature Sensor - RESS Coolant Inlet Temperature Sensor	< P0534 Fail Threshold KtACXR_T_ThreshTableOn and Table KtACXR_T_ThreshTableOff if the compressor is on for cabin & RESS cooling OR < P0534 Fail Threshold Table KtACXR_T_ThreshTableOff if the compressor is on for RESS cooling only	No active DTCs:	P0CD7, P0CD8, P0CD6		
					Outlet Temp Sensor Status	= Valid		
					Complete Flag	=False		
					Compressor On	>2s		
					No active DTCs:	P0073; P0072; P0071		
					HighSidePressure	>2250kpa for greater than 20 consecutive seconds, disable for current active cooling cycle. Re-enable if <2000kpa within that 20 second count.		
					OAT Arb Status	= valid or unitialized		
			CASE 2		CASE 2			
			IF Low Side Refrigerant Pressure based on OAT Arb AND	<150Kpa when OAT >=20C OR 0Kpa when OAT <=15C (Linear Interoplation between 20C and 15C)	System Voltage	>10.2V		
			Low Side Pressure Time	>30s	No active DTCs:	P2517; P2518; P2516		
					No active DTCs:	P0606		
					No active DTCs:	P0073; P0072; P0071		
					OAT Arb Status	= Valid or uninitalized		
					Compressor Off Time	>240s		
			CASE 3		CASE 3			
			IF Low Side Refrigerant Pressure based on OAT Arb AND	< 100Kpa when OAT >=5C OR 0Kpa when OAT <5C	System Voltage	>10.2V		
			Low Side Pressure Time	>4s	No active DTCs:	P2517; P2518; P2516		
					No active DTCs:	P0073; P0072; P0071		
					OAT Arb Status	= Valid or uninitalized		
					Compressor running flag	= ON		
			CASE 4		CASE 4			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			IF High Side Refrigerant Pressure AND High Side Pressure Time	>5000Kpa >30s	System Voltage No active DTCs: HSRP Status No active DTCs: No active DTCs: OAT Arb Status Compressor Off Time	>10.2V P0533; P0532; P0531 = Valid P0606 P0073; P0072; P0071 = Valid or uninitalized >240s		
A/C Compressor Motor Voltage Sensor Performance	P0D69	ACCM Motor Voltage Sensor is not performing as intended	ABS (Compressor Input Voltage - VITM Battery Cell Voltage)	>15V	System Voltage No active DTCs: Compressor High Voltage Status No active DTCs: Battery Cell Voltage Status No active DTCs: Power mode High Voltage Battery Contactor	>10.2V P0D6A; P0D6B = Valid P0ABC, P0ABD, P0ABB, P0AF8, P1A07, (U1111 AND U185A) = Valid P0AE4, P0AD9, P0AA1, P0ADD, P1EBC, P0AE2 ≠ Crank = Closed	35 fails / 40 samples at 100ms	Two Trips, Type B
Electric A/C Compressor Control Module Internal Temperature Sensor Performance	P0D71	ACCM CPU Temp. Sensor is not performing as intended	IF ABS (Compressor CPU Temperature Sensor - Intake Air Temperature Sensor) AND IF ABS (Compressor CPU Temperature Sensor - Compressor IGBT Sensor)	> 10C >10C	System Voltage No active DTCs: IGBT Status No active DTCs: No active DTCs: OAT_Filtd Status OAT_Filtd No active DTCs: No active DTCs: ECT Status No active DTCs: CPU Temp Status Power mode Engine Coolant Temp - Outside Air Temperature Filtered Compressor Off Time	>10.2V P0D77; P0D78 = Valid P0606 P0073; P0072; P0071 = Valid or uninitalized >-7C P0113, P0112, P0111, P0114 P0119; P0118; P0117; P0116 = Valid P0D72; P0D73 = Valid ≠ Crank < 15C > 21600s	35 fails / 40 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Electric A/C Compressor Control Module Output Driver Temperature Sensor Performance	P0D76	ACCM IGBT Temp. Sensor is not performing as intended	IF ABS (Compressor IGBT Temperature Sensor - OAT_Raw Temperature Sensor) AND IF ABS (Compressor IGBT Temperature Sensor - Intake Air Temperature Sensor)	>15C >10C	System Voltage No active DTCs: IGBT Status No active DTCs: No active DTCs: OAT_Filtd Status OAT_Filtd No active DTCs: OAT_Raw Status No active DTCs: No active DTCs: ECT Status Power mode Engine Coolant Temp - Outside Ambient Temperature Filtered Compressor Off Time	>10.2V P0D77; P0D78 = Valid P0606 P0073; P0072; P0071 = Valid or uninitalized >-7C P0073; P0072; P0071 = Valid or uninitalized P0113, P0112, P0111, P0114 P0119; P0118; P0117; P0116 = Valid ≠ Crank < 15C > 21600s	35 fails / 40 samples at 100ms	Two Trips, Type B
A/C Refrigerant Pressure Sensor B Rationality	P151C	Low Side Refrigerant Pressure Sensor is not functioning as intended	ABS (Low Side Refrigerant Pressure - High Side Refrigerant pressure)	>200kpa	System Voltage No active DTCs: Power mode No active DTCs: OAT Raw/Filtd Status No active DTCs: ECT Status Outside Air Temp raw reading HSRP Engine Coolant Temp - Outside Ambient Temperature Filtered HSRP Status No active DTCs: No active DTCs: Compressor Off Time	>10.2V P2517; P2518 ≠ Crank P0073; P0072; P0071 = Valid P0119; P0118; P0117; P0116 = Valid 0C < OAT_raw < 25C 0 Kpa < HSRP < 675 Kpa < 15C = Valid P0537;P0538;P153B P0606 > 3600s	32 fails / 40 samples at 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Refrigerant Pressure Sensor B Stuck Performance	P2516	Low Side Refrigerant Pressure Sensor is not functioning as intended	IF Low Side Refrigerant Pressure Start Of Diag - Low Side Refrigerant Pressure End of Diag	< 4kpa after 180s	System Voltage No active DTCs: Power mode No active DTCs: OAT_Filtd Status No active DTCs: Engine Coolant Tempeature Status Engine Coolant Temp - Outside Air Temperature No active DTCs: Compressor Off Time Compressor Running Flag TRUE for Compressor Running Flag	>10.2V P2517;P2518 ≠ Crank P0073; P0072; P0071 = Valid or uninitalized P0119; P0118; P0117; P0116 = Valid < 15C P0606 >3600s <185 s TRUE		One Trip, Type A
A/C Refrigerant Pressure Sensor B Circuit Low Input	P2517	Signal has a out of range low circuit fault	Sensor voltage	< 2% (0.1V) of reference voltage	System Voltage	>10.2V	16 fails / 20 samples at 100ms	Two Trips, Type B
A/C Refrigerant Pressure Sensor B Circuit High Input	P2518	Signal has a out of range high circuit fault	Sensor voltage	> 98% (4.9V) of reference voltage	System Voltage	>10.2V	40 fails / 50 samples at 100ms	One Trip, Type A
High Voltage Battery Diagnostics								
Hybrid Battery Voltage Sense A Circuit Range/Performance	P0B3C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense B Circuit Range/Performance	P0B41	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense C Circuit Range/Performance	P0B46	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense D Circuit Range/Performance	P0B4B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense E Circuit Range/Performance	P0B50	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense F Circuit Range/Performance	P0B55	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense G Circuit Range/Performance	P0B5A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense H Circuit Range/Performance	P0B5F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense I Circuit Range/Performance	P0B64	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense J Circuit Range/Performance	P0B69	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense K Circuit Range/Performance	P0B6E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense L Circuit Range/Performance	P0B73	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense M Circuit Range/Performance	P0B78	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense N Circuit Range/Performance	P0B7D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense O Circuit Range/Performance	P0B82	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense P Circuit Range/Performance	P0B87	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense Q Circuit Range/Performance	P0B8C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense R Circuit Range/Performance	P0B91	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense S Circuit Range/Performance	P0B96	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense T Circuit Range/Performance	P0B9B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense U Circuit Range/Performance	P0BA0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense V Circuit Range/Performance	P0BA5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense W Circuit Range/Performance	P0BAA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense X Circuit Range/Performance	P0BAF	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense Y Circuit Range/Performance	P0BB4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense Z Circuit Range/Performance	P0BB9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AA Circuit Range/Performance	P1B16	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AB Circuit Range/Performance	P1B19	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AC Circuit Range/Performance	P1B1C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AD Circuit Range/Performance	P1B1F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AE Circuit Range/Performance	P1B22	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AF Circuit Range/Performance	P1B25	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AG Circuit Range/Performance	P1B45	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AH Circuit Range/Performance	P1B48	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AI Circuit Range/Performance	P1B4B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AJ Circuit Range/Performance	P1B4E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AK Circuit Range/Performance	P1B51	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AL Circuit Range/Performance	P1B54	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AM Circuit Range/Performance	P1B57	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AN Circuit Range/Performance	P1B5A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AO Circuit Range/Performance	P1B5D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AP Circuit Range/Performance	P1B60	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AQ Circuit Range/Performance	P1B63	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AR Circuit Range/Performance	P1B66	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AS Circuit Range/Performance	P1B69	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AT Circuit Range/Performance	P1B6C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AU Circuit Range/Performance	P1B6F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AV Circuit Range/Performance	P1B72	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AW Circuit Range/Performance	P1B75	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AX Circuit Range/Performance	P1B78	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AY Circuit Range/Performance	P1B7B	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense AZ Circuit Range/Performance	P1B7E	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BA Circuit Range/Performance	P1B81	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BB Circuit Range/Performance	P1B84	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BC Circuit Range/Performance	P1B87	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BD Circuit Range/Performance	P1B8A	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BE Circuit Range/Performance	P1B8D	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BF Circuit Range/Performance	P1B90	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BG Circuit Range/Performance	P1B93	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BH Circuit Range/Performance	P1B96	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BI Circuit Range/Performance	P1B99	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BJ Circuit Range/Performance	P1B9C	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BK Circuit Range/Performance	P1B9F	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BL Circuit Range/Performance	P1BA2	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BM Circuit Range/Performance	P1BA5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BN Circuit Range/Performance	P1BA8	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BO Circuit Range/Performance	P1BAB	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BP Circuit Range/Performance	P1BAE	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BQ Circuit Range/Performance	P1BB1	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BR Circuit Range/Performance	P1BB4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BS Circuit Range/Performance	P1BB7	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BT Circuit Range/Performance	P1BBA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BU Circuit Range/Performance	P1BBD	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BV Circuit Range/Performance	P1BC0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BW Circuit Range/Performance	P1BC3	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BX Circuit Range/Performance	P1BC6	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BY Circuit Range/Performance	P1BC9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense BZ Circuit Range/Performance	P1BCC	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CA Circuit Range/Performance	P1BCF	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CB Circuit Range/Performance	P1BD2	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CC Circuit Range/Performance	P1BD5	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CD Circuit Range/Performance	P1BD8	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CE Circuit Range/Performance	P1BDB	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CF Circuit Range/Performance	P1BDE	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CG Circuit Range/Performance	P1BE1	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CH Circuit Range/Performance	P1BE4	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CI Circuit Range/Performance	P1BE7	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CJ Circuit Range/Performance	P1BEA	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CK Circuit Range/Performance	P1BED	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CL Circuit Range/Performance	P1BF0	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CM Circuit Range/Performance	P1BF3	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CN Circuit Range/Performance	P1BF6	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CO Circuit Range/Performance	P1BF9	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CP Circuit Range/Performance	P1BFC	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CQ Circuit Range/Performance	P1E01	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Voltage Sense CR Circuit Range/Performance	P1E04	Rationality compares cell voltage to movement of other cell voltages	Individual Cell voltage movement	Not in same direction as the Average Cell Voltage Movement	CellVoltageRationalityFA (see Fault Bundle Page) Average Cell Voltage Movement No active DTCs:	= FALSE > 0.006V U185A	20 Failures out of 40 Samples Frequency: 200ms	One Trip, Type A
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	Rationality compares pack voltage sensor to average cell voltage * 96	|Average cell voltage * 96 - Battery Pack voltage|	> 10 V	VICMVoltageFA (see Fault Bundle Page) No active DTCs:	= FALSE U0111 U185A	60 Failures out of 80 Samples Frequency: 100ms	One Trip, Type A
Hybrid Battery Pack Voltage Sense Circuit Correlation	P0AF8	Correlation compares pack voltage sensor to either TPIM Bus Voltage or Charger Bus Voltage	|Battery Pack voltage - TPIM Bus Voltage |	> 12 V	Main Contactor Status No active DTCs:	= Closed P0ABC P0ABD P1A07 P0ABB P1E28 P1AE8 P1AEA U1817	400 Failures out of 1995 Samples Frequency: 25ms	One Trip, Type A
			OR					
			|Battery Pack voltage - Charger Bus Voltage |	> 12 V	Charger and Multipurpose Contactor Status No active DTCs:	= Closed P0ABC P0ABD P1A07 P0ABB P0D4E P0D4F P1EEB P1EEC P0D5C P1ECE P16C5 U1838	400 Failures out of 1995 Samples Frequency: 25ms	
Hybrid Battery System Voltage High	P0AFB	Voltage too high	High Voltage Battery Pack Voltage	> KtBSED_U_BOV_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB U0111	320 Failures out of 1595 Samples	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
						U185A	Frequency: 25ms	
			OR					
			Any Cell Voltage	> KtBSED_U_BOV_CellVoltThresh (V) (see VICM Supporting Tables)	VICMVoltageFA (see Fault Bundle Page) No active DTCs: Must Send CPID	= FALSE U0111 U185A 0x7E4 07 AE 32 0C 0C 00 00 00	40 Failures out of 195 Samples Frequency: 25ms	
		DTC Clear						
Battery Energy Control Module Hybrid/EV Battery Cell Overvoltage	P1EAB	Voltage too high	Cell Voltage	> 4.5 V	No active DTC's: System Voltage	(U185A AND U0111) >10.2V	80 Failures out of 80 Samples Frequency: 25ms	One Trip, Type A
			OR					
			Any BECM response to HPC2 request to NOT test overvoltage signal/circuit (assert line logic-level-high).	= Overvoltage Signal/Circuit line logic-level-low	RUN/CRANK Transitions to Charger contactor Status CellVoltageRationalityFA (see Fault Bundle Page) Inverter voltage System Voltage No active DTC's: Must Send CPID	= ON for > 5 s = Open = FALSE > 225 V >10.2V (U185A AND U0111) 0x7E4 07 AE 32 0C 0C 00 00 00	400 Fail Samples Frequency: 25ms	
		DTC Clear						
Hybrid/EV Battery Cell Overvoltage Signal/Circuit Performance	P1EAC	Over voltage circuit 2nd protection - Fault Flag Test	Any BECM response to HPC2 request to test overvoltage signal/circuit (assert line logic-level-low).	= Overvoltage Signal/Circuit line logic-level-high	RUN/CRANK Transitions to Charger contactor Status CellVoltageRationalityFA (see Fault Bundle Page) Inverter voltage System Voltage No active DTC's:	= ON for > 5 s = Open = FALSE > 225 V >10.2V (U185A AND U0111)	2000 Fail Samples Frequency: 25ms	One Trip, Type A
			OR					
		Test Active Stuck On	BECM overvoltage signal/circuit test response.	= Test Active	HPC2 overvoltage signal/circuit test request to BECM. System Voltage No active DTC's:	= Cease Test >10.2V (U185A AND U0111)	400 Fail Samples Frequency: 25ms	
			OR					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Test Active Stuck Off	BECM overvoltage signal/circuit test response.	= Not Test Active	HPC2 overvoltage signal/circuit test request to BECM. System Voltage No active DTC's:	= Run Test >10.2V (U185A AND U0111)	400 Fail Samples Frequency: 25ms	
Hybrid Battery System Voltage Low	P0AFA	Voltage too low	High Voltage Battery Pack Voltage	< KtBSED_U_BUV_PackVoltThresh (V) (see VICM Supporting Tables)	No active DTCs:	P0ABC P0ABD P1A07 P0AF8 P0ABB U0111 U185A	320 Failures out of 1595 Samples Frequency: 25ms	One Trip, Type A
			OR					
		DTC Clear	Any Cell Voltage	< KtBSED_U_BUV_CellVoltThresh (V) (see VICM Supporting Tables)	VICMVoltageFA (see Fault Bundle Page) No active DTCs: Must Send CPID	= FALSE U0111 U185A 0x7E4 07 AE 32 0C 0C 00 00 00	40 Failures out of 195 Samples Frequency: 25ms	
Hybrid Battery Pack Current Sensor A/B Correlation	P0B13	Checks for deviation between Fine and Coarse current sensors	| Fine Current - Coarse Current |	> 10 A	Fine Current measured	Between -20A and 20A	400 Failures out of 1995 Samples Frequency: 25ms	One Trip, Type A
					OR			
					Coarse Current measured No active DTCs:	Between -20A and 20A P0AC1 P0AC2 P1EBA P1A07 P0B13 P0B10 P0B11 P1EBB U0111 U185A		
Hybrid Battery Temperature Sensor Range/Performance	P0A9C	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery 2 Temperature Sensor Performance	P0AC6	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery 3 Temperature Sensor Performance	P0ACB	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery 4 Temperature Sensor Performance	P0AE9	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor E Circuit Range/Performance	P0BC3	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor F Range/Performance	P0C34	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor G Circuit Range/Performance	P0C7D	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor H Circuit Range/Performance	P0C82	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Temperature Sensor I Circuit Range/Performance	P0C89	Rationality compares temperature with the other sensor values read	| Temperature input deviates from the average battery temperature of other Module_Groups |	> 20 ºC	TempRationalityFA (see Fault Bundle Page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	Two Trips, Type B
Hybrid Battery Pack Life(EV Range)	P0A7F	High Pack Power capability	Power limits	< KtBSED_P_BPD_EndOfLIfe PwrThrsh (kW) - see VICM Supporting Tables	Maximum battery temperature Minimum battery temperature Battery SOC RunCrank System Voltage Battery Voltage Sensor fault bundle (see Fault Bundle Page) Battery Current Sensor fault bundle (see Fault Bundle Page) TempRationalityFA (see Fault Bundle Page)	< 46 ºC > 10 ºC > 19.5% < 90% = TRUE >10.2V = False = False = False	300 Samples Frequency: 100ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Actual battery power exceedance of power limits in terms of % overshoot multiplied by seconds of duration	> 50 %-Sec		
Hybrid Battery Pack Over temperature	P0A7E	Battery temp. too high	Battery Module Temperature	> 73.5 ºC	TempRationalityFA (see fault bundle page)	= FALSE	50 Failures out of 67 Samples Frequency: 100ms	One Trip, Type A
Miscellaneous Diagnostics								
Engine Hood Switch Performance	P257D	Rationality Check for the Vehicle Hood Switch	Hood Switch Position Sensor reading within an invalid range	Within the following ranges: 67.8% - 71.5% 43.4% - 45.7% 14.6% - 17.2%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B
Engine Hood Switch Circuit Low Voltage	P257E	Detects if the Vehicle Hood Switch is Shorted to Ground	Hood Switch Position Sensor reading below a threshold	<14.6%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8 samples 1 sample every 12.5ms	Two Trips, Type B
Engine Hood Switch	P257F	Detects if the Vehicle Hood	Hood Switch Position Sensor reading	>71.5%	Diagnostic Enabled Propulsion System Active	=TRUE =TRUE	6 failed samples within 8	Two
Control Pilot Indicator Control Circuit	P0D2B	Detects a fault with the Control Pilot LED Output Driver Control Circuit	Case 1: Short to Ground		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	=TRUE =TRUE =TRUE	12 failed samples within 15 samples 1 sample every 100 ms	One Trip, Type A
			Case 2: Short to Battery or Open Circuit		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	=TRUE =FALSE =FALSE	40 failed samples within 50 samples 1 sample every 100 ms	
Charge Status Indicator Control Circuit	P0D2C	Detects a fault with the Charge Status LED Output Driver Control Circuit	Case 1: Short to Ground		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	= TRUE =TRUE =TRUE	40 failed samples within 50 samples; 1 sample every 100ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			Case 2: Short to Battery or Open Circuit		Diagnostic Enabled LED Commanded On Charge Cord Plugged In	=TRUE = FALSE =FALSE	40 failed samples within 50 samples; 1 sample every 100ms	
Control Module Power Off Timer Performance	P262B	Detects a fault in the internal Control Module off-timer	The aboslute value of the difference between the Control Module 'Off' Timer and Control Module 'On' Timer (both timers operating during Controller 'On') exceeds a threshold	Difference > 5.6%	Diagnostic Enabled Controller 'On' Time RunCrank DTCs Not Active	=TRUE > 60 seconds =TRUE P0601, P0602, P0603, P062F, P0604 and P0606	Runs once per drive cycle (when Run/Crank transitions from TRUE to FALSE).	Two Trips, Type B
High Voltage Energy Management Communication Bus Enable Circuit	P1EB9	Detects a fault in the High Voltage Energy Management Communication (HVEM) Bus Enable Circuit	Case 1: Short to Ground		Diagnostic Enabled HVEM Bus Enabled	=TRUE =TRUE	480 failed samples within 560 samples 1 sample every 12.5ms	One Trip, Type A
			Case 2: Short to Battery or open circuit		Diagnostic Enabled HVEM Bus Enabled	=TRUE =FALSE		
Control Module Wake-up Circuit Performance	P06E4	Detects a fault in the Control Module Output Wake-Up Circuit	Case 1: Short to Ground		Diagnostic Enabled Control Module Output Wake-Up Circuit Enabled	=TRUE =TRUE	480 failed samples within 560 samples 1 sample every 12.5ms	One Trip, Type A
			Case 2:Short to Battery or Open circuit		Diagnostic Enabled Control Module Output Wake-Up Circuit Enabled	=TRUE =FALSE		
Ignition Switch Run/Start Position Circuit Low	P2534	Detects if the Run/Crank input circuit is low	Short to Ground or Open condition	<2volts	Diagnostic Enabled CAN Communication ECM Run/Crank Active Data	=TRUE Enabled Available and Active	10 failed samples within 20 samples 1 sample every 250ms	One Trip, Type A
Ignition Switch Run/Start	P2535	Detects if the Run/Crank input	Short to Battery	>5volts	Diagnostic Enabled CAN Communication	=TRUE Enabled	10 failed samples within 20	One

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECM Run/Crank Active Data	Available and False		
Ignition Switch Accessory Position Circuit Low	P2537	Detects an accessory position circuit open	Accessory	FALSE	P2537 Propulsion System Propulsion System Active Time	Not Test Failed This Key On and Not Test Passed This Key On Active > 0.5 seconds	0.1 seconds (8 * 0.0125)	Two Trips, Type B
		DTC Pass	Accessory	TRUE			0.1 seconds (8 * 0.0125)	
System Voltage Low	P0562	Detects if Battery input voltage is below a threshold	Battery voltage is below a threshold	≤ 10.2volts		Continuous	1 failed sample for 500ms below Threshold value	Special Type C
Control Module Read Only Memory (Rom)	P0601	This DTC will be stored if any software or calibration checksum is incorrect	Calculated Checksum does not match stored checksum				Runs once per powerup	One Trip, Type A
		Flash ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Not Programmed	P0602	Indicates that the Control Module needs to be programmed	'No Start' Calibration is set to true which is only available on a new un-programmed Module			Continuous	1s loop, 1 failure	One Trip, Type A
Control Module Long Term Memory Reset	P0603	Non-volatile memory checksum error	Checksum at power-up does not match checksum at power-down			Runs at battery connect OR after a controller reset OR When Battery Backed RAM failure detected OR next controller init when Failure counter increments to 1 OR Fault is active OR Test not passed since code clear OR Test failed this key on OR MIL Request is ON	2 consecutive failed samples	One Trip, Type A
Control Module Random Access Memory (RAM) Failure	P0604	Control Module is unable to correctly write and read data to and from RAM	Data read does not match data written	> 3 samples (each sample represents 2 writes and 2 reads)		Continuous	Will finish first memory scan within 240 seconds at all engine conditions - diagnostic runs continuously (background loop)	One Trip, Type A
		RAM ECC Circuit Test	Failed validation of test data written to ECC			Continuous	1s loop, 3 failures in powerup cycle	
Control Module Internal Performance	P0606	ALU and Register Test	Control Module fails to execute a diagnostic test algorithm			Continuous	1s loop, 3 failures in powerup cycle	One Trip, Type A
		Configuration Registers Test	Comparison of current configuration register settings with predefined values fails			Continuous	1s loop, 3 failures in powerup cycle	
		MMU Test	Test of memory management related instructions fails	Fails MMU instruction		Continuous	1s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		MMU Configuration Fault	Verifies MMU TLB's are properly configured for the application	TLB set incorrectly		Continuous	1s loop, 3 failures in powerup cycle	
		Stack Limits Test	Verifies stack usage does not exceed maximum stack size	Stack usage exceeds 100%		Continuous	1s loop, 3 failures in powerup cycle	
		Clock Status	Checks for loss of lock/clock, forces a reset if failed			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ALU Test	Auxiliary microprocessor fails to run a defined diagnostic algorithm			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary RAM Test	Auxiliary microprocessor fails a write/read data diagnostic RAM test			Continuous	1s loop, 3 failures in powerup cycle	
		Auxiliary ROM Test	Auxiliary microprocessor ROM checksum error			Continuous	2.5s loop, 3 failures in powerup cycle	
		Auxiliary Register Configuration Test	Configuration register values do not match expected pre-configured values			Continuous	100ms loop, 3 failures in powerup cycle	
		Auxiliary Stack Test	Auxiliary microprocessor stack underflow or overflow			Continuous	100ms loop, 3 failures in powerup cycle	
		Seed and Key Test	Seed and key test failed - invalid order, timeout, incorrect seed, incorrect key			Continuous	100ms loop, 3 failures in powerup cycle	
		Main Detected Seed Incorrect Order	Seed and key test failed - main microprocessor received seed from the auxiliary icroprocessor out of order			Continuous	100ms loop, 3 failures in powerup cycle	
		Main Detected Unknown Seed	Seed and key test failed - main microprocessor received an unknown seed			Continuous	100ms loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (BVREF)	5V reference voltages out of range	10.46 % above or below		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (IVPWR)	IVPWR voltage out of range	IVPWR less than 9V or greater than 18V		Never	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (IVBAT)	IVBAT voltage out of range	IVBAT less than 9V or greater than 18V		Never	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (Analog 25% reference line)	25% reference line out of range	Reference less than 22% or greater than 28%		Continuous	1s loop, 3 failures in powerup cycle	
		Internal IO Diagnostic (Analog 75% reference line)	75% reference line out of range	Reference less than 72% or greater than 78%		Continuous	1s loop, 3 failures in powerup cycle	
		Control Module Wake-up Circuit Performance (Self Wakeup Fault)	Control module unable to do a Self Wakeup when there is a request to do so		Diagnostic Enabled Self-Wakeup Requested	=TRUE =TRUE	Runs once at powerup if a Self-Wakeup request was active last power down	
		SPI Fault Detection Test	SPI B, C, or D fault detected			Continuous	1s loop, 3 failures in powerup cycle	
		SPI B Fault Detection Test	Fault detected via echo test on SPI bus B			Continuous	1s loop, 3 failures in powerup cycle	
		SPI C Fault Detection Test	Fault detected via echo test on SPI bus C			Continuous	1s loop, 3 failures in powerup cycle	
		SPI D Fault Detection Test	Fault detected via echo test on SPI bus D			Continuous	1s loop, 3 failures in powerup cycle	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Long Term Memory Performance	P062F	Update BINVDM operation	Battery independent non-volatile status update failed				Runs at controller shutdown and after new data is written to EEPROM (which is checked every 600 seconds) 2 consecutive failed samples	One Trip, Type A
Communication Faults								
Control Module Communication Bus A Off	U0073	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On Bus A Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	Two Trips, Type B
Control Module Communication Bus B Off	U0074	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On Bus B Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	One Trip, Type A
Control Module Communication Bus H Off	U007A	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state.			Controller On Bus H Communication Enabled	=TRUE > 2 seconds	5 failures out of 5 samples 1 s loop	One Trip, Type A
Lost Communication With	U0100	Detects that CAN serial data	Messages have not been received from	≥ 500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with	U0101	Detects that CAN serial data	Messages have not been received from	≥ 1500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Battery Energy Control Module	U0111	Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus A	Messages have not been received from the BECM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	

