COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Intake Camshaft Actuator Solenoid Circuit – Bank 1	P0010	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 18 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B 2 trips
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 > KtPHSD_phi_CamPosErrorLimIc 1 Deg (see Supporting Table)	The following DTC's are NOT active: P0010 IntkCMP B1 Circuit P0340, P0341, Intake B1 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	System Voltage > 11 Volts, and System Voltage < 18 Volts Desired cam position cannot vary more than 7.5 Cam Deg for at least KtPHSD_t_StablePositionTimeIc1 seconds (see Supporting Table)	275 failures out of 500 samples 100 ms /sample	Type B 2 trips
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 9 crank degrees before or 9 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized Cam phaser is in "parked" position No Active DTCs: No Pending DTCs:	< 1200 P0335, P0336 P0340, P0341 5VoltReferenceA_FA 5VoltReferenceB_FA P0341	4 failures out of 5 samples if the engine is being assisted by the starter 24 failures out of 30 samples if the engine is running without assistance from the starter One sample per cam rotation	Type B 2 trips
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 18.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							Continuous	
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 18.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 3.1 ohms -OR- Calculated Heater Resistance > 9.3 ohms	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 18.0 volts >= 0.17 seconds	Once per valid cold start	2 trips Type B
HO2S Heater Resistance Bank 1 Sensor 2	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 3.1 ohms -OR- Calculated Heater Resistance > 9.3 ohms	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 18.0 volts >= 0.17 seconds	Once per valid cold start	2 trips Type B
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP and MAF do not match estimated engine airflow as established by the TPS	1) Difference between measured MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails	Table, f(TPS). See supporting tables	Engine Speed	> 800 RPM Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	Continuously fail MAP and MAF portions of diagnostic for 0.1875 ms Continuous in MAIN processor	Type: A MIL: YES Trips: 1

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			2) Difference between measured MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (MAF circuit hi) have failed this key cycle, or battery voltage < 10.0 volts, then MAF portion of diagnostic fails	Table, f(TPS). See supporting tables				
Mass Air Flow System Performance	P0101	Determines if the MAF sensor is stuck within the normal operating range	Filtered Throttle Model AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 350 kPa/(g/s) > 15 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)	>= 400 RPM <= 8191 RPM > 70 Deg C < 125 Deg C > -20 Deg C < 125 Deg C > 0.125 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					No Active DTCs:	See table "IFRD Residual Weighting MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FA IAT_SensorFA IAT_SensorFP CylDeacSystemTFTKO		
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	<= 1200 Hertz (0.608 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 8.0 Volts >= 1.0 seconds	300 failures out of 375 samples 1 sample every cylinder firing event	Type B 2 trips
Mass Air Flow Sensor Circuit High Frequency	P0103	Detects a high frequency output from the MAF sensor	MAF Output	>= 14500 Hertz (872 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 8.0 Volts >= 1.0 seconds	300 failures out of 375 samples 1 sample every cylinder firing event	Type B 2 trips
Manifold Absolute Pressure Sensor Performance	P0106	Determines if the MAP sensor is stuck within the normal operating range	Filtered Throttle Model AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 350 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)	 >= 400 RPM <= 8191 RPM > 70 Deg C < 125 Deg C > -20 Deg C < 125 Deg C > 0.125 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM	Continuous Calculations are performed every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					No Active DTCs:	MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
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 (0.2 Volts = 3.5 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
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 (4.5 Volts = 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 STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Intake Air Temperature Sensor Circuit Low (High Temperature)	P0112	Detects a continuous short to ground in the IAT signal circuit or the IAT sensor	Raw IAT Input	< 45 Ohms (~150 deg C)	Engine Run Time Coolant Temp Vehicle Speed No Active DTCs:	> 10.0 seconds < 150 deg C >= 0 KPH ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor Circuit High (Low Temperature)	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 420000 Ohms (~-60 deg C)	Engine Run Time Coolant Temp Vehicle Speed Engine Air Flow No Active DTCs:	> 10.0 seconds > -40 deg C <= 512 KPH <= 512 gm/sec ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError MAF_SensorFA MAF_SensorFP MAF_SensorTFTKO	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
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 occur: 1) ECT at power up > IAT at power up by an IAT based table lookup value after a minimum 28800 second soak (fast fail). 2) ECT at power up > IAT at power up by 15.8 C after a minimum 28800 second soak and a block heater has not been detected. 3) ECT at power up > IAT at power up by 15.8 C after a minimum 28800 seconds soak and the time spent cranking the	See "P0116: Fail if power up ECT exceeds IAT by these values" in the Supporting tables section	No Active DTC's Non-volatile memory initization Test complete this trip Test aborted this trip IAT Low Fuel Condition Diag **Diagnostic is aborted when Block Heater is detected. Block Heater is detected when the following occurs:** 1) ECT at power up > IAT at power up by 2) Cranking time 3) Power up IAT	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid = Not occurred = False = False ≥ -7 ºC = False > 15.8 ºC < 10.0 Seconds > -7 ºC	1 failure 500 msec/sample Once per valid cold start	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag	= False	4a) Vehicle drive time 4b) Vehicle speed 4c) IAT drops from power up IAT	> 400 Seconds > 14.9 MPH ≥ 5.3 ºC		
Engine Coolant Temp Sensor Circuit Low	P0117	This DTC detects a short to ground in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ 150ºC)	< 47 Ohms			5 failures out of 6 samples 1 sec/sample Continuous	2 trips Type B
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)	> 420000 Ohms	Engine run time Or IAT min	> 10.0 seconds ≥ 0.0 °C	5 failures out of 6 samples 1 sec/sample Continuous	2 trips Type B
TPS1 Circuit	P0120	Detects a continuous or intermittent short or open in TPS1 circuit on the secondary processor but sensor is in range on the primary processor	Secondary TPS1 Voltage < or Secondary TPS1 Voltage >	0.325 4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the secondary processor	Type: A MIL: YES Trips: 1
Throttle Position Sensor Performance	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model AND ABS(Measured Flow – Modeled Air Flow) Filtered	> 350 kPa/(g/s) > 15 grams/sec	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 400 RPM <= 8191 RPM > 70 Deg C < 125 Deg C > -20 Deg C < 125 Deg C	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						> 0.125 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate See table "IFRD Residual Weighting Factors". No Active DTCs: MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit on both processors or just the primary processor	Primary TPS1 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type: A MIL:

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Secondary TPS1 Voltage <	0.325		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	YES Trips: 1
TPS1 Circuit High	P0123	Detects a continuous or intermittent short in TPS1 circuit on both processors or just the primary processor	Primary TPS1 Voltage >	4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type: A MIL:
			Secondary TPS1 Voltage >	4.75		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	YES Trips: 1
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault	Actual accumulated airflow is > predicted accumulated airflow before: Range #1 (Primary) ECT reaches 74.0 °C when IAT min is ≤ 54.5°C and ≥ 10.0°C. Range #2 (Alternate) ECT reaches 65.0 °C when IAT min is < 10.0°C and ≥ -7.0°C.	See "P0128: Maximum Accumulated Airflow for IAT and Start-up ECT conditions" in the Supporting tables section	No Active DTC's Engine run time Fuel Condition **Range #1 (Primary) Test** ECT at start run Average Airflow Vehicle speed **Range #2 (Alternate) Test** ECT at start run	MAP_SensorFA MAF_SensorFA TPS_Performance_FA TPS_FA TPS_ThrottleAuthority Defaulted IAT_SensorFA ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA 30 ≤ Eng Run Tme ≤ 1800 seconds Ethanol ≤ 100% ≤ 69.0 °C ≥ 1.0 gps > 5 mph for at least 0.8 miles ≤ 60.0 °C	30 failures to set DTC 1 sec/sample Once per ignition cycle	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Average Airflow Vehicle speed	≥ 1.0 gps > 5 mph for at least 0.8 miles		
					Accumulated Airflow Adjustments 1) Max. airflow amount added when accumulating airflow is 2) Zero Airflow accumulated when airflow is 3) With AFM active Airflow added to acculmulated is multiplyed by 4) With Decel Fuel Cut Off active, acculmulated airflow is reduced by multiplying actual airflow by	 30.0 gps < 2.0 gps 50.00% 1.00 times		
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage	TPS_ThrottleAuthority Defaulted 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 < system voltage< 18.0 volts	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	2 % <= Throttle <= 45 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	0.0 % <= Throttle <= 45.0 %		
					Fuel Control State	= Closed Loop		
						not = Power		
					Fuel Control State	Enrichment		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for Time	> 2 seconds		