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	Detects that CAN serial data communication has been lost with the Brake System Control Module on Bus A	Messages have not been received from the EBCM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Electric A/C Compressor Control Module	U016B	Detects that CAN serial data communication has been lost with the Electric A/C Compressor Control Module on Bus A	Messages have not been received from the EACCM for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication With Hybrid Powertrain Control Module	U0293	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus A	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On Bus A Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Hybrid Powertrain Control Module on Bus B	U1817	Detects that CAN serial data communication has been lost with the Hybrid Powertrain Control Module on Bus B	Messages have not been received from the HCP for a specified time	≥ 500ms	Controller On Bus B Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	One Trip, Type A
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication With ECM on Bus B	U1818	Detects that CAN serial data communication has been lost with the ECM on Bus B	Messages have not been received from the ECM for a specified time	≥ 500ms	Controller On Bus B Communication Enabled Battery Voltage	=TRUE > 2 seconds >10.2V	Runs in 10ms loop	Two Trips, Type B
		DTC Pass					10ms after receiving any message from the supervised source	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Lost Communication with Battery Charger Control Module on Bus H	U1838	Detects that CAN serial data communication has been lost with the Battery Charger Control Module on Bus H	Messages have not been received from the Battery Charger Module for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	One Trip, Type A
					Bus H Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Lost Communication with Battery Energy Control Module on Bus H	U185A	Detects that CAN serial data communication has been lost with the Battery Energy Control Module on Bus H	Messages have not been received from the Battery Energy Control Module for a specified time	≥ 500ms	Controller On	=TRUE	Runs in 10ms loop	One Trip, Type A
					Bus H Communication Enabled	> 2 seconds		
					Battery Voltage	>10.2V		
		DTC Pass					10ms after receiving any message from the supervised source	
Fuel Door Diagnostics								
Fuel Fill Door Switch Stuck Closed	P04B6	Fuel Door Position Rationality	Fuel door opened	FALSE	Fuel Fill Door Switch Stuck Closed Diagnostic Enable Calibration	=TRUE	50ms	Two Trips, Type B
			AND refuel request	TRUE				
			AND refuel detected	TRUE				
Fuel Fill Door Position Sensor/Switch Circuit	P04B8	Detects if sensor reading is invalid	Fuel Fill Door Position Sensor reading within an invalid range	65.9%< Reported Position <=81.6%	Fuel Fill Door Position Sensor/Switch Circuit Diagnostic calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Position Sensor/Switch Circuit Low	P04B9	Detects if the Circuit is Shorted to Ground	Fuel Fill Door Position Sensor reading below a threshold	Reported Position<22.9%	Fuel Fill Door Position Sensor/Switch Circuit Low Diagnostic Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Position Sensor/Switch Circuit High	P04BA	Detects if the Circuit is Shorted to Battery	Fuel Fill Door Position Sensor reading above a threshold	Reported Position > 94.5%	Fuel Fill Door Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Lock Control	P04BB	Detects a fault in the Fuel Fill	Hardware Reported Test Result for	Fault =TRUE	Fuel Fill Door Lock Control	=TRUE	80% of total number samples	One
			OR		The Hardware reported test result, for an open circuit or short to power condition	≠ INDETERMINANT		
			Hardware Reported Test Result for		The door lock driver circuit	=ASSERT UNLOCK		
					OR			
					The door lock driver circuit must be active to assert Lock state	=ASSERT LOCK		
			Hardware Reported Test Result for SHORT Circuit to Ground	Fault =TRUE	Fuel Fill Door Lock Control Circuit/Open Diagnostic Enable Calibration	=TRUE	64 out of 80 samples @ 50ms per sample	
					The Hardware reported	≠ INDETERMINANT		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					The door lock driver circuit is NOT be active	=ASSERT NONE		
Fuel Fill Door Lock Control Range/Performance	P04BC	Performance for the Fuel Fill Door Lock Control	Fuel Door Does NOT transition Unlocked to Locked		Fuel Fill Door Lock Control Range/Performance Diagnostic Enable Calibration	=TRUE	600ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is comanded to the Lock position	=ASSERTLOCK		
					The Fuel Fill Door is not already in the Lock postion	=TRUE		
Fuel Fill Door Unlock Control Range/Performance	P04C0	Performance for the Fuel Fill Door Unlock Control	Fuel Door Lock state does NOT transition from Locked to Unlock		Fuel Fill Door Unlock Control Range/Performance Diagnostic Enable Calibration	=TRUE	600ms	Two Trips, Type B
					No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
					The Fuel Fill Door Lock is commanded to the unlock position	=ASSERTUNLOCK		
					The Fuel Fill Door is not already in the Unlock postion	=TRUE		
Fuel Fill Door Lock Position Sensor/Switch Circuit	P04C3	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%> Reported Positon <=81.6%	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Lock Position Sensor/Switch Circuit Range/Performance	P04C4	Performance for the Fuel Fill Door Lock Position Sensor/Switch Circuit	The current Fuel Fill Door position is determined to be	NOT LOCKED	Fuel Fill Door Lock Position Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	16 out of 20 samples @ 50ms per sample	Two Trips, Type B
			AND the previous lock position is	LOCKED	No active DTCs:	P04BB, P04BD, P04BE, P04BF, P04C1, P04C2, P04C3, P04C5, P04C6,		
			AND the Fuel Fill Door lock has NOT been commanded to UNLOCK	≠ASSERT UNLOCK				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Fill Door Lock Position Sensor/Switch Circuit Low	P04C5	Detects if the circuit is shorted to ground	Switch sensor reading less than threshold	Reported Position<22.9%	Fuel Fill Door Lock Position Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Lock Position Sensor/Switch Circuit High	P04C6	Detects if the circuit is shorted to battery or open	Switch sensor reading greater than threshold	Reported Position > 94.5%	Fuel Fill Door Lock Position Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit	P04C8	Detects if the circuit resistance is incorrect	Switch sensor reading within invalid range	65.9%< Reported Position <=81.6%	Fuel Fill Door Open Request Sensor/Switch Circuit Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit Low	P04CA	Detects if the circuit is shorted to ground	Fuel Fill Door Lock Request Switch sensor reading less than threshold	Reported Position<22.9%	Fuel Fill Door Open Request Sensor/Switch Circuit Low Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Fuel Fill Door Open Request Sensor/Switch Circuit High	P04CB	Detects if the Circuit is shorted to battery or open	Fuel Fill Door Request Switch sensor reading above threshold	Reported Position > 94.5%	Fuel Fill Door Open Request Sensor/Switch Circuit High Diagnostic Enable Calibration	=TRUE	6 out of 8 samples @ 500ms per sample	Two Trips, Type B
Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request	P1461	Detects incorrect EVAP System pressure during a Fuel Fill Door Open Request	The Fuel Tank Vapor Pressure does NOT fall within a pressure range	Fuel Tank Vapor Pressure >= .623 Kpa OR Fuel Tank Vapor Pressure < -.623 Kpa	Evaporative Emission (EVAP) System Pressure Incorrect During Fuel Fill Door Open Request Diagnostic Enable Calibration	=TRUE	120sec	One Trip, Type A
					A request to refuel the vehicle has been detected	=TRUE		
Fuel Fill Door Switch Wake-up Circuit Performance	P169D	Detects a circuit fault in the Fuel Fill Door Switch Wake-Up Circuit	Refuel Request Wake- up circuit state not equal to Refuel request Switch Postion State		Fuel Fill Door Switch Wake-up Circuit Performance Diagnostic Enable Calibration	=TRUE		Two Trips, Type B
					No Active DTCs for the Open Request Sensor/Switch Circuit	P04C8, P04CA, P04CB		
			Case 1: Fuel Fill Door Switch Wake-Up Circuit Active	=FALSE	Fuel Fill Door Open Switch Request	=TRUE	4 out of 5 samples @ 50ms per sample	
			Case 2: Fuel Fill Door Switch Wake-Up Circuit Active	=TRUE	Fuel Fill Door Open Switch Request	=FALSE	64 out of 80 samples @ 50ms per sample	

Charging Diagnostics

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Pilot Circuit High	P0CF6	Sets when % control pilot signal	% Control Pilot Signal	> 58 %	System Voltage Charge Cord State	> 9.0V Not Connected	30 failures out of 50 samples	One
		DTC Pass					5 seconds	
Control Pilot Circuit Low	P0CF5	Sets when % control pilot signal (voltage/system) is below a threshold	% Control Pilot Signal	< 3 %	System Voltage Control Pilot Diag Switch Charge Cord State	> 9.0V On Not Connected	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Control Pilot Circuit	P0CF4	This diagnostic tests the integrity of the Charge Control Pilot.There are two tests to ensure proper functioning of the pilot.	Part A: OR Aux Micro Logic State OR Main Micro Logic State	 High Low	Part A: Vehicle Speed System Voltage Charge Cord State	 > = 5 mph > 9.0V Not Connected	30 failures out of 50 samples	One
			Part B: % Control Pilot Signal OR Aux Micro Logic State OR Main Micro Logic State	 > 55 % OR < 30% Low High	Part B: CPDIAG Switch State Control Pilot Charging Switch State Charging Ventilation Switch State Charge Cord State System Voltage	 Asserted Open Open Not Connected > 10.2 V		
		DTC Pass					5 seconds	
Proximity Detection Circuit High	P0D59	Sets when Proximity Detection Circuit Voltage is above a threshold	Proximity Detection Circuit Voltage	> 4.8 V.	System Voltage Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 9.0V > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Proximity Detection Circuit Low	P0D58	Sets when Proximity Detection Circuit Voltage is below a threshold	Proximity Detection Circuit Voltage	< 4.2 V.	System Voltage Vehicle Speed Shift Lever Position No Faults on Vehicle Speed	> 9.0V > 12.4 mph Not in Park	30 failures out of 50 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Battery Charger System Precharge Time Too Long	P0D26	This diagnostic tests whether precharge has occurred in the appropriate amount of time in a characteristic way. The target voltage is battery pack voltage. A deviation or deadband around pack voltage is calculated in the form of a percentage deviation. To have a successful or passing precharge, the bus voltage must rise and be within the calculated deadband window for a continuous time of at least 0.25 seconds and before 10 seconds has elapsed since the beginning of precharge.	Not Passing (see pass criteria below)	>= 10 seconds	System Voltage AND Multi-Purpose Contactor AND Charger Contactor State Precharge Too Long Time	> 9.0V open Precharge < = 10 sec.	10 sec	One Trip, Type A
		DTC Pass	abs({[Charger Bus Voltage / Battery Pack Voltage] - 1}x 100) AND Precharge Complete Window Time	< 5% >= 0.25 seconds			0.25 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Output Shorted	P0D23	Sets Charger Bus Current is above a threshold	Bus Current	> .35 A	System Voltage Multi-Purpose Contactor Charger Contactor State No Active DTCs on HV output current sensor signal No Active Cooling No Active Heating	> 9.0V Open Precharge P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16 (See Definitions tab)	4 failures out of 5 samples 100 ms rate	One Trip, Type A
		DTC Pass					0.5 seconds	
Battery Charger Input Current Too High	P0D2A	Sets when Charger AC Input Current is above a threshold If AC Voltage >= 180 V If AC Voltage < 160 V	AC input current AC input current	> 17 A > 13 A	No Active DTCs on AC Input Voltage No Active DTCs on AC Input Current Signal Control Pilot Charging Switch State	P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD P0D3A, P0D3B, P1EE7, P1EE8, P1ECE, P0D5C, P0D5B, P16C4, P1EFD, P1F14 Closed	240 failures out of 300 samples 100 ms rate	One Trip, Type A
		DTC Pass					5 seconds	
Battery Charger Output Current Performance	P0D22	This DTC can be set in either of two ways (Part A or Part B). Part A monitors for the charger output HV current to be within an acceptable deviation band about the commanded current. If this allowable deviation is exceeded, the DTC will be set. Part B monitors for the special case where the OBCM has been commanded on but the	Part A: abs(Charger HV Output Current Deviation)	>=Table F(Commanded Current) See Supporting Tables	Part A & Part B Common: System Voltage Part A: Charge Control Mode Commanded HV Current Charging Contactor	> 9.0V Constant Current OR Constant Voltage >0.5A	Part A: 255 failures out of 320 samples 100 ms rate	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		charger has not turned on its HV output. If this condition occurs the DTC will be set. Part A and Part B are mutually exclusive fault detection strategies.	Part B: Charger HV Power Supply Status	= UNAVAILABLE	Part B: Charger HV Power Supply Enable Command Commanded HV Voltage Charger Turn On Delay Time (B) (has expired)	= TRUE >201V >=6 Sec	Part B: 255 failures out of 320 samples 100 ms rate	
		DTC Pass					32 sec	
Battery Charger Output	P0D21	This DTC sets when the Battery	Bus Voltage Actual Charger Bus Voltage /Expected Charger Bus Voltage	< 150 V < 67 %	Part A: No Active DTCs on HV Output Voltage Sensor Charge System Mode Multipurpose Contactor State Charging Contactor State	P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C P16C5, P1EFD Charge OR Charge&Heat OR Cool OR Charge&Cool Closed Closed	8 failures out of 10 samples	Two
		Part B: In Charger Heat Only Mode	Note: Expected Charger Bus Voltage = HV Charger Current x 78 Ohms		Part B: Charge Control Mode Thermal Condition Request Multi-Purpose Contactor State System Voltage Charger HV Out Current No Active DTCs on HV Output Current Sensor Charger Contactor Control Status System Voltage No faults on HV Output Voltage Sensor Charge System Mode	Constant Current Active Heat Open > 9 V > 0.5 A P0D53, P0D54, P1EEB, P1EEC, P1ECE, P0D5C, P16C5, P1EFD, P1F16 Closed > 9.0 V P0D4E, P0D4F, P1EEB, P1EEC, P1ECE, P0D5C P16C5, P1EFD Heat Only Mode	100 ms rate	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger AC Voltage Not Present	P1EE6	Sets when Charger AC input Voltage is below a threshold	Charger AC Input Voltage	<= 5 V	System Voltage AC On Requested No Active DTCs on AC Input Voltage Sensor Control Pilot State	> 9.0V >= 4 Sec. P0D3F, P0D40, P1EE7, P1EE8, P0D3E, P1ECE, P0D5C, P0D5B, P16C4, P1EFD Connected Ready (In/Out)	40 failures out of 50 samples 100 ms rate	One Trip, Type A
Control Pilot Charging Switch Range/Performance	P0CF9	Sets when Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 28 % < 14 %	System Voltage Control Pilot Charging Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics	> 9.0V Closed Asserted Not Connected Completed this Key-Cycle	30 failures out of 50 samples 100 ms rate	One Trip, Type A
Control Pilot Charging Ventilation Switch Range/Performance	P0D01	Sets when Control Pilot % voltage is below a threshold or if it is above a threshold	Control Pilot Normalized Voltage OR Control Pilot Normalized Voltage Note: Control Pilot Normalized Voltage=Charging System Control Pilot Voltage / Battery Voltage	> 10 % < 4 %	System Voltage Charging Ventilation Switch State CPDIAG Switch State Charge Cord State Control Pilot Circuit and Performance Diagnostics Control Pilot Charging Switch Performance	> 9.0V Closed Asserted Not Connected Completed this Key-Cycle Completed this Key-Cycle	30 failures out of 50 samples 100 ms rate	One Trip, Type A
			Case 2: Short to Battery or Open	=TRUE	Charge Port Door Unlock Command	=FALSE	64 out of 80 samples @ 50ms per sample	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Rail Pressure	P018B	This DTC detects a fuel	Absolute value of fuel pressure	<= 30 kPa	1. FRP Circuit Low 2. FRP Circuit High 3. FuelPump Circuit Low DTC (P0231)	Not active Not active Not active	Frequency: seconds or fuel pressure Duration of intrusive test is fueling related (5 to 12 seconds).	DTC
					4. FuelPump Circuit High DTC (P0232)	Not active		
					5. FuelPump Circuit Open DTC (P023F)	Not active	Intrusive test is run when fuel flow is below Max allowed fuel flow rate (Typical values in the range of 11 to 50 g/s)	
					6. Reference Voltage DTC (P0641)	Not active		
					7. Fuel Pump Control Module Driver Over-temperature DTC (P064A)	Not active		
					8. Control Module Internal Performance DTC (P0606)	Not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					9. Engine run time 10. Emissions fuel level (PPEI $3FB) 11. Fuel pump control 12. Fuel pump control state 13. Engine fuel flow 14. ECM fuel control system failure (PPEI $1ED)	>=5 seconds Not low Enabled Normal or FRP rationality control > 0.047 g/s Not failed		
Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low	FRP sensor voltage	< 0.14 V	Ignition	Run or Crank	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Rail Pressure (FRP) Sensor Circuit High Voltage	P018D	This DTC detects if the fuel pressure sensor circuit is shorted high	FRP sensor voltage	> 4.86 V	Ignition	Run or Crank	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Pump Control Circuit Low Voltage	P0231	This DTC detects if the fuel pump control circuit is shorted to low	Fuel Pump Current	> 14.48A	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank enabled enabled 9V < voltage < 32V	72 test failures in 80 test samples if Fuel Pump Current <100A 1 sample/12.5 ms	DTC Type A 1 trip
Fuel Pump Control Circuit High Voltage	P0232	This DTC detects if the fuel pump control circuit is shorted to high	Voltage measured at fuel pump circuit	> 3.86 V	Commanded fuel pump output Fuel pump control enable	0% duty cycle (off) False	36 test failures in 40 test samples; 1 sample/12.5ms Pass/Fail determination made only once per trip	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Time that above conditions are met	>=4.0 seconds		
Fuel Pump Control Circuit (Open)	P023F	This DTC detects if the fuel pump control circuit is open	Fuel Pump Current AND Fuel Pump Duty Cycle	<=0.5A >20%	Ignition OR HS Comm OR Fuel Pump Control AND Ignition Run/Crank Voltage	Run or Crank enabled enabled 9V < voltage < 32V	72 test failures in 80 test samples; 1 sample/12.5ms	DTC Type A 1 trip
Fuel System Control Module Enable Control Circuit	P025A	This DTC detects if there is a fault in the fuel pump control enable circuit	PPEI (PPEI (Powertrain Platform Electrical Interface) Fuel System Request ($1ED)	≠ Fuel Pump Control Module Enable Control Circuit	Ignition AND PPEI Fuel System Request ($1ED)	Run or Crank valid	72 failures out of 80 samples 1 sample/12.5 ms	DTC Type A 1 trip
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if any software or calibration check sum is incorrect	Calculated Checksum (CRC16)	≠ stored checksum for any of the parts (boot, software, application calibration, system calibration)	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure if it occurs during the first ROM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background	DTC Type A 1 trip
Control Module Not Programmed	P0602	Indicates that the FSCM needs to be programmed	This DTC is set via calibration, when KeMEMD_b_NoStartCal	= TRUE	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	Runs once at power up	DTC Type A 1 trip

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	Non-volatile memory checksum error at controller power-up	Checksum at power-up	≠ checksum at power-down	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure Frequency: Once at power-up	DTC Type A 1 trip
Control Module Random Access Memory (RAM)	P0604	Indicates that control module is unable to correctly write and read data to and from RAM	Data read	≠ Data written	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 failure if it occurs during the first RAM test of the ignition cycle, otherwise 5 failures Frequency: Runs continuously in the background.	DTC Type A 1 trip
Control Module Internal Performance 1. Main Processor Configuration Register Test 2. Processor clock test	P0606	This DTC indicates the FSCM has detected an internal processor fault or external watchdog fault (PID 2032 discriminates the source of the fault)	1. For all I/O configuration register faults: •Register contents 2. For Processor Clock Fault: •EE latch flag in EEPROM. OR • RAM latch flag.	Incorrect value. 0x5A5A 0x5A	Ignition OR HS Comm OR Fuel Pump Control 1. For all I/O configuration register faults: •KeMEMD_b_ProcFlt CfgRegEnbl 2. For Processor Clock Fault: •KeMEMD_b_ProcFlt CLKDiagEnbl	Run or Crank enabled enabled TRUE TRUE	Tests 1 and 2 1 failure Frequency: Continuously (12.5ms) Test 3 3 failures out of 15 samples 1 sample/12.5 ms	DTC Type A 1 trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
3. External watchdog test			3. For External Watchdog Fault: • Software control of fuel pump driver	Control Lost	3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl 3. For External Watchdog Fault: •Control Module ROM(P0601) 3. For External Watchdog Fault: •Control Module RAM(P0604)	TRUE not active not active		
Control Module Long Term Memory (EEPROM) Performance	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write	Did not complete	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	1 test failure Once on controller power-up	DTC Type A 1 trip
5Volt Reference Circuit (Short High/Low/Out of Range)	P0641	Detects continuous short or out of range on the #1 5V sensor reference circuit	Reference voltage AND Output OR Reference voltage AND Output OR Reference voltage AND Output	>= 0.5V inactive >= 5.5V active <= 4.5V active	Ignition	Run or Crank	15 failures out of 20 samples 1 sample/12.5 ms	DTC Type A 1 trip
			OR Reference voltage	> 102.5% nominal (i.e., 5.125V) OR <97.5% nominal (i.e., 4.875V)				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Fuel Pump Control Module - Driver Over-temperature 1	P064A	This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions	Pump Driver Temp	> 150C	Ignition OR HS Comm OR Fuel Pump Control KeFRPD_b_FPOverTe Ignition Run/Crank	Run or Crank Enabled Enabled TRUE 9V<voltage<32V	3 failures out of 15 samples 1 sample/12.5 ms	DTC Type B 2 trips
Ignition 1 Switch Circuit Low Voltage	P2534	This DTC detects if the Ignition1 Switch circuit is shorted to low or open	Ignition 1 voltage	<= 6 V	Engine	Running	180 failures out of 200 samples 1 sample/25.0 ms	DTC Type A 1 trip
Fuel Pump Flow Performance (rationality)	P2635	This DTC detects degradation in the performance of the SIDI electronic return-less fuel system	Filtered fuel rail pressure error	<= Low Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) OR >= High Threshold (function of desired fuel rail pressure and fuel flow rate. 15% of resultant Target Pressure) **(See Supporting Tables tab)**	1. FRP Circuit Low DTC (P018C)	Not active	Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 12.5 ms loop	DTC Type B 2 trips
					2. FRP Circuit High DTC (P018D)	Not active .		
					3. Fuel Rail Pressure Sensor Performance DTC (P018B)	Not active		
					4. FuelPump Circuit Low DTC (P0231)	Not active		
					5. FuelPump Circuit High DTC (P0232)	Not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					6. FuelPump Circuit Open DTC (P023F)	Not active		
					7. Reference Voltage DTC (P0641)	Not active		
					8. Fuel Pump Control Module Driver Over-temperature DTC's (P064A)	Not active		
					9. Control Module Internal Performance DTC (P0606)	Not active		
					10. An ECM fuel control system failure (PPEI $1ED)	Not occurred		
					11. The Barometric pressure (PPEI $4C1) signal	Valid (for absolute fuel pressure sensor)		
					12. Engine run time	>= 30 seconds		
					13. Emissions fuel level (PPEI $3FB)	Not low		
					14. Fuel pump control	Enabled		
					15. Fuel pump control state	Normal		
					16. Battery Voltage	11V<=voltage=<32V		
					17. Fuel flow rate **(See Supporting Tables tab)**	> 0.047 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure & Vbatt (Typical values in the range of 11 to 50 g/s)		
					18. Fuel Pressure Control System	Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command.		

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	Detects that a CAN serial data bus shorted condition has occurred to force the CAN device driver to enter a bus-off state	Bus Status	Off	Power mode	Run/Crank	5 failures out of 5 samples (5 seconds)	DTC 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 ECM/PCM “A”	U0100	Detects that CAN serial data communication has been lost with the ECM	Message $0C9	Undetected	1. Power mode	Run/Crank	12 failures out of 12 samples (12 seconds)	DTC Type B 2 trips
					2. Ignition Run/Crank Voltage	11V<voltage<32V		
					3. U0073	not active		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Wheel Speed Sensor Diagnostics								
Left Front Wheel Speed	C1232	The left front wheel speed	WSS feedback voltage < Threshold	0.20v	Sys Voltage	> 9.0	> 100ms	two trips
Right Front Wheel Speed	C1233	The right front wheel speed	WSS feedback voltage < Threshold	0.20v	Sys Voltage	> 9.0	> 100ms	two trips
Left Rear Wheel Speed Sensor Circuit Low	C1234	The left rear wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1209	> 100ms	two trips
Right Rear Wheel Speed Sensor Circuit Low	C1235	The right rear wheel speed sensor is open.	WSS feedback voltage < Threshold Pass Threshold: > 0.20v	0.20v Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled No Active DTCs	> 9.0 < 19.5 True (Note 1) C1210	> 100ms	two trips
Left Front Wheel Speed Sensor Circuit High	C1207	The left front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Right Front Wheel Speed Sensor Circuit High	C1208	The right front wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Left Rear Wheel Speed Sensor Circuit High	C1209	The left rear wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal Range: 0.20v < WSS voltage range < 2.20v	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)		two trips
Right Rear Wheel Speed Sensor Circuit High	C1210	The right rear wheel speed sensor is shorted.	WSS feedback voltage > Threshold1 OR ORION ASIC detects current > Threshold2 Pass Threshold: < 2.2v	Threshold1 = 2.20v Threshold2 = 35ma Nominal range: (0.20v < WSS voltage range < 2.20v)	Sys Voltage Sys Voltage Processing_Enabled	> 9.0 < 19.5 True (Note 1)	> 100ms	two trips
Left Front Wheel Speed Sensor Circuit	C1221	The left front WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1207	70ms	two trips
		Missing signal. The left front wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1207	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Right Front Wheel Speed Sensor Circuit	C1222	The right front WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1208	70ms	two trips
		Missing signal. The right front wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1208	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	
Left Rear Wheel Speed Sensor Circuit	C1223	The left rear WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1209	70ms	two trips
		Missing signal. The left rear wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 12.8kph True (Note 1) C1209	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15 ms	
Right Rear Wheel Speed Sensor Circuit	C1224	The right rear WSS signal has dropped out. It has stopped producing edges.	Number of detected edges = 0	0 edges Nominal Range: (N/A)	Veh Vel System Voltage Processing_Enabled No Active DTCs	> 8 mph < 19.5 True (Note 1) C1210	70ms	two trips
		Missing signal. The right rear wheel speed sensor is no longer being detected.	For Single Missing, TC Active, and Multiple Missing WSS's: Missing Threshold = Larger of: (0.2 x Max)m/s or 1.8m/s Max is the maximum filtered velocity from the other 3 wheels Pass Threshold: WSS signal is detected	See Malfunction Criteria Nominal Range: (0.6kph < WSS vel range < 240kph)	Accel (on all wheels) Veh Vel (largest from all 4 wheels) Processing_Enabled No Active DTCs	< 17.16m/s/s > 8 mph True (Note 1) C1210	Single: Time > 5s Single TC Active: Time > 60s Multiple: Time > 2minutes / > 15ms	
Left Front Wheel Speed Sensor Circuit Range/Performance	C1225	Erratic signal. The left front WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1207	280ms Pass >30s	two trips
Right Front Wheel Speed Sensor Circuit Range/Performance	C1226	Erratic signal. The right front WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1208	280ms Pass >30s	two trips
Left Rear Wheel Speed Sensor Circuit Range/Performance	C1227	Erratic signal. The left rear WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1209	280ms Pass >30s	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Right Rear Wheel Speed Sensor Circuit Range/Performance	C1228	Erratic signal. The right rear WSS is exhibiting erratic behavior with a large acceleration.	WSS Accel > Threshold Pass Threshold: < 491m/s/s	491m/s/s Nominal Range: (N/A)	Veh Vel Processing_Enabled No Active DTCs	> 8 mph True (Note 1) C1210	280ms Pass >30s	two trips
Tire Size Mismatch	C122E	This detects that there may be mismatched sized tires on the vehicle	|WSS (one wheel) – WSS(other 3)| / Wheel Vel(other 3) > Threshold	20% Nominal Range: N/A	Vehicle Velocity Cornering Wheel Slip Brake Pedal Apply Detected Processing_Enabled No Active DTCs	>4m/s < 3% (Note 10) Not Detected (Note 10) True (Note 2) True (Note 1) C1207 C1208 C1209 C1210	30ms	two trips
Pedal Travel								
Brake Pedal Position Sensor Power Circuit Low	C120F	The supply to the pedal position sensor is shorted to ground.	Pedal supply voltage < Threshold Pass Threshold > 0.5v	0.5v	Processing_Enabled	True (Note 1)	30ms	Two trips
Brake Pedal Position	C12E5	Determines if the voltage	Pedal supply voltage < Threshold Low	Low = 4.75v	Processing_Enabled	True (Note 1)	30ms	Two trips
Brake Pedal Position Sensor 3 Circuit Low	C129A	Brake pedal position 3 input signal voltage is low.	Brake Ped Pos 3 Voltage < Threshold Pass Threshold > 5% of sensor supply voltage	5% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 3 Circuit High	C129B	Brake pedal position 3 input signal voltage is high.	Brake Ped Pos 3 Voltage > Threshold Pass Threshold > 95% of sensor supply voltage	95% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 3 Circuit Offset Error	C129C	The brake pedal position 3 input signal offset voltage is out of range	Brake Ped Pos 3 input offset > Threshold Pass Threshold Brake Ped Pos 3 input offset < Threshold	33 mm Nominal Range: 4.75v - 5.25v - Supply	Brake Pedal Apply Detected OR Pressure Zeroing Enable AND Processing_Enabled No Active DTCs	True (Note 2) True (Note 3) True (Note 1) C120F C127D C129A C129B C12E5 C12F8	15ms	two trips
		Base brake pedal travel sensor 3 offset error	Brake Pedal Travel Sensor 3 > Max Threshold	Max Threshold = 33 mm	Brake Pedal Apply Detected	True (Note 2)	7ms	
Brake Pedal Position Sensor 3 Plausibility	C12F8	The difference of the two travel sensor inputs is greater than a	|(%Input 1 - %Input 2)| >= Threshold	10%	Pedal Supply Voltage Failure	False True > 4.75v	30ms	two trips
Brake Pedal Position Sensor 4 Circuit Low	C129D	Brake pedal position 4 input signal voltage is low.	Brake Ped Pos 4 Voltage < Threshold Pass Threshold >5% of sensor voltage	5% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Brake Pedal Position Sensor 4 Circuit High	C129E	Brake pedal position 4 input signal voltage is high.	Brake Ped Pos 4 Voltage > Threshold Pass Threshold <95% of sensor supply voltage	95% of sensor supply voltage Nominal Range: 4.75v - 5.25v - Supply	Sensor Supply Voltage Sensor Supply Voltage Processing_Enabled No Active DTCs	> 4.75v < 5.25 True (Note 1) C120F	75ms	two trips
Brake Pedal Position Sensor 4 Circuit Offset Error	C129F	The brake pedal position 2 input signal offset voltage is out of range	Brake Ped Pos 4 input offset > Threshold Pass Thresold Brake Ped Pos 4 input offset <Threshold	33 mm Nominal Range: 4.75v - 5.25v - Supply	Brake Pedal Apply Detected OR Pressure Zeroing Enable AND Processing_Enabled No Active DTCs	True (Note 2) True (Note 3) True (Note 1) C120F C127D C129D C129E C12E5 C120C	15ms	two trips
		Base brake pedal travel sensor 4 offset error	Brake Pedal Travel Sensor 4 > Max Threshold	Max Threshold = 33 mm	Brake Pedal Apply Detected	True (Note 2)	7 ms	
				Pressure Sensors				
ABS Sensor Reference Output Circuit	C12E4	Determines if the internal 5v voltage supply is out of range.	Internal supply voltage < Threshold Low Internal supply voltage > Threshold High Pass Threshold 4.75 < Volt <5.25	Low = 4.75v High = 5.25v Nominal Range: (N/A)	Processing_Enabled	True (Note 1)	30ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Master Cylinder** Pressure Sensor and Brake Pedal Position Sensor Correlation	C12B1	The Master Cylinder Pressure sensor reading does not correlate with the pedal travel sensor readings.	M/C pressure input outside correlation table with Brake Ped Pos x inputs M/C Pressure has not changed by more than Threshold 1 while pedal travel inputs have changed more than Threshold 2	Outside acceptance table (Note 4) Threshold 1 = 50.0 kPa Threshold 2 =2.0 mm (rod)	Processing_Enabled System self test complete One brake apply M/C Pressure signal stable No Active DTCs	True (Note 1) True True True (Note 5) C120C C120F C12B2 C12B3 C12B4 C128B C128E C127D C129A C129B C129C C129D C129E C129F C12E5 C12F8	150ms (condition 1) 100ms (condition 2)	Two trips
ABS **Master Cylinder** Pressure Sensor Circuit Open or Shorted Low	C12B2	Out of range Low The MCP sensor is either open or shorted to ground.	MCP Voltage < Threshold Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	two trips
ABS **Master Cylinder** Pressure Sensor Circuit Shorted High	C12B3	The MCP sensor signal is shorted high.	MCP Voltage > Supply Threshold Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	two trips
ABS **Master Cylinder** Pressure Sensor Performance	C12B4	An MCP erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed.	Transitions from Valid to Open/Shorted State Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12B2 C12B3	100ms Pass =150ms	Two trips
ABS **Master Cylinder** Pressure Sensor Offset Error	C128B	The MCP sensor's input signal offset is out of range.	MCP Offset > Threshold	800 kPa (0.7v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	(Brake Switch Veh Accel Pump Motor) or Brake Pedal Apply Detected AND Processing_Enabled No active DTCs:	False > 0.4m/s2 Not Active True (Note 2) True (Note 1) C12B2 C12B3 C128E	20ms	Two trips
		Emulator pressure offset is out of range.	Emulator Pressure Offset > Max Threshold	800 kPa	Emulator Pressure Detected	TRUE	7 ms	

15 OBDG01 BSCM (EBCM) Summary Tables

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Master Cylinder** Pressure Sensor Raw Offset Error	C128E	The MCP sensor's raw offset is out of range.	MCP Raw Offset > Threshold	5000 kPa (1.64v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Control Vehicle Acceleration Vehicle Velocity Accelerator Pedal Position Brake Switch Processing_Enabled No active DTCs:	False (Note 6) > -0.5m/s/s > 2.0m/s < 10% False True (Note 1) C12B2 C12B3 C128E	1s	Two trips
ABS **HPA** Pressure Sensor Circuit Open or Shorted Low	C12B6	Out of range low. The HPA pressure sensor is either open or shorted to ground.	HPA Voltage < Threshold Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **HPA** Pressure Sensor Circuit Shorted High	C12B7	The HPA pressure sensor signal is shorted high.	HPA Voltage > Supply Threshold Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **HPA** Pressure Sensor Erratic	C12B8	An HPA pressure sensor erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed	Transitions from Valid to Open/Shorted State Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12B6 C12B7	100ms Pass = 150ms	Two trips
ABS **Boost** Pressure Sensor Circuit Open or Shorted Low	C12BC	The boost pressure sensor is either open or shorted to ground.	Boost Voltage < Threshold Pass Threshold: > 5%	5% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **Boost** Pressure Sensor Circuit Shorted High	C12BD	The boost pressure sensor signal is shorted high.	Boost Voltage > Supply Threshold Pass Threshold: < 95%	95% Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled	True (Note 1)	100ms	Two trips
ABS **Boost** Pressure Sensor Erratic	C12BE	A boost pressure sensor erratic condition exist if the ohmic fault status has changed since the last time the ohmic check was performed	Transitions from Valid to Open/Shorted State Pass Threshold: Transitions do not occur.	Successive Loops Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Processing_Enabled No active DTCs:	True (Note 1) C12BC C12BD	100ms Pass = 150ms	Two trips
ABS **Boost** Pressure Sensor Raw Offset Error	C128D	The boost pressure sensor's raw offset is out of range.	Boost Signal Raw Offset > Threshold	5000 kPa (1.64v typical) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Control Vehicle Acceleration Vehicle Velocity Accelerator Pedal Position Brake Switch Processing_Enabled No active DTCs:	False (Note 6) > -0.5m/s/s > 2.0m/s < 10% False True (Note 1) C12BC C12BD C12BE	1s	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Boost** Pressure Sensor Offset Error	C128A	The boost pressure sensor's input signal offset is out of range.	Boost Signal Offset > Threshold Pass Threshold: < 800 kPa	800 kPa (0.7v typically) Nominal Range: (4.75v - 5.25v - Supply 0.5 - 4.5v - Sensor)	Brake Switch Vehicle Acceleration Pump Motor Processing_Enabled No active DTCs:	False > 0.4m/s2 Not Active True (Note 1) C12BC C12BD C12BE	20ms	Two trips
ABS **Boost** Pressure Performance	C120A	Determines if the boost pressure being commanded is being achieved or not.	Boost Pres Diff(BPD) = |Boost Pres(filtered, zeroed) – test command| With VSC or TC or ABS active: BPD > Thrshld1 Without VSC and TC and ABS active: BPD > Thrshld2	Thrshld1 = 3000 kPa Thrshld2 = 1500 kPa Nominal Range: (N/A)	Processing_Enabled No active DTCs:	True (Note 1) C12B6 C12B7 C12B8 C12BC C12BD C12BE C128A C128D C127D C12E4	500ms	two trips
ABS **Boost** Pressure Loss	C12FE	The Boost Loss Fault is used to allow the boost control function to keep operating, despite motor failures or other failures and conditions that cause the boost pressure to be limited to less than commanded. The boost control will continue, applying as much pressure as possible, until the boost pressure available is no greater than the master cylinder pressure the driver is applying, at which time a fault will be set and the system will revert to 'push through'.	Boost Press(slow filtered) < Threshold1 AND MC Press Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition MC Press Greater Than Boost Press Time Incremented When: Boost Pressure Commanded > (Boost Press + 1500 kPa) AND MC Pressure > (Boost Press – 2 bar) No active DTCs	True False C12BC C12BD C12BE C128A C128D C127D C12E4	250 ms	Two trips
		This diagnostic is set when the boost loss condition described in the "Boost Loss Fault" is a result of certain situations such as the Engine Run Active being low. This diagnostic is used to effect the proper system reaction without indicating a hardware fault.	Boost Press < Threshold1 AND MCP Greater Than Boost Press Time >= Time1 AND Accum Pres Filtered > Threshold2 OR Boost Loss First Apply Time > Time2	Threshold1 = 7000 kPa Time1 = 250msec Threshold2 = 16000 kPa Time2 = 250msec	Boost Pressure Valid Boost Loss Condition Boost Loss Condition Fault	True True False	250 ms	
				BB Solenoids				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS **Power Switch** Circuit Open	C12E6	When the power switch has been commanded on the voltage level is monitored for proper operation.	Voltage Level (switched battery) < Threshold Pass Threshold > 80% bat volt	80% bat voltage Nominal Range: (N/A)	Power Switch Base Brake Enabled Power Switch Command	True (Note 8) On	50ms	Two trips
ABS **Power Switch** Circuit Shorted	C12E7	The Base Brake Power switch voltage decay is monitored after the power switch is turned off. Voltage too high indicates a shorted switch. Voltage too low indicates a missing filter capacitor.	Power Switch Short Fault: Power switch feedback > Threshold1 Power Switch Short FSM Capacitor Fault: Power switch feedback < Threshold2 Pass Threshold 80% < fdbk <50%	Threshold1 = 80% bat volt Threshold2 = 50% bat volt Nominal Range: (N/A)	Power Switch Command Motor	Off != Running	50ms	Two trips
ABS **Base Brake Open** Solenoid **Circuit Open**	C12D6	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Open** Solenoid **Circuit Shorted**	C12D7	Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < 85%	85% of batter (Solenoid in PWM Mode) Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Open** Solenoid **Driver Shorted**	C12D8	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high**.	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Circuit Open**	C12D9	Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high**.	Solenoid feedback voltage < Threshold Solenoid feedback voltage > Threshold Pass Threshold >80% Pass Threshold <30%	80% battery 30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >65.23%	65.23% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Circuit Shorted**	C12DA	Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	30% of battey (Solenoid in ON/OFF Mode)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	15ms (Solenoid in ON/OFF Mode)	Two trips
		Whenever the Power Switch **Base Brake** is closed and the driver transistor is turned on (solenoid commanded on) the feedback voltage should be **low.**	Solenoid feedback voltage > Threshold Pass Threshold: < Threshold	85% of batter (Solenoid in PWM Mode) Nominal Range: (8v > 16v)	Power Switch Slip Control Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 7) > 8v < 16v On	21ms (Solenoid in PWM Mode)	
ABS **Base Brake Closed** Solenoid **Driver Shorted**	C12DB	Whenever the Power Switch **Base Brake** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Threshold >30%	30% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	Two trips
		Whenever the Power Switch **Slip Control** is closed and the driver transistor is not turned on (solenoid commanded off) the feedback voltage should be **high.**	Solenoid feedback voltage < Threshold Pass Pass Threshold > 43.49%	43.49% battery Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	21ms (Solenoid in PWM Mode)	
ABS Boost Valve Solenoid Circuit **Shorted**	C12DD	This failsafe is for shorted coil detection for HW CLC coils	Current Feedback > Threshold Pass Threshold: < 150% of requested current	150% of requested current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.25a < 0.35a	15ms	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ABS Boost Valve Solenoid **Circuit Performance**	C12A7	The current from the closed loop current controlled valve coil is diagnosed by checking if the difference of the measured current feedback and the commanded current is within a tolerance range.	Coil Feedback Current > Threshold Pass Threshold: < 25% of commanded current	25% of Commanded Current Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Commanded Current Commanded Current	True (Note 8) > 8v < 16v > 0.44a < 1.5a	100ms	Two trips
		Whenever the Power Switch Base Brake is closed and the driver transistor is not turned on (solenoid commanded off) the feedback current should be 0 amps.	Current feedback > Threshold Pass Threshold < 0.10amp	0.10amp Nominal Range: (8v > 16v)	Power Switch Base Brake Enabled Solenoid Power Supply Solenoid Power Supply Coil Command	True (Note 8) > 8v < 16v Off	30ms	
FSM Pump Motor								
ABS Pump Motor Run On	C12E9	This fault occurs if the Motor is continuously on for greater than 60s for 5 consecutive run times during an ignition cycle.	FSM Run-On Fault counter > Threshold Pass Threshold < 5	5 Nominal Range: (10v > 16v)	Motor_Enabled Motor_ON	True (Note 9) > 60s	15 ms	Two trips
ABS Pump Motor Locked	C12E8	This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate.	FS_Motor_No_Edge_Counter < Threshold	50 Nominal Range: (10v > 16v)	Motor_Enabled	True (Note 9)	15 ms	Two trips
		This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate. 150 PWM cycles are applied to the FS motor during motor start. If a turning point is not recognized during those 150 PWM cycles the fault counter will be incremented by one. If the fault count increase to 5 the fault will set The turning point fault is monitored during motor start (not during motor spinning state).	Motor start PWM cycles > Threshold (without a recognized turning point)	750 cycles	Motor_Enabled	True (Note 9)	4.75 s	Two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		This fault is set when the motor control micro communicates to the system micro that the motor is unable or will not rotate. The interrupt order fault is set, if the calls of the requested interrupt-services are not in the correct order. The interrupt order fault is monitored during motor start and motor spinning state.	Requested "interrupt-services" order = Value	Value = Incorrect order	Motor_Enabled	True (Note 9)	Interrupt frequency is tied to motor speed, so it is speed dependent.	Two trips
ABS Pump Motor Performance	C12E0	This fault checks to see if a condition exists in which the accumulator is not charging	Accumulator Pressure < Threshold Pass Threshold > 12000 kPa	11000 kPa Nominal Range: (10v > 16v)	Brake Pedal Apply Detected Motor_Enabled Boost_Pressure < Command + 150 kPa No active DTCs:	True (Note 2) True (Note 9) True C12B6 C12B7 C12B8 C127D C12E4	100ms	Two trips
				Power Inputs				
EBCM Device Voltage Low	C12E1	System voltage is too low for certain operations. **If the vehicle is not moving or if the vehicle is in park and the park signal is valid, the fault maturation time will be 20 sec. Otherwise the fault maturation time will be**	System voltage < Threshold Pass Threshold Volt >9.3v	9v Nominal Range: (N/A)	Ignition **Vehicle Moving** **PRNDL** **OR** **PRNDL_P Signal Valid** **Wheel Speeds Valid**	!= Crank **!= TRUE** **!= Park** **False** **False**	**20s** 100ms	Special C
EBCM Device Voltage High	C12E2	System voltage is too high for certain operations.	System voltage > Threshold Pass Threshold Volt <15.7v	16v Nominal Range: (N/A)	Ignition	!= Crank	100ms	Two trips
				Wake Inputs				
Ignition Circuit Low	C1240	Ignition voltage is too Low	Ignition Voltage < Threshold Pass Threshold > 6v	6v	EngRunCrankTerminalStatus EngRunCrankTerminalStatusValid	!= False = True	5s	Two trips
Ignition Circuit High	C1241	Ignition voltage is too High	Ignition Voltage > Threshold Pass Threshold < 6v	6v	EngRunCrankTerminalStatus EngRunCrankTerminalStatusValid	= False = True	5s	Two trips
ACC Wake Up Circuit Low	C1242	Wakeup voltage is too Low at startup	Vakeup voltage < Threshold Pass Threshold > 6v	6v	Engine run flag active Diagnostic ran this ignition cycle Normal Communiction Enabled	= True for 3s = False = True	5s	Two trips
				Controller				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Self Test Failed	C127C	The Built In Self Test (BIST) is responsible for testing the internal functionality of the core within the main microprocessor	Fail Consecutive Times = Threshold	2 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM Processor Performance	C127B	**Normal Operation:** The micro sends a watchdog enable command(WEC) via the SPI to the Orion ASIC every schedule loop. If the ASIC does not receive this message, the external watchdog circuit inhibits the power switches. **Ignition Self-Test:** The external watchdog circuit is tested by not sending the WEC via the SPI to the ASIC so that the external watchdog is off and then commanding the power switch to on.	Power Switch Slip Control Voltage Feedback > Threshold Pass Threshold < 80% bat volt	80% bat volt Nominal Range: (N/A)		Run during Start-up	30ms	one trip
EBCM Random Access Memory (RAM)	C1255	The following tests are continuously ran: 1. Read/write of the micro's RAM registers. 2. Address check of the RAM address lines. 3. Verify that the RAM location used to store the persistent address line test address (offset) advances to the next address line address. 4. Perform data check on a RAM address that includes a dependency check against another RAM location that is address adjacent to the RAM location being tested. 5. Verify that the RAM location used to store the persistent data test address advances to the next test address.	If any of the tests fail, the system is forced into a reset by writing an invalid watchdog key to the system registers. If the RAM failure is NOT detected by the bootloader static RAM check algorithm then a fault code is set and the exact type of RAM failure is written to NVRAM.	See Malfunction Criteria Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM Read Only Memory (ROM)	C1256	This check is called from the scheduler each loop. Each ROM section is check-summed by byte. Each byte will be added to the current checksum for a section. If the byte being checked is the last byte of a section, then the section is verified for a correct checksum.	ROM Section's Checksum != Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Stack Overrun	C126E	To detect underflow and overflow of the system stacks, a word of RAM is reserved at the end of each of the system stacks. A word of RAM is also reserved at the upper-most address of the stack section. The contents of these reserved words will be monitored periodically to determine if they have been modified. To detect cases where the application could be pushing a value onto the stack that matches the test value, the test value that is stored at these reserved addresses will be changed each update.	End of Stack != Threshold	Set value changed every software release Nominal Range: (N/A)		Upon Starting Scheduler in the Application	Immediate	one trip
EBCM Processor Overrun	C121D	Processor did not perform a proper shutdown. NVRAM blocks written at shutdown do not match expected values upon startup. Processing interrupt occurred.	The contents of the two NVRAM blocks are compared upon start-up with expected values from shutdown process.	Blocks do not compare	Vehicle moving On Brake	True True Upon Starting Scheduler in the Application	15ms	two trips
EBCM Unimplemented Interrupt	C121E	This fault is set if an interrupt occurs that has no explicit interrupt handler defined.	Interrupt Set = Threshold	Not Defined Interrupt Handler Nominal Range: (N/A)		**Upon Starting Scheduler in the Application**	6 interrupts	Two trips
EBCM Unexpected Exception	C121F	This fault is set if an exception that is not supported in our system has been generated.	Exception Not Supported = Condition	N/A Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips
EBCM A/D Conversion Timeout	C127D	If the Analog to digital converter does not complete its conversion in a set amount of time then this fault is set.	A/D Conversion Counter = Threshold	0 (Counts down from 100) Nominal Range: (N/A)		Upon Starting Scheduler in the Application	100 clock cycles	one trip
EBCM Non-Volatile Random Access Memory (NVRAM) / Non-volatile RAM	C12FF	Checksum Error Fault	NVRAM status bit sent out by core software reports a failed NVRAM	NVRAMDiagstat > 0 Fault Counts > 0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	Two trips
EBCM Non-Volatile Random Access Memory (NVRAM) / Software Learn ID		Software ID held in NVRAM does not match ID hard coded in software	BB NVRAM SW BLOCK ID ~=Software ID	SwVerIDStat > 0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	
EBCM High End Timer Performance	C127A	Execution of the High End Timer (HET) program is limited to the actual instructions of the HET program. Execution of default instructions indicates program execution error.	Default Instructions = Threshold	Executed Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM High End Timer Program Overflow	C123B	If the HET program does not complete execution time within one HET loop time, the current HET program is aborted and the next program execution is started and a fault code is set.	HET Program Exectution Time > Threshold	HET Loop Time Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM High End Timer (HET) RAM Fault	C123C	The following tests are continuously ran: 1. Read/write of the micro's HET RAM registers. 2. Address check of the HET RAM address lines. 3. Verify that the HET RAM location used to store the persistent address line test address (offset) advances to the next address line address. 4. Perform data check on a HET RAM address that includes a dependency check against another HET RAM location that is address adjacent to the HET RAM location being tested. 5. Verify that the HET RAM location used to store the persistent data test address advances to the next test address. The following test is run at power up and reset 1. CAN device RAM check on the mailbox area.	If any of the tests fail, the system is forced into a reset by writing an invalid watchdog key to the system registers. If the RAM failure is NOT detected by the bootloader static RAM check algorithm then a fault code is set and the exact type of RAM failure is written to NVRAM.	See Malfunction Criteria Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM High End Timer (HET) Watchdog	C123A	If the HET monitor task is not executed within the allowed time frame, a counter is decremented. When the counter decrements to zero, an interrupt is generated and this fault is set.	Counter = Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
EBCM High End Timer Periodic Interrupt	C123E	This failsafe verifies that a solenoid feedback interrupt generates a high end timer(HET) interrupt every loop cycle.	Solenoid Feedback Interrupt from the HET = Threshold	Calculated based on Solenoid activity Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
EBCM Solenoid Timeout	C123D	Each solenoid in the system should generate a HET interrupt. At the completion of the System Self-Test, the number of valid HET interrupts is expected to be equal to the number of solenoids in the system.	Number of Valid HET Interrupts != Number	12 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15ms	one trip
CAN / Communications								
EBCM Internal Communication Error	C121C	The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made. If the previous transmission was not completed, then the IPC handler declares an IPC packe	Slave micro has not sent a packet for 3.5 sec	Time Nominal Range: (N/A)	3.5 sec	Upon Starting Scheduler in the Application	15 ms	two trips
		The periodic Internal Processor Communication (IPC) packet transmission service checks for previous transmission request completion before the new request is made. If the previous transmission was not completed, then the IPC handler declares an IPC packe	Secondary micro-processor communication packet does not re-synchonize with expected start-up sequence and with in set time.	Time Nominal Range: (N/A)	100msec	Upon Starting Scheduler in the Application	15 ms	
EBCM Serial Peripheral Interface Performance	C126F	2 data bytes are sent to the Orion ASIC. The Orion sends back the first byte.	Received Data != Sent Data for Threshold # of attempts	3 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	20 ms	one trip
EBCM Serial Peripheral Interface Inoperative	C123F	Each time data is sent out from the SPI port, a counter is loaded. The counter is decremented each check that the micro polls the SPI status to see if the data transfer is complete. The counter should never reach zero before the data transfer is complete. If the counter reaches zero, it means that the peripheral, NVRAM, appears to be non-functional.	Counter = Threshold	0 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15 ms	one trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module Communication Bus E Off	U180D	The hardware confirmation timeout condition is monitored every time the CAN driver initialization service is called. The CAN driver init service is called after power up, in Bus Off, or in transmit acknowledgement recovery. The number of counts the CAN driver is allowed to wait for hardware confirmation is 11. If the confirmation is not received by this number then the fault is set.	# of initialization attempts > threshold	11		Upon Starting Scheduler in the Application	15 ms	two trips
		The CAN peripheral monitors CAN bus activity and increments an error counter if the following errors are present: 1) BIT ERROR: If the bit sent does not match what was expected to be sent, increment the counter. 2) STUFF ERROR: This error has to be detected at the bit time of the 6th consecutive equal bit level in a message field that should be coded by the method of bit stuffing. 3) CRC ERROR: This error is detected if the calculated result of the receiver is not the same as that received from the transmitter. 4) FORM ERROR: This error is detected when a fixed-form bit field contains one or more illegal bits. 5) ACKNOWLEDGMENT ERROR: This error is detected by a transmitter whenever it does not monitor a dominant bit	CAN Hardware Transmit Error Counter > Threshold	256 Nominal Range: (N/A)		Upon Starting Scheduler in the Application	15 ms	
		The CAN frame does not receive acknowledgement for predefined amount of time. If this fault is enabled in the node supervisor then transmit confirmation is expected within 200 ms.Transmit request sets the timeout timer and successful transmission resets the timeout timer.	CAN Frame acknowledgement not received	Not Received Nominal Range: (N/A)		Upon Starting Scheduler in the Application	200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Antilock Brake System Control Module Lost Communication With Hybrid Powertrain Control Module on Bus E	U1858	MISSING_PRV_CTRL_RGN_BRK_TRQ_CE Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	two trips
		PRIV_REGEN_BRAKE_ARC_ERROR	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		PRIV_REGEN_BRAKE_PROT_ERROR	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
Antilock Brake System Control Module Lost Communication With Engine Control Module on Bus E	U186A	MISSING_PTEI_AXLE_TORQUE_CMD Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	two trips
		GMLAN_CMD_AXLE_TRQ_ARC_ERROR	Out of the 16 received frames, 4 ARC values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	
		GMLAN_CMD_AXLE_TRQ_PROT_ERROR	Out of the 16 received frames, 4 protection values do not match the calculated values.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	190msec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Antilock Brake System Control Module Lost Communication With Transmission Control Module	U186B	PPEI_TRANS_GEN_STAT_2 Communication message is missing.	The specified input packet with consistent data was not received by COMMS for a predefined time. Every periodic input packet is monitored for input deadline timeout. The deadline timeout is reset each time new packet data is received. The deadline timeout is either set in DBC file or during the configuration of the COMMS subsystem.	Nominal Range: (N/A)		Upon Starting Scheduler in the Application	175msec	two trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage	P0B3D	Sets when cell voltage is	Cell Voltage A	<= 0.2V	Diagnostic Enable	TRUE	1.4second in a 2 second	One
Hybrid Battery Voltage	P0B42		Cell Voltage B	<= 0.2V	Run/Crank,	TRUE	window	Trip
Hybrid Battery Voltage Sense C Circuit Low	P0B47		Cell Voltage C	<= 0.2V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit Low	P0B4C		Cell Voltage D	<= 0.2V				
Hybrid Battery Voltage Sense E Circuit Low	P0B51			<= 0.2V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E, P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B, P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51, P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A, P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62, P1E63, P1E64,		
Hybrid Battery Voltage Sense F Circuit Low	P0B56		Cell Voltage F	<= 0.2V				
Hybrid Battery Voltage Sense G Circuit Low	P0B5B		Cell Voltage G	<= 0.2V				
Hybrid Battery Voltage Sense H Circuit Low	P0B60		Cell Voltage H	<= 0.2V				
Hybrid Battery Voltage Sense I Circuit Low	P0B65		Cell Voltage I	<= 0.2V				
Hybrid Battery Voltage Sense J Circuit Low	P0B6A		Cell Voltage J	<= 0.2V				
Hybrid Battery Voltage Sense K Circuit Low	P0B6F		Cell Voltage K	<= 0.2V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense L Circuit Low	P0B74		Cell Voltage L	<= 0.2V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense M Circuit Low	P0B79		Cell Voltage M	<= 0.2V	No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense N Circuit Low	P0B7E		Cell Voltage N	<= 0.2V	No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense O Circuit Low	P0B83		Cell Voltage O	<= 0.2V				
Hybrid Battery Voltage Sense P Circuit Low	P0B88		Cell Voltage P	<= 0.2V				
Hybrid Battery Voltage Sense Q Circuit Low	P0B8D		Cell Voltage Q	<= 0.2V				
Hybrid Battery Voltage Sense R Circuit Low	P0B92		Cell Voltage R	<= 0.2V				
Hybrid Battery Voltage Sense S Circuit Low	P0B97		Cell Voltage S	<= 0.2V				
Hybrid Battery Voltage Sense T Circuit Low	P0B9C		Cell Voltage T	<= 0.2V				
Hybrid Battery Voltage Sense U Circuit Low	P0BA1		Cell Voltage U	<= 0.2V				
Hybrid Battery Voltage Sense V Circuit Low	P0BA6		Cell Voltage V	<= 0.2V				
Hybrid Battery Voltage Sense W Circuit Low	P0BAB		Cell Voltage W	<= 0.2V				
Hybrid Battery Voltage Sense X Circuit Low	P0BB0		Cell Voltage X	<= 0.2V				
Hybrid Battery Voltage Sense Y Circuit Low	P0BB5		Cell Voltage Y	<= 0.2V				
Hybrid Battery Voltage Sense Z Circuit Low	P0BBA		Cell Voltage Z	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AA Circuit Low	P1B17		Cell Voltage AA	<= 0.2V				
Hybrid Battery Voltage Sense AB Circuit Low	P1B1A		Cell Voltage AB	<= 0.2V				
Hybrid Battery Voltage Sense AC Circuit Low	P1B1D		Cell Voltage AC	<= 0.2V				
Hybrid Battery Voltage Sense AD Circuit Low	P1B20		Cell Voltage AD	<= 0.2V				
Hybrid Battery Voltage Sense AE Circuit Low	P1B23		Cell Voltage AE	<= 0.2V				
Hybrid Battery Voltage Sense AF Circuit Low	P1B26		Cell Voltage AF	<= 0.2V				
Hybrid Battery Voltage Sense AG Circuit Low	P1B46		Cell Voltage AG	<= 0.2V				
Hybrid Battery Voltage Sense AH Circuit Low	P1B49		Cell Voltage AH	<= 0.2V				
Hybrid Battery Voltage Sense AI Circuit Low	P1B4C		Cell Voltage AI	<= 0.2V				
Hybrid Battery Voltage Sense AJ Circuit Low	P1B4F		Cell Voltage AJ	<= 0.2V				
Hybrid Battery Voltage Sense AK Circuit Low	P1B52		Cell Voltage AK	<= 0.2V				
Hybrid Battery Voltage Sense AL Circuit Low	P1B55		Cell Voltage AL	<= 0.2V				
Hybrid Battery Voltage Sense AM Circuit Low	P1B58		Cell Voltage AM	<= 0.2V				
Hybrid Battery Voltage Sense AN Circuit Low	P1B5B		Cell Voltage AN	<= 0.2V				
Hybrid Battery Voltage Sense AO Circuit Low	P1B5E		Cell Voltage AO	<= 0.2V				
Hybrid Battery Voltage Sense AP Circuit Low	P1B61		Cell Voltage AP	<= 0.2V				
Hybrid Battery Voltage Sense AQ Circuit Low	P1B64		Cell Voltage AQ	<= 0.2V				
Hybrid Battery Voltage Sense AR Circuit Low	P1B67		Cell Voltage AR	<= 0.2V				
Hybrid Battery Voltage Sense AS Circuit Low	P1B6A		Cell Voltage AS	<= 0.2V				
Hybrid Battery Voltage Sense AT Circuit Low	P1B6D		Cell Voltage AT	<= 0.2V				
Hybrid Battery Voltage Sense AU Circuit Low	P1B70		Cell Voltage AU	<= 0.2V				
Hybrid Battery Voltage Sense AV Circuit Low	P1B73		Cell Voltage AV	<= 0.2V				
Hybrid Battery Voltage Sense AW Circuit Low	P1B76		Cell Voltage AW	<= 0.2V				
Hybrid Battery Voltage Sense AX Circuit Low	P1B79		Cell Voltage AX	<= 0.2V				
Hybrid Battery Voltage Sense AY Circuit Low	P1B7C		Cell Voltage AY	<= 0.2V				
Hybrid Battery Voltage Sense AZ Circuit Low	P1B7F		Cell Voltage AZ	<= 0.2V				
Hybrid Battery Voltage Sense BA Circuit Low	P1B82		Cell Voltage BA	<= 0.2V				
Hybrid Battery Voltage Sense BB Circuit Low	P1B85		Cell Voltage BB	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BC Circuit Low	P1B88		Cell Voltage BC	<= 0.2V				
Hybrid Battery Voltage Sense BD Circuit Low	P1B8B		Cell Voltage BD	<= 0.2V				
Hybrid Battery Voltage Sense BE Circuit Low	P1B8E		Cell Voltage BE	<= 0.2V				
Hybrid Battery Voltage Sense BF Circuit Low	P1B91		Cell Voltage BF	<= 0.2V				
Hybrid Battery Voltage Sense BG Circuit Low	P1B94		Cell Voltage BG	<= 0.2V				
Hybrid Battery Voltage Sense BH Circuit Low	P1B97		Cell Voltage BH	<= 0.2V				
Hybrid Battery Voltage Sense BI Circuit Low	P1B9A		Cell Voltage BI	<= 0.2V				
Hybrid Battery Voltage Sense BJ Circuit Low	P1B9D		Cell Voltage BJ	<= 0.2V				
Hybrid Battery Voltage Sense BK Circuit Low	P1BA0		Cell Voltage BK	<= 0.2V				
Hybrid Battery Voltage Sense BL Circuit Low	P1BA3		Cell Voltage BL	<= 0.2V				
Hybrid Battery Voltage Sense BM Circuit Low	P1BA6		Cell Voltage BM	<= 0.2V				
Hybrid Battery Voltage Sense BN Circuit Low	P1BA9		Cell Voltage BN	<= 0.2V				
Hybrid Battery Voltage Sense BO Circuit Low	P1BAC		Cell Voltage BO	<= 0.2V				
Hybrid Battery Voltage Sense BP Circuit Low	P1BAF		Cell Voltage BP	<= 0.2V				
Hybrid Battery Voltage Sense BQ Circuit Low	P1BB2		Cell Voltage BQ	<= 0.2V				
Hybrid Battery Voltage Sense BR Circuit Low	P1BB5		Cell Voltage BR	<= 0.2V				
Hybrid Battery Voltage Sense BS Circuit Low	P1BB8		Cell Voltage BS	<= 0.2V				
Hybrid Battery Voltage Sense BT Circuit Low	P1BBB		Cell Voltage BT	<= 0.2V				
Hybrid Battery Voltage Sense BU Circuit Low	P1BBE		Cell Voltage BU	<= 0.2V				
Hybrid Battery Voltage Sense BV Circuit Low	P1BC1		Cell Voltage BV	<= 0.2V				
Hybrid Battery Voltage Sense BW Circuit Low	P1BC4		Cell Voltage BW	<= 0.2V				
Hybrid Battery Voltage Sense BX Circuit Low	P1BC7		Cell Voltage BX	<= 0.2V				
Hybrid Battery Voltage Sense BY Circuit Low	P1BCA		Cell Voltage BY	<= 0.2V				
Hybrid Battery Voltage Sense BZ Circuit Low	P1BCD		Cell Voltage BZ	<= 0.2V				
Hybrid Battery Voltage Sense CA Circuit Low	P1BD0		Cell Voltage CA	<= 0.2V				
Hybrid Battery Voltage Sense CB Circuit Low	P1BD3		Cell Voltage CB	<= 0.2V				
Hybrid Battery Voltage Sense CC Circuit Low	P1BD6		Cell Voltage CC	<= 0.2V				
Hybrid Battery Voltage Sense CD Circuit Low	P1BD9		Cell Voltage CD	<= 0.2V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CE Circuit Low	P1BDC		Cell Voltage CE	<= 0.2V				
Hybrid Battery Voltage Sense CF Circuit Low	P1BDF		Cell Voltage CF	<= 0.2V				
Hybrid Battery Voltage Sense CG Circuit Low	P1BE2		Cell Voltage CG	<= 0.2V				
Hybrid Battery Voltage Sense CH Circuit Low	P1BE5		Cell Voltage CH	<= 0.2V				
Hybrid Battery Voltage Sense CI Circuit Low	P1BE8		Cell Voltage CI	<= 0.2V				
Hybrid Battery Voltage Sense CJ Circuit Low	P1BEB		Cell Voltage CJ	<= 0.2V				
Hybrid Battery Voltage Sense CK Circuit Low	P1BEE		Cell Voltage CK	<= 0.2V				
Hybrid Battery Voltage Sense CL Circuit Low	P1BF1		Cell Voltage CL	<= 0.2V				
Hybrid Battery Voltage Sense CM Circuit Low	P1BF4		Cell Voltage CM	<= 0.2V				
Hybrid Battery Voltage Sense CN Circuit Low	P1BF7		Cell Voltage CN	<= 0.2V				
Hybrid Battery Voltage Sense CO Circuit Low	P1BFA		Cell Voltage CO	<= 0.2V				
Hybrid Battery Voltage Sense CP Circuit Low	P1BFD		Cell Voltage CP	<= 0.2V				
Hybrid Battery Voltage Sense CQ Circuit Low	P1E02		Cell Voltage CQ	<= 0.2V				
Hybrid Battery Voltage Sense CR Circuit Low	P1E05		Cell Voltage CR	<= 0.2V				
Hybrid Battery Voltage Sense A Circuit High	P0B3E	Sets when cell voltage is detected above threshold	Cell Voltage A	>= 4.8V	Diagnostic Enable	TRUE	1.4second in a 2 second window	One Trip
Hybrid Battery Voltage Sense B Circuit High	P0B43		Cell Voltage B	>= 4.8V	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE		
Hybrid Battery Voltage Sense C Circuit High	P0B48		Cell Voltage C	>= 4.8V	No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery Voltage Sense D Circuit High	P0B4D		Cell Voltage D	>= 4.8V				
Hybrid Battery Voltage Sense E Circuit High	P0B52		Cell Voltage E	>= 4.8V	No Active DTCs associated with Open Sense Line	P0B3B, P0B40, P0B45, P0B4A, P0B4F, P0B54, P0B59, P0B5E,		
Hybrid Battery Voltage Sense F Circuit High	P0B57		Cell Voltage F	>= 4.8V		P0B63, P0B68, P0B6D, P0B77, P0B7C, P0B81, P0B86, P0B8B,		
Hybrid Battery Voltage Sense G Circuit High	P0B5C		Cell Voltage G	>= 4.8V		P0B95, P0B9A, P0B9F, P0BA4, P0BA9, P0BAE, P0BB3, P0BB8, P1B28, P1B29, P1B2A, P1B2B, P1B2C, P1B2D, P1E4C, P1E4D, P1E4E, P1E4F, P1E50, P1E51,		
Hybrid Battery Voltage Sense H Circuit High	P0B61		Cell Voltage H	>= 4.8V		P1E52, P1E53, P1E54, P1E56, P1E57, P1E58, P1E59, P1E5A,		
Hybrid Battery Voltage Sense I Circuit High	P0B66		Cell Voltage I	>= 4.8V		P1E5B, P1E5C, P1E5D, P1E5E, P1E5F, P1E60, P1E61, P1E62,		
Hybrid Battery Voltage Sense J Circuit High	P0B6B		Cell Voltage J	>= 4.8V		P1E63, P1E64, P1E65, P1E66, P1E67. P1E68.		
Hybrid Battery Voltage Sense K Circuit High	P0B70		Cell Voltage K	>= 4.8V		P1E69, P1E6A, P1E6B, P1E6C, P1E6E, P1E6F, P1E70, P1E71,		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense L Circuit High	P0B75		Cell Voltage L	>= 4.8V		P1E72, P1E73, P1E74, P1E75, P1E76, P1E77, P1E78, P1E79, P1E7A, P1E7B, P1E7C, P1E7D, P1E7E, P1E7F, P1E80, P1E81, P1E82, P1E83, P1E84, P1E86, P1E87, P1E88, P1E89, P1E8A		
Hybrid Battery Voltage Sense M Circuit High	P0B7A		Cell Voltage M	>= 4.8V				
Hybrid Battery Voltage Sense N Circuit High	P0B7F		Cell Voltage N	>= 4.8V				
Hybrid Battery Voltage Sense O Circuit High	P0B84		Cell Voltage O	>= 4.8V	2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense P Circuit High	P0B89		Cell Voltage P	>= 4.8V	No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense Q Circuit High	P0B8E		Cell Voltage Q	>= 4.8V	No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense R Circuit High	P0B93		Cell Voltage R	>= 4.8V				
Hybrid Battery Voltage Sense S Circuit High	P0B98		Cell Voltage S	>= 4.8V				
Hybrid Battery Voltage Sense T Circuit High	P0B9D		Cell Voltage T	>= 4.8V				
Hybrid Battery Voltage Sense U Circuit High	P0BA2		Cell Voltage U	>= 4.8V				
Hybrid Battery Voltage Sense V Circuit High	P0BA7		Cell Voltage V	>= 4.8V				
Hybrid Battery Voltage Sense W Circuit High	P0BAC		Cell Voltage W	>= 4.8V				
Hybrid Battery Voltage Sense X Circuit High	P0BB1		Cell Voltage X	>= 4.8V				
Hybrid Battery Voltage Sense Y Circuit High	P0BB6		Cell Voltage Y	>= 4.8V				
Hybrid Battery Voltage Sense Z Circuit High	P0BBB		Cell Voltage Z	>= 4.8V				
Hybrid Battery Voltage Sense AA Circuit High	P1B18		Cell Voltage AA	>= 4.8V				
Hybrid Battery Voltage Sense AB Circuit High	P1B1B		Cell Voltage AB	>= 4.8V				
Hybrid Battery Voltage Sense AC Circuit High	P1B1E		Cell Voltage AC	>= 4.8V				
Hybrid Battery Voltage Sense AD Circuit High	P1B21		Cell Voltage AD	>= 4.8V				
Hybrid Battery Voltage Sense AE Circuit High	P1B24		Cell Voltage AE	>= 4.8V				
Hybrid Battery Voltage Sense AF Circuit High	P1B27		Cell Voltage AF	>= 4.8V				
Hybrid Battery Voltage Sense AG Circuit High	P1B47		Cell Voltage AG	>= 4.8V				
Hybrid Battery Voltage Sense AH Circuit High	P1B4A		Cell Voltage AH	>= 4.8V				
Hybrid Battery Voltage Sense AI Circuit High	P1B4D		Cell Voltage AI	>= 4.8V				
Hybrid Battery Voltage Sense AJ Circuit High	P1B50		Cell Voltage AJ	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AK Circuit High	P1B53		Cell Voltage AK	>= 4.8V				
Hybrid Battery Voltage Sense AL Circuit High	P1B56		Cell Voltage AL	>= 4.8V				
Hybrid Battery Voltage Sense AM Circuit High	P1B59		Cell Voltage AM	>= 4.8V				
Hybrid Battery Voltage Sense AN Circuit High	P1B5C		Cell Voltage AN	>= 4.8V				
Hybrid Battery Voltage Sense AO Circuit High	P1B5F		Cell Voltage AO	>= 4.8V				
Hybrid Battery Voltage Sense AP Circuit High	P1B62		Cell Voltage AP	>= 4.8V				
Hybrid Battery Voltage Sense AQ Circuit High	P1B65		Cell Voltage AQ	>= 4.8V				
Hybrid Battery Voltage Sense AR Circuit High	P1B68		Cell Voltage AR	>= 4.8V				
Hybrid Battery Voltage Sense AS Circuit High	P1B6B		Cell Voltage AS	>= 4.8V				
Hybrid Battery Voltage Sense AT Circuit High	P1B6E		Cell Voltage AT	>= 4.8V				
Hybrid Battery Voltage Sense AU Circuit High	P1B71		Cell Voltage AU	>= 4.8V				
Hybrid Battery Voltage Sense AV Circuit High	P1B74		Cell Voltage AV	>= 4.8V				
Hybrid Battery Voltage Sense AW Circuit High	P1B77		Cell Voltage AW	>= 4.8V				
Hybrid Battery Voltage Sense AX Circuit High	P1B7A		Cell Voltage AX	>= 4.8V				
Hybrid Battery Voltage Sense AY Circuit High	P1B7D		Cell Voltage AY	>= 4.8V				
Hybrid Battery Voltage Sense AZ Circuit High	P1B80		Cell Voltage AZ	>= 4.8V				
Hybrid Battery Voltage Sense BA Circuit High	P1B83		Cell Voltage BA	>= 4.8V				
Hybrid Battery Voltage Sense BB Circuit High	P1B86		Cell Voltage BB	>= 4.8V				
Hybrid Battery Voltage Sense BC Circuit High	P1B89		Cell Voltage BC	>= 4.8V				
Hybrid Battery Voltage Sense BD Circuit High	P1B8C		Cell Voltage BD	>= 4.8V				
Hybrid Battery Voltage Sense BE Circuit High	P1B8F		Cell Voltage BE	>= 4.8V				
Hybrid Battery Voltage Sense BF Circuit High	P1B92		Cell Voltage BF	>= 4.8V				
Hybrid Battery Voltage Sense BG Circuit High	P1B95		Cell Voltage BG	>= 4.8V				
Hybrid Battery Voltage Sense BH Circuit High	P1B98		Cell Voltage BH	>= 4.8V				
Hybrid Battery Voltage Sense BI Circuit High	P1B9B		Cell Voltage BI	>= 4.8V				
Hybrid Battery Voltage Sense BJ Circuit High	P1B9E		Cell Voltage BJ	>= 4.8V				
Hybrid Battery Voltage Sense BK Circuit High	P1BA1		Cell Voltage BK	>= 4.8V				
Hybrid Battery Voltage Sense BL Circuit High	P1BA4		Cell Voltage BL	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BM Circuit High	P1BA7		Cell Voltage BM	>= 4.8V				
Hybrid Battery Voltage Sense BN Circuit High	P1BAA		Cell Voltage BN	>= 4.8V				
Hybrid Battery Voltage Sense BO Circuit High	P1BAD		Cell Voltage BO	>= 4.8V				
Hybrid Battery Voltage Sense BP Circuit High	P1BB0		Cell Voltage BP	>= 4.8V				
Hybrid Battery Voltage Sense BQ Circuit High	P1BB3		Cell Voltage BQ	>= 4.8V				
Hybrid Battery Voltage Sense BR Circuit High	P1BB6		Cell Voltage BR	>= 4.8V				
Hybrid Battery Voltage Sense BS Circuit High	P1BB9		Cell Voltage BS	>= 4.8V				
Hybrid Battery Voltage Sense BT Circuit High	P1BBC		Cell Voltage BT	>= 4.8V				
Hybrid Battery Voltage Sense BU Circuit High	P1BBF		Cell Voltage BU	>= 4.8V				
Hybrid Battery Voltage Sense BV Circuit High	P1BC2		Cell Voltage BV	>= 4.8V				
Hybrid Battery Voltage Sense BW Circuit High	P1BC5		Cell Voltage BW	>= 4.8V				
Hybrid Battery Voltage Sense BX Circuit High	P1BC8		Cell Voltage BX	>= 4.8V				
Hybrid Battery Voltage Sense BY Circuit High	P1BCB		Cell Voltage BY	>= 4.8V				
Hybrid Battery Voltage Sense BZ Circuit High	P1BCE		Cell Voltage BZ	>= 4.8V				
Hybrid Battery Voltage Sense CA Circuit High	P1BD1		Cell Voltage CA	>= 4.8V				
Hybrid Battery Voltage Sense CB Circuit High	P1BD4		Cell Voltage CB	>= 4.8V				
Hybrid Battery Voltage Sense CC Circuit High	P1BD7		Cell Voltage CC	>= 4.8V				
Hybrid Battery Voltage Sense CD Circuit High	P1BDA		Cell Voltage CD	>= 4.8V				
Hybrid Battery Voltage Sense CE Circuit High	P1BDD		Cell Voltage CE	>= 4.8V				
Hybrid Battery Voltage Sense CF Circuit High	P1BE0		Cell Voltage CF	>= 4.8V				
Hybrid Battery Voltage Sense CG Circuit High	P1BE3		Cell Voltage CG	>= 4.8V				
Hybrid Battery Voltage Sense CH Circuit High	P1BE6		Cell Voltage CH	>= 4.8V				
Hybrid Battery Voltage Sense CI Circuit High	P1BE9		Cell Voltage CI	>= 4.8V				
Hybrid Battery Voltage Sense CJ Circuit High	P1BEC		Cell Voltage CJ	>= 4.8V				
Hybrid Battery Voltage Sense CK Circuit High	P1BEF		Cell Voltage CK	>= 4.8V				
Hybrid Battery Voltage Sense CL Circuit High	P1BF2		Cell Voltage CL	>= 4.8V				
Hybrid Battery Voltage Sense CM Circuit High	P1BF5		Cell Voltage CM	>= 4.8V				
Hybrid Battery Voltage Sense CN Circuit High	P1BF8		Cell Voltage CN	>= 4.8V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CO Circuit High	P1BFB		Cell Voltage CO	>= 4.8V				
Hybrid Battery Voltage Sense CP Circuit High	P1BFE		Cell Voltage CP	>= 4.8V				
Hybrid Battery Voltage Sense CQ Circuit High	P1E03		Cell Voltage CQ	>= 4.8V				
Hybrid Battery Voltage Sense CR Circuit High	P1E06		Cell Voltage CR	>= 4.8V				
Hybrid Battery Voltage Sense A Circuit Hybrid Battery Voltage Sense B Circuit Hybrid Battery Voltage Sense C Circuit Hybrid Battery Voltage Sense D Circuit Hybrid Battery Voltage Sense E Circuit Hybrid Battery Voltage Sense F Circuit Hybrid Battery Voltage Sense G Circuit Hybrid Battery Voltage Sense H Circuit Hybrid Battery Voltage Sense I Circuit	P0B3B P0B40 P0B45 P0B4A P0B4F P0B54 P0B59 P0B5E P0B63	Sets when cell voltage is detected open	|1st Cell V – 2nd Cell V| **Case 2: General Cell Voltage Sensing Line** Affected Cell Voltage- Adjacent Cell **Case 3: Bus Bar (+) Side Sensing Line** Affected Cell Voltage- One Cell **Case 4: Bus Bar (-) Side Sensing Line** Affected Cell Voltage- One Cell **Case 5: Common Power Line** Affected Cell Voltage- Adjacent Cells (No Power Off) *Note- **Case 1: Single Power Line** Case 1 causes the slave ASIC to not be powered resulting in all affected cell voltages = 0V	Case 2 : |1st Cell V – 2nd Cell V| > 1V Case 3 : Busbar Cap Voltage > 0.7V **&** Busbar + Side Cell Voltage Case 4 : Busbar Cap Voltage > 0.7V **&** Busbar + Side Cell Voltage > 2.5V Case 5 : |1st Cell V – 2nd Cell V| > 0.5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm	TRUE TRUE U2603, U2604, U2605, U2606	600 ms out of a 600 ms window Frequency- 200 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense J Circuit	P0B68							
Hybrid Battery Voltage Sense K Circuit	P0B6D							
Hybrid Battery Voltage Sense M Circuit	P0B77							
Hybrid Battery Voltage Sense N Circuit	P0B7C							
Hybrid Battery Voltage Sense O Circuit	P0B81				2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Voltage Sense P Circuit	P0B86				No Active DTCs associated with VTSM Cell Balancing Fault	P1E92, P1E98, P1E9E, P1EA4		
Hybrid Battery Voltage Sense Q Circuit	P0B8B				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
Hybrid Battery Voltage Sense S Circuit	P0B95							
Hybrid Battery Voltage Sense T Circuit	P0B9A							
Hybrid Battery Voltage Sense U Circuit	P0B9F							
Hybrid Battery Voltage Sense V Circuit	P0BA4							
Hybrid Battery Voltage Sense W Circuit	P0BA9							
Hybrid Battery Voltage Sense X Circuit	P0BAE							
Hybrid Battery Voltage Sense Y Circuit	P0BB3							
Hybrid Battery Voltage Sense Z Circuit	P0BB8							
Hybrid Battery Voltage Sense AA Circuit	P1B28							
Hybrid Battery Voltage Sense AB Circuit	P1B29							
Hybrid Battery Voltage Sense AC Circuit	P1B2A							
Hybrid Battery Voltage Sense AD Circuit	P1B2B							
Hybrid Battery Voltage Sense AE Circuit	P1B2C							
Hybrid Battery Voltage Sense AF Circuit	P1B2D							
Hybrid Battery Voltage Sense AG Circuit	P1E4C							
Hybrid Battery Voltage Sense AH Circuit	P1E4D							
Hybrid Battery Voltage Sense AI Circuit	P1E4E							
Hybrid Battery Voltage Sense AJ Circuit	P1E4F							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense AK Circuit	P1E50							
Hybrid Battery Voltage Sense AL Circuit	P1E51							
Hybrid Battery Voltage Sense AM Circuit	P1E52							
Hybrid Battery Voltage Sense AN Circuit	P1E53							
Hybrid Battery Voltage Sense AO Circuit	P1E54							
Hybrid Battery Voltage Sense AQ Circuit	P1E56							
Hybrid Battery Voltage Sense AR Circuit	P1E57							
Hybrid Battery Voltage Sense AS Circuit	P1E58							
Hybrid Battery Voltage Sense AT Circuit	P1E59							
Hybrid Battery Voltage Sense AU Circuit	P1E5A							
Hybrid Battery Voltage Sense AV Circuit	P1E5B							
Hybrid Battery Voltage Sense AW Circuit	P1E5C							
Hybrid Battery Voltage Sense AX Circuit	P1E5D							
Hybrid Battery Voltage Sense AY Circuit	P1E5E							
Hybrid Battery Voltage Sense AZ Circuit	P1E5F							
Hybrid Battery Voltage Sense BA Circuit	P1E60							
Hybrid Battery Voltage Sense BB Circuit	P1E61							
Hybrid Battery Voltage Sense BC Circuit	P1E62							
Hybrid Battery Voltage Sense BD Circuit	P1E63							
Hybrid Battery Voltage Sense BE Circuit	P1E64							
Hybrid Battery Voltage Sense BF Circuit	P1E65							
Hybrid Battery Voltage Sense BG Circuit	P1E66							
Hybrid Battery Voltage Sense BH Circuit	P1E67							
Hybrid Battery Voltage Sense BI Circuit	P1E68							
Hybrid Battery Voltage Sense BJ Circuit	P1E69							
Hybrid Battery Voltage Sense BK Circuit	P1E6A							
Hybrid Battery Voltage Sense BL Circuit	P1E6B							
Hybrid Battery Voltage Sense BM Circuit	P1E6C							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense BO Circuit	P1E6E							
Hybrid Battery Voltage Sense BP Circuit	P1E6F							
Hybrid Battery Voltage Sense BQ Circuit	P1E70							
Hybrid Battery Voltage Sense BR Circuit	P1E71							
Hybrid Battery Voltage Sense BS Circuit	P1E72							
Hybrid Battery Voltage Sense BT Circuit	P1E73							
Hybrid Battery Voltage Sense BU Circuit	P1E74							
Hybrid Battery Voltage Sense BV Circuit	P1E75							
Hybrid Battery Voltage Sense BW Circuit	P1E76							
Hybrid Battery Voltage Sense BX Circuit	P1E77							
Hybrid Battery Voltage Sense BY Circuit	P1E78							
Hybrid Battery Voltage Sense BZ Circuit	P1E79							
Hybrid Battery Voltage Sense CA Circuit	P1E7A							
Hybrid Battery Voltage Sense CB Circuit	P1E7B							
Hybrid Battery Voltage Sense CC Circuit	P1E7C	DTC Pass		Case 2 : |1st Cell V – 2nd Cell V| <= 1V			600 ms	
Hybrid Battery Voltage Sense CD Circuit	P1E7D							
Hybrid Battery Voltage Sense CE Circuit	P1E7E			Case 3 : Busbar Cap Volt <= 0.7V				
Hybrid Battery Voltage Sense CF Circuit	P1E7F							
Hybrid Battery Voltage Sense CG Circuit	P1E80			Case 4 : Busbar Cap Volt > 0.7V				
Hybrid Battery Voltage Sense CH Circuit	P1E81							
Hybrid Battery Voltage Sense CI Circuit	P1E82			Case 5: |1st Cell V - 2nd Cell V| <= 0.5V				
Hybrid Battery Voltage Sense CJ Circuit	P1E83							
Hybrid Battery Voltage Sense CK Circuit	P1E84							
Hybrid Battery Voltage Sense CM Circuit	P1E86							
Hybrid Battery Voltage Sense CN Circuit	P1E87							
Hybrid Battery Voltage Sense CO Circuit	P1E88							