O2S Slow Response Bank 1 Sensor 1	P0133	This DTC determines if the O2 sensor response time is degraded.	The average response time is caluclated over the test time, and compared to the threshold. Refer to **"P0133 - O2S Slow Response Bank 1 Sensor 1"** Pass/Fail Threshold table in the Supporting Tables tab.		No Active DTC's	TPS_ThrottleAuthority Defaulted 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	Sample time is 60 seconds Frequency: Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	2 trips Type B
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 1.5 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 1.5 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	17 gps <= engine airflow <= 55 gps		
					Engine speed	1250 <= RPM <= 2850		
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 7 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 1.3 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			
					Time	> 4.5 seconds		
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	380 mvolts < Oxygen Sensor signal < 525 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA	400 failures out of 500 samples. Minimum of 0 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 3.0 %	2 trips Type B
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete		
					Predicted Exhaust Temp (by			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					location) Engine Run Time Fuel	= Wamed Up > 124 seconds <= 87 % Ethanol	Frequency: Continuous 100msec loop	
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.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 1.5 amps	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** Time	ECT_Sensor_FA 10.0 volts < system voltage< 18.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 10 seconds delay between tests and 1 second execution rate	2 trips Type B
O2S Circuit Low Voltage Bank 1 Sensor 2	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 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	TPS_ThrottleAuthority Defaulted 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 < system voltage< 18.0 volts = Not active = Not active	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	2 % <= Throttle <= 45 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 4.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 2	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Throttle Position Fuel Control State Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel State Fuel Condition **All of the above met for** Time	2.5 % <= Throttle <= 45.0 % = Closed Loop not = Power Enrichment = TRUE Enabled (On) DFCO not active Ethanol <= 87% > 4 seconds		
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2 (Split volume catalyst only)	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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 8.0 units OR 2) Accumulated air flow during slow rich to lean test > 32 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed DTC's Passed	TPS_ThrottleAuthority Defaulted 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 < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False = enabled = P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable))	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria	1 trips Type A EWMA
					After above conditions are met:			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					DFCO mode is continued (wo driver initiated pedal input).		must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2 (Split volume catalyst only)	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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the lower and upper voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 8.0 units OR 2) Accumulated air flow during slow lean to rich test > 22 grams (lower threshold is 300 mvolts and upper threshold is 600 mvolts)	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed DTC's Passed	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013E, P013F, P2270 or P2271 10.0 volts < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False = enabled = P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable))	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow	1 trips Type A EWMA

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					DTC's Passed DTC's Passed DTC's Passed	= P013A (and P013C (if applicable)) = P2271 (and P2273 (if applicable)) = P013F (and P014B (if applicable))	non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					After above conditions are met: Fuel Enrich mode continued.			
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2 (Split volume catalyst only)	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 cannot go below the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal > 450 mvolts AND 2) Accumulated air flow during stuck rich test > 32 grams.	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013F, P2270 or P2271 10.0 volts < system voltage< 18.0 volts = Valid = Not Valid = Not Valid	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Low Fuel Condition Diag Post fuel cell DTC's Passed	= False = enabled = P2270 and P2272 (if applicable)	the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2 (Split volume catalyst only)	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 cannot go above the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal < 300 mvolts AND 2) Accumulated air flow during lean to rich test > 52 grams.	No Active DTC's B1S2 Failed this key cycle	TPS_ThrottleAuthority Defaulted 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 < system	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed DTC's Passed DTC's Passed DTC's Passed After above conditions are met: Fuel Enrich mode entered.	voltage< 18.0 volts = Valid = Not Valid = Not Valid = False = enabled = P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable)) = P013A (and P013C (if applicable)) = P2271 (and P2273 (if applicable))	Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
O2S Circuit Insufficient Activity Bank 1 Sensor 2	P0140	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	380 mvolts < Oxygen Sensor signal < 525 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Predicted Exhaust Temp (by location) Engine Run Time Fuel	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 volts < system voltage< 18.0 volts = All Cylinders active = Complete = Wamed Up > 124 seconds <= 87 % Ethanol	590 failures out of 740 samples. Minimum of 1 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 3.0 %	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							Frequency: Once per trip for post sensors 100msec loop	
O2S Heater Performance Bank 1 Sensor 2	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 1.5 amps	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** Time	ECT_Sensor_FA 10.0 volts < system voltage< 18.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 10 seconds delay between tests and 1 second execution rate	2 trips Type B
Fuel System Too Lean Bank 1	P0171	Determines if the fuel control system is in a lean condition, based on the filtered long-term fuel trim.	The filtered long-term fuel trim metric	> **Long Term Trim Lean** Table	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF VSS Fuel Level Long Fuel Trim data accumulation:	400 <rpm< 7000 > 70 kPa -38 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 < 186 mph > 10 % or if fuel sender is faulty > 25 seconds of data must accumulate on each trip, with at least 10 seconds of data in the current fuel trim cell before a pass or fail decision can be made.	> 100 ms Frequency: Continuous Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during **89** % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	Type B 2 Trip(s)
					Closed loop fueling Enabled			
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > 50 and < 120 and > 0.2 liters of fuel consumed after a fuel fill event (Flex Fuel Only)		
				disable	Engine speed	rpm< 400 or rpm> 7000		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				conditions:	Fuel Level	< 10 % for at least 30 seconds		
					EGR Flow Diag. Intrusive Test Active			
					Catalyst Monitor Diag. Intrusive Test Active			
					Post O2 Diag. Intrusive Test Active			
					Device Control Active			
					EVAP Diag. “tank pull down” portion of the test Active			
					fuel trim metric updated during decels? **(YES)**			
					No active DTCs:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit FA EvapFlowDuringNonPurge FA EvapVentSolenoidCircuit FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected FA EGRValvePerformance FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
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.			BARO Coolant Temp MAP IAT MAF	> 70 kPa -38 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0		Type B 2 Trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		There are two different, yet related tests that are used to determine a Rich fault, they are Passive and Intrusive and are described below:			VSS Fuel Level Long Fuel Trim data accumulation:	< 186 mph < 10 % for at least 30 seconds > 25 seconds of data must accumulate on each trip, with at least 10 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		
					Closed loop fueling Enabled A Function of Coolant Temperature based on Start-up			
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > 50 and < 120 and > 0.2 liters of fuel consumed after a fuel fill event (Flex Fuel Only)		
		Passive Test: Non-purge cells are monitored to determine if a rich condition exists.	The filtered Non-Purge Long Term Fuel Trim metric	≤ **Non Purge Rich Limit** Table			> 100 ms Frequency: Continuous	
		Intrusive Test- When the Purge Long Term fuel trim metric is ≤ **the Purge Rich Limit Table,** Purge is ramped off to determine if excess purge vapor is the cause of the Rich condition. If the filtered Purge-on Long Term fuel trim > **Purge Rich Limit Table** the test passes without checking the Non-Purge Long Term fuel trim metric.	If the Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric	≤ **Purge Rich Limit** Table ≤ **Non Purge Rich Limit** Table		Passive Test decision cannot be made. A passive decision cannot be made when Purge is enabled.	Fail determinations require that the Malfunction Criteria be satisfied for 2 out of 3 intrusive segments.	
			Segment Definition - Segments can last up to 60, and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 10 grams of vapor. A maximum of 3 completed segments or 20 intrusive attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge-on Long Term fuel trim > Purge Rich Limit Table for at least 200 seconds, indicating that the canister has been purged. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.				
				disable **conditions:**	Engine speed EGR Flow Diag. Intrusive Test Not Active	rpm< 400 or rpm> 7000	Development data indicates that the	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Fuel Level Catalyst Monitor Diag. Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” portion of the test Not Active fuel trim metric updated during decels? **(YES)** No active DTCs:	< 10 % for at least 30 seconds IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit FA EvapFlowDuringNonPurge FA EvapVentSolenoidCircuit FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected FA EGRValvePerformance FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA	Fuel Adjustment System Diagnostic (FASD) is typically enabled during **89** % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	
Injector 1	P0201	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 18 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Injector 2	P0202	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 18 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	Type B 2 trips
Injector 3	P0203	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 18 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	Type B 2 trips
Injector 4	P0204	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 18 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	Type B 2 trips
Injector 5	P0205	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 18 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	Type B 2 trips
Injector 6	P0206	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 18 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	Type B 2 trips
TPS2 Circuit	P0220	Detects a continuous or intermittent short or open in TPS2 circuit on the secondary processor but sensor is in range on the primary processor	Secondary TPS2 Voltage < or Secondary TPS2 Voltage >	0.25 4.59		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference error No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	Type: A MIL: YES Trips: 1

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short in TPS2 circuit on both processors or just the primary processor	Primary TPS2 Voltage <	0.25		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type: a
						No 5 V reference error		MIL:
			Secondary TPS2 Voltage <	0.25		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	YES Trips: 1
TPS2 Circuit High	P0223	Detects a continuous or intermittent short or open in TPS2 circuit on both processors or just the primary processor	Primary TPS2 Voltage >	4.59		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79/159 counts; 57 counts continuous; 3.125 msec /count in the Primary processor	Type: a
						No 5 V reference error		MIL:
			Secondary TPS2 Voltage >	4.59		No 5 V reference DTCs	19/39 counts or 14 counts continuous; 12.5 msec/count in the Secondary processor	YES Trips: 1
Fuel Pump Primary Circuit (ODM)	P0230	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 18 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms /sample Continuous	2 trips Type B
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected	P0300 P0301 P0302 P0303	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring crankshaft velocity	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific veh. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. see	**(>**Idle SCD AND > Idle SCD ddt Tables) **OR** (>SCD Delta AND > SCD Delta ddt Tables) **OR** (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables) **OR** (>Cyl Mode AND > Cyl Mode ddt Tables)	Engine Run Time ECT If ECT at startup then misfire enables when ECT System Voltage + Throttle delta - Throttle delta	> 2 crankshaft revolutions < -7ºC > 21ºC 9.00<volts<18.00 < 100.00% per 25 ms < 100.00% per 25 ms	Emission Exceedence = (5) failed 200 rev blocks of 16. Failure reported with (1) Exceedence in 1st (16) 200 rev block, or (4) Exceedences thereafter.	2 Trips Type B (Mil Flashes with Catalyst Damaging Misfire)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0304 P0305 P0306		Algorithm Description Document for additional details.	**OR** (>Rev Mode Table) **OR** (> AFM Table in Cyl Deact mode)			1st Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. 2nd and 3rd Catalyst Exceedence = (1) 200 rev block with catalyst damage. Failure reported with (3) Exceedences in FTP, or (1) Exceedence outside FTP. Continuous	
	P0307		Misfire Percent Emission Failure Threshold	≥ 1% P0300 ≥ 1% emission	Engine Speed	450 < rpm < (Engine Speed Limit) - 400 Engine speed limit is a function of inputs like Gear and temperature typical Engine Speed Limit = 6500 rpm		
	P0308		Misfire Percent Catalyst Damage	>"Catalyst Damaging Misfire Percentage" Table				
				disable conditions:	No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO n IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensorTestFailedTKO CrankSensorFaultActive CrankIntakeCamCorrelationFA CrankExhaustCamCorrelationFA CrankCamCorrelationTFTKO	4 cycle delay	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						AnyCamPhaser_FA AnyCamPhaser_TFTKO		
					P0315 & engine speed	> 1000 rpm		
					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	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Undetectable engine speed and engine load region	invalid speed load range in **decel index** tables	4 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	<" Zero torque engine load" in Supporting Tables tab	4 cycle delay	
					Below zero torque: TPS (area) Veh Speed EGR Intrusive test Manual Trans Throttle Position AND Automatic transmission shift	 ≤ 0% > 48 KPH Active Clutch shift > 95.00%	4 cycle delay 12 cycle delay 4 cycle delay 7 cycle delay	
					Driveline Ring Filter active 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:	 7 engine cycles after misfire 3 Engine cycles after misfire		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Abnormal engine speed oscillations: (Rough road etc) Off Idle, number of consecutive decelerating cylinders after accelerating,: (Number of decels can vary with misfire detection equation) TPS Engine Speed Veh Speed SCD Cyl Mode Rev Mode	 > 3 % > 1000 rpm > 5 kph = 4 consecutive cyls = 4 consecutive cyls		
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors	≥ 3.0043 OR ≤ 2.9970	OBD Manufacturer Enable Counter	0	0.50 seconds Frequency Continuous 100 msec	1 Trips Type A
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit	Gated FFT Output	< OpenCircuitThresh See Supporting Tables for OpenCircuitThresh	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Enginer Run Time No Active DTC's Power Take-Off Disabled (= FALSE)	= 1 ≥ 1500 RPM ≥ -40 deg. C ≥ 1 seconds KS_Ckt_Perf_B1B2_FA GetPTOR_b_PTO_Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for an overactive knock sensor caused by excessive knock or noisy engine components	Knock Fast Retard (spark degrees)	> (FastRtdMax + 5.0 degrees - 1.0 degrees spark	Diagnostic Enabled (1 = Enabled) Knock Detection Enabled	= 1 > 0 **Knock Detection Enabled** is calculated	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				See Supporting Tables for FastRtdMax		by multiplying the following three factors: FastAttackRate FastAttackCoolGain FastAttackBaroGain (see Supporting Tables)		
					Engine Speed MAP No Active DTC's Power Take-Off Disabled (= FALSE)	≥ 450 RPM ≥ 10 kPa GetTPSR_ThrotAuthDefault GetPTOR_b_PTO_Active		
Knock Sensor (KS) Circuit Low Bank 1	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< ShortLowThresh * (5 / 65,535) Volts < 2 * [ShortLowThresh * (5 / 65,535) - 2.5] Volts See Supporting Tables for ShortLowThresh	ECT Enginer Run Time Engine Oil Temp No Active DTC's	≥ -40 deg. C ≥ 1 seconds < 130 deg. C EngOilModeledTempValid	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit High Bank 1	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> ShortHiThresh * (5 / 65,535) Volts > 2 * [ShortLowThresh * (5 / 65,535) - 2.5] Volts See Supporting Tables for ShortHiThresh	ECT Enginer Run Time Engine Oil Temp No Active DTC's	≥ -40 deg. C ≥ 1 seconds < 160 deg. C EngOilModeledTempValid	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Bank 2	P0330	This diagnostic checks for an open in the knock sensor circuit	Gated FFT Output	< OpenCircuitThresh See Supporting Tables for OpenCircuitThresh	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Enginer Run Time No Active DTC's	= 1 ≥ 1500 RPM ≥ -40 deg. C ≥ 1 seconds KS_Ckt_Perf_B1B2_FA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Power Take-Off Disabled (= FALSE)	GetPTOR_b_PTO_Active		