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Voltage Sense CP Circuit	P1E89							
Hybrid Battery Voltage Sense CQ Circuit	P1E8A							
Hybrid Battery Temperature Sensor Circuit Low	P0A9D	Sets when Temperature Sensor X falls below a Threshold	Temperature Sensor X	Temperature Sensor X > 87.5C (ADC Count < 680)	Diagnostic Enable	TRUE	1.4 seconds in a 2 second window	Two Trips
Hybrid Battery 2 Temperature Sensor Circuit Low Voltage	P0AC7				Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency- 200 ms	
Hybrid Battery 3 Temperature Sensor Circuit Low Voltage	P0ACC				No Active DTCs associated with VTSM Loss of Comm	U2603, U2604, U2605, U2606		
Hybrid Battery 4 Temperature Sensor Circuit Low Voltage	P0AEA							
Hybrid Battery Temperature Sensor E Circuit Low	P0BC4							
Hybrid Battery Temperature Sensor F Circuit Low	P0C35							
Hybrid Battery Temperature Sensor G Circuit Low	P0C7E				2nd Protection Self Test Diagnostic	Not Running		
Hybrid Battery Temperature Sensor H Circuit Low	P0C83							
Hybrid Battery Temperature Sensor I Circuit Low	P0C8A				No Active DTCs associated with VTSM Internal Performance	P1E8E, P1E94, P1E9A, P1EA0		
		DTC Pass		Temperature Sensor X <= 87.5C (ADC Count >= 680)			2 Seconds	
Hybrid Battery Temperature Sensor Circuit High	P0A9E	Sets when Temperature Sensor X falls above a Threshold	Temperature Sensor X	Temperature Sensor X < -40C (ADC Count > 3992)	Diagnostic Enable	TRUE	1.4 seconds in a 2 second window	Two Trips
Hybrid Battery 2 Temperature Sensor Circuit High Voltage	P0AC8				Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	Frequency- 200 ms	
Hybrid Battery 3 Temperature Sensor	P0ACD				No Active DTCs associated with VTSM	U2603, U2604, U2605, U2606		
Hybrid Battery 4 Temperature Sensor Circuit High Voltage	P0AEB				No Active DTCs associated with VTSM 5V Ref Diagnostic	P1E93, P1E99, P1E9F, P1EA5		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Temperature Sensor E Circuit High Hybrid Battery Temperature Sensor F Circuit High Hybrid Battery Temperature Sensor G Circuit High Hybrid Battery Temperature Sensor H Circuit High Hybrid Battery Temperature Sensor I Circuit High	P0BC5 P0C36 P0C7F P0C84 P0C8B				2nd Protection Self Test Diagnostic No Active DTCs associated with VTSM Internal Performance No Active DTCs on VITM RESS Bus Off	Not Running P1E8E, P1E94, P1E9A, P1EA0 U2401		
		DTC Pass		Temperature Sensor X >= -40C (ADC Count <= 3992)			2 Seconds	
Battery Energy Control Module Hybrid Battery Voltage Isolation Sensor Circuit	P1AE6	Sets when AC (alternating current) Isolation Circuit is detected Faulted	AC (alternating current) Isolation Circuit	If there is no return signal for isolation test signal (sine-wave)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VICM Isolation Start Request VITM System Voltage No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H High Voltage Contactor Status	TRUE TRUE TRUE > 11V U185B Open	1.4 seconds in a 2 second window Frequency- 200 ms	One Trip
		DTC Pass		If there is return signal for isolation test signal (sine-wave)			2 Seconds	
Hybrid Battery Pack	P0C44	Sets when Inlet Coolant Temp	Inlet Temp	Inlet Temp >= 87.9C	Diagnostic Enable	TRUE	1.75 seconds in a 2.5	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Coolant Temperature Sensor Circuit Low		Sensor falls below a Threshold		(ADC Count <= 130)	Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE	seconds window Frequency- 250 ms	
					VITM System Voltage	>= 9V		
		DTC Pass		Inlet Temp < 87.9C (ADC Count > 130)			2.5 Seconds	
Hybrid Battery Pack Coolant Temperature Sensor Circuit High	P0C45	Sets when Inlet Coolant Temp Sensor goes above a Threshold	Inlet Temp	Inlet Temp < -40C (ADC Count > 3823)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	1.75 seconds in a 2.5 seconds window Frequency- 250 ms	Two Trips
					VITM System Voltage	>= 9V		
		DTC Pass		Inlet Temp >= -40C (ADC Count <= 3823)			2.5 Seconds	
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit Low	P0CD7	Sets when Outlet Coolant Temp Sensor falls below a Threshold	Outlet Temp	Inlet Temp >= 87.9C (ADC Count <= 130)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	1.75 seconds in a 2.5 seconds window Frequency- 250 ms	Two Trips
					VITM System Voltage	>= 9V		
		DTC Pass		Inlet Temp < 87.9C			2.5 Seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				(ADC Count > 130)				
Hybrid/EV Battery Pack Coolant Temperature Sensor B Circuit High	P0CD8	Sets when Outlet Coolant Temp Sensor goes above a Threshold	Outlet Temp	Outlet Temp < -40C (ADC Count > 3823)	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	1.75 seconds in a 2.5 seconds window Frequency- 250 ms	Two Trips
		DTC Pass		Outlet Temp >= -40C (ADC Count <= 3823)			2.5 Seconds	
Hybrid Battery Pack Voltage Sense Circuit Low	P0ABC	If Pack side Voltage is below Threshold	Pack Voltage	< 24V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip
		DTC Pass		Pack Voltage >= 24V			250 ms	
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	If Pack side Voltage is above Threshold	Pack Voltage	> 456V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		Pack Voltage <= 456V			250 ms	
Hybrid Battery Pack Current Sensor B Circuit Low	P0B10	If Fine Current is below Threshold	Fine Current	< -23A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip
		DTC Pass		Fine Current >= -23A			250 ms	
Hybrid Battery Pack Current Sensor B Circuit High	P0B11	If Fine Current is above Threshold	Fine Current	> 23A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip
		DTC Pass		Fine Current <= 23A			250 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Hybrid Battery Pack Current Sensor Circuit Low	P0AC1	If Coarse Current is below Threshold	Coarse Current	< -470A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	175 ms in a 250 ms window Frequency- 25 ms	One Trip
		DTC Pass		Coarse Current >= -470A			250 ms	
Hybrid Battery Pack Current Sensor Circuit High	P0AC2	If Coarse Current is above Threshold	Coarse Current	> 280A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	175 ms in a 250 ms window Frequency- 25ms	One Trip
		DTC Pass		Coarse Current <= 280A			250 ms	
Hybrid/EV Battery Pack Current Sensor A Exceeded Learning Limit	P1EBA	If Pack Current Coarse Offset is out of range	|Pack Current Coarse Offset|	> 8A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable High Voltage Contactor Status Charger Contactor Status	TRUE TRUE Open Open	At power up - 185 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VITM System Voltage VITM Initalization Status Extended No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	>= 9V Initializing U185B		
		DTC Pass		|Pack Current Coarse Offset| <= 8A			At power up - 185 ms	
Hybrid/EV Battery Pack Current Sensor B Exceeded Learning Limit	P1EBB	If Pack Current Fine Offset is out of range	Pack Current Fine Offset	|Pack Current Fine Offset| > 2.5A	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable High Voltage Contactor Status Charger Contactor Status VITM System Voltage VITM Initalization Status Extended No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	TRUE TRUE Open Open >= 9V Initializing U185B	At power up - 185 ms	One Trip
		DTC Pass		|Pack Current Fine Offset| <= 2.5A			At power up - 185 ms	
Battery Energy Control Module 5 Volt Reference Circuit	P1A07	Sets when 5V VITM reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	600 ms in a 1 second window Frequency- 25 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					VITM System Voltage	>= 9V		
		DTC Pass		2.8V <= 5V Reference Value <= 3.2V			1 Second	
Battery Energy Control Module System Voltage Low	P1A0C	If 12V System Voltage is below Threshold	12V System Voltage	< 9.0V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	5 seconds in a 6 seconds window Frequency: 1 Second	Special Type C
		DTC Pass		12V System Voltage >= 9.0V			6 Seconds	
Battery Energy Control Module System Voltage High	P1A0D	If 12V System Voltage is above Threshold	12V System Voltage	>18.5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	5 seconds in a 6 seconds window Frequency: 1 Second	Special Type C
		DTC Pass		12V System Voltage >=			6 Seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
				18.5V				
Battery Energy Control Module Communication Bus A Off	U180B	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank or Accessory/Run VITM System Voltage	TRUE TRUE >= 9V	1.4 seconds in a 2 seconds window Frequency- 200 ms	Two Trips
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Communication Bus H Off	U1806	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank or Accessory/Run VITM System Voltage	TRUE TRUE >= 9V	1.4 seconds in a 2 seconds window Frequency- 200 ms	Two Trips
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Lost Communication with Hybrid Powertrain Control Module B on Bus H	U185B	If message $20A is not Received by VITM	Loss of Supervision with VICM module on Charger CAN bus	# of consecutive $20A message not received > 5	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	700 ms in a 1 second window Frequency- 100 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			1 Second	
Battery Energy Control Module Lost Communication With Hybrid Powertrain Control Module	U1885	If message $1DF is not Received by VITM	Loss of Supervision with HCP module on HS GMLAN bus	# of consecutive $20A message not received > 10	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	TRUE TRUE >= 9V Completed TRUE	1.75 seconds in a 2 second window Frequency- 250 ms	Two Trips
		DTC Pass		1			2 Seconds	
Battery Energy Control Module Random Accessoryess Memory (RAM)	P1A05	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM Initalization Status Extended VITM System Voltage	TRUE TRUE Initializing >= 9V	At power up - 10 ms	One Trip
		DTC Pass		1			At power up - 10 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Energy Control Module Read Only Memory (ROM)	P1A06	Flash ROM Checksum method	Flash ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM Initalization Status Extended VITM System Voltage	TRUE TRUE Initializing >= 9V	At power up - 5 ms up to 400 ms	One Trip
		DTC Pass		1			At power up - 5 ms up to 400 ms	
Battery Energy Control Module Internal Performance	P0A1F	VITM Software Watchdog	If Watchdog resets controller	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	N/A Immediate	One Trip
		DTC Pass		1				
Battery Energy Control Module Ignition Switch Run/Start Position Circuit Low	P1A5E	If RunCrank input state is below Threshold and RunCrank Received Serial Data State = Active	RunCrank Hardwire Input and Serial Data signal	RunCrank Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	5 seconds in a 6 second window Frequency- 1000 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		DTC Pass		RunCrank Input >= 5V			6 seconds	
Battery Energy Control Module Ignition Switch Run/Start Position Circuit High	P1A5F	If RunCrank input state is above Threshold and RunCrank Received Serial Data State = Inactive	RunCrank Hardwire Input and Serial Data signal	RunCrank Input >= 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	5 seconds in a 6 second window Frequency- 1000 ms	One Trip
					VITM System Voltage	>= 9V		
					No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus H	U185B		
		DTC Pass		RunCrank Input < 5V			6 seconds	
Battery Energy Control Module Ignition Switch Accessory Position Circuit Low	P1A60	If Acessory input state is below Threshold and received serial data Propulsion System Active state = True and Accessory Diagnostic Delay is Expired	Accessory Hardwire Input	Accessory Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable	TRUE TRUE	0.1 seconds (8*0.0125)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module Lost Communication With with HCP (TPIM) on Bus A (HS GMLAN Bus) VITM System Voltage Propulsion System Active Accessory Diagnostic Delay	U1885 >= 9V TRUE Expired		
		DTC Pass		Accessory Input < 5V			0.1 seconds (8*0.0125)	
Battery Energy Control Module Lost Communication with Hybrid Batterry Interface Control Module X	U2603 U2604 U2605 U2606	If associated message from Slave is not received	Loss of Supervision with VTSMx on Private CAN bus	# of consecutive serial data message from VTSMx not received > 7	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable 2nd Protection Self Test Diagnostic VITM System Voltage	TRUE TRUE Not Running >= 9V	2.8 seconds in a 4 second window Frequency- 400 ms	One Trip
		DTC Pass		1			4 Seconds	
Battery Energy Control Module High Voltage Energy Management Communication Bus Enable Circuit Low	P1EC1	If High Voltage Energy Management (HVEM) Wakeup input state is below Threshold and HVEM Received Serial Data State = Active	HVEM Hardwire Input and Serial Data signal	HVEM Input < 5V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	7 seconds in a 10 second window Frequency- 1000 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					No Active DTC for Battery Energy Control Module System Voltage Low No Active DTC for Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on Bus A (HS)	P1A0C U2602		
		DTC Pass		HVEM Input >= 5V			10 Seconds	
Battery Energy Control Module Dedicated Bus 1 Off	U2401	If Bus Off is Detected	Transmit Error Counter (TEC)	TEC > 255	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	1.4 seconds in a 2 second window Frequency- 200 ms	One Trip
		DTC Pass		TEC < 255			2 Seconds	
Battery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	U2602	If message $236 is not Received by VITM	Loss of Supervision with VICM module on HS GMLAN bus	# of consecutive $236 message not received > 3	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE TRUE >= 9V	2.8 seconds in a 4 second window Frequency- 100 ms	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Flashing Programming Session (Other Modules or itself) Mode $28 Executed on HS Bus	Completed TRUE		
		DTC Pass		1			4 Seconds	
Hybrid Battery Interface Control Module x Cell Balancing Circuit	P1E92 P1E98 P1E9E P1EA4	Cell Balance switch output	Cell Balance switch is below threshold	4.0V < Cell Voltage < 5.0V Threshold = 66mV 3.5V < Cell Voltage < 4.0V Threshold = 41mV 3.0V < Cell Voltage < 3.5V Threshold = 22mV	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM 2nd Protection Self Test Diagnostic No Active DTCs associated with VTSM Internal Performance	TRUE TRUE U2603, U2604, U2605, U2606 Not Running P1E8E, P1E94, P1E9A, P1EA0	14 seconds in a 20 seconds window Frequency- 200 ms	One Trip
		DTC Pass		Threshold is above values specified for Cell Voltage specified			20 Seconds	
Hybrid Battery Interface Control Module x ROM	P1E90 P1E96 P1E9C P1EA2	ROM Checksum method	ROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down- Total of 824 ms for all slaves	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			At power down- Total of	
Hybrid Battery Interface Control Module x RAM	P1E8F P1E95 P1E9B P1EA1	RAM Read Write function Failed	RAM Read not Equal to RAM Written	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power up- Total of 58 ms for all slaves	One Trip
		DTC Pass		1			At power up- Total of 58 ms for all slaves	
Hybrid Battery Interface Control Module x KAM	P1E91 P1E97 P1E9D P1EA3	Using Checksum method	EEPROM Checksum Value Calculated is Different than Stored	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM	TRUE Transitions: TRUE to FALSE (During VTSMx Power down) U2603, U2604, U2605, U2606	At power down- Total of 26 ms for all Slaves	One Trip
		DTC Pass		1			At power down- Total of 26 ms for all Slaves	
Hybrid Battery Interface	P1E8E	VTSMx Software Watchdog	If Watchdog resets controller	1	Diagnostic Enable	TRUE	N/A instantaneous -	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Control Module x Performance	P1E94 P1E9A P1EA0	OR SPI Bus Malfunction (Read Value from Register Not Equal to Written Value)	OR Wrong value Read		Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	TRUE >= 9V	Watchdog Reset 500us - SPI Bus	
		DTC Pass		Both should pass			500 us in 200ms window	
Hybrid Battery Interface Control Module x 5V Ref	P1E93 P1E99 P1E9F P1EA5	Sets when 5V VTSM reference voltage is out of range	5V Reference Value (Circuit for Reference Diagnostic, Shunt Regulator)	5V Reference Value < 2.8V or 5V Reference Value > 3.2V	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable No Active DTCs associated with VTSM 2nd Protection Self Test Diagnostic	TRUE TRUE U2603, U2604, U2605, U2606 Not Running	1.4 seconds in a 2.0 seconds window Frequency- 200ms	One Trip
		DTC Pass		2.8V <= 5V Reference Value <=3.2V			2.0 seconds	
Hybrid/EV Battery Interface Control Module Software IncompatibleBattery Energy Control Module Lost Communication with Hybrid Processor Control Module B on HS	P1EB1	VITM Software version and Software version of ALL Slave modules are compatible	If any software version incompatibility is detected	1	Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage No Active DTCs associated with VTSM Loss of Comm	TRUE TRUE >= 9V U2603, U2604, U2605, U2606	At power up- 200 ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass		1			At power up- 200 ms	
Hybrid/EV Battery Interface Control Module x Not Programmed	P1EB2 P1EB3 P1EB4 P1EB5	If VTSMx did not Program correctly	Wrong or No response from Slave indicating error in Programming	1	After Programming session Diagnostic Enable Run/Crank, Accessory/Run or HVEM EB Comm Enable VITM System Voltage	 TRUE TRUE >= 9V	As soon as Programming session ends	One Trip
		DTC Pass		1			As soon as Programming session ends	
Hybrid/EV Battery Interface Control Module x Processor Performance	P1F06 P1F07 P1F08 P1F09	Compare VTSMx Reported Value with Expected Value in VITM	Reported Key Value by VTSMx is not correct	5	Diagnostic Enable Seed and Key Algorithm Calibration Run/Crank, Accessory or HVEM EB Comm Enable No Active DTCs associated with VTSM Loss of Comm 2nd Protection Self Test Diagnostic	TRUE TRUE TRUE U2603, U2604, U2605, U2606 Not Running	1 second in a 1.4 second window Frequency- 200 ms	Two Trips, Type B
		DTC Pass		5			1.4 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
MCP A Phase Current Diagnostics								
Drive Motor "A" Phase U-	P0BFD	To detect electrical failure of	Sum of 3 phase currents	>156 A	Wakeup Signal	On	X: 160 ct Y: 190 ct	One
Drive Motor "A" Phase U-V-W Current Sensor Overcurrent	P0C01	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 725 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Drive Motor "A" Phase U-V-W Circuit/Open	P0C05	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 9 A	Inverter State Inverter Voltage Rotor Position Current Commanded	RUN > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	X: 200 ct Y: N/A R: 0.11-0.5 ms T: 22 - 100 ms	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Circuit Low	P0BE7	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Circuit High	P0BE8	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase U Current Sensor Offset Out-of Range	P0BE6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BE7/P0BE8	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Circuit Low	P0BEB	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Circuit High	P0BEC	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase V Current Sensor Offset Out-of Range	P0BEA	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEB/P0BEC	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "A" Phase W Current Sensor Circuit Low	P0BEF	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Circuit High	P0BF0	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "A" Phase W Current Sensor Offset Out-of Range	P0BEE	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
MCP A IGBT Diagnostics								
Drive Motor "A" Inverter Performance	P0A78	Detects IGBT Desaturation Faults Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal High Voltage	On > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
Drive Motor "A" Inverter Power Supply Circuit/Open	P0C0B	Detects IGBT Bias Faults Monitors hw status line to detect loss of power supply to gate drive board	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP A High Voltage (HV) Diagnostics								
Drive Motor "A" Hybrid Battery System Voltage High	P1AEE	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage OR Hardware Over Voltage Flag	> 463V = TRUE	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AE8	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AE9	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery System Voltage	P1AEC	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery)	>= 40 V	No Active DTCs: Controller Initialization	P1AE8, P1AE9	X: 110 cts Y: 184 cts R: 10.4ms T: 1144ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			AND ABS(HV - sum of mid-pack voltages)	>= 50 V	Contactors	Closed		
Drive Motor "A" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF0	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1AE8, P1AE9, P1AEC Complete	X: 240 cts Y: 480 cts R: 10.4 ms T: 2496 ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit Low	P1AF4	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 1 Circuit High	P1AF5	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV OR Pos mid-pack - HV_Bat	>40 V >40V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9, P1AEC Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B0B	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B0C	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV OR Neg mid-pack - HV_Bat	>40 V >40V	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9, P1AEC Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "A" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B41	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(HV - HV_Battery) AND ABS(HV_Bat - Neg mid-pack - Pos mid-pack) OR ABS(HV - Neg mid-pack - Pos mid-pack) AND ABS(HV_Bat - Neg mid-pack - Pos mid-pack)	>= 40 >= 50 >= 50 >= 50	No Active DTCs: Controller Initialization Run/Crank	P1AE8, P1AE9, P1B0B, P1B0C, P1AEC, P1AF5, P1AF4 Complete Active	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
Motor Control Processor Voltage Diagnostics								
Sensor Power Supply "A" Circuit Low	P06B1	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
							OR continuous fail time > 300 ms	
Sensor Power Supply "A" Circuit High	P06B2	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
System Voltage Low	P1ADE	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1ADF	*This is the 12V system voltage Hi diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	
Motor A Inverter Temp Sensor Diagnostics								
Drive Motor Inverter Temperature Sensor A Circuit Range/Performance	P0AEE	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS (Inverter Temp A - Average of (Power Electronics Coolant Temp and Transmission Fluid Temp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available	On >=21600s >=7200s >=7200s > -20C TRUE	700 cts Start Delay PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active Propulsion System Inactive Timer Mask Off Board Charging Inactive Timer Fault Active Off Board Charging Inactive Timer Mask Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	FALSE TRUE FALSE Use Data FALSE Use Data FALSE Use Data TRUE P0AF0 and P0AEF		
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	To detect Inverter A Temperature Sensor #1 voltage Out of Range high	PIM Temp A	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor A Circuit Low	P0AEF	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp A	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor Inverter Temperature Sensor C Circuit Range/ Performance	P0BD2	Inverter A Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp C - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal	On	300 cts Start Delay	One Trip, Type A
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0BD4 and P0BD3		
Drive Motor Inverter Temperature Sensor C Circuit High	P0BD4	To detect Inverter A Temperature Sensor #2 Out of Range high (voltage)	PIM Temp C Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present	ON	X: 250 cts Y: 350 cts R: 10.4ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					at start of trip: Cumulative Inverter Warmup Time	>=90s	T: 2600ms	
					at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor C Circuit Low	P0BD3	To detect Inverter A Temperature Sensor #2 Out of Range low (voltage)	PIM Temp C Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor E Circuit Range/Performance	P0BDC	Inverter A Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp E - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal	On	300 cts Start Delay	One Trip, Type A
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	FALSE Use Data TRUE P0BDE and P0BDD		
Drive Motor Inverter Temperature Sensor E Circuit High	P0BDE	To detect Inverter A Temperature Sensor #3 Out of Range high (voltage).	PIM Temp E Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor E Circuit Low	P0BDD	To detect Inverter A Temperature Sensor #3 Out of Range low (voltage).	PIM Temp E Temperature	> 130 degC (near 0V)	Wakeup Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "A" Inverter Phase U Over Temperature	P0C11	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 102.5 deg C	PIM Temperature No Active DTCs:	IN RANGE P0AEE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "A" Inverter Phase V Over Temperature	P0C12	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp C Temperature	> 102.5 deg C	PIM Temperature No Perf Fault; P0BDC	IN RANGE NOT ACTIVE	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp E Temperature	> 102.5 deg C	PIM Temperature No Active DTCs:	IN RANGE P0BD2	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Motor A Resolver Sensors - Discrete Diagnostics								
Drive Motor "A" Position Sensor Circuit	P0A3F	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos Signal	<2.3V	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Range/Performance	P0A40	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	>4.0V	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Loss of Tracking	P1B03	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal Tracking Error	> 5 deg	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed)	>6300 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Drive Motor "A" Position Sensor Not Learned	P0C17	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC OR ALL Phase Current OR TimeOut	 >50 rpm < 192 V <15 A > 1.4 second for 1 Timeout	Key Off Wakeup Signal ABS(Motor Speed) High Voltage Valid Stored Offset	TRUE ON < 20 rpm > 192 V FALSE	300 ms learn time	One Trip, Type A
Drive Motor "A" Position Exceeded Learning Limit	P0C4E	**Fail Case 1:**To detect an OOR Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Fail Case 2: To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				
Drive Motor "A" Position Sensor Learn Incorrect	P1B0F	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
					Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
Motor A Resolver Sensors - Circuit Diagnostics								
Drive Motor "A" Position Sensor Circuit "A" Low	P0C52	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	Two Trips, Type B
Drive Motor "A" Position Sensor Circuit "A" High	P0C53	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	Two Trips, Type B
Drive Motor "A" Position Sensor Circuit "B" Low	P0C5C	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	Two Trips, Type B
Drive Motor "A" Position Sensor Circuit "B" High	P0C5D	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	Two Trips, Type B
MCPA Controller Fault Diagnostics								
Control Module Read Only Memory (ROM)	P1A51	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Long	P1EB6	*This Diagnostic tests for BINVDM errors*						One

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Term Memory Reset		**DTC Fail case 1:** Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	Trip, Type A
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P1A50	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM	Data read	does not match data written	Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM						
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module Internal Performance	P0A1B	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = False >11V = False <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False =False = False = false	Up down counter = 3	
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = false <= 0 MPH = False = off for less than 5 seconds		
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTes t	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_XferTest	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
MCPA Torque Security Diagnostics								
Control Module Long Term Memory Performance	P1ADC	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV write will not succeed = fail Assembly cal fail = false				
Drive Motor A Torque Delivered Performance	P0C19	*This Diagnostic tests that the difference between the motor A torque command slew and the motor torque achieved is greater than a threshold.*						One Trip, Type A
		DTC Fail case 1: The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor A Control Module Not Programmed	P1A4F	*This diagnostic prevents flashing different MCP software into MCP A that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	*≠ Calibration*				
Drive Motor A Control Module Internal Control Module Torque Calculation Performance	P1E0A	*This diagnostic detects the torque command path calculation errors*						One Trip, Type A
		DTC Fail case 1: If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active TPTKO Torque Mon Fail	= True = False = True	30 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	
		DTC Fail case 2: If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold (MTDR)	Difference between Primary and Redundant signals	> 164Nm				
		DTC Fail case 3: Compares the ISSD primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 4: Compares the ISSQ primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 5: Compares the ISSCmd primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> 50A				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 6: Compares the BEMF Dec primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> .001Nm				
		DTC Fail case 7: Compares the Usdq Limited primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCCR)	Difference between Primary and Redundant signals	> .5V				
		DTC Fail case 8: Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (SVMR)	**For OverMod:** Mod Index Square or PerfSqr **For Linear:** Mod Index Square or PerfSqr	> .2Nm > 1Nm > .1Nm > .15Nm				
		DTC Fail case 9: Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	>4000				
		DTC Fail case 10: Compares the VDC Adapt primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> .03V				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 11: Compares the Qest primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> 0Nm				
		DTC Fail case 12: Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MSPR)	Difference between Primary and Redundant signals	>116 RadPerSec				
Communication Diagnostics								
Lost Comm'n With ECM/PCM on Bus A	U1876	*This diagnostic indicates a lost communication between the MCPA and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Comm'n With TCM	U1849	*This diagnostic indicates a lost communication between the MCPA and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled	> 9.5 Volts =RUN =FALSE =TRUE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller	U1845	*This diagnostic indicates a lost communication between the MCPA and the HCP*						Two Trips, Type B
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B on Bus B	U182E	*This diagnostic indicates a lost communication between the MCPA and the VICM on Bus B*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid	U2613	*This diagnostic indicates a lost communication between the MCPA and the VICM*						Two

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Controller B		**DTC Fail case 1:** Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	Trips, Type B

APPENDIX

ALU= Arithmetic Logic Unit
BPCM= Batt Pack Ctrl Module
HWIO= Hardware Input/Output
IGBT= Insulated Gate Bipolar Transistors (Phase Current Controllers)
OOR= Out of Range

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
MCP B Phase Current Diagnostics								
Drive Motor "B" Phase U-	P0BFE	To detect electrical failure of	Sum of 3 phase currents	> 156 A	Wakeup Signal	On	X: 160 ct Y: 190 ct	One
Drive Motor "B" Phase U-V-W Current Sensor Overcurrent	P0C04	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT. **Fail Case 2**: To detect slow, intermittent 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 725 A	Wakeup Signal	On	X: 2 cts Y: 10 cts R: 2.08 ms T: 4.2 ms X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	One Trip, Type A
Drive Motor "B" Phase U-V-W Circuit/Open	P0C08	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 9 A	Inverter State Inverter Voltage Rotor Position Current Commanded	RUN > 35 V -30 deg < Phase Axis < +30 deg >= 23 A	X: 200 ct Y: N/A R: 0.11-0.5 ms T: 22 - 100 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit Low	P0BF3	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Circuit High	P0BF4	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase U Current Sensor Offset Out-of Range	P0BF2	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BE7/P0BE8	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit Low	P0BF7	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Circuit High	P0BF8	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output current at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase V Current Sensor Offset Out-of Range	P0BF6	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	V Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEB/P0BEC	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Phase W Current Sensor Circuit Low	P0BFB	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase W Current Sensor Circuit High	P0BFC	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 800 A	Wakeup Signal PWM Output Enable	On FALSE	X: 4 cts Y: 6 cts R: 10.4 ms T: 42 ms	One Trip, Type A
Drive Motor "B" Phase W Current Sensor Offset Out-of Range	P0BFA	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	W Phase offset current output at highside	>30 A	Wakeup Signal Power Stage No Active DTCs:	On OPEN P0BEF/P0BF0	X: 8 cts Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
MCP B IGBT Diagnostics								
Drive Motor "B" Inverter Performance	P0A79	Detects IGBT Desaturation Faults Monitors hw status line to detect internal overcurrent faults, shoot through, or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Wakeup Signal High Voltage	On > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
Drive Motor "B" Inverter Power Supply Circuit/Open	P0C0E	Detects IGBT Bias Faults Monitors hw status line to detect loss of power supply to gate drive board	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 100V	X: 1 ct Y: N/A R: 2.08ms T: 2.08ms	One Trip, Type A
MCP B High Voltage (HV) Diagnostics								
Drive Motor "B" Hybrid Battery System Voltage High	P1AEF	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage OR Hardware Over Voltage Flag	> 463V = TRUE	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.1 - 0.5 ms T: 0.3 - 1.50 ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1AEA	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1AEB	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "B" Control Module Hybrid Battery System Voltage	P1AED	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND	>= 40 V	No Active DTCs: Controller Initialization	P1AEA, P1AEB Complete	X: 110 cts Y: 184 cts R: 10.4ms T: 1144ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
			ABS(HV - sum of mid-pack voltages)	>= 50 V	Contactors	Closed		
			MCPB Isolation Diagnostics					
Drive Motor "B" Control Module Hybrid Battery Voltage System Isolation Fault	P1AF2	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1AEA, P1AEB, P1AED Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit Low	P1AF6	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor Circuit High	P1AF7	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV OR Pos mid-pack - HV_Bat	>40 V >40V	No Active DTCs: Controller Initialization Run/Crank	P1AEA, P1AEB, P1AED Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 728ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit Low	P1B43	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensor 2 Circuit High	P1B44	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV OR Neg mid-pack - HV_Bat	>40 V >40V	No Active DTCs: Controller Initialization Run/Crank	P1AEA, P1AEB, P1AED Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 728ms	Two Trips, Type B
Drive Motor "B" Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1B42	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(HV - HV_Battery) AND ABS(HV_Bat - Neg mid-pack - Pos mid-pack) OR ABS(HV - Neg mid-pack - Pos mid-pack) AND ABS(HV_Bat - Neg mid-pack - Pos mid-pack)	>= 40 >= 50 >= 50 >= 50	No Active DTCs: Run/Crank Controller Initialization	P1AEA, P1AEB, P1B43, P1B44, P1AED, P1AF7, P1AF6 Active Complete	X: 100 cts Y: 150 cts R: 10.4ms T: 1040ms	Two Trips, Type B
			Motor B Temp Sensor Diagnostics					
Drive Motor "B" Control Module Temperature Sensor Performance	P0A31	Motor B Temperature Sensor In-Range Rationality Check	ABS(Motor Thermistor Temperature - the average of (Power Electronic Coolant Temperature and Transmission Fluid Temperature)) "ColdStartAvg"	> 20 deg C	Wake Up Signal Propulsion System Inactive Time	On >=21600s	300 cts Start Delay	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid Propulsion System Inactive Timer Fault Active Propulsion System Inactive Timer Mask Off Board Charging Inactive Timer Fault Active Off Board Charging Inactive Timer Mask Battery Thermal Conditioning Inactive Fault Active Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Motor Temp Out Of Range Faults:	>=7200s >=7200s > -20C TRUE FALSE TRUE FALSE Use Data FALSE Use Data FALSE Use Data TRUE P0A32 and P0A33	PLUS X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range High	P0A33	To detect temperature sensor voltage Out of Range high.	Motor Temp	< -41 deg C (near 5V)	Warmup Time Warmup Torque	Init Complete >=90s >=ABS(20 Nm)	X: 900 cts Y:1800cts R: 10.4ms T: 9378ms	One Trip, Type A
Drive Motor "B" Control Module Temperature Sensor Circuit Out of Range Low	P0A32	To detect temperature sensor voltage Out of Range low.	Motor Temp	> 184 degC (near 0V)		Init Complete	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Over Temperature	P0A35	To detect a sustained motor overtemperature condition	Motor Temperature exceeds inital fault threshold AND Does not decrease below reset threshold	> 149 deg C	Motor Temperature No Active Temp Performance Fault	IN RANGE P0A31	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor Control Processor Voltage Diagnostics								
Sensor Power Supply "B" Circuit Low	P06B4	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
Sensor Power Supply "B" Circuit High	P06B5	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	X: 40 cts Y: 50 cts R: 10.4ms T: 416 ms OR continuous fail time > 300 ms	One Trip, Type A
System Voltage Low	P1AE0	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
System Voltage Hi	P1AE1	*This is the 12V system voltage Hi diagnostic*						Special Type C
		DTC Fail case 1: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	
Motor B Inverter Temp Sensor Diagnostics								
Drive Motor Inverter Temperature Sensor B Circuit Range/Performance	P0AF3	Inverter B Temperature Sensor #1 In-Range Rationality Check	ABS(PIM Temp B - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time	On >=21600s	300 cts Start Delay	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0AF4 and P0AF5		
Drive Motor Inverter Temperature Sensor B Circuit High	P0AF5	To detect Inverter B Temperature Sensor #1 voltage out of range high	PIM Temp B Temperature	< -58 deg C (near 5V)	Wakeup Signal	ON	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
					When malfunction present at start of trip: Cumulative Inverter Warmup Time	>=90s		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					at or above Inverter Warmup Torque Threshold	>=ABS(20 Nm)		
Drive Motor Inverter Temperature Sensor B Circuit Low	P0AF4	To detect Inverter B Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor D Circuit Range/Performance	P0BD7	Inverter B Temperature Sensor #2 In-Range Rationality Check	ABS(PIM Temp D - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal	On	300 cts Start Delay	One Trip, Type A
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Battery Thermal Conditioning Inactive Mask Plug In Charging Present No Active Power Inverter Temp Out Of Range Faults:	Use Data TRUE P0BD8 and P0BD9		
Drive Motor Inverter Temperature Sensor D Circuit High	P0BD9	To detect Inverter B Temperature Sensor #2 Out of Range high (voltage)	PIM Temp D Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor D Circuit Low	P0BD8	To detect Inverter B Temperature Sensor #2 Out of Range low (voltage)	PIM Temp D Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor F Circuit Range/Performance	P0BE1	Inverter B Temperature Sensor #3 In-Range Rationality Check	ABS(PIM Temp F - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	>20 deg C	Wake Up Signal Propulsion System Inactive Time Thermal Conditioning Off Time Charge Off Time Cold Start Average Temperature Power Electronics Coolant Temperature Available Power Electronics Coolant Temperature Fault Active Tranmission Fluid Temperature Valid	On >=21600s >=7200s >=7200s > -20C TRUE FALSE TRUE	700 cts Start Delay PLUS X: 200 cts Y: 300 cts R: 10.4ms T: 2080ms =9.36 sec total	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P0BE2 and P0BE3		
Drive Motor Inverter Temperature Sensor F Circuit High	P0BE3	To detect Inverter B Temperature Sensor #3 Out of Range high (voltage).	PIM Temp F Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=90s >=ABS(20 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor Inverter Temperature Sensor F Circuit Low	P0BE2	To detect Inverter B Temperature Sensor #3 Out of Range low (voltage).	PIM Temp F Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	One Trip, Type A
Drive Motor "B" Inverter Phase U Over Temperature	P0C14	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp B Temperature	> 102.5 deg C	PIM Temperature No Active DTCs:	IN RANGE P0A3F	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Inverter Phase V Over Temperature	P0C15	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp D Temperature	> 102.5 deg C	PIM Temperature No Active DTCs:	IN RANGE P0BD7	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Drive Motor "B" Inverter Phase W Over Temperature	P0C16	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp F Temperature	> 102.5 deg C	PIM Temperature No Active DTCs:	IN RANGE P0BE1	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	One Trip, Type A
Motor B Resolver Sensors - Discrete Diagnostics								
Drive Motor "B" Position Sensor Circuit	P0A45	To detect Loss of Signal or converter error (line open, short) in the Motor Resolver circuit	Sin or Cos signal	<2.3v	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit Range/Performance	P0A46	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	Sin or Cos Signal	> 4.0v	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A
Drive Motor "B" Position Sensor Circuit Loss of Tracking	P1B04	To detect a Loss of Tracking fault in the Motor Resolver circuit.	Internal tracking Error	>5deg	Wakeup Signal Resolver Initialization Delay	On 2ms	Fast Fail X: 100 Y: 10000 R: 2 ms T: 200 ms Slow Fail X: 120 Y: 900000 R: 2 ms T: 240 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Drive Motor "B" Position Sensor Circuit Overspeed	P1B0E	To detect when Motor B has exceeded operational maximum speed	ABS(Motor speed)	>9500 rpm	Wakeup Signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Drive Motor "B" Position Sensor Not Learned	P0C18	To detect an unvalidated Resolver Offset Learn Value AND No Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed) OR Filtered DC Voltage OR ALL Phase Current Max-Min Delta OR TimeOut waiting for entry conditions	 >50 rpm < 192 V <100 A > 1.4 second for 1 timeout	Key Off Wakeup Signal ABS(Motor Speed) High Voltage Valid Stored Offset	TRUE ON < 20 rpm > 192 V FALSE	300 ms learn time	One Trip, Type A
Drive Motor B Position Exceeded Learning Limit	P0C4F	**Fail Case 1:** To detect an Oor Offset Learn Value	Offset Learn Completes AND ABS(Offset Correction Angle)	> 30 degrees	ABS(Motor Speed) High Voltage	< 20 rpm > 192V	300 ms learn time	One Trip, Type A
		Fail Case 2: To detect a sudden jump from previously stored offset learn value	Offset Learn Completes AND ABS(Offset Correction Angle - prevoiusly stored value)	> 10 degrees				
Drive Motor "A" Position Sensor Learn Incorrect	P1B10	To detect an unvalidated Resolver Offset Learn Value AND a Stored Previously Valid Value	Offset Learn DIDN'T complete because: ABS(Motor Speed)	> 50 rpm	Key Off	TRUE	300 ms learn time	Two Trips, Type B
			OR Filtered DC Voltage	< 192V	Wakeup Signal	TRUE		
			OR ALL Phase Current Max-Min Delta	< 15A	ABS(Motor Speed)	< 20 rpm	X: 30 ct Y: N/A R: 2.08ms T: 62.4ms	
					Valid Stored Offset	TRUE		
					High Voltage	> 192 V		
Motor B Resolver Sensors - Circuit Diagnostics								
Drive Motor "B" Position Sensor Circuit "A" Low	P0C57	To detect Resolver Circuit S1/3 Out of Range Low	Resolver S13 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	Two Trips, Type B
Drive Motor "B" Position Sensor Circuit "A" High	P0C58	To detect Resolver Circuit S1/3 Out of Range High	Resolver S13 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	Two Trips, Type B
Drive Motor "B" Position Sensor Circuit "B" Low	P0C61	To detect Resolver Circuit S2/4 Out of Range Low	Resolver S24 Circuit Reference Voltage	< 0.5 v	Wakeup Signal	On	X: 50 cts Y: 80 cts R: 10.4ms T: 520ms	Two Trips, Type B
Drive Motor "B" Position Sensor Circuit "B" High	P0C62	To detect Resolver Circuit S2/4 Out of Range High	Resolver S24 Circuit Reference Voltage	> 4.5 v	Wakeup Signal	On	X: 20 cts Y: 30 cts R: 10.4ms T: 208ms	Two Trips, Type B
MCP B Controller Fault Diagnostics								

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)	P1A54	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Fail case 2: This DTC will be stored if any check sum in the **calibration** is incorrect						
		DTC Fail case 3: This DTC will be stored if any check sum in the **software** is incorrect						
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Control Module Long Term Memory Reset	P1EB7	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
Control Module Random Access Memory (RAM) Failure	P1A53	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM	Data read	does not match data written	Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM						
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Control Module Internal Performance	P0A1C	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False	Up down counter = 3	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	=False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds		
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_XferTest	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
MCPB Torque Security Diagnostics								
Control Module Long Term Memory Performance	P1ADD	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set						
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Drive Motor B Torque Delivered Performance	P0C1A	*This Diagnostic tests that the difference between the motor B torque command slew and the motor torque achieved is greater than a threshold.*						One Trip, Type A
		DTC Fail case 1: The slewed MCP torque command is different by the MCP torque achieved	the commanded torque - the achieved torque	< 138	Ignition switch	in crank or run		
Drive Motor B Control Module Not Programmed	P1A52	*This diagnostic prevents flashing different MCP software into MCP B that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	*≠ Calibration*				
Drive Motor B Control	P1E0B	*This diagnostic detects the torque command path calculation errors*						One

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Module Internal Control Module Torque Calculation Performance		**DTC Fail case 1:** If the difference between the Torque achieved primary path signal and the redundant path signal is greater than a threshold (MTQR)	Difference between Primary and Redundant signals	> 164Nm	Fault Active TPTKO Torque Mon Fail	= True = False = True	30 fail counts out of 32 sample counts Executes in a 6.25 ms Loop Detects in 200ms	Trip, Type A
		DTC Fail case 2: If the difference between the Torque Commanded primary path signal and the redundant path signal is greater than a threshold (MTDR)	Difference between Primary and Redundant signals	> 164Nm				
		DTC Fail case 3: Compares the ISSD primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 4: Compares the ISSQ primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCUR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 5: Compares the ISSCmd primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> 50A				
		DTC Fail case 6: Compares the BEMF Dec primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCDR)	Difference between Primary and Redundant signals	> .001Nm				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 7: Compares the Usdq Limited primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MCCR)	Difference between Primary and Redundant signals	> .5V				
		DTC Fail case 8: Compares the Duty ABC primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (SVMR)	**For OverMod:** Mod Index Square or PerfSqr **For Linear:** Mod Index Square or PerfSqr	> .2Nm > 1Nm > .1Nm > .15Nm				
		DTC Fail case 9: Compares the Power Input Watts primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	>4000				
		DTC Fail case 10: Compares the VDC Adapt primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> .03V				
		DTC Fail case 11: Compares the Qest primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (HVTR)	Difference between Primary and Redundant signals	> 0Nm				

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 12: Compares the Motor Speed primary path calculated signal in task 0 rate with redundant signal calculated in 6.25ms and fails if it is different than a threshold (MSPR)	Difference between Primary and Redundant signals	>116 RadPerSec				
Communication Diagnostics								
Lost Comm'n With ECM/PCM on Bus A	U1879	*This diagnostic indicates a lost communication between the MCPB and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Communication With TCM	U1850	*This diagnostic indicates a lost communication between the MCPB and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Comm'n With Hybrid	U1846	*This diagnostic indicates a lost communication between the MCPB and the HCP*						Two

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Controller		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Detects within 500 msec at 6.25 msec loop rate	Trips, Type B
Lost Comm'n With Hybrid Controller B on Bus B	U182F	*This diagnostic indicates a lost communication between the MCPB and the VICM on Bus B*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission Diagnostic System Disable Diagnostic Enable Timer	> 9.5 Volts =RUN =FALSE =TRUE =TRUE =FALSE >=3 sec	Executes in a 6.25ms loop Detects in 500 ms	
Lost Comm'n With Hybrid Controller B	U2614	*This diagnostic indicates a lost communication between the MCPB and the VICM*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode Bus Off Fault Active Normal Communication Enabled Normal Message Transmission	> 9.5 Volts =RUN =FALSE =TRUE =TRUE	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Diagnostic System Disable Diagnostic Enable Timer	=FALSE >=3 sec		

APPENDIX

ALU= Arithmetic Logic Unit
BPCM= Batt Pack Ctrl Module
HWIO= Hardware Input/Output
IGBT= Insulated Gate Bipolar Transistors (Phase Current Controllers)
OOR= Out of Range