Knock Sensor (KS) Circuit Low Bank 2	P0332	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< ShortLowThresh * (5 / 65,535) Volts < 2 * [ShortLowThresh * (5 / 65,535) - 2.5] Volts See Supporting Tables for ShortLowThresh	ECT Enginer Run Time Engine Oil Temp No Active DTC's	≥ -40 deg. C ≥ 1 seconds < 130 deg. C EngOilModeledTempValid	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit High Bank 2	P0333	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> ShortHiThresh * (5 / 65,535) Volts > 2 * [ShortLowThresh * (5 / 65,535) - 2.5] Volts See Supporting Tables for ShortHiThresh	ECT Enginer Run Time Engine Oil Temp No Active DTC's	≥ -40 deg. C ≥ 1 seconds < 160 deg. C EngOilModeledTempValid	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	<u>Engine-Cranking Crankshaft Test:</u> Time since last crankshaft position sensor pulse received <u>Time-Based Crankshaft Test:</u> No crankshaft pulses received	>= 4.0 seconds >= 0.125 seconds	<u>Engine-Cranking Crankshaft Test:</u> Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow <u>Time-Based Crankshaft Test:</u> Engine is Running Starter is not engaged	= FALSE = FALSE = FALSE > 3.0 grams/second))	<u>Engine-Cranking Crankshaft Test:</u> Continuous every 100 msec <u>Time-Based Crankshaft Test:</u> Continuous every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					No DTC Active:	5VoltReferenceB_FA		
			Event-Based Crankshaft Test:		Event-Based Crankshaft Test:		Event-Based Crankshaft Test:	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	2 failures out of 10 samples One sample per engine revolution	
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Crank Re-synchronization Test:		Crank Re-synchronization Test:		Crank Re-synchronization Test:	Type B 2 trips
			Time in which 20 or more crank re-synchronizations occur	< 25.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	>= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335	Continuous every 250 msec	
			Time-Based Crankshaft Test:		Time-Based Crankshaft Test:		Time-Based Crankshaft Test:	
			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	
			Engine Start Test during Crank:		Engine Start Test during Crank:		Engine Start Test during Crank:	
			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	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Event-Based Crankshaft Test: Crank Pulses received in one engine revolution OR Crank Pulses received in one engine revolution	< 51 > 65	Event-Based Crankshaft Test: Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	Event-Based Crankshaft Test: 8 failures out of 10 samples One sample per engine revolution	
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Determines if a fault exists with the cam position bank 1 sensor A signal	Engine Cranking Camshaft Test: Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse Time-Based Camshaft Test: Fewer than 4 camshaft pulses received in a time Fast Event-Based Camshaft Test: No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle)	>= 1.5 seconds >= 4.0 seconds > 3.0 seconds	Engine Cranking Camshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Time-Based Camshaft Test: Engine is Running Starter is not engaged No DTC Active: Fast Event-Based Camshaft Test: 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:	 = FALSE = FALSE = FALSE > 3.0 grams/second)) 5VoltReferenceA_FA 5VoltReferenceA_FA	Engine Cranking Camshaft Test: Continuous every 100 msec Time-Based Camshaft Test: Continuous every 100 msec Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						5VoltReferenceB_FA CrankSensor_FA		
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	= 0	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
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	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 12 MEDRES events is less than 4 or greater than 10 (There are 12 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: 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	Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles AND	< 398 > 402	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
IGNITION CONTROL #1 CIRCUIT	P0351	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 1 (Cylinders 1 and 4 for V6 with waste spark)	The ECM detects that the commanded state of the driver and the actual state of the control		Engine running Ignition Voltage	**> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			circuit do not match.					
IGNITION CONTROL #2 CIRCUIT	P0352	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 2 (Cylinders 2 and 5 for V6 with waste spark)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #3 CIRCUIT	P0353	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 3 (Cylinders 3 and 6 for V6 with waste spark)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Secondary AIR Incorrect Airflow (Single Bank Systems)	P0411	Detects an insufficient flow condition This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open)	Predicted System Pressure versus Actual System Pressure Error	> 5.0 kPa or < -3.5 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage SL Stability time SL Range	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts > 5.0 seconds rpm < 3000 and > 3400	Phase 1 Conditional test weight > 7.0 seconds Total 'String Length' accumulation time	2 trip(s) Type B
			OR System Pressure Error	> 1.0 kPa				
		Leaks downstream of the valve are detected via an evaluation of both pressure error and average pressure “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.	or while the Average String Length	< -1.0 kPa >**SL Threshold Bank 1** Table	**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**		> 10 seconds	
				disable **conditions:**	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRSystemPressureSensor FA	Frequency: Once per trip when AIR pump commanded On	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA MAP_SensorFA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected _FA CatalystSysEfficiencyL oB1_FA CatalystSysEfficiencyL oB2_FA ControllerProcessorPer f_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_F A FuelInjectorCircuit_FA		
Secondary AIR Solenoid Control Circuit	P0412	This DTC checks the AIR solenoid circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System Voltage	> 10.7 Volts < 18.0 Volts	20 failures out of 25 samples 250 ms loop Continuous	2 trip(s) Type B
Secondary AIR Pump Control Circuit	P0418	This DTC checks the AIR Pump circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System Voltage	> 10.7 Volts < 18.0 Volts	20 failures out of 25 samples 250 ms loop Continuous	2 trip(s) Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Catalyst System Low Efficiency Bank 1	P0420	Oxygen Storage	Normalized Ratio OSC Value (EWMA filtered)	< 0.350	***Valid Idle Period Criteria***		1 test attempted per valid idle period Minimum of 1 test per trip Maximum of 8 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 1000ms	Type A 1 Trip(s)
		The 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 Lean and Rich 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 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.			Throttle Position	< 2.00 %		
		The Catalyst Monitoring Test is done during idle. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document.			Vehicle Speed	*< 2.00 Kph*		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine speed	> 1100 RPM for a minimum of 15 seconds since end of last idle period.		
					Engine run time	≥ MinimumEngineRunTime**, This is a function of Coolant Temperture, please see Supporting Tables**		
					Tests attempted this trip	< 255		
					The catalyst diagnostic has not yet completed for the current trip.			
					Catalyst Idle Conditions Met Criteria			
					General Enable met and the Valid Idle Period Criteria met			
					Green Converter Delay Induction Air	Not Active		
					Intrusive test(s): Fueltrim Post O2 EVAP EGR	Not Active		
					RunCrank Voltage	> 10.90 Volts		
					Ethanol Estimation	NOT in Progress		
					ECT	*40 < ° C < 126*		
					Barometric Pressure	> 70 KPA		
					Idle Time before going intrusive is	< 50 Seconds		
					Idle time is incremented if Vehicle speed	< 2 Kph and the throttle position < 2.00 % as identified in the Valid Idle Period Criteria section.		
					Short Term Fuel Trim	*0.90 < ST FT < 1.10*		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Predicted catalyst temp > MinCatTemp table (degC) (refer to "Supporting Tables" tab) AND Engine Airflow > MinAirflowToWarmCatalyst table (g/s) (refer to "Supporting Tables" tab) (Based on engine coolant at the time the WarmedUpEvents counter resets to 0.) for at least 50 seconds with a closed throttle time < 180 seconds consecutively (closed throttle consideration involves having the TPS < the value as stated in the Valid Idle Period Criteria Section) . Also, in order to increment the WarmedUpEvents counter (counter must exceed 50 cal value), either the vehicle speed must exceed the vehicle speed cal or the TPS must exceed the TPS cal as stated in the Valid Idle Period Criteria section above. **Closed loop fueling Enabled** A Function of Coolant Temperature based on Start-up coolant temp. and a function of Time also based on Start-up coolant temp. **Please see "Supporting Tables" Tab** **PRNDL** is in Drive Range on an Auto Transmission vehicle. ***Idle Stable Criteria :: Must hold true from after Catalyst Idle Conditions Met to the end of test*** MAF | *2.80 < g/s < 16.50* Predicted catalyst temperature | < 670 degC ***Engine Fueling Criteria at Beginning of Idle Period*** **The following fueling related must also be met from between 4 and 7 seconds after the Catalyst Idle Conditions Met Criteria has been met for at least 4 seconds prior to allowing intrusive control** Number of pre-O2 switches | > 2 Short Term Fuel Trim Avg | *0.900 < ST FT Avg < 1.040* ***Rapid Step Response (RSR) feature will initiate multiple tests:***			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					If the difference between current EWMA value and the current OSC Normalized Ratio value is > 0.610 and the current OSC Normalized Ratio value is < 0.100 Maximum of 24 RSR tests to detect failure when RSR is enabled. ***Green Converter Delay Criteria*** This is part of the check for the Catalyst Idle Conditions Met Criteria section The diagnostic will not be enabled until the following has been met: Predicted catalyst temperature > 590 ° C for 3600 seconds non-continuously. Note: this feature is only enabled when the vehicle is new and cannot be enabled in service PTO Not Active ***General Enable*** **DTC's Not Set** MAF_SensorFA AmbientAirDefault_SC IAT_SensorCircuitFA ECT_Sensor_FA O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EvapPurgeSolenoidCircuit_FA IAC_SystemRPM_FA EGRValvePerformance_FA EGRValveCircuit_FA CamSensor_FA CrankSensorFaultActive TPS_Performance_FA EnginePowerLimited VehicleSpeedSensor_FA			
Evaporative Emission (EVAP) System Small Leak Detected	P0442	This DTC will detect a small leak (≥ 0.020") in the EVAP system between the fuel fill cap and the purge solenoid. The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut	The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (See P0442: EONV Pressure Threshold Table on Supporting		Fuel Level Drive Time Drive length ECT Baro Odometer Time since last complete test	10 % ≤ Percent ≤ 90 % ≥ 600 seconds ≥ 5.2 miles ≥ 70 °C ≥ 70 kPa ≥ 10.0 miles ≥ 17 hours	Once per trip, during hot soak (up to 2400 sec.). No more than 2 unsuccessful attempts between completed tests.	1 trip Type A EWMA Average run length is 7 under normal conditions

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.	Tables Tab). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum)/pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail).		if normalized result and EWMA is passing OR Time since last complete test if normalized result or EWMA is failing Estimated ambient temperature at end of drive Estimate of Ambient Air Temperature Valid	≥ 10 hours 0 °C ≤ Temperature ≤ 34 °C		Run length is 2 to 6 trips after code clear or non-volatile reset
		After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When the pressure drops (-62.27) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62.27 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort.	When EWMA is , the DTC light is illuminated. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 2 additional consecutive trips.	> 0.65 (EWMA Fail Threshold) ≤ 0.35 (EWMA Re-Pass Threshold)	**Conditions for Estimate of Ambient Air Temperature (EAT) to be valid:** **1. Cold Start** Startup delta deg C (ECT-IAT) OR **2. Short Soak and Previous EAT Valid** Previous time since engine off OR **3. Not a Cold Start and Previous EAT Valid and between Short and Long Soak** Previous time since engine off AND Must expire Estimate of Ambient Temperature Valid Conditioning Time. **Please see "P0442: Estimate of Ambient Temperature Valid Conditioning Time" in Supporting Tables Tab.** **4. Not a Cold Start and Previous EAT Not Valid and less than Long Soak** Previous time since engine off AND	≤ 8 °C ≤ 7200 seconds 7200 seconds < Time < 25200 seconds Vehicle Speed ≥ 28.0 mph AND Mass Air Flow ≥ 0 g/sec < 25200 seconds		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Must expire maximum value in Estimate of Ambient Temperature Valid Conditioning Time. **Please see "P0442: Estimate of Ambient Temperature Valid Conditioning Time" in Supporting Tables Tab.**	Vehicle Speed ≥ 28.0 mph AND Mass Air Flow ≥ 0 g/sec		
					OR **5. Long Soak** Previous time since engine off	≥ 25200 seconds		
				Abort Conditions:	**1. High Fuel Volatility** During the volatility phase, pressure in the fuel tank is integrated vs. time. If the integrated pressure is	> -5		
					then test aborts and unsuccessful attempts is incremented.			
					OR **2. Vacuum Refueling Detected** See P0454 Fault Code for information on vacuum refueling algorithm.			
					OR **3. Fuel Level Refueling Detected** See P0464 Fault Code for information on fuel level refueling.			
					OR **4. Vacuum Out of Range and No Refueling** See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.			
					OR **5. Vacuum Out of Range and Refueling Detected** See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.			
					OR **6. Vent Valve Override Failed** Device control using an off-board tool to control the vent solenoid, cannot exceed during the EONV test	0.50 seconds		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					OR **7. Key up during EONV test** No active DTCs:	 FuelLevelDataFault MAF_SensorFA ECT_Sensor_FA IAT_SensorFA VehicleSpeedSensor_FA IgnitionOffTimeValid AmbientAirDefault P0443 P0446 P0449 P0452 P0453 P0455 P0496		
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM)	P0443	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage	11 volts ≤ Voltage ≤ 18 volts	20 failures out of 25 samples 250 ms /sample Continuous with solenoid operation	2 trips Type B
Evaporative Emission (EVAP) Vent System Performance	P0446	This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister. This test runs with normal purge and vent valve is open.	Vent Restriction Prep Test: Vented Vacuum or Vented Vacuum for 60 seconds Vent Restriction Test: Tank Vacuum for 5 seconds BEFORE Purge Volume 2 liters of fuel must be consumed after setting the DTC active the first time to set the DTC active the second time.	 < -623 Pa > 1245 Pa > 2989 Pa ≥ 6 liters	Fuel Level System Voltage Startup IAT Startup ECT BARO No active DTCs:	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 18 volts 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C ≥ 70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453	Once per Cold Start Time is dependent on driving conditions Maximum time before test abort is 1000 seconds	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						P0454		
Evaporative Emission (EVAP) Vent Solenoid Control Circuit (ODM)	P0449	This DTC checks the circuit for electrical integrity during operation. If the P0449 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage	11 volts ≤ Voltage ≤ 18 volts	20 failures out of 25 samples 250 ms / sample Continuous with solenoid operation	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit Performance	P0451	The DTC will be set if the fuel tank vacuum sensor is out of range when it tries to re-zero prior to the phase-1 or phase-2 portions of the engine-off natural vacuum small leak test.	The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts) Upper voltage threshold (voltage addition above the nominal voltage) Lower voltage threshold (voltage subtraction below the nominal voltage) The difference between tank vacuum sensor voltage and the nominal offset voltage is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then filtered with a EWMA (with 0= perfect pass and 1=perfect fail). When EWMA is , the DTC light is illuminated. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 2 additional consecutive trips.	0.2 volts 0.2 volts > 0.73 (EWMA Fail Threshold) ≤ 0.40 (EWMA Re-Pass Threshold)	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The number of times that it executes can range from zero to two per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	1 trip Type A EWMA Average run length: 6 Run length is 2 trips after code clear or non-volatile reset

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	P0452	This DTC will detect a fuel tank pressure sensor signal that is too low out of range.	Fuel tank pressure sensor signal The normal operating range of the fuel tank pressure sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	< 0.15 volts (3 % of Vref or ~ 1681 Pa)	Time delay after sensor power up for sensor warm-up ECM State ≠ crank	is 0.10 seconds	80 failures out of 100 samples 100 ms / sample Continuous	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	P0453	This DTC will detect a fuel tank pressure sensor signal that is too high out of range.	Fuel tank pressure sensor signal The normal operating range of the fuel tank pressure sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	> 4.85 volts (97% of Vref or ~ -4172 Pa)	Time delay after sensor power up for sensor warm-up ECM State ≠ crank	is 0.10 seconds	80 failures out of 100 samples 100 ms / sample Continuous	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent	P0454	This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. The abrupt change is defined as a change in vacuum: in the span of 1.0 seconds. A refueling event is confirmed if the fuel level has a persistent change for 30 seconds.	112 Pa < Vacuum < 249 Pa of 10 %	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete. The test will report a failure if 1 out of 3 samples are failures.	1 trips Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Evaporative Emission (EVAP) System Large Leak Detected	P0455	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system. Purge valve is controlled (to allow purge flow) and vent valve is commanded closed.	Purge volume BEFORE Tank vacuum 2 liters of fuel must be consumed after setting the DTC active the first time to set the DTC active the second time. <u>Weak Vacuum Follow-up Test</u> (fuel cap replacement test) Weak Vacuum Test failed. Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	> 13 liters ≤ 2740 Pa ≥ 2740 Pa	Fuel Level System Voltage BARO No active DTCs: <u>Cold Start Test</u> If ECT > IAT, Startup temperature delta (ECT-IAT): Cold Test Timer Startup IAT Temperature Startup ECT <u>Weak Vacuum Follow-up Test</u> This test can run following a weak vacuum failure or on a hot restart.	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 18 volts ≥ 70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454 ≤ 8 °C ≤ 1000 seconds 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C	Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1000 seconds <u>Weak Vacuum Follow-up Test</u> With large leak detected, the follow-up test is limited to 1300 seconds. Once the MIL is on, the follow-up test runs indefinitely.	2 trips Type B
Fuel Level Sensor 1 Performance	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.	Delta Fuel Volume change over an accumulated 124 miles.	< 3 liters	Engine Running No active DTCs:	 VehicleSpeedSensor_FA	250 ms / sample Continuous	2 trips Type B
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 %	Run/Crank Voltage	11 volts ≤ Voltage ≤ 18 volts	180 failures out of 225 samples 100 ms / sample Continuous	2 trips Type B
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a fuel sender stuck out ofrange high in the primary fuel tank.	Fuel level Sender % of 5V range	> 60 %	Run/Crank Voltage	11 volts ≤ Voltage ≤ 18 volts	180 failures out of 225 samples 100 ms / sample Continuous	2 trips Type B
Fuel Level Sensor 1 Circuit Intermittent	P0464	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to	If a change in fuel level is detected, the engine-off natural vacuum test is aborted due to an apparent refueling event.		This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak	1 trip Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		abort due to an apparent re-fueling event.	Subsequent to the abort, a refueling rationality test is executed to confirm that an actual refueling event occurred. If a refueling event is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. An intermintant change in fuel level is defined as: The fuel level changes and does not remain for 30 seconds during a 600 second refueling rationality test.	 by 10 % > 10 %			test. The test can only execute up to once per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete. The test will report a failure if 1 out of 3 samples are failures.	