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ATPC Voltage Diagnostics								
Sensor Power Supply C Circuit Low	P06E7	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0 V	Wakeup Signal	ON	X: 40 ct Y: 50 ct R: 10.4 ms T: 416 ms OR 300 ms continuous fail time	One Trip, Type A
Sensor Power Supply C Circuit High	P06E8	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0 V	Wakeup Signal	ON	X: 40 ct Y: 50 ct R: 10.4 ms T: 416 ms OR 300 ms continuous fail time	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module System Voltage Low	P1E19	*This is the 12V system voltage low diagnostic*						Special Type C
		DTC Fail case: Sets when the ignition voltage is below a threshold	Ignition Voltage	<= 10 Volts	Enable Cal RunCrankActive Engine Speed	= true = true >= 0 RPM	5 fail counts out of 6 sample counts Executes in a 1000ms loop Detects in 6 sec	
		DTC Pass:		Ignition Voltage > 10 Volts			1 second	
Auxiliary Transmission Fluid Pump Control Module System Voltage High	P1E1A	*This is the 12V system voltage Hi diagnostic*						Special Type C
		DTC Fail case: Sets when the ignition voltage is above a threshold	Ignition Voltage	>= 18 Volts	Enable Cal RunCrankActive	= true = true		
		DTC Pass:		Ignition Voltage < 18 Volts			1 second	
ATPC Phase Current Diagnostics								
Auxiliary Transmission Fluid Pump Phase U-V-W Circuit/Open	P0C20	Drive Motor "A" Missing Motor Current checks for minimum current in each phase when rotor position is near that peak's phase axis. Each phase is checked individually as rotor turns.	ABS(Peak Phase Axis Current)	< 1A	Inverter State	Run	X: 200 ct Y: N/A R: 0.11 ms T: 22 ms	One Trip, Type A
					High Voltage	> 35V		
					Rotor Position	-30 deg < Phase Axis < +30 deg		
					Current Command	>= 3A		
Auxiliary Transmission Fluid Pump Motor Current High	P0C28	**Fail Case 1**: To detect fast, repeated 3 Phase over currents and to protect IGBT.	U, V, or W Phase current sensor	> 35 A	Wakeup Signal	On	X: 2 cts Y: 30 cts R: 2.08 ms T: 4.2 ms	One Trip, Type A
		Fail Case 2: To detect slow, intermittent 3 Phase over currents and to protect IGBT.					X: 5 cts Y: 50 cts R: 2.08 ms T: 10.4 ms	
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Low	P1E2A	Circuit Low monitor to detect the failure of U-phase current sensor circuit below valid range	U Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit High	P1E2B	Circuit High monitor to detect the failure of U-phase current sensor circuit above valid range	U Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U Current Sensor Circuit Range/Performance	P1E2C	Offset Circuit monitor to detect the failure of U-phase offset current above valid range	U Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E2A/P1E2B	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Low	P1E2D	Circuit Low monitor to detect the failure of V-phase current sensor circuit below valid range	V Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit High	P1E2E	Circuit High monitor to detect the failure of V-phase current sensor circuit above valid range	V Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase V Current Sensor Circuit Range/Performance	P1E2F	Offset Circuit monitor to detect the failure of V-phase offset current above valid range	V Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E2D/P1E2E	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit Low	P1E30	Circuit Low monitor to detect the failure of W-phase current sensor circuit below valid range	W Phase current sensor output at highside	< -30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit High	P1E31	Circuit High monitor to detect the failure of W-phase current sensor circuit above valid range	W Phase current sensor output at highside	> 30A	Wakeup Signal PWM Output Enabled	ON FALSE	X: 4 ct Y: 6 ct R: 10.4 ms T: 42 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase W Current Sensor Circuit Range/Performance	P1E32	Offset Circuit monitor to detect the failure of W-phase offset current above valid range	W Phase offset current output at highside	> 2A	Wakeup Signal PowerStage No Active DTCs:	ON OPEN P1E30/P1E31	X: 8 ct Y: N/A R: 10.4 ms T: 83 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Phase U-V-W Current Sensor Correlation	P1E33	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 5A	Wakeup Signal	ON	X: 160 ct Y: 190 ct R: 0.11 ms T: 17.6 ms	One Trip, Type A
ATPC IGBT Diagnostics								
Auxiliary Transmission Fluid Pump Motor Inverter Power Supply Circuit/Open	P1E38	Detects IGBT Bias Faults Monitors hw line to detect loss of power supply to gate drive board.	Phase A, B, or C Power Supply	FAILED (Status Fault Bit)	Wakeup Signal High Voltage	ON > 200V	X: 67 ct Y: 100 cnt R: 2 ms T: 134 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Motor Inverter Performance	P1E39	Detects IGBT Desaturation Faults. Monitors hw status line to detect internal overcurrent faults, shoot through or loss of switching control events	Phase A, B, or C High or Low Side Devices	OVERDRIVEN (Status Fault Bit)	Inverter State High Voltage	Initialization Complete > 200V	66 ms (4 retries at 4ms with a 10ms wait time between each retry)	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
ATPC Sensorless Controls Diagnostics								
Auxiliary Transmission Fluid Pump Torque Performance	P1E3A	Detects Sensorless Stall of Aux Fluid Pump	Commanded speed - Actual speed	> 200 rpm	Torque command	> 6.8 Nm	X: 400 ct Y:2500 R: 2.08 ms T: 832 ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Overspeed	P179A	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially	>6500 rpm	Wake up signal	On	X: 10 cts Y: 12 cts R: 10.4ms T: 104ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Calculated Motor Position Performance	P1E29	Loss of Sensorless Control OR Polarity Detection Fault	Motor Speed Speed Command OR Rotor Speed ERS	< -500 r/min > 0 > 62.8 rad/s	Wake up signal	On	X: 3 cts Y: 5 cts R: 2ms T: 6ms X:100 cts Y:N/A R:2ms Retries: 5 T:1s	One Trip, Type A
ATPC High Voltage (HV) Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage High	P1E27	To detect over voltage and to protect TPIM HV Circuit	HV Sensor Voltage OR Hardware Over Voltage Flag	> 463V = TRUE	Controller Initialization	Complete	X: 3 cts Y: N/A R: 0.0002ms T: 600us	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Sense Circuit Low Voltage	P1E20	Circuit Low monitor of HV output voltage sensor	HV Sensor Voltage	<30V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Drive Motor "A" Control Module Hybrid Battery Voltage Sense Circuit High Voltage	P1E21	Circuit High monitor of HV output voltage sensor	HV Sensor Voltage	>500 V	Controller Initialization Run/Crank	Complete Active	X: 15 cts Y: 20 cts R: 10.4ms T: 156.3ms	One Trip, Type A
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery System Voltage	P1E28	To check correlation of HV with sum of mid-pack voltages and HV_Battery.	ABS(HV - HV_Battery) AND ABS(HV - sum of mid-pack voltages)	>= 40 V >= 50 V	No Active DTCs: Contactors	P1E20, P1E21 Closed	X: 110 cts Y: 184 cts R: 10.4ms T: 1144ms	Two Trips, Type B
ATPC Isolation Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage System Isolation Fault	P1E22	Isolation Lost between mid-pack voltage and chassis	Isolation Ratio (Neg mid-pack voltage / Pos mid-pack voltage)	>4.53	No Active DTCs: Controller Initialization	P1E20, P1E21, P1E28 Complete	X: 250 cts Y: 300 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 1 Low	P1E1C	Circuit 1 Low monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage	<20V	Controller Initialization	Complete	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Run/Crank Contactors	Active Closed		
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 1 High	P1E1D	Circuit 1 High monitor of Pos mid-pack voltage sensor	Pos mid-pack voltage - HV OR Pos mid-pack - HV_Bat	>40 V >40V	No Active DTCs: Controller Initialization Run/Crank	P1E20, P1E21, P1E28 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 Low	P1E1E	Circuit 2 Low monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage	<20V	Controller Initialization Run/Crank Contactors	Complete Active Closed	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensor Circuit 2 High	P1E1F	Circuit 2 High monitor of Neg mid-pack voltage sensor	Neg mid-pack voltage - HV OR Neg mid-pack - HV_Bat	>40 V >40V	No Active DTCs: Controller Initialization Run/Crank	P1E20, P1E21, P1E28 Complete Active	X: 70 cts Y: 100 cts R: 10.4ms T: 729ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Control Module Hybrid Battery Voltage Isolation Sensing Performance	P1E1B	To check correlation of sum of mid-pack voltages against HV and HV_Battery	ABS(HV - HV_Battery) AND ABS(HV_Bat - Neg mid-pack - Pos mid-pack) OR ABS(HV - Neg mid-pack - Pos mid-pack) AND ABS(HV_Bat - Neg mid-pack - Pos mid-pack)	>= 40 >= 50 >= 50 >= 50	No Active DTCs: Controller Initialization Run/Crank	P1E20, P1E21, P1E1E, P1E1F, P1E28, P1E1D, P1E1C Complete Active	X: 100 cts Y: 150 cts R: 10.4ms T: 1040 ms	Two Trips, Type B
				ATPC Temp Sensor Diagnostics				
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit High	P1E34	To detect Inverter A Temperature Sensor #1 voltage out of range high	PIM Temp A Temperature	< -58 deg C (near 5V)	Wakeup Signal When malfunction present at start of trip: Cumulative Inverter Warmup Time at or above Inverter Warmup Torque Threshold	ON >=600s >=ABS(1 Nm)	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Low	P1E35	To detect Inverter A Temperature Sensor #1 Out of Range low (voltage)	PIM Temp B Temperature	> 130 degC (near 0V)	WakeUp Signal	On	X: 250 cts Y: 350 cts R: 10.4ms T: 2600ms	Two Trips, Type B

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Inverter Temperature Sensor Circuit Range/Performance	P1E36	Inverter A Temperature Sensor #1 In-Range Rationality Check	ABS(PIMTemp - AVG(PwrElecCoolantTemp and TransTemp)) "ColdStartAvg"	> 20 deg C	Wake Up Signal	On	300 cts Start Delay	Two Trips, Type B
					Propulsion System Inactive Time	>=21600s		
					Thermal Conditioning Off Time	>=7200s	PLUS	
					Charge Off Time	>=7200s	X: 550 cts Y: 700 cts R: 10.4ms T: 2080ms =8.84 sec total	
					Cold Start Average Temperature	> -20C		
					Power Electronics Coolant Temperature Available	TRUE		
					Power Electronics Coolant Temperature Fault Active	FALSE		
					Tranmission Fluid Temperature Valid	TRUE		
					Propulsion System Inactive Timer Fault Active	FALSE		
					Propulsion System Inactive Timer Mask	Use Data		
					Off Board Charging Inactive Timer Fault Active	FALSE		
					Off Board Charging Inactive Timer Mask	Use Data		
					Battery Thermal Conditioning Inactive Fault Active	FALSE		
					Battery Thermal Conditioning Inactive Mask	Use Data		
					Plug In Charging Present	TRUE		
					No Active Power Inverter Temp Out Of Range Faults:	P1E34 and P1E35		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Auxiliary Transmission Fluid Pump Motor Inverter Over Temperature	P1E37	To detect an in-range overtemperature condition that can potentially damage inverter	PIM Temp A Temperature	> 98 deg C initial fault	PIM Temperature No Active DTCs:	IN RANGE P1E36	X: 500 cts Y: 1500 cts R: 10.4ms T: 5200ms	Two Trips, Type B
ATPC Controller Diagnostics								
Auxiliary Transmission Fluid Pump Control Module Read Only Memory (ROM)	P1E25	*This Diagnostic tests the checksum on ROM (flash) memory*						One Trip, Type A
		DTC Fail case 1: This DTC will be stored if any check sum in the **boot** is incorrect **DTC Fail case 2:** This DTC will be stored if any check sum in the **calibration** is incorrect **DTC Fail case 3:** This DTC will be stored if any check sum in the **software** is incorrect	Calculated Checksum does not match stored checksum		Ignition Status	= Run or Crank	1 failure if it occurs during the first ROM test of the ignition cycle otherwise 5 failures Frequency: Runs continuously in the background	
		DTC Pass:		ROM fault = false 2nd SOH ROM fault = false Main SOH ROM fault = false				
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Performance	P1E24	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up **DTC Fail case 2:** Non-volatile memory (**Preserved**) checksum error at controller power-up **DTC Fail case 3:** Non-volatile memory (**BINVDM**) checksum error at controller power-up **DTC Fail case 4:** Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Pass:		No ROM memory faults				
Auxiliary Transmission Fluid Pump Control Module Random Access Memory (RAM)	P1E23	*This Diagnostic tests the checksum on RAM memory*						One Trip, Type A
		DTC Fail case 1: Indicates that HCP is unable to correctly write and read data to and from **Dual Store** RAM			Ignition Status	= Run or Crank	Should finish within 30 seconds at all operating conditions	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Indicates that HCP is unable to correctly write and read data to and from **Write Protect** RAM						
		DTC Fail case 3: Indicates that HCP is unable to correctly write and read data to and from **2nd SOH** RAM						
		DTC Fail case 4: Indicates that HCP is unable to correctly write and read data to and from **Main SOH** RAM	Data read	does not match data written				
		DTC Fail case 5: Indicates that HCP is unable to correctly write and read data to and from **System** RAM						
		DTC Fail case 6: Indicates that HCP is unable to correctly write and read data to and from **Cache** RAM						
		DTC Fail case 7: Indicates that HCP is unable to correctly write and read data to and from **eTPU** RAM						
		DTC Pass:		No errors in 1000ms MainSOH RAM faults = false CommFlts = false System RAM faults = false CacheRam faults = false eTPU RAM faults = false				
Auxiliary Transmission Fluid Pump Motor Control Module	P0B0D	*This Diagnostic tests all the internal processor integrity subsystems*						One Trip, Type A
		DTC Fail case 1: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSPI_Flt	HWIO detects Fault	= true (in SPI Hardware)	Run/Crank Voltage OR Powertrain Relay Voltage Diagnostic System Enable Powermoding	> 9.5 Volts = true = Accesory or Off	28 fail counts out of 32 sample counts Executes in a 6.25ms loop Detects in 200ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 2: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndNotRunningSeedKyTst	Key Value	= Calibration Value	SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault 12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	= False =False = False = false >11V = false <= 0 MPH = False = off for less than 5 seconds	Detects in 150ms	
		DTC Fail case 3: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndFailsToTakeRmdlActn	IPT Detects faulty harware in Inhibit path IPT feedback	≠ calibration Value	HV Bat contactor Staus Available MMDR HPMR HV Battery Contactors Motor Faults Motor Speed SRAR shutdowns SPI Fault RunCrank Active Ram or ROM fault	= True = Powerdown Wait State = Eval BP Open State >= 80 V = Closed = False <= 10 RPM = False =False = False = False	Up down counter = 3	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					12V battery Seed received in wrong order fault Vehicle Speed Seed/Key Timeout Powermode	>11V = False <= 0 MPH = False = off for less than 5 seconds		
		DTC Fail case 4: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_2ndRxIncorrectKeys	Key Value	≠ Calibration Value	1. Number Of Mains 2. IPT status	1. > 0 2. = Not running for > 0.075s	Detects in 150ms or two consecutive faulty keys	
		DTC Fail case 5: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdKeyTimeout	seed does not update	within Calibration threshold	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	Detects in 1 sec	
		DTC Fail case 6: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainDtctdSdRxWrongOrdr	Seed sequence	≠ expected order	1. Number Of Monitors 2. SPI faults	1. > 0 2. = FALSE	12 fail counts out of 16 sample counts Executes in a 12.5ms loop Detects in 200ms	
		DTC Fail case 7: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainSequenceFlt	Seed timeout PSW Fault	> 200 ms = True	1. Seed Update Key StoreFault Enable OR 2. Program Sequence Watch Enable	1. = True 2. = True	3 fail counts out of 4 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 8: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainALU_Flt	HWIO detects Fault	=2 (ina row)	1. ALU Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 9: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainCfgRegFlt	HWIO detects Fault	=2 (in arow)	1. Diagnostic Test Enabled 2. Diagnostic system status 3. Code clear active 4. PMDI Low voltage clear diag enable conditons met	1. = TRUE 2. = Enabled 3. >= 0.15s 4. = True	runs continuously in 12.5ms loop Detects in 12.5ms	
		DTC Fail case 10: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainStackFlt	HWIO detects Fault	= 5 (Since Powerup)	Diagnostic Test Enabled Diagnostic System Enables	= True =True	Runs Continuously in 100ms loop Detects in 500ms	
		DTC Fail case 11: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_MainADC_Flt	Continuous Fault	> 200ms	1. A2D Converter Test Enabled 2. PT Relay Voltage 3. Run Crank Voltage	1. = TRUE 2. > -1 3. > 7	5 fail counts out of 8 sample counts Executes in a 50ms loop Detects in 200ms	
		DTC Fail case 12: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RunCrankCorrFlt	Run Crank on Seconday Processor	≠ Run Crank Active	1. Run Crank Discrete Diagnostic Enable 2. SPI Faults	1. = True 2. = False	5 fail counts out of 8 sample counts Executes in a 25ms loop Detects in 200ms	
		DTC Fail case 13: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_FlashECC_CktTest	HWIO detects Fault	= 3 /10 5/10	1. Flash ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	
		DTC Fail case 14: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_RAM_ECC_CktTes t	HWIO detects Fault	= 3 /10 5/10	1. RAM ECC Circuit Test Enable 2. Power-Up Reset	1. = True 2. = True	3 fail counts out of 10 sample counts (turns on MIL) 5 fail counts out of 10 sample counts (shutdown vehicle) Executes once at every power up reset	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Fail case 15: Indicates that the HCP has detected an internal processor integrity fault CePISR_e_DMA_XferTest	HWIO detects Fault or Memory Copy Error	= True or =True	Diagnostic Test Enabled	= TRUE		
Auxiliary Transmission Fluid Pump Control Module Long Term Memory Reset	P1EB8	*This Diagnostic tests for unuseable BINVDM (flash) memory only*						One Trip, Type A
		DTC Fail case 1: Indicates that the NVM Error flag **HWIO Bat Write will not succeed** set	Last EEPROM write did not complete		Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Fail case 2: Indicates that the NVM Error flag **HWIO Assembly Cal** set			Ignition voltage	≥ 5 volts	1 failure Frequency: Once at power-up	
		DTC Pass:		NV writewillnotsucceed = fail Assemblycalfail = false				
Auxiliary Transmission Fluid Pump Motor Control Module Not Programmed	P1BFF	*This diagnostic prevents flashing different MCP software into MCP C that does not match its ID*						One Trip, Type A
		DTC Fail case 1: The MCP ID hardware does not match the calibration for the specific MCP	MCP ID Hardware	*≠ Calibration*				
Control Module Long Term Memory Reset	P1EB8	*This Diagnostic tests for BINVDM errors*						One Trip, Type A
		DTC Fail case 1: Non-volatile memory (**Static**) checksum error at controller power-up	Checksum at power-up does not match checksum at power-down		Ignition Status	= Run or Crank	1 failure Frequency: Once at powerup	
		DTC Fail case 2: Non-volatile memory (**Preserved**) checksum error at controller power-up						
		DTC Fail case 3: Non-volatile memory (**BINVDM**) checksum error at controller power-up						
		DTC Fail case 4: Non-volatile memory (**ShutdownFinished**) checksum error at controller power-up						
		DTC Pass:		No ROM memory faults				
ATPC Comm'n								
Lost Comm'n With ECM/PCM on Bus A	U1839	*This diagnostic indicates a lost communication between the ATPC and the ECM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the ECM on Bus A	Missed ECM Messages		Run/Crank Voltage OR Powertrain Relay Voltage PowerMode	> 9.5 Volts =RUN	Executes in a 6.25ms loop Detects in 500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With TCM	U183B	*This diagnostic indicates a lost communication between the ATPC and the TCM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Detects that CAN serial data communication has been lost with the TCM on Bus A	Missed TCM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller	U2611	*This diagnostic indicates a lost communication between the ATPC and the HCP*						Two Trips, Type B
		Detects that CAN serial data communication has been lost with the HCP	Missed HCP Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Detects within 500 msec at 6.25 msec loop rate	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B	U183C	*This diagnostic indicates a lost communication between the ATPC and the VICM on Bus A*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus B (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		
Lost Comm'n With Hybrid Controller B	U2615	*This diagnostic indicates a lost communication between the ATPC and the VICM*						Two Trips, Type B
		DTC Fail case 1: Lost Communication with Hybrid Powertrain Control Module B on Bus A (VICM)	Missed VICM Messages		Run/Crank Voltage OR Powertrain Relay Voltage	> 9.5 Volts	Executes in a 6.25ms loop Detects in 500 ms	
					PowerMode	=RUN		
					Bus Off Fault Active	=FALSE		
					Normal Communication Enabled	=TRUE		
					Normal Message Transmission	=TRUE		
					Diagnostic System Disable	=FALSE		
					Diagnostic Enable Timer	>=3 sec		