Cooling Fan 1 Relay Control Circuit (ODM)	P0480	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 18 volts ≥ 400 RPM	20 failures out of 25 samples 100 ms / sample Continuous with fan operation	2 trips Type B Not used on systems with Mechanical Fan)
Cooling Fan 1 Relay Control Circuit (ODM)	P0481	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 18 volts ≥ 400 RPM	20 failures out of 25 samples 100 ms / sample Continuous with fan operation	2 trips Type B Not used on systems with Mechanical Fan)
Evaporative Emission (EVAP) System Flow During Non-Purge	P0496	This DTC will determine if the purge solenoid is leaking to engine manifold vacuum. This test will run with the purge valve closed and the vent valve closed.	Tank Vacuum for 5 seconds BEFORE Test time	> 2491 Pa ≥ refer to "P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of	Fuel Level System Voltage BARO Startup IAT Temperature Startup ECT	10% ≤ Percent ≤ 90% 11 volts ≤ Voltage ≤ 18 volts ≥ 70 kPa 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C	Once per cold start Cold start: max time is 1000 seconds	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				Fuel Level table" in Supporting Tables Tab.	Engine Off Time	≥ 28800.0 seconds		
					No active DTCs:	MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454		
Low Engine Speed Idle system	P0506	This DTC will determine if a low idle exists	Filtered Engine Speed Error filter coefficient	< 95.00 rpm 0.00375	Baro Coolant Temp Engine run time Ignition voltage Time since gear change Time since a TCC mode change IAT Vehicle speed Commanded RPM delta Idle time	> 70 kPa > 60 °C ≥ 60 sec 18 ≥ volts ≥ 11 ≥ 3 sec > 3 sec > -20 °C ≤ 2 mph ≤ 25 rpm > 5 sec PTO not active Transfer Case not in 4WD LowState Output control state normal Output control state instrumentation	Diagnostic runs in every 12.5 ms loop Diagnostic reports pass or fail in 10 sec once all enable conds are met	2 trips Type B
					No active DTCs	AmbientAirDefault ECT_Sensor_FA EngCoolHot EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA EnginePowerLimited TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic ClchPstnEmisFA ClchToT_TypedABC		
High Engine Speed Idle system	P0507	This DTC will determine if a high idle exists	Filtered Engine Speed Error filter coefficient	> -190.00 rpm 0.00375	Baro Coolant Temp Engine run time Ignition voltage Time since gear change Time since a TCC mode change IAT Vehicle speed Commanded RPM delta Idle time No active DTCs	> 70 kPa > 60 °C ≥ 60 sec 18 ≥ volts ≥ 11 ≥ 3 sec > 3 sec > -20 °C ≤ 2 mph ≤ 25 rpm > 5 sec PTO not active Transfer Case not in 4WD LowState Output control state normal Output control state instrumentation AmbientAirDefault ECT_Sensor_FA EngCoolHot EGRValveCircuit_FA	Diagnostic runs in every 12.5 ms loop Diagnostic reports pass or fail in 10 sec once all enable conds are met	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA EnginePowerLimited TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic ClchPstnEmisFA ClchToT_TypedABC		
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" for greater than a calibratable period of time	Cruise switch data integrity is equal to "illegal range"		Switch architecture is CAN, CAN based switch diagnostic is TRUE, general switch diagnostic enable is TRUE	fail continuously for greater than 0.700 seconds	Type: C MIL: NO Trips: 1

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state	Cruise Control Resume switch remains applied for greater than a calibratable period of time			Switch architecture is CAN, CAN based switch diagnostic is TRUE, general switch diagnostic enable is TRUE	fail continuously for greater than 90 seconds	Type: C MIL: NO Trips: 1
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			Switch architecture is CAN, CAN based switch diagnostic is TRUE, general switch diagnostic enable is TRUE	fail continuously for greater than 90 seconds	Type: C MIL: NO Trips: 1
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			Switch architecture is CAN, DTC enable cal is TRUE	10 fails out of 16 samples	Type: C MIL: NO Trips: 1
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect	Output state invalid		PCM State	= crank or run	Diagnostic runs continuously in the background Diagnostic reports a fault if 1 failure occurs on the first pass. Diagnostic reports a fault if 5 failures occur after the first pass is complete.	Type A 1 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Control Module Not Programmed	P0602	This DTC will be stored if the PCM is a service PCM that has not been programmed.	Output state invalid		PCM State	= crank or run PCM is identified through calibration as a Service PCM	Diagnostic runs at powerup	Type A 1 trips
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
ECM RAM Failure	P0604	Indicates that the ECM is unable to correctly read data from or write data to RAM	1. Primary processor data pattern written doesn't match the pattern read for a count >	1 count if found on first memory scan. 5counts if found on subsequent scans.			1. Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously	Type: A
			2. Secondary processor battery backed RAM failed checksum twice for original values at power up and the defaulted values				2. Completion at intilization, <500 ms	
			3. Secondary processor copy of calibration area to RAM failed for a count >	2counts			3. Completion at intilization, <500 ms	MIL: YES
			4. Secondary Processor data pattern written doesn't match the pattern read consecutive times				4. Will finish within 30 seconds at all engine conditions.	
			5. Secondary Processor TPS or APPS minimum learned values fail compliment check continuouslv				5. 0.0625sec continuous	Trips: 1
ECM Processor	P0606	Indicates that the ECM has detected an internal processor integrity fault						Type: A MIL: YES Trips:

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
1. Processor Performance Check - Throttle limiting Fault			When drag is active Secondary processor detects Primary's calculated throttle position is greater > than Secondary Processor calculated Throttle Position by	0.00%		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 0.1875sec in the Secondary Processor	1
			Secondary processor detects Primary's calculated throttle position is greater > than Secondary's calculated Throttle Position when driver is commanding the throttle from APP by	7.04%				
			Secondary processor detects Primary's calculated throttle position is greater > than Secondary's calculated Throttle Position when reduce engine power is active by	44.61%				
2. Processor Performance Check - ETC software is not executed or it is not executed in in proper order			Software tasks on the Primary Processor in the 12.5 ms loop were not executed or were not executed in the correct order.	0.0625sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2. 0.0625sec continuous	
			Software tasks on the Primary Processor in the 25 ms loop were not executed or were not executed in the correct order.	0.1250sec continuous			0.1250sec continuous	
			Software tasks on the Primary Processor in the 50 ms loop were not executed or were not executed in the correct order.	0.5000sec continuous			0.5000sec continuous	
			Software tasks on the Primary Processor in the 100 ms loop were not executed or were not executed in the correct order.	1.0000sec continuous			1.0000sec continuous	
			Software tasks on the Primary Processor in the 250 ms loop were not executed or were not executed in the correct order.	2.5000sec continuous			2.5000sec continuous	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			The first completion of the RAM diagnostic on the Primary Processor was completed > the amount of time	360.0000sec continuous			360.0000sec continuous	
			The first completion of the ROM diagnostic on the Primary Processor was completed > the amount of time	360.0000sec continuous			360.0000sec continuous	
			Software tasks on the Secondary Processor were not executed or were not executed in the correct order.	Two Consecutive Loops (12.5ms * 2) 25ms			25 ms	
3. Processor Performance Check - SPI Failure			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 recieved by the Primary Processor			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	In the primary processor, 159/400 counts intermittent or 39 counts continuous; 39 counts continuous @ initialization	
			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 recieved by the Secondary Processor				In the secondary processor 0.4750sec at initialization, 0.1750sec continuous or 20/200 intermittent.	
4. Processor Performance Check - Secondary Processor state of health (Main)			Primary processor check of the secondary processor by verifing the hardware line toggle between the two processors toggles within the threshold values	9.3750sec and 15.6250sec		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	9counts continuous at initialization or 9 counts continuous; 12.5 msec /count in the Primary processor	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
5. Processor Performance Check - Primary Processor Learn Corruption Fault			Primary Processor TPS or APPS minimum learned values fail compliment check			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1000sec continuous	
6. Processor Performance Check - Primary Processor Clock Fault			The ocillator failed for the Primary processor where the clock is outside the threshold	27.85 kHz and 37.68 kHz		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	100ms continuous	
9. Processor Performance Check - Secondary Processor ALU Fault			The secondary check of the ALU failed to compute the expected result			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
10. Processor Performance Check - Secondary Processor Register Configuration Fault			Secondary processor failed configuration check of the registers.			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
11. Processor Performance Check - Secondary Processor StackFault			Secondary processor checks stack beginning and end point for pattern written at initialization .			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
12. Processor Performance Check - Secondary Processor MAIN Processor Fault			Secondary processor check that the Primary processor hasen't set a select combination of internal processor faults			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
13. Processor Performance Check - Primary Processor ALU Fault			The primary processor check of the ALU failed to compute the expected result	Two Consecutive Times			12.5ms continuous	
14. Processor Performance Check - Primary Processor Register Configuration Fault			Primary processor failed configuration check of the registers.				12.5ms continuous	
Main & MHC state of health fault	P0607	Primary state of health (SOH) discrete line is not toggling between the two processors for a time >	0.4875sec			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4875sec continuous	Type:C MIL: NO Trips: 1
Control Module Accelerator Pedal Position (APP) System Performance	P060D	Verify that the indicated accelerator pedal position calculation is correct	1. PPS sensor switch fault - When the APP sensor 2 is shorted to ground, the sensor value is >	41		1. Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions Engine Running TPS minimum learn is not active No Pedal related errors or diagnostic faults. Diagnostic is enabled (Only applicable for Legacy accelerator pedals)	Consecutive checks within 200ms or 2/2 counts; 175msec/count	Type: A MIL: YES Trips:

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			2. Difference between primary processor indicated accelerator pedal position and secondary indicated accelerator pedal position is >	5		2. Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions MAIN Pedal Sync Error is FALSE	44/40 counts or 39 counts continuous; 12.5 msec/count in the Secondary processor	1
						Engine Running TPS minimum learn is not active Diagnostic is enabled (Only applicable for Legacy accelerator pedals)		
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write did not complete		Ignition State	= unlock/accesory, run, or crank	1 test failure Diagnostic runs once at powerup	Type A 1 trips
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on th 5 volt reference circuit #1	Primary Processor Vref1 < Primary Processor Vref1 >	4.432 4.659		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39 counts or 0.1875sec continuous; 12.5 msec/count in Primary processor	Type: A
			Secondary Processor Vref1 < Secondary Processor Vref1 >	4.432 4.659			19/39 counts or 15 counts continuous; 12.5 msec/count in Secondary processor	MIL: YES Trips: 1
Malfunction Indicator Lamp (MIL) Control Circuit (ODM)	P0650	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Remote Vehicle Start is not active	11 volts ≤ Voltage ≤ 18 volts	20 failures out of 25 samples 250 ms / sample Continuous	2 trip Type B NO MIL

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on th 5 volt reference circuit #2	Primary Processor Vref2 < or Primary Processor Vref2 >	4.432 4.659		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39 counts or 0.1875sec continuous; 12.5 msec/count in main /Secondary processor	Type: A MIL: YES Trips: 1
			Secondary Processor Vref1 < Secondary Processor Vref1 >	4.432 4.659			19/39 counts or 15 counts continuous; 12.5 msec/count in Secondary processor	
Powertrain Relay Control (ODM)	P0685	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage	11 volts ≤ Voltage ≤ 18 volts	8 failures out of 10 samples 250 ms / sample Continuous	2 trips Type B
Powertrain Relay Feedback Circuit Low	P0689	This DTC is a check to determine if the Powertrain relay is functioning properly.	PT Relay feedback voltage is	≤ 5 volts	Powertrain relay commanded "ON" No active DTCs:	PowertrainRelayStateOn Error	5 failures out of 6 samples 1second / sample	1 trips Type C
Powertrain Relay Feedback Circuit High	P0690	This DTC is a check to determine if the Powertrain relay is functioning properly.	PT Relay feedback voltage is Stuck Test: PT Relay feedback voltage is when commanded 'OFF'	≥ 18 volts > 2 volts	Powertrain relay commanded "ON" No active DTCs:	PowertrainRelayStateOn Error	5 failures out of 6 samples 1second / sample Stuck Test: 100 ms/ sample Continous failures ≥ 2 seconds	2 trips Type B
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 1 trips MIL: NO
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBTCM is valid	**with GMLAN:** Serial Communication 2's		**All except Class2 with PWM:** Serial communication to EBTCM	No loss of	**All except Class2 PWM:**	1 trip(s) Type C

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			complement message - ($140 for PPEI2 or $1C9 for PPEI3) **OR** Serial Communication message ($140 for PPEI2 or $1C9 for PPEI3) rolling count value	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one	(U0108) Power Mode Engine Running Status of traction in GMLAN message ($380 for PPEI2 or $4E9 for PPEI3)	communication = Run = True = Traction Present	Count of 2's complement values not equal >= 10 **OR** 10 rolling count failures out of 10 samples Performed every 25 msec	
			with PWM: PWM Duty cycle **OR** PWM Duty cycle	< 5 Pct > 95 Pct	**Only Class2 with PWM:** Traction Status for PWM ($2B3C Class2 message) Engine Run Time	= Traction Present > 2 Seconds	**Only Class2 with PWM:** 12 failures out of 30 samples Performed every 50 msec	
Inlet Airflow System Performance	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	Filtered Throttle Model AND (ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 350 kPa/(g/s) > 15 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)	>= 400 RPM <= 8191 RPM > 70 Deg C < 125 Deg C > -20 Deg C < 125 Deg C > 0.125 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 1 multiplied	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						by MAP1 Residual Weight Factor based on RPM MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
O2S Insufficient Switching Bank 1 Sensor 1	P1133	This DTC determines if the O2 sensor is no longer sufficiently switching.	Fault condition present if Half Cycle L/R or R/L Switches are below the threshold. OR If Slope Time L/R or R/L Switches are below the threshold.	H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to table named "P1133 - O2S HC L to R Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table & "P1133 - O2S HC R to L Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table in Supporting tables tab) OR S/T L/R switches < 3, or S/T R/L switches < 3	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA	Sample time is 60 seconds Frequency: Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						FuelTankPressureSnsr Ckt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSe nsor_FA EngineMisfireDetected _FA	been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 1.5 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 1.5 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	17 gps <= engine airflow <= 55 gps		
					Engine speed	1250 <= RPM <= 2850		
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 7 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 1.3 mgrams		
					Baro	= Not Defaulted		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						not = Power Enrichment		
					Fuel Control State			
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for			
					Time	> 4.5 seconds		
Air Fuel Imbalance Bank 1	P1174	Determines if the air-fuel delivery system is imbalanced by monitoring the pre-catalyst O2 sensor voltage characteristics	The Bank 1 AFIM Filtered Length Ratio variable exceeds a value of	> 1.600	System Voltage	*10 < V < 18 for > 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop	Type B 2 Trip(s)
					Engine Run Time	> 50 seconds	AFIM Filtered Length Ratio variable is updated after every 2.5 seconds of valid data.	