Time Required Legend:	
X: Fail Counts R: Loop Time T: Fault Detect Time	Y: Sample Counts (N/A if no XofY structure)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
A/C Compressor Control	P15BA	Run/Crank circuit is stuck on	Run/Crank input AND GMLAN Signal "VICM Run Crank Terminal Status"	ON INACTIVE	System Voltage Comm with VICM	12V System Status > 10.25 V Message $236 recd.	5 fails out of 10 samples. Continuous sampling at 50 msec/sample	One Trip, Type A
A/C Compressor Control	P15B9	Run/Crank circuit is stuck off	Run/Crank input AND GMLAN Signal "VICM Run Crank Terminal Status"	= OFF = ACTIVE	System Voltage HW Inputs Comm with VICM	12V System Status > 10.25 V Accessory Message $236 recd.	5 fails out of 10 samples.	One
A/C Compressor Motor Voltage Sensor Circuit High	P0D6A	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	450V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		
						Compressor Input Voltage reading within 15 V of Battery Cell Voltage reading		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Voltage Sensor Circuit Low	P0D6B	Monitor High Voltage input to ACCM	Sets when HV <= Threshold	190V	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Contactors Closed with no faults	High Voltage Battery Contactor is CLOSED for 6.2 sec AND High Voltage Battery Contactor Fault Active is FALSE		
					HV Battery Normal Operation	Battery Cell Voltage Fault Active is FALSE		
						Compressor Input Voltage reading within 15 V of Battery Cell		
		Status Pass	HV >= Threshold	200V	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Instantaneous Voltage High	P1ECA	Monitor High Voltage input to ACCM	Sets when HV >= Threshold	480V	System Voltage	12V System Status > 10.25 V	1 fail out of 1 sample Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	HV <= Threshold	440V	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
A/C Compressor Motor Phase U Current Low	P0D7A	Monitor U-phase motor current	U-phase Input >= Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	U-phase Input < Threshold	68 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec	
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.	sampling rate	
A/C Compressor Motor Phase U Current High	P0D7B	Monitor U-phase motor current	U-phase Input <= Threshold	-68 Amps	System Voltage HW Inputs Motor Stopped	12V System Status > 10.25 V Accessory OR Run/Crank Thermal Refrigerant Compressor Speed Request = 0 RPM	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
		Status Pass	U-phase Input > Threshold	-68 Amps	System Voltage HW Inputs ECU reset	12V System Status > 10.25 V Accessory OR Run/Crank After a FAIL a 12V reset is required before PASS will be enabled.	30 passes out of 60 samples. Continuous 50 msec sampling rate	
A/C Compressor Motor Phase V Current Low	P0D7C	Monitor V-phase motor current	V-phase Input >= Threshold	68 Amps	System Voltage HW Inputs Motor Stopped	12V System Status > 10.25 V Accessory OR Run/Crank Thermal Refrigerant Compressor Speed Request = 0 RPM	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
		Status Pass	V-phase Input < Threshold	68 Amps	System Voltage HW Inputs ECU reset	12V System Status > 10.25 V Accessory OR Run/Crank After a FAIL a 12V reset is required before PASS will be	30 passes out of 60 samples. Continuous 50 msec sampling rate	
A/C Compressor Motor Phase V Current High	P0D7D	Monitor V-phase motor current	V-phase Input <= Threshold	-68 Amps	System Voltage HW Inputs Motor Stopped	12V System Status > 10.25 V Accessory OR Run/Crank Thermal Refrigerant Compressor Speed Request = 0 RPM	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
		Status Pass	V-phase Input > Threshold	-68 Amps	System Voltage HW Inputs ECU reset	12V System Status > 10.25 V Accessory OR Run/Crank After a FAIL a 12V reset is required before PASS will be	30 passes out of 60 samples. Continuous 50 msec sampling rate	
A/C Compressor Motor Phase W Current Low	P0D7E	Monitor W-phase motor current	W-phase Input >= Threshold	68 Amps	System Voltage HW Inputs Motor Stopped	12V System Status > 10.25 V Accessory OR Run/Crank Thermal Refrigerant Compressor Speed Request = 0 RPM	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
		Status Pass	W-phase Input < Threshold	68 Amps	System Voltage HW Inputs ECU reset	12V System Status > 10.25 V Accessory OR Run/Crank After a FAIL a 12V reset is required before PASS will be	30 passes out of 60 samples. Continuous 50 msec sampling rate	
A/C Compressor Motor Phase W Current High	P0D7F	Monitor W-phase motor current	W-phase Input <= Threshold	-68 Amps	System Voltage HW Inputs Motor Stopped	12V System Status > 10.25 V Accessory OR Run/Crank Thermal Refrigerant Compressor Speed Request = 0 RPM	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
		Status Pass	W-phase Input > Threshold	-68 Amps	System Voltage HW Inputs ECU reset	12V System Status > 10.25 V Accessory OR Run/Crank After a FAIL a 12V reset is required before PASS will be	30 passes out of 60 samples. Continuous 50 msec sampling rate	
A/C Compressor Motor Instantaneous Current High	P1EC9	Monitor DC Link current	Sets when DC Link > Threshold	60A	System Voltage HW Inputs	12V System Status > 10.25 V Accessory OR Run/Crank	1 fail out of 1 sample Continuous 50 msec sampling rate	Two Trips, Type B
		Status Pass	DC Link <= Threshold	60A	System Voltage HW Inputs Motor Running	12V System Status > 10.25 V Accessory OR Run/Crank Motor Spinning and reaching Speed Request (Thermal	1 pass out of 1 sample Continuous 50 msec sampling rate	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be enabled.		
					Clear Codes	After 10 fails, need clear code from VICM		
A/C Compressor Motor Current High	P0D6F	Monitor DC Link current	Sets when DC Link > Threshold	27A	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	Input <= Threshold	27A	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Motor Spinning and reaching Speed Request (Thermal Refrigerant Compressor Speed Request > 0 RPM)		
					Speed Request Reset	After a fail, Speed request needs to go to 0 before PASS will be		
A/C Compressor Control Module Random Access Memory (RAM) Error	P16B8	RAM memory read/write check	Sets on read/write fault to RAM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be		
A/C Compressor Control Module Read Only Memory (ROM) Error	P16B9	ROM memory check sum	Sets on check sum error with ROM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be		
A/C Compressor Control Module Keep Alive Memory (KAM) Error	P16BA	EEPROM memory check sum	Sets on check sum error with EEPROM		System Voltage	12V System Status > 10.25 V	< 250 msec after boot	One Trip, Type A
					HW Inputs	Accessory OR Run/Crank		
					Start up	Upon CPU boot (Run/Crank or ACC transition high)		
		Status Pass			System Voltage	12V System Status > 10.25 V		
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module B	U1860	Loss of communication with VICM ECU	Message $236 missed	30 times	System Voltage	12V System Status > 10.25 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Message $236 detected	1 time	System Voltage	12V System Status > 10.25 V	< 110 msec. 10 msec scan rate	
					HW Inputs	Accessory OR Run/Crank		
Electric A/C Compressor Control Module Lost Communication with Hybrid Powertrain Control Module 1	U2608	Loss of communication with HCP ECU	Message $1DF missed	30 times	System Voltage	12V System Status > 10.25 V	3 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Message $1DF detected	1 time	System Voltage	12V System Status > 10.25 V	< 110 msec.	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					HW Inputs	Accessory OR Run/Crank	10 msec scan rate	
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit High	P0D72	Monitor ACCM CPU temperature	Tcpu input < Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Outside Air Temperature	OAT > -7 deg C		
		Status Pass	Tcpu input >= Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be		
					Outside Air Temperature	OAT > -7 deg C		
Electric A/C Compressor Control Module Internal Temperature Sensor Circuit Low	P0D73	Monitor ACCM CPU temperature	Tcpu input > Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tcpu input <= Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit High	P0D77	Monitor ACCM IGBT temperature	Tigbt input = Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Speed Request	Compressor speed request > 0 rpm		
					Outside Air Temperature	OAT > -7 deg C		
		Status Pass	Tigbt input >= Threshold	-40 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
					Outside Air Temperature	OAT > -7 deg C		
Electric A/C Compressor Control Module Output Driver Temperature Sensor Circuit Low	P0D78	Monitor ACCM IGBT temperature	Tigbt input > Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
		Status Pass	Tigbt input <= Threshold	274 deg C	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					ECU reset	After a FAIL a 12V reset is required before PASS will be enabled.		
A/C Compressor Control Module Wake-up Circuit Performance	P16B7	ACC circuit is stuck off	Accessory	OFF	System Voltage	12V System Status > 10.25 V	500 msec	Two Trips, Type B
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500 msec		
		Status Pass	Accessory	ON	System Voltage	12V System Status > 10.25 V	500 msec	
					HW Inputs	Run/Crank		
					Prop Sys Active	Propulsion System Active = True		
					Timer	500msec		
A/C Compressor Motor Start-Up Current Performance	P1F0B	Monitor Inverter Phase Currents	During driver circuit check for all U/V/W Phases, if any current < Threshold	1 A	System Voltage	12V System Status > 10.25 V	< 50 msec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
		Status Pass	During driver circuit check for all U/V/W Phases, all currents >= Threshold	1 A	System Voltage	12V System Status > 10.25 V	1 pass out of 1 sample Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					ECU reset	After a FAIL a 12V reset is required before PASS will be		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit High	P1F0D	Monitor ACCM DC Link Current	Current input >= Threshold	36.7 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
		Status Pass	Current input < Threshold	36.7 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Stopped	Thermal Refrigerant Compressor Speed Request = 0 RPM		
Electric A/C Compressor Control Module A/C Compressor Motor Current Feedback Circuit Low	P1F0C	Monitor ACCM DC Link Current	Current input <= Threshold	-2.5 Amps	System Voltage	12V System Status > 10.25 V	30 fails out of 60 samples. Continuous 50 msec sampling rate	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
					Peak Motor Current	Exceeds threshold specified in EACCM Supporting Tables for 50 ms		
		Status Pass	Current input > Threshold	-2.5 Amps	System Voltage	12V System Status > 10.25 V	30 passes out of 60 samples. Continuous 50 msec sampling rate	
					HW Inputs	Accessory OR Run/Crank		
					Motor Running	$236 Speed Request > 0		
A/C Compressor Motor Speed Performance	P1F0A	Monitor ACCM Motor Speed	Motor Speed < Threshold	1800 rpm	System Voltage	12V System Status > 10.25 V	20 sec	Two Trips, Type B
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup	Motor Spinning but not reaching 1800 RPM		
					IGBT Temp	Tigbt < 85 degC		
					Timer	> 20 sec after motor starts spinning		
					OR			
					System Voltage	12V System Status > 10.25 V	1 min	
					HW Inputs	Accessory OR Run/Crank		
					Motor Startup	Motor Spinning but not reaching 1800 RPM		
					IGBT Temp	Tigbt > 85 degC		
					Increase in IGBT Temp	ΔTigbt >= 10 degC		
					Timer	> 1 min after motor starts spinning and IGBT Temp increases 10 deg		
		Status Pass	Motor Speed >= Threshold	1800 rpm	System Voltage	12V System Status > 10.25 V	15min	
					HW Inputs	Accessory OR Run/Crank		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Motor Running	Thermal Refrigerant Compressor Speed Request > 0 RPM		
					ECU Reset	after a FAIL a 12V reset and 15 minutes is required to re-try the compressor.		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger 14 Volt Output Current Sensor Circuit Low (12VC)	P0D49	DTC Fail Sets when the LV Current raw data, (12VC _AD_READ), is less than or equal to a threshold	Low Voltage DC Current (sensor reading)	<= 0.293 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Current (sensor reading)	> 0.293 Amps			500 ms	
Battery Charger 14 Volt Output Current Sensor Circuit High (12VC)	P0D4A	DTC Fail Sets when the LV Current raw data, (12VC _AD_READ), is greater than or equal to a threshold	Low Voltage DC Current (sensor reading)	>= 54 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Current (sensor reading)	< 54 Amps			500 ms	
Battery Charger 14 Volt Output Voltage Sensor Circuit Low (LVS)	P0D44	DTC Fail Sets when the LV Voltage raw data, (LVS _AD_READ), is less than or equal to a threshold	Low Voltage DC Voltage (sensor reading)	<= 1.87 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC Voltage (sensor reading)	> 1.87 Volts			500 ms	
Battery Charger 14 Volt Output Voltage Sensor Circuit High (LVS)	P0D45	DTC Fail Sets when the LV Voltage raw data, (LVS _AD_READ), is greater than or equal to a threshold	Low Voltage DC Voltage (sensor reading)	>= 16.88 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	Two Trips, Type B
		DTC Pass	Low Voltage DC Voltage (sensor reading)	< 16.88 Volts			500 ms	
Battery Charger Cold Plate Temperature Sensor Circuit Low (THCP)	P1ED6	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP _AD_READ), is less than or equal to a threshold	Cold Plate Temperature (sensor reading)	<= -49.5 ℃	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	> -49.5 ℃			1275 ms	
Battery Charger Cold Plate Temperature Sensor Circuit High (THCP)	P1ED7	DTC Fail Sets when the Cold Plate Temperature raw data, (THCP _AD_READ), is greater than or equal to a threshold	Cold Plate Temperature (sensor reading)	>= 135 ℃	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms in a 1275 ms window	One Trip, Type A
		DTC Pass	Cold Plate Temperature (sensor reading)	< 135 ℃			1275 ms	
Battery Charger Control Module Reference Voltage "B" Circuit Low (Sec Reference Voltage)	P1EE9	DTC Fail Sets when the SEC Reference Voltage raw data,(SecVref _AD_READ), is less than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	<= 0.782 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	> 0.782 Volts			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Reference Voltage "B" Circuit High (Sec Reference Voltage)	P1EEA	DTC Fail Sets when the Sec Reference Voltage raw data,(SecVref _AD_READ), is greater than or equal to a threshold	Low Voltage DC (Secondary) Micro Reference Voltage	>= 1.407 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Low Voltage DC (Secondary) Micro Reference Voltage	< 1.407 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit Low (HVS)	P0D4E	DTC Fail Sets when the HV Voltage raw data,(HVS _AD_READ), is less than or equal to a threshold	High Voltage DC Voltage (sensor reading)	<= 2.62 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Voltage (sensor reading)	> 2.62 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit High (HVS)	P0D4F	DTC Fail Sets when the HV Voltage raw data,(HVS _AD_READ), is greater than or equal to a threshold	High Voltage DC Voltage (sensor reading)	>= 482 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Voltage (sensor reading)	< 482 Volts			500 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Circuit Low (HVC)	P0D53	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ), is less than or equal to a threshold	High Voltage DC Current (sensor reading)	<= 0.098 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Current (sensor reading)	> 0.098 Amps			500 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Circuit High (HVC)	P0D54	DTC Fail Sets when the HV Current raw data,(HVC_AD_READ), is greater than or equal to a threshold	High Voltage DC Current (sensor reading)	>= 17.7 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC Current (sensor reading)	< 17.7 Amps			500 ms	
Battery Charger Control Module Reference Voltage "C" Circuit Low (HV Reference Voltage)	P1EEB	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is less than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	<= 0.782 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	> 0.782 Volts			500 ms	
Battery Charger Control Module Reference Voltage "C" Circuit High (HV Reference Voltage)	P1EEC	DTC Fail Sets when the HV Reference Voltage raw data,(HVVref_AD_READ), is greater than or equal to a threshold	High Voltage DC (HV) Micro Reference Voltage	>= 1.407 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	400 ms in a 500 ms window	One Trip, Type A
					High Voltage DC (HV) micro status	is AWAKE*		
		DTC Pass	High Voltage DC (HV) Micro Reference Voltage	< 1.407 Volts			500 ms	
Battery Charger Control Module Ignition Switch Run/Start Position Circuit Low(PROG)	P1EF6	DTC Fail Sets if Run/Crank hardwire input state is low when Run/Crank Terminal Status serial data signal indicates hardwire state should be high	Run/Crank hardwire input state	<= 2.0 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	1200 ms in a 1500 ms window	One Trip, Type A
			VICM Run/Crank Terminal Status signal (CC)	= HIGH	Loss of Comm on HVEM	U185C not set		
		DTC Pass	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	>= 5.5 Volts = HIGH/LOW			1500 ms	
Battery Charger Control Module Ignition Switch Run/Start Position Circuit High(PROG)	P1EF7	DTC Fail Sets if Run/Crank hardwire input state is high when Run/Crank Terminal Status serial data signal indicates hardwire state should be low	Run/Crank hardwire input state	>= 5.5 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	1200 ms in a 1500 ms window	One Trip, Type A
			VICM Run/Crank Terminal Status signal (CC)	= LOW	Loss of Comm on HVEM	U185C not set		
		DTC Pass	Run/Crank hardwire input state VICM Run/Crank Terminal Status signal (CC)	<= 2.0 Volts = HIGH/LOW			1500 ms	
Battery Charger Control Module High Voltage Energy Management Communication Bus Enable Circuit Low (HVCEN)	P1EF8	DTC Fail Sets if HVEM Comm Enable hardwire input state is low when HVEM Comm Enable Terminal Status serial data signal indicates hardwire state should be high	HVEM Comm Enable hardwire input state	<= 2.0 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	1200 ms in a 1500 ms window	One Trip, Type A
			VICM HVEM Comm Enable Terminal Status signal (HS)	= HIGH	Loss of Comm VICM on HS	U2612 not set		
		DTC Pass	HVEM Comm Enable hardwire input state VICM HVEM Comm Enable Terminal Status signal (HS)	>= 5.5 Volts = HIGH/LOW			1500 ms	
On Board Charger Control Module Lost Communication with Hybrid Powertrain Control Module 2 on Bus H	U185C	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the VICM on the HVEM Expansion Bus.	Supervised signal timeout detected: Supervised signal	HVChrgrBsOutCrntCmd Message ID - $304 Message - High_V_Control_Energy_Mgmt CC	Low Voltage DC (Secondary) micro status	is AWAKE*	250 ms	One Trip, Type A
					Charger CAN Bus State	is ACTIVE		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
On Board Charger Control Module Lost Communication with Engine Control Module	U1861	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the ECM on the HSGMLAN bus.	Supervised signal timeout detected: Supervised signal	 LegDiagStndCndMet Message ID - $4C1 Message - PPEI_Engine_General_Status 4	Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE* is ACTIVE	1250 ms	Two Trips, Type B
		DTC Pass	Supervised signal received within timeout window				< 1250 ms	
Battery Charger Control Module Lost Communication with Hybrid Powertrain Control Module 2	U2612	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the VICM on the HSGMLAN bus.	Supervised signal timeout detected: Supervised signal	 VICMHVEnMgCmEnTrS Message ID - $236 Message - VICM Status HS	Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE* is ACTIVE	250 ms	Two Trips, Type B
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
Battery Charger Control Module Lost Communication with Hybrid Powertrain Control Module 1	U2609	DTC Fail Sets if signal supervision timeout detected while the OBCM is in communication with the HCP on the HSGMLAN bus.	Supervised signal timeout detected: Supervised signal	 PrplsnSysAtv Message ID - $1DF Message - PTEI_Propulsion_General_Status 1	Low Voltage DC (Secondary) micro status HSGMLAN bus State	is AWAKE* is ACTIVE	250 ms	Two Trips, Type B
		DTC Pass	Supervised signal received within timeout window				< 250 ms	
On Board Charger Control Module Communications Bus H Off	U1807	DTC Fail Sets if HVEM Expansion Bus off error is detected	HVEM Expansion Bus off error	= TRUE	Low Voltage DC (Secondary) micro status	is AWAKE*	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	HVEM Expansion Bus off error	= FALSE			40ms	
Battery Charger Control Module System Voltage Low (LV System Voltage exceeds operating Range)	P1EFC	Subtest 1 of 2: LV Voltage System Check DTC Fail Sets if Low Voltage Output voltage is less tha a voltage threshold	Low Voltage voltage	< 10 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	5 sec in a 5 sec window	Special Type C
		DTC Pass	Low Voltage voltage	is not < 10 Volts			5 sec in a 5 sec window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Subtest 2 of 2: LV Voltage System Check DTC Fail Sets if Low Voltage Output voltage is less than a voltage threshold - two test cases: 1) LV output is OFF, but is requested to turn ON 2) LV output is ON	Case 1: Low Voltage voltage Case 2: Low Voltage voltage	< 9 Volts < 8 Volts	LV Output Command= LV Request= LV Output Command= Low Voltage DC (Secondary) micro status	OFF ON ON is AWAKE*	400 ms in a 500 ms window 2 sec in a 2 sec window	
		DTC Pass	Case 1: Low Voltage voltage Case 2: Low Voltage voltage	>= 9 Volts is not < 8 Volts			500 ms 2 sec in a 2 sec window	
Battery Charger Control Module Random Access Memory (RAM) Error	P16C2	DTC Fail Each RAM location is written with a predefined value and verified. Sets when verfication on any RAM location fails.	Secondary RAM test result HV or Primary micor SPI Verify Command	= FAIL OR Negative Acknowledgement	Low Voltage DC (Secondary) micro status High Voltage DC (HV) micro status High Voltage AC (Primary) micro status	is AWAKE* is AWAKE* is AWAKE*	10 ms in a 10 ms window, only execute after power up reset	One Trip, Type A
		DTC Pass	Secondary RAM test result HV or Primary micor SPI Verify Command	= PASS AND Positive Acknowledgment			10ms	
Battery Charger Control Module Read Only Memory (ROM) Error	P16C1	DTC Fail Sets When checksum verification on application/calibration area fails	Secondary ROM test result HV or Primary micor SPI Verify Command	= FAIL OR Negative Acknowledgement	Low Voltage DC (Secondary) micro status	is AWAKE*	20 ms in a 20 ms window, only execute after power up reset	One Trip, Type A
		DTC Pass	Secondary ROM test result HV or Primary micor SPI Verify Command	= PASS AND Positive Acknowledgment			20ms	
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - Primary)	P16C4	Sub-Test 1 of 5 SPI Primary Mico Message Checksum Error DTC Fail Sets when any Primary SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCntr[AC Meas Msg], OR MessageChkSumErrCntr[OBD Msg], OR MessageChkSumErrCntr[Primary Status], OR MessageChkSumErrCntr[Temperature Msg]	>= 2 >= 2 >= 2 >= 2	Low Voltage DC (Secondary) micro status	is AWAKE*	44 ms in a 44 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					SPI mode	= NORMAL		
		DTC Pass	MessageChkSumErrCntr[AC Meas Msg], AND MessageChkSumErrCntr[OBD Msg], AND MessageChkSumErrCntr[Primary Status], AND MessageChkSumErrCntr[Temperature Msg]	< 2 < 2 < 2 < 2			22 ms (message trans rate)	
		Sub-Test 2 of 5 SPI Primary Micro Message Timeout Error DTC Fail Sets when any Primary SPI Message is not received within an expected time window	MessageTimer[AC Meas Msg], OR MessageTimer[OBD Msg], OR MessageTimer[Primary Status], OR MessageTimer[Temperature Msg]	>= 65 ms >= 65 ms >= 65 ms >= 65 ms	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	65 ms	
		DTC Pass	MessageTimer[AC Meas Msg], AND MessageTimer[OBD Msg], AND MessageTimer[Primary Status], AND MessageTimer[Temperature Msg]	< 65 ms < 65 ms < 65 ms < 65 ms			< 65 ms	
		Sub-Test 3 of 5 SPI Primary Micro Node Timeout Error DTC Fail Sets when Primary SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL OR SYNCH	3 - 5 ms	
		DTC Pass	SpiResynchErrorCounter[PRI]	< 1			< 3 - 5 ms (depends on message received)	
		Sub-Test 4 of 5 SPI Primary Micro Channel Rationality Error DTC Fail Sets when Primary Channel SPI Mode takes longer than a timer threshold to reach Normal Mode	SpiChannelRationalityTimerInst[PRI]	>= 1000 ms	Low Voltage DC (Secondary) micro status SPI mode HV channel SPI mode Primary channel	is AWAKE* = NORMAL = SYNCH OR VERIFY	1000 ms	
		DTC Pass	SpiChannelRationalityTimerInst[PRI]	< 1000 ms			< 1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 5 of 5 SPI Primary Micro Driver Hardware Error DTC Fail Sets when Primary SPI hardware driver errors received	spi_ResultStatus	Failed	Low Voltage DC (Secondary) micro status	is AWAKE*	1 ms	
		DTC Pass	spi_ResultStatus	Passed			1 ms	
Battery Charger Control Module SPI Bus 1 (SPI Communication Fault - HV DC)	P16C5	Sub-Test 1 of 5 SPI HV DC Micro Message Checksum Error DTC Fail Sets when any HV DC SPI checksum error count for a SPI Message is greater than or equal to the counter threshold	MessageChkSumErrCntr[HV DC Meas Msg]	>= 2	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	44 ms in a 44 ms window	One Trip, Type A
		DTC Pass	MessageChkSumErrCntr[HV DC Meas Msg]	< 2			22 ms (message trans rate)	
		Sub-Test 2 of 5 SPI HV DC Micro Message Timeout Error DTC Fail Sets when any HV DC SPI Message is not received within an expected time window	MessageTimer[HV DC Meas]	>= 65 ms	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL	65 ms	
		DTC Pass	MessageTimer[HV DC Meas]	< 65 ms			< 65 ms	
		Sub-Test 3 of 5 SPI HV DC Micro Node Timeout Error DTC Fail Sets when HV DC SPI Resynch Error Counter is greater than or equal to the counter threshold	SpiResynchErrorCounter[PRI]	>= 1	Low Voltage DC (Secondary) micro status SPI mode	is AWAKE* = NORMAL OR SYNCH	3 - 5 ms	
		DTC Pass	SpiResynchErrorCounter[PRI]	< 1			< 3 - 5 ms (depends on message received)	
		Sub-Test 4 of 5 SPI HV DC Micro Channel Rationality Error DTC Fail Sets when HV DC Channel SPI Mode takes longer than a timer threshold to reach Normal Mode	SpiChannelRationalityTimerInst[PRI]	>= 1000 ms	Low Voltage DC (Secondary) micro status	is AWAKE*	1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					SPI mode Primary channel SPI mode HV channel	= NORMAL = SYNCH OR VERIFY		
		DTC Pass	SpiChannelRationalityTimerInst[PRI]	< 1000 ms			< 1000 ms	
		Sub-Test 5 of 5 SPI HV DC Micro Driver Hardware Error DTC Fail Sets when HV DC SPI hardware driver errors received	spi_ResultStatus	Failed	Low Voltage DC (Secondary) micro status	is AWAKE*	1 ms	
		DTC Pass	spi_ResultStatus	Passed			1 ms	
Battery Charger Hybrid/EV Battery Output Power Performance (HV Output Power Rationality)	P0D5C	DTC Fail Sets when the measured High Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	High Voltage Power (HV Voltage x HV Current)	> (AC Power x 1.9995) + 120 Watts	HV Current Sensor faults HV Voltage Sensor faults High Voltage DC (HV) Micro Ref Voltage faults AC Input Power Status	P0D53 or P0D54 not set P0D4E or P0D4F not set P1EEB or P1EEC not set not FAILED	1.6 seconds in a 2 seconds window	One Trip, Type A
		DTC Pass	High Voltage Power (HV Voltage x HV Current)	<= (AC Power x 1.9995) + 120 Watts			2 seconds	
Battery Charger 14 Volt Output Power Performance (LV Output Power Rationality)	P0D5B	DTC Fail Sets when the measured Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	Low Voltage Power (LV Voltage x LV Current)	> (AC Power x 1.9995) + 125 Watts	LV Current Sensor faults LV Voltage Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults AC Input Power Status	P0D49 or P0D4A not set P0D44 or P0D45 not set P1EE9 or P1EEA not set not FAILED	1.6 seconds in a 2 seconds window	One Trip, Type A
		DTC Pass	Low Voltage Power (LV Voltage x LV Current)	<= (AC Power x 1.9995) + 125 Watts			2 seconds	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Total Output Power Performance(Total Output Power Rationality)	P1ECE	DTC Fail Sets when the sum of the measured High Voltage output power and Low Voltage output power exceeds the theoretical power available (calculated as charger real AC input power X charger efficiency + offset)	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	> (AC Power x 1.9995) + 130 Watts	HV Current Sensor faults	P0D53 or P0D54 not set	1.6 seconds in a 2 seconds window	One Trip, Type A
					HV Voltage Sensor faults	P0D4E or P0D4F not set		
					LV Current Sensor faults	P0D49 or P0D4A not set		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
					AC Input Power Status	not FAILED		
		DTC Pass	High Voltage Power (HV Voltage x HV Current) + Low Voltage Power (LV Voltage x LV Current)	<= (AC Power x 1.9995) + 130 Watts	AC Input Power Status	is Updated via SPI bus	2 seconds	
Battery Charger 14 Volt Output Voltage Comparator Circuit(12Volt Alarm Rationality)	P1EED	DTC Fail Monitors for an irrational combination of states consisting of: LV Converter Over/Under voltage input = HIGH, with a non-zero LV Current output.	12V Alarm hardware detection (triggered) AND Low Voltage Current	= TRUE > 1.0 Amps	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	One Trip, Type A
					LV Current Sensor faults	P0D49 or P0D4A not set		
					LV ON Command from Primary	= ON		
					LV Hardware Shutdown (12V Alarm)	= Shutdown		
		DTC Pass	12V Alarm hardware detection (triggered) OR Low Voltage Current	= FALSE <= 1.0 Amps			2 seconds	
Battery Charger Input Voltage Conditioner Temperature Sensor Performance (PFC Temperature Sensor-Rationality)	P1EE1	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(PFC temperature current cycle - PFC temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					PFC Temperature Sensor faults Primary MCU normal mode run time	P1EDF or P1EE0 not set > 1 second		
		DTC Pass	ABS(PFC temperature current cycle - PFC temperature previous cycle)	< 2℃			800ms	
		DTC Pass	PFC temperature max - PFC temperature min	>= 0.03125℃			40ms	
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold	Pfc_Failures==3 ||(Pfc_Failures==2&&(Min_failures=2&& Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 -Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 -Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time.	is AWAKE* P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set P1ED6 or P1ED7 not set >20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Secondary micro has to run	1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger High Voltage Converter "A" Temparature Sensor Performance(1kW HV Converter Temperature Sensor-Rationality)	P1ECD	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status HV 1kW Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1ECB or P1ECC not set > 1 second	640ms in a 800ms window	One Trip, Type A
		DTC Pass	ABS(HV 1kW temperature current cycle - HV 1kW temperature previous cycle)	< 2℃			800ms	
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold	HV1_Failures==3 ||(HV1_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 -Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 -Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults	is AWAKE* P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set P1ED6 or P1ED7 not set	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time. Secondary micro has to run	>20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds 1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger High Voltage Converter "B" Temparature Sensor Performance (2kW HV Converter Temperature Sensor-Rationality)	P1ED2	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(HV 2kW temperature current cycle - HV 2kW temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status HV 2kW Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1ED0 or P1ED1 not set > 1 second	640ms in a 800ms window	One Trip, Type A
		DTC Pass	ABS(HV 2kW temperature current cycle - HV 2kW temperature previous cycle)	< 2℃			800ms	
		Sub-Test 2 of 2 Zero Offset Check DTC Fail Charger contains multiple temperature sensors. After a sufficient charger off time to allow sensor normalization, temperature sensor values are compared at start up to detect sensor reading offset errors. All sensors should report within a deadband. Diagnostic fails	HV1_Failures==3 ||(HV1_Failures==2&&(Min_failures=2&&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 -Case), Hv1_Failures++++,Case_Failures++;	 >=20℃ >=20℃	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		if any one or more of below test conditions is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure one other sensor has only one failure. Sensor failure means the absolute difference of sensors is great or equal the threshold	HV1_Failures++++,Case_Failures++; Temperature ABS(HV2 -Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃	PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time. Secondary micro has to run	P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set P1ED6 or P1ED7 not set >20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds 1 second		
		DTC Pass	Compliment of fail conditions					
Battery Charger Cold Plate Temperature Sensor Performance (Cold Plate Temperature Sensor-Rationality)	P1ED8	Sub-Test 1 of 2 Exessively Large Rate of Change (Noisy Sensor) DTC Fail Sets when the absolute rate of change of measured temperature is greater than or equal to a temperature change rate threshold - temperature changes are normally relatively slow	ABS(Cold Plate temperature current cycle - Cold Plate temperature previous cycle)	>= 2℃	Low Voltage DC (Secondary) micro status Cold Plate Temperature Sensor faults Primary MCU normal mode run time	is AWAKE* P1ED6 or P1ED7 not set > 1 second	640ms in a 800ms window	One Trip, Type A
		DTC Pass	ABS(Cold Plate temperature current cycle - Cold Plate temperature previous cycle)	< 2℃			800ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Sub-Test 2 of 2 Case Thermal Offset Rationality DTC Fail sets when one of below conditons is true. 1 Sensor has 3 failures 2 All sensors have 2 failures 3 Sensor has 2 failures and at least one other sensor has only one failure Sensor failure means the absolute difference of sensors is great or equal the threshold	Case_Failures==3 ||(Case_Failures==2&&(Min_failures=2 &&Max_failures=2)||Min_failures<=1) the variables are calculate in following way: Temperature ABS(PFC -HV1), Pfc_Failures++,Hv1_Failures++; Temperature ABS(PFC -HV2), Pfc_Failures++,Hv2_Failures++; Temperature ABS(PFC -Case), Pfc_Failures++,Case_Failures++; Temperature ABS(HV1 -HV2), Hv1_Failures++,Hv2_Failures++; Temperature ABS(HV1 -Case), Hv1_Failures++++,Case_Failures++; Temperature ABS(HV2 -Case), Hv2_Failures++++,Case_Failures++; Min_failures=MIN(PFC,HV1,HV2,Case); Max_failures=MAX(PFC,HV1,HV2,Case);	>=20℃ >=20℃ >=20℃ >=20℃ >=20℃ >=20℃	Low Voltage DC (Secondary) micro status PFC Temperature Sensor faults HV 1kW Temperature Sensor faults HV 2kW Temperature Sensor faults Cold Plate Temperature Sensor faults Charger Off Time Charger Off Time V Charger Off Time M Charger Off Time Charger Off Time V Charger Off Time M The test only run as long as the module has not yet charged or precharged. After (pre)charge has been started the algorithm is allowed to run a a delay time. Secondary micro has to run	is AWAKE* P1EDF or P1EE0 not set P1ECB or P1ECC not set P1ED0 or P1ED1 not set P1ED6 or P1ED7 not set >20 minutes ==use Data ==Valid ==Valid is true is true 10 seconds 1 second	640ms in a 800ms window	
		DTC Pass	Compliment of fail conditions					
Battery Charger 14 Volt Output Voltage Sensor Circuit Range/Performance (LV Output Voltage Sensor Rationality)	P0D43	DTC Fail The Low Voltage Output Voltage Sensor is rationalized against other analog measurements of vehicle system voltage. The diagnostic fails if a deviation limit is exceeded:	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) AND ABS(LV Voltage-HVEMB Enable Voltage) Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage)	>= 6 Volts >= 6 Volts >= 6 Volts	Low Voltage DC (Secondary) micro status Low Voltage DC (Secondary) Micro Ref Voltage faults LV Voltage Sensor faults	is AWAKE* P1EE9 or P1EEA not set P0D44 or P0D45 not set	4sec in a 5sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	Case 1: Run/Crank = High ABS(LV Voltage-RunCrank Voltage) OR ABS(LV Voltage-HVEMB Enable Voltage) Case 2: Run/Crank = Low ABS(LV Voltage-HVEMB Enable Voltage)	< 6 Volts < 6 Volts < 6 Volts			5sec	
Battery Charger High Voltage Converter "A" Output Power Regulation Performance(HV 1kW PWM Regulation Test-Functional Check)	P1EF0	Sub-Test 1 of 2 HV 1kW Voltage PWM Regulation Check DTC Fail Sets when one more of the following conditions is true: 1 The difference of the HV Voltage and HV Voltage Command is below or equal to the overshoot Threshold and the absolute difference of HV Voltage and the Voltage command is above voltage Threshold and the absolute difference of HV Current and the Current command is above Current Threshold 2 The difference of the HV Voltage and HV Voltage Command is above the overshoot Threshold and the HV Current is above the Current diff Threshold.	One of following two conditions are true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) AND ABS(HV Current-HV Current Command)) OR 2.HV Voltage - HV Voltage Command AND HV Current	<=25V >25V >1A >25V >2A	Low Voltage DC (Secondary) micro status HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE* =ON =Inactive P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set	1.6sec in a 2sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	One of followings condition is true. 1. HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) OR ABS(HV Current-HV Current Command)) 2. HV Voltage - HV Voltage Command AND HV Current	<=25V <=25V <=1A >25V <=2A			2sec	
		Sub-Test 2 of 2 HV 1kW Current PWM Regulation Check DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE* <= 25V =ON =Inactive P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set	1.6sec in a 2sec window	
		DTC Pass	HV Current - HV Current Command	<=1A			2sec	
Battery Charger High Voltage Converter "B" Output Power Regulation Performance (HV 2kW PWM Regulation Test-Functional Check)	P1EF1	Sub-Test 1 of 2 HV 2KW Voltage PWM Regulation Functional DTC Fail Sets when one more of the following conditions is true: 1 The difference of the HV Voltage and HV Voltage Command is below or equal the overshoot Threshold and the absolute difference of HV Voltage and the Voltage command is above voltage Threshold and the absolute difference of HV Current and the Current command is above Current Threshold 2 The difference of the HV Voltage and HV Voltage Command is above the	One of following two conditions are true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) AND ABS(HV Current-HV Current Command)) OR 2.HV Voltage - HV Voltage Command AND HV Current	<=25V >25V >1A >25V >2A	Low Voltage DC (Secondary) micro status HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults	is AWAKE* ==ON = Active P0D4E or P0D4F not set	1.6sec in a 2sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Command is above the overshoot Threshold and the HV Current is above the Current diff Threshold.			HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	P0D53 or P0D54 not set P1EEB or P1EEC not set		
		DTC Pass	One of followings condition is true: 1.HV Voltage - HV Voltage Command AND (ABS(HV Voltage-HV Voltage Command) OR ABS(HV Current-HV Current Command)) 2.HV Voltage - HV Voltage Command AND HV Current	<=25V <=25V <=1A >25V <=2A			2sec	
		Sub-Test 2 of 2 HV 2KW Current PWM Regulation Functional DTC Fail Sets when the difference of the HV Current and HV Current Command is above a threshold.	HV Current - HV Current Command	>1A	Low Voltage DC (Secondary) micro status HV Voltage - HV Command from HV DC HV DC HV ON Command HighlineTap mode HV Voltage Sensor faults HV Current Sensor faults High Voltage DC (HV) Micro Ref Voltage faults	is AWAKE* <= 25V =ON =Active P0D4E or P0D4F not set P0D53 or P0D54 not set P1EEB or P1EEC not set	1.6sec in a 2sec window	
		DTC Pass	HV Current - HV Current Command	<=1A			2sec	
Battery Charger 14V Converter Output Power Regulation Performance (LV PWM Regulation Test-Functional Check)	P1EEF	Sub-Test 1 of 2 LV Voltage PWM Regulation Functional DTC Fail Sets when one more of the following conditions is true: 1 The difference of the LV Voltage and LV_Voltage_SetPointFromCmd is below or equal the overshoot Threshold and the absolute difference of LV Voltage and the LV_Voltage_SetPointFromCmd is above voltage	ABS(LV Voltage - LV Voltage Command) AND ABS(LV Current-LV Current Command) OR 2.LV Current	>2V >3A > 1A	Low Voltage DC (Secondary) micro status	is AWAKE*	50.4 sec in a 63 sec window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		Threshold and the absolute difference of LV Current and the LV_Current_SetPointFromCmd is above Current Threshold 2 The difference of the LV Voltage and LV Voltage_SetPointFromCmd Command is above the overshoot Threshold and the LV Current is above the Current diff Threshold.			LV Output LV Output (SPI Signal) (LV Voltage - LV Voltage Command) LV Voltage Sensor faults LV Current Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults	=ON = UPDATED <= 1.5 Volts P0D44 or P0D45 not set P0D49 or P0D4A not set P1EE9 or P1EEA not set		
		DTC Pass	ABS(LV Voltage - LV Voltage Command) OR ABS(LV Current-LV Current Command) OR 2.LV Current	<=2V <=3A <=1A			63 sec	
		Sub-Test 2 of 2 LV Current PWM Regulation Functional DTC Fail Sets when the difference of the LV Current and LV_Current_SetPointFromCmd is above a threshold.	LV Current - LV Current Command	> 3A	Low Voltage DC (Secondary) micro status HV DC LV ON Command LV Voltage Sensor faults LV Current Sensor faults Low Voltage DC (Secondary) Micro Ref Voltage faults LV Voltage - LV Voltage Command	is AWAKE* = ON P0D44 or P0D45 not set P0D49 or P0D4A not set P1EE9 or P1EEA not set <= 1.5V	50.4 sec in a 63 sec window	
		DTC Pass	LV Current - LV Current Command	<= 3A			63 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Power Efficiency (Power Efficiency Functional)	P1EFD	DTC Fail Sets when the absolute difference of the AC Input power and the sum of the HV Output Power and the LV Output Power is above or equal to a threshold. Indicative of a sensor rationality error.	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	>= 3300 Watts	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	Two Trips, Type B
					LV Current Sensor faults	P0D49 or P0D4A not set		
					LV Voltage Sensor faults	P0D44 or P0D45 not set		
					HV Current Sensor faults	P0D53 or P0D54 not set		
					HV Voltage Sensor faults	P0D4E or P0D4F not set		
					High Voltage DC (HV) Micro Ref Voltage faults	P1EEB or P1EEC not set		
					Low Voltage DC (Secondary) Micro Ref Voltage faults	P1EE9 or P1EEA not set		
					AC Input Power Status	not FAILED		
		DTC Pass	ABS(AC Power - (HV Voltage*HV Current + LV Voltage*LV Current))	< 3300 Watts			2 seconds	
Battery Charger Hybrid/EV System Discharge Time Too Long (Discharger Time Functional)	P0D5E	DTC Fail Sets if the High Voltage Output voltage is greater than or equal to a voltage threshold after an allowed discharge time period - discharge was unsuccessful.	High Voltage Output voltage Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	>= 60 Volts	Low Voltage DC (Secondary) micro status	is AWAKE*	1.5 sec in a 1.5 sec window	One Trip, Type A
					HV Voltage Validity	= VALID		
		DTC Pass	High Voltage Output voltage Case 1: 1.5 seconds after receiving the High Voltage Charger Active Discharge Command OR Case 2: 1.5 seconds after a 5.25 second shut down delay timer has elapsed following confirmation of OBCM Loss of Comm With VICM (DTC U185C confirmed) - total elapsed time 6.75 seconds	< 60 Volts			< 1.5 sec	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Reverse Polarity Protection Circuit Performance (Reverse Battery Functional)	P1EFE	DTC Fail Sets when the Low Voltage Switch Enable signal is not equal to the LV Switch Enable Check (Relay status input should reflect relay control output state).	Low Voltage Switch Enable	≠ Low Voltage Switch Enable Check	Low Voltage DC (Secondary) micro status	is AWAKE*	1.6sec in a 2sec window	Two Trips, Type B
		DTC Pass	Low Voltage Switch Enable	= Low Voltage Switch Enable Check			2sec	
Battery Charger Control Module Long Term Memory (KAM) Error (EEPROM Integrity)	P16C3	DTC Fail Sets when the presence of predefined values at predefined locations in EEPROM cannot be confirmed	eepromPage00DiagDataByte OR eepromPage0ADiagDataByte	≠A5 (hex) ≠A5 (hex)	Low Voltage DC (Secondary) micro status	is AWAKE*	40 ms in a 40 ms window	One Trip, Type A
		DTC Pass	eepromPage00DiagDataByte AND eepromPage0ADiagDataByte	= A5 (hex) = A5 (hex)			40 ms	
Battery Charger Input Current Sensor Exceeded Learning Limit (AC Current Sensor Integrity)	P1F14	DTC Fail Sets if the AC Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	AC Current Sensor Cal Status	= FALSE	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A
		DTC Pass	AC Current Sensor Cal Status	≠ FALSE			800 ms	
Battery Charger Hybrid/EV Battery Output Current Sensor Exceeded Learning Limit (HV Current Sensor Integrity)	P1F16	DTC Fail Sets if the High Voltage Output Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	High Voltage Current Sensor Cal Complete Flag (HV_Current_Cal_Hist_Status)	= 0	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A
		DTC Pass	High Voltage Current Sensor Cal Complete Flag (HV_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger 14 Volt Output Current Sensor Exceeded Learning Limit (LV Current Sensor Integrity)	P1F15	DTC Fail Sets if the Low Voltage Output Current Sensor calibration process has not been completed or if the calibration complete status flag in EEPROM has been erased or corrupted.	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	= 0	Low Voltage DC (Secondary) micro status	is AWAKE*	640ms in a 800ms window	One Trip, Type A
		DTC Pass	Low Voltage Current Sensor Cal Complete Flag (LV_Current_Cal_Hist_Status)	≠ 0			800 ms	
Battery Charger Control Module Wake-Up Circuit Performance (ACC)	P16C6	DTC Fail Sets when the Accessory Wake Up is detected as low when expected to be high.	Accessory Wake Up High State Timer (accOnTimer)	<= 100ms	Low Voltage DC (Secondary) micro status	is AWAKE*	<= 100ms	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
					Prop System Active Status HSGMLAN bus State HSGMLAN Comm Faults HCP_HS_LossOfComm	is Active is ACTIVE U2609 not set is False		
		DTC Pass	Accessory Wake Up High State Timer (accOnTimer)	> 100ms			> 100ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Range/Performance (PBIAS Voltage-Functional)	P1F03	DTC Fail The test uses two (2) sets of calibration values, one for determining if the PBIAS voltage is in range to turn the charger outputs on, and the other when the charger outputs are on to determine if the PBIAS voltage is sufficient to keep the outputs on.	PBIAS Voltage (BIASRAW) If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	< 10.5 Volts OR > 13.5 Volts < 10.0 Volts OR > 15.0 Volts	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	Low voltage fail time = 253ms High voltage fail time = 10.25sec (250ms fault maturity time after initial fault detection at 3ms or 10sec)	One Trip, Type A
		DTC Pass	PBIAS Voltage (BIASRAW) If the charger outputs (HV & LV) are off, PBIAS voltage must be: Else If the charger outputs are on (either HV or LV), PBIAS must be:	>= 10.5 Volts OR <= 13.5 Volts >= 10.0 Volts OR <= 15.0 Volts			250 ms	
Battery Charger Input Voltage Conditioner Temperature Too High (PFC Thermal System Fault)	P1EF5	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the PFC Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	PFC Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the PFC Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	PFC Temperature	<= 90C			1 ms	
Battery Charger High Voltage Converter "A" Temperature Too High (HV 1kW Converter Thermal System Fault)	P1EF3	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the 1kW Converter Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	1kW High Voltage Converter Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 1kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	1kW High Voltage Converter Temperature	<= 90C			1 ms	
Battery Charger High Voltage Converter "B" Temperature Too High (HV 2kW Converter Thermal System Fault)	P1EF4	DTC Fail Diagnostic uses a hysteresis pair. FAIL sets when the 2kW Converter Thermister reported equivalent temperature is greater than or equal to an upper temperature threshold value	2kW High Voltage Converter Temperature	>= 100C	High Voltage AC (Primary) micro status	is AWAKE* (AC connected or Bulk residual power)	1ms in a 1ms window	One Trip, Type A
		DTC Pass Diagnostic uses a hysteresis pair. PASS sets when the 2kW Converter Thermister reported equivalent temperature is less than or equal to a lower temperature threshold value	2kW High Voltage Converter Temperature	<= 90C			1 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit High (BLKS1)	P1EDA	DTC Fail Sets when the reported Bulk Voltage1 is greater than a voltage threshold	Bulk Voltage1	> 463 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage1	<= 463 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "A" Circuit Low (BLKS1)	P1ED9	DTC Fail Sets when the reported Bulk Voltage1 is less than a voltage threshold	Bulk Voltage1	< 25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage1	>= 25 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit High (BLKS2)	P1EDD	DTC Fail Sets when the reported Bulk Voltage2 is greater than a voltage threshold	Bulk Voltage2	> 463 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	<= 463 Volts			500 ms	
Battery Charger Converter Input Voltage Sensor "B" Circuit Low (BLKS2)	P1EDC	DTC Fail Sets when the reported Bulk Voltage2 is less than a voltage threshold	Bulk Voltage2	< 25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	Bulk Voltage2	>= 25 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit High (PBIAS)	P1F02	DTC Fail Sets when the reported PBIAS Voltage is greater than a voltage threshold	PBIAS Voltage	> 16 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PBIAS Voltage	<= 16 Volts			500 ms	
Battery Charger Control Module Supply Voltage Sensor Circuit Low (PBIAS)	P1F01	DTC Fail Sets when the reported PBIAS Voltage is less than a voltage threshold	PBIAS Voltage	< 6 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
		DTC Pass	PBIAS Voltage	>= 6 Volts			500 ms	
Battery Charger Input Current Sensor Circuit High (IACS)	P0D3B	DTC Fail Sets when the reported AC Current is greater than a current threshold	AC Current	> 24.78 Amps	AC Voltage	> 80 Volts	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	<= 24.78 Amps			200 ms	
Battery Charger Input Current Sensor Circuit Low (IACS)	P0D3A	DTC Fail Sets when the reported AC Current is less than a current threshold	AC Current	< 1.65 Amps	AC Voltage	> 80 Volts	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Current	>= 1.65 Amps			200 ms	
Battery Charger High Voltage Converter "A" Temparature Sensor Circuit High (THMOD)	P1ECC	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is greater than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	<= 3.28 Volts			500 ms	
Battery Charger High Voltage Converter "A" Temparature Sensor Circuit Low (THMOD)	P1ECB	DTC Fail Sets when the 1kW HV Converter Temperature sensor voltage (THMOD) is less than a voltage threshold	1kW HV Converter Temperature Sensor Voltage (THMOD)	< 0.03 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	1kW HV Converter Temperature Sensor Voltage (THMOD)	>= 0.03 Volts			500 ms	
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit High (THPFC)	P1EE0	DTC Fail Sets when the PFC Temperature sensor voltage is greater than a voltage threshold	PFC Temperature Sensor Voltage	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	<= 3.28 Volts			500 ms	
Battery Charger Input Voltage Conditioner Temperature Sensor Circuit Low (THPFC)	P1EDF	DTC Fail Sets when the PFC Temperature sensor voltage is less than a voltage threshold	PFC Temperature Sensor Voltage	< 0.03 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	PFC Temperature Sensor Voltage	>= 0.03 Volts			500 ms	
Battery Charger Control Module Reference Voltage "A" Circuit High (HV DC Ref Voltage)	P1EE8	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is greater than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	> 1.25 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	<= 1.25 Volts			500 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Control Module Reference Voltage "A" Circuit Low (HV DC Ref Voltage)	P1EE7	DTC Fail Sets when the High Voltage AC (HV DC) Micro reference voltage is less than a voltage threshold	High Voltage AC (HV DC) Micro Reference Voltage	< 1.00 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	High Voltage AC (HV DC) Micro Reference Voltage	>= 1.00 Volts			500 ms	
Battery Charger Input Voltage Sensor Circuit High (VACS)	P0D40	DTC Fail Sets when the reported AC Voltage is greater than a voltage threshold	AC Peak Voltage	> 422 Volts	AC Present Bulk Voltage Dropping	is TRUE is FALSE	160 ms in a 200 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	<= 422 Volts			200 ms	
Battery Charger Input Voltage Sensor Circuit Low (VACS)	P0D3F	DTC Fail Sets when the reported AC Voltage is less than a voltage threshold	AC Peak Voltage	< 90 Volts	AC Present Bulk Voltage Dropping	is TRUE is FALSE	5500 ms in a 6875 ms window	One Trip, Type A
		DTC Pass	AC Peak Voltage	>= 90 Volts			6875 ms	
Battery Charger High Voltage Converter "B" Temparature Sensor Circuit High (THMOD2)	P1ED1	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is greater than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	> 3.28 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	<= 3.28 Volts			500 ms	
Battery Charger High Voltage Converter "B" Temparature Sensor Circuit Low (THMOD2)	P1ED0	DTC Fail Sets when the 2kW HV Converter Temperature sensor voltage (THMOD2) is less than a voltage threshold	2kW HV Converter Temperature Sensor Voltage (THMOD2)	< 0.03 Volts	AC Voltage	> 80 Volts	400 ms in a 500 ms window	One Trip, Type A
		DTC Pass	2kW HV Converter Temperature Sensor Voltage (THMOD2)	>= 0.03 Volts			500 ms	
Battery Charger High Voltage Converter "A" Input Current Sensor Circuit High (CSEN1)	P1EE3	DTC Fail CSEN1 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN1 Input Voltage	> 1.5 Volts	AC Voltage HV Output	> 80 Volts is OFF	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN1 Input Voltage	<= 1.5 Volts			1000 ms	
Battery Charger High Voltage Converter "B" Input Current Sensor Circuit High (CSEN2)	P1EE5	DTC Fail CSEN2 Input is greater than a voltage threshold, (the micro performs this test internally)	CSEN2 Input Voltage	> 1.5 Volts	AC Voltage HV Output	> 80 Volts is OFF	950 ms in a 1000 ms window	One Trip, Type A
		DTC Pass	CSEN2 Input Voltage	<= 1.5 Volts			1000 ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Input Voltage Sensor Circuit Range/Performance (AC Input Voltage Sensor-Rationality)	P0D3E	DTC Fail AC Peak Voltage is compared to two equivalent voltage measurements (Bulk1 and Bulk2). Fail is set if the deviation betweeen AC Peak Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	> 59 Volts > 59 Volts	AC Present Bulk Voltage Dropping PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	is TRUE is FALSE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	1760ms in a 1920ms window	One Trip, Type A
		DTC Pass	ABS(AC Peak Voltage - Bulk1 Voltage) AND ABS(AC Peak Voltage - Bulk2 Voltage)	<= 59 Volts <= 59 Volts			1920ms	
Battery Charger Input Current Sensor Circuit Range/Performance (AC Input Current Sensor-Rationality)	P0D39	DTC Fail Sets when the AC Current zero offset value is greater than or equal to a current threshold.	AC Current	>= 1.4 Amps	AC Voltage AC Voltage Sensor faults PFC Discharged delay	> 80 Volts P0D3F or P0D40 not set is TRUE (delay expired)	512ms in a 640ms window	One Trip, Type A
		DTC Pass	AC Current	< 1.4 Amps			640ms	
Battery Charger Converter Input Voltage Sensor "A" Performance (Converter Input Bulk Voltage Sensor 1-Rationality)	P1EDB	DTC Fail Bulk1 Voltage is compared to two equivalent voltage measurements (AC Peak Voltage and Bulk2). Fail is set if the deviation betweeen Bulk1 Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(Bulk1 Voltage - AC Peak Voltage) AND ABS(Bulk1 Voltage - Bulk2 Voltage)	> 59 Volts > 10 Volts	AC Voltage Bulk Voltage Dropping PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	> 80 Volts is FALSE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	512ms in a 640ms window	One Trip, Type A
		DTC Pass	ABS(Bulk1 Voltage - AC Peak Voltage) AND ABS(Bulk1 Voltage - Bulk2 Voltage)	<= 59 Volts <= 10 Volts			640ms	

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum
Battery Charger Converter Input Voltage Sensor "B" Performance (Converter Input Bulk Voltage Sensor 2-Rationality)	P1EDE	DTC Fail Bulk2 Voltage is compared to two equivalent voltage measurements (AC Peak Voltage and Bulk1). Fail is set if the deviation betweeen Bulk2 Voltage and each of the two equivalent measurements is greater than voltage deviation thresholds.	ABS(Bulk2 Voltage - AC Peak Voltage) AND ABS(Bulk2 Voltage - Bulk1 Voltage)	> 59 Volts > 10 Volts	AC Voltage Bulk Voltage Dropping PFC Discharged delay Bulk1 Voltage Sensor faults Bulk2 Voltage Sensor faults AC Voltage Sensor faults	> 80 Volts is FALSE is TRUE (delay expired) P1ED9 or P1EDA not set P1EDC or P1EDD not set P0D3F or P0D40 not set	512ms in a 640ms window	One Trip, Type A
		DTC Pass	ABS(Bulk2 Voltage - AC Peak Voltage) AND ABS(Bulk2 Voltage - Bulk1 Voltage)	<= 59 Volts <= 10 Volts			640ms	
Battery Charger Input Power Up Protection Circuit Peformance (AC Inrush RelayFunctionality)	P1EFF	DTC Fail Sets when the AC Relay Check input and the AC relay output are equal.(The AC Relay Check input should be opposite polarity of the AC Relay Output)	AC Relay Output	= AC Relay Check input	AC Voltage	> 80 Volts	2400ms in a 3000ms window	Two Trips, Type B
		DTC Pass	AC Relay Output	≠ AC Relay Check input			3000ms	

KtBSED_U_BUV_CellVoltThresh

Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
Voltage (V)	1.85	1.86	1.96	1.96	1.98	2.05	2.05	2.05	2.05

KtBSED_U_BUV_PackVoltThresh

Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
Voltage (V)	184.1	186.07	195.67	195.67	198.87	205.27	205.27	205.27	205.27

KtBSED_U_BOV_CellVoltThresh

Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
Voltage (V)	4.348	4.354	4.358	4.398	4.398	4.398	4.398	4.398	4.398

KtBSED_U_BOV_PackVoltThresh

Temperature (°C, average battery temp)	-30	-20	-10	0	10	20	30	40	50
Voltage (V)	414.3	414.94	415.26	419.1	419.1	419.1	419.1	419.1	419.1

KtBSED_P_BPD_EndOfLIfePwrThrs

SOC (%) \ Temperature(°C)	-30	-20	-10	0	20	30	50	80	90
10	-2.320	-4.660	-6.240	-10.270	-25.340	-29.390	-27.760	9.000	9.000
20	-2.780	-6.390	-9.780	-18.560	-30.000	-30.880	-28.630	7.550	7.520
30	-3.100	-7.170	-12.240	-21.780	-31.070	-31.800	-29.320	1.715	1.740
40	-3.440	-7.370	-14.070	-22.340	-31.760	-32.510	-29.980	0.827	0.827
60	-3.730	-7.780	-15.150	-23.710	-33.370	-34.020	-31.270	0.694	0.694
80	-3.880	-8.100	-15.850	-24.760	-34.730	-35.370	-32.440	0.388	0.388
90	-3.950	-8.200	-16.100	-25.120	-35.290	-35.950	-32.980	0.320	0.320

P0D22: Engine Off Time Before Vehi **Charger HV Output Current Deviation as a Function of Desired Current**

Curve : Charger HV Output Current Deviation Table (in percent)
Axis: Desired Current in Amps

Axis	0	1	2	3	3.5	4	5
Curve	35	35	35	35	35	30	20

KtESTD_DC_HVHeatIGBTDiag

Energy Storage System Battery Voltage (V)	254	262	271	280	291	303	317	333	351	373	405
Duty Cycle (%)	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33
	84	79	74	69	64	59	54	49	44	39	33

KtESTD_DC_RESSPumpSpdDiagHtr

Energy Storage System Outlet Temperature (°C)	-50	-40	-30	-20	-10	0	10	20	30	40	50	60
Duty Cycle (%)	0	0	0	0	0	0	0	0	0	0	0	0

KtESTD_dT_HtrDgInltTmpMinSlope

Energy Storage System Outlet Temperature (°C)	-50	-40	-30	-20	-10	0	10	20	30	40	50	60
Slope Threshold (deg °C/sec)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

KtESTD_dT_InletSlopeTime

Energy Storage System Outlet Temperature (°C)	-40	-30	-20	-10	0
Time (sec)	10	10	10	10	10

KtESTD_dT_PsvPumpPerfThreshold

Energy Storage System Outlet Temperature (°C)	-40	-30	-20	-10	0
Slope Threshold (deg °C/sec)	0.2	0.2	0.2	0.2	0.2

KtESTD_dT_PumpPerfThreshold

Energy Storage System Outlet Temperature (°C)	-40	-30	-20	-10	0
Slope Threshold	-0.05	-0.05	-0.05	-0.05	-0.05

KtESTD_t_HVHtrDiagIGBTOnTm

Energy Storage System Inlet Temperature (°C)	-40	-20	0	20	40
Time (sec)	40	40	40	40	40
	40	40	40	40	40
	40	40	40	40	40
	40	40	40	40	40
	40	40	40	40	40
	40	40	40	40	40

KtACXR_p_R134AHSRPOffFailThrsh

Temperature (°C, Outside air temperature, emissions related)	-20	-15	-10	-5	4.9	5	10	15	20	25	30	35	40	45	50	55	60
Threshold (°C)	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

KtACXR_p_R134ALSRPOffFailThrsh

Temperature (°C, Outside air temperature, emissions related)	-20	-15	-10	-5	4.9	5	10	15	20	25	30	35	40	45	50	55	60
Threshold (°C)	0	0	0	0	0	0	0	0	150	150	150	150	150	150	150	150	150

KtACXR_p_R134ALSRPOnFailThrsh

Temperature (°C, Outside air temperature, emissions related)	-20	-15	-10	-5	4.9 5	10		15	20	25	30	35	40	45	50	55	60
Threshold (°C)	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100

KtACXR_T_ThreshTableOff

Temperature (°C, Outside air temperature, emissions related)	25	30	35	40	45	50	55	60
Threshold (°C)	4.5	4.5	3.5	3.5	3.5	3	3	3

KtACXR_T_ThreshTableOn

Temperature (°C, Outside air temperature, emissions related)	25	30	35	40	45	50	55	60
Threshold (°C)	5	4.5	4	4	4	4	4	4

KtPCOD_dT_PECL_OBCM_Charge	Temperature (°C, Outside air temperature, emissions related)	-40	-20	-10	0	10	15	25	30	45	50
	Threshold (°C)	40	30	15	15	15	15	15	15	15	15

KtPCOD_dT_PECL_OBCM_Drive	Temperature (°C, Outside air temperature, emissions related)	-40	-20	-10	0	10	15	25	30	45	50
	Threshold (°C)	40	30	25	20	20	20	20	20	20	15

KtOATD_p_HSRP	Temperature (°C, Outside air temperature, emissions related)	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4
	Pressure (Kpa)	31.45000076	37	43.3	49.5	55.97	62.59999847	69	76.6	83.9	91.4	99.2	107.2	115.5	124	133	141.8	151
			-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12
			160.7	170.5	180.6	191	202	213	224	235.7	247	259.9	272	285.4	298.6	312.2	326	340.5
			13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
			355	370.2	385.6	401.4	417.5	434	451	468.4	486.2	504.3	522.9	541.99	561.46	581.38	601.7	622.568
			29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
			643.85	665.6	687.8	710.5	733.7000122	757.4	781.6	806.3	831.6	857.3	883.6	910.5	937.9	965.8	994.3	1023.4
			45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
			1053	1083.3	1114	1145	1177.599976	1210.3	1243.5	1277.5	1312	1347	1383	1419.7	1456.9	1494.9	1533	1572.8

15 OBDG01 FSCM Supporting Tables

P2635 **Fuel Pump Performance Maximum Fuel Flow map (grams / second)**

X-axis= Desired Fuel Pressure (kiloPascals)
Y-axis= Battery voltage (volts)

	200	250	300	350	400	450	500	550	600
4.5	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
6	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
7.5	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
9	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
10.5	8.898438	8.898438	8.898438	8.898438	8.835938	5.414063	2.453125	0	0
12	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.125	5.179688	2.585938
13.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	7.59375
15	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
16.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
18	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
19.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
21	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
22.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
24	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
25.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
27	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438
28.5	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438	8.898438

P2635 **Fuel Injector Flow curve (grams / second)**

X-axis= Fuel Pressure (kiloPascals)

128	148	168	188	208	228	248	268	288	308	328	348	368	388	408	428	448	468
1.014893	1.091064	1.162109	1.229004	1.291992	1.351074	1.407959	1.462891	1.516113	1.565918	1.61499	1.663086	1.709961	1.756104	1.800049	1.843018	1.884033	1.925049

488	508	528	548	568	588	608	628	648	668	688	708	728	748	768
1.965088	2.00293	2.040039	2.075928	2.112061	2.146973	2.180908	2.214111	2.24707	2.281982	2.315918	2.349121	2.38208	2.414063	2.447021

P2635 **Minimum Fuel Injector Pulse Width curve (seconds)**

X-axis= engine speed (revolutions / minute)

0	512	1024	1536	2048	2560	3072	3584	4096	4608	5120	5632	6144	6656	7168	7680	8192
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Cert Doc Bundle

NOTE: If any one of these codes were set for N sensors, these FA get set to TRUE for said N sensor

Battery Current Sensor

P0AC1	P0AC2	P1EBA	P1A07	P0B13	P0B10	P0B11	P1EBB	(U0111 and U185A)

Battery Voltage Sensor

P0ABC	P0ABD	P1A07	P0AF8	P0ABB	(U0111 and U185A)

Bus Voltage Sensor

P1AE8	~~P1AE9~~	P1AEA	P1AEB	P1AEC	~~P1AED~~	P1E20	P1E21	P1E28	U0293

Charger Current Sensor

P0D53	P0D54	U1838

CellVoltageRationalityFA

P0B3D	P1B6D	P1BF4	P1B5C	P1BE3	P1E4F	P1E7E
P0B42	P1B70	P1BF7	P1B5F	P1BE6	P1E50	P1E7F
P0B47	P1B73	P1BFA	P1B62	P1BE9	P1E51	P1E80
P0B4C	P1B76	P1BFD	P1B65	P1BEC	P1E52	P1E81
P0B51	P1B79	P1E02	P1B68	P1BEF	P1E53	P1E82
P0B56	P1B7C	P1E05	P1B6B	P1BF2	P1E54	P1E83
P0B5B	P1B7F	P0B3E	P1B6E	P1BF5	P1E56	P1E84
P0B60	P1B82	P0B43	P1B71	P1BF8	P1E57	P1E86
P0B65	P1B85	P0B48	P1B74	P1BFB	P1E58	P1E87
P0B6A	P1B88	P0B4D	P1B77	P1BFE	P1E59	P1E88
P0B6F	P1B8B	P0B52	P1B7A	P1E03	P1E5A	P1E89
P0B74	P1B8E	P0B57	P1B7D	P1E06	P1E5B	P1E8A
P0B79	P1B91	P0B5C	P1B80	P0B3B	P1E5C	U2603
P0B7E	P1B94	P0B61	P1B83	P0B40	P1E5D	U2604
P0B83	P1B97	P0B66	P1B86	P0B45	P1E5E	U2605
P0B88	P1B9A	P0B6B	P1B89	P0B4A	P1E5F	U2606
P0B8D	P1B9D	P0B70	P1B8C	P0B4F	P1E60	P1EB1
P0B92	P1BA0	P0B75	P1B8F	P0B54	P1E61	P1EB2
P0B97	P1BA3	P0B7A	P1B92	P0B59	P1E62	P1EB3
P0B9C	P1BA6	P0B7F	P1B95	P0B5E	P1E63	P1EB4
P0BA1	P1BA9	P0B84	P1B98	P0B63	P1E64	P1EB5

P0BA6	P1BAC	P0B89	P1B9B	P0B68	P1E65
P0BAB	P1BAF	P0B8E	P1B9E	P0B6D	P1E66
P0BB0	P1BB2	P0B93	P1BA1	P0B77	P1E67
P0BB5	P1BB5	P0B98	P1BA4	P0B7C	P1E68
P0BBA	P1BB8	P0B9D	P1BA7	P0B81	P1E69
P1B17	P1BBB	P0BA2	P1BAA	P0B86	P1E6A
P1B1A	P1BBE	P0BA7	P1BAD	P0B8B	P1E6B
P1B1D	P1BC1	P0BAC	P1BB0	P0B95	P1E6C
P1B20	P1BC4	P0BB1	P1BB3	P0B9A	P1E6E
P1B23	P1BC7	P0BB6	P1BB6	P0B9F	P1E6F
P1B26	P1BCA	P0BBB	P1BB9	P0BA4	P1E70
P1B46	P1BCD	P1B18	P1BBC	P0BA9	P1E71
P1B49	P1BD0	P1B1B	P1BBF	P0BAE	P1E72
P1B4C	P1BD3	P1B1E	P1BC2	P0BB3	P1E73
P1B4F	P1BD6	P1B21	P1BC5	P0BB8	P1E74
P1B52	P1BD9	P1B24	P1BC8	P1B28	P1E75
P1B55	P1BDC	P1B27	P1BCB	P1B29	P1E76
P1B58	P1BDF	P1B47	P1BCE	P1B2A	P1E77
P1B5B	P1BE2	P1B4A	P1BD1	P1B2B	P1E78
P1B5E	P1BE5	P1B4D	P1BD4	P1B2C	P1E79
P1B61	P1BE8	P1B50	P1BD7	P1B2D	P1E7A
P1B64	P1BEB	P1B53	P1BDA	P1E4C	P1E7B
P1B67	P1BEE	P1B56	P1BDD	P1E4D	P1E7C
P1B6A	P1BF1	P1B59	P1BE0	P1E4E	P1E7D

VICMVoltageFA

P0B3D	P1B6D	P1BF4	P1B5C	P1BE3	P1E4F	P1E7E	P1B48	P1BCF
P0B42	P1B70	P1BF7	P1B5F	P1BE6	P1E50	P1E7F	P1B4B	P1BD2
P0B47	P1B73	P1BFA	P1B62	P1BE9	P1E51	P1E80	P1B4E	P1BD5
P0B4C	P1B76	P1BFD	P1B65	P1BEC	P1E52	P1E81	P1B51	P1BD8
P0B51	P1B79	P1E02	P1B68	P1BEF	P1E53	P1E82	P1B54	P1BDB
P0B56	P1B7C	P1E05	P1B6B	P1BF2	P1E54	P1E83	P1B57	P1BDE
P0B5B	P1B7F	P0B3E	P1B6E	P1BF5	P1E56	P1E84	P1B5A	P1BE1
P0B60	P1B82	P0B43	P1B71	P1BF8	P1E57	P1E86	P1B5D	P1BE4
P0B65	P1B85	P0B48	P1B74	P1BFB	P1E58	P1E87	P1B60	P1BE7
P0B6A	P1B88	P0B4D	P1B77	P1BFE	P1E59	P1E88	P1B63	P1BEA
P0B6F	P1B8B	P0B52	P1B7A	P1E03	P1E5A	P1E89	P1B66	P1BED

P0B74	P1B8E	P0B57	P1B7D	P1E06	P1E5B	P1E8A	P1B69	P1BF0
P0B79	P1B91	P0B5C	P1B80	P0B3B	P1E5C	P0B3C	P1B6C	P1BF3
P0B7E	P1B94	P0B61	P1B83	P0B40	P1E5D	P0B41	P1B6F	P1BF6
P0B83	P1B97	P0B66	P1B86	P0B45	P1E5E	P0B46	P1B72	P1BF9
P0B88	P1B9A	P0B6B	P1B89	P0B4A	P1E5F	P0B4B	P1B75	P1BFC
P0B8D	P1B9D	P0B70	P1B8C	P0B4F	P1E60	P0B50	P1B78	P1E01
P0B92	P1BA0	P0B75	P1B8F	P0B54	P1E61	P0B55	P1B7B	P1E04
P0B97	P1BA3	P0B7A	P1B92	P0B59	P1E62	P0B5A	P1B7E	U2603
P0B9C	P1BA6	P0B7F	P1B95	P0B5E	P1E63	P0B5F	P1B81	U2604
P0BA1	P1BA9	P0B84	P1B98	P0B63	P1E64	P0B64	P1B84	U2605
P0BA6	P1BAC	P0B89	P1B9B	P0B68	P1E65	P0B69	P1B87	U2606
P0BAB	P1BAF	P0B8E	P1B9E	P0B6D	P1E66	P0B6E	P1B8A	U2401
P0BB0	P1BB2	P0B93	P1BA1	P0B77	P1E67	P0B73	P1B8D	P1EB1
P0BB5	P1BB5	P0B98	P1BA4	P0B7C	P1E68	P0B78	P1B90	P1EB2
P0BBA	P1BB8	P0B9D	P1BA7	P0B81	P1E69	P0B7D	P1B93	P1EB3
P1B17	P1BBB	P0BA2	P1BAA	P0B86	P1E6A	P0B82	P1B96	P1EB4
P1B1A	P1BBE	P0BA7	P1BAD	P0B8B	P1E6B	P0B87	P1B99	P1EB5
P1B1D	P1BC1	P0BAC	P1BB0	P0B95	P1E6C	P0B8C	P1B9C	P0ABC
P1B20	P1BC4	P0BB1	P1BB3	P0B9A	P1E6E	P0B91	P1B9F	P0ABD
P1B23	P1BC7	P0BB6	P1BB6	P0B9F	P1E6F	P0B96	P1BA2	
P1B26	P1BCA	P0BBB	P1BB9	P0BA4	P1E70	P0B9B	P1BA5	
P1B46	P1BCD	P1B18	P1BBC	P0BA9	P1E71	P0BA0	P1BA8	
P1B49	P1BD0	P1B1B	P1BBF	P0BAE	P1E72	P0BA5	P1BAB	
P1B4C	P1BD3	P1B1E	P1BC2	P0BB3	P1E73	P0BAA	P1BAE	
P1B4F	P1BD6	P1B21	P1BC5	P0BB8	P1E74	P0BAF	P1BB1	
P1B52	P1BD9	P1B24	P1BC8	P1B28	P1E75	P0BB4	P1BB4	
P1B55	P1BDC	P1B27	P1BCB	P1B29	P1E76	P0BB9	P1BB7	
P1B58	P1BDF	P1B47	P1BCE	P1B2A	P1E77	P1B16	P1BBA	
P1B5B	P1BE2	P1B4A	P1BD1	P1B2B	P1E78	P1B19	P1BBD	
P1B5E	P1BE5	P1B4D	P1BD4	P1B2C	P1E79	P1B1C	P1BC0	
P1B61	P1BE8	P1B50	P1BD7	P1B2D	P1E7A	P1B1F	P1BC3	
P1B64	P1BEB	P1B53	P1BDA	P1E4C	P1E7B	P1B22	P1BC6	
P1B67	P1BEE	P1B56	P1BDD	P1E4D	P1E7C	P1B25	P1BC9	
P1B6A	P1BF1	P1B59	P1BE0	P1E4E	P1E7D	P1B45	P1BCC	

TempRationalityFA

P0A9D	P0C83	P0CB4

P0A9E	P0C84	P0CB5
P0AC7	P0C8A	P0CB9
P0AC8	P0C8B	P0CBA
P0ACC	P0C8F	P1EB1
P0ACD	P0C90	P1EB2
P0AEA	P0C94	P1EB3
P0AEB	P0C95	P1EB4
P0BC4	P0C99	P1EB5
P0BC5	P0C9A	U2401
P0C35	P0CAA	U2603
P0C36	P0CAB	U2604
P0C7E	P0CAF	U2605
P0C7F	P0CB0	U2606