					ECT	> 10 oC		
					Engine speed	*1250 < rpm < 3500*		
					Mass Airflow	*7 < g/s < 400*		
					PerCent Ethanol	< 85 %		
					Delta O2 voltage during previous 12.5ms	> 5 and -5		
					O2 sensor switches	> 0 times during current 2.5 second sample period		
					Quality Factor	> 0 in the current operating region		
					For DoD equipped vehicles only	No DoD state change during current 2.5 second sample period.		
					The AFIM Filtered Length Ratio is determined by calculating the difference between the measured O2 voltage length (accumulated O2 voltage over a 2.5 second period) and an emissions-correlated threshold value, divided by the threshold value, and finally multiplied by a Quality Factor (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The resulting ratio is then filtered utilizing a first-order lag filter.			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					The first report is delayed for 100 seconds to allow time for the AFIM Filtered Length Ratio variable to saturate. This minimizes the possibility of reporting a pass before a potential failure could be detected. **Closed Loop fueling enabled** A Function of Coolant Temperature based on Start-up coolant temp. and a function of Time also based on Start-up coolant temp. **Please see "Supporting Tables" Tab** Fuel System Status | LONG FT Enabled **Disable Conditions:** **MIL not illuminated for DTC's** EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA Ethanol Composition Sensor FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA O2S_Bank_1_Sensor_1_FA O2S_Bank_2_Sensor_1_FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Device Control | **Not Active** Intrusive Diagnostics | **Not Active** Engine OverSpeed Protection | **Not Active** Reduced Power Mode (ETC DTC) | **Not Active** PTO | **Not Active** Traction Control | **Not Active**			
EngineMetal OvertempActive	P1258	The objective of the algorithm is to protect the engine in the event of engine metal overtemperature, mainly due to loss of coolant	The ECM detects that the engine coolant has exceeded a threshold for certain amount of time.	Engine Coolant > 131 for 2 seconds	If feature was active and it set the coolant sensor fault then feature will be enabled on coolant sensor fault pending on the next trip.	KeEMOG_b_DisableOvertempProtect = 0 Feature is enabled only if KeEMOG_b_DisableOvertempProtect = 0 and Engine Run time > 2	Time that EMOP active must be true for P1258 to be set is 0 seconds	Type A 1 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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 estimated accumulated exhaust power OR Average desired accumulated exhaust power - Average estimated accumulated exhaust power (EWMA filtered)	< -4.50 KJ/s (high RPM failure mode) > 0.25 KJ/s (low RPM failure mode)	Cold Start Emission Reduction Strategy Is Active. The strategy is considered active if either the Spark cat light off or Idle cat light off strategies are considered active. Spark CLO is considered active when the CatLightOffDesiredSparkRetard (function of idle RPM and air per cylinder and scaled based on coolant and engine run time) <= 5.00 degrees of Spark Idle CLO is considered active if the desired RPM exceeds a base RPM value (function of coolant) plus an RPM offset. The amount of RPM offset to be considered catalyst light off is also a function of coolant temperature. Refer to "Supporting Tables" for details.		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.	Type A 1 Trip(s)
					Vehicle Speed < 2 kph Throttle Position < 0.50 percent A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. When the delay timer > 3.50 seconds the diagnostic will continue the calculation. For Manual Transmission vehicles, the clutch must be fully engaged. Clutch Pedal Position < 13.00 OR The clutch must be fully disengaged. Clutch Pedal Position > 88.00 ***General Enable*** **DTC's Not Set** MAF_SensorFA MAP_SensorFA IAT_SensorCircuitFA IAT2_SensorCircuitFA ECT_Sensor_FA CrankSensorFaultActive IAC_SystemRPM_FA TPS_FA VehicleSpeedSensor_FA EngineMisfireDetected_FA IgnitionOutputDriver_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA FuelInjectorCircuit_FA Clutch Sensor FA			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Transmission Engine Speed Request Circuit	P150C	Determines if engine speed request from the TCM is valid	Serial Communication rolling count value Transmission engine speed protection	+ 1 from previous $19D message (PTEI3) not equal to 2's complement of transmission engine speed request + Transmission alive rolling count	Diagnostic enable bit Engine run time # of Protect Errors # of Alive Rolling Errors No idle diagnostic 506/507 code No Serial communication loss to TCM Engine Running Power mode	 1 0.5 10 3 IAC_SystemRPM_FA (U0101) = TRUE Run Crank Active	Diagnostic runs in 25 ms loop	2 trips Type B
Throttle Actuator Control - Position Performance	P1516	1) Detect a throttle positioning error	The throttle model and actual Throttle position differ by > or The throttle model and actual Throttle position differ by <	7.04% 7.04%	Engine Running or Ignition Voltage > and Ignition Voltage > and Throttle is being Controlled and Communication Fault (SPI is not set) and TPS minimum learn is not active Ignition voltage failure is false (P1682)	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions 11 5.4	0.1875sec in the Secondary processor	Type: a MIL: YES Trips: 1
		2) Detect throttle control is driving the throttle in the incorrect direction	Thottle Position >	45.11%	(Throttle is being Controlled and TPS minimum learn is active) or	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1375sec continuous	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Reduce Engine Power is Active			
		3) Degraded Motor	Desired throttle position is stable within 0.25% for 4.0000sec and the delta between Indicated throttle position and desired throttle position in greater than 2.00%		Engine Running or Ignition Voltage >	11	0.4875sec continuous on secondary processor	
					and Ignition Voltage >	5.4		
					and Throttle is being Controlled			
					and Communication Fault (SPI is not set)			
					and TPS minimum learn is not active			
					Ignition voltage failure is false (P1682)			
Remote Vehicle Speed Limiting Signal Circuit	P162B	Determines if the speed request from OnStar is valid	**Password Protect error** - Serial Communication message - ($3ED)	Message <> two's complement of message	Vehicle Requested Speed Limit	< 183 Kph	>= 10 Password Protect errors out of 10 samples	Type C 1 trip(s)
			OR					
			Rolling count error - Serial Communication message ($3ED) rolling count value	Message <> previous message rolling count value + one			>= 10 Rolling count errors out of 10 samples	
							Performed every 25 msec	
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 – ETC Run/Crank| >	3.00Volts	Powertrain commanded on and		240/480 counts or 0.1750sec continuous; 12.5 msec/count in main processor	Type: A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Run/crank voltage >	Table, f(IAT). See supporting tables		MIL: YES
					and Run/crank voltage >	5.5		Trips: 1
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error	Difference between measured throttle position and modeled throttle position >	7.04%		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 15/15 counts; 12.5 msec/count in the primary processor	Type: A
					TPS minimum learn is not active and Throttle is being Controlled and			MIL: YES
			Difference between measured throttle position and modeled throttle position <	7.04%	(Engine Running or Ignition Voltage > or	11		
					Ignition Voltage >) Ignition voltage failure is false (P1682)	5.5		Trips: 1
		2) Detect throttle control is driving the throttle in the incorrect direction or exceed the reduced power limit	Thottle Position >	44.61%	TPS minimum learn is active		2. 11counts; 12.5 msec/count in the primary processor	
			Thottle Position >	44.41%	Reduced Power is True			
Throttle return to default	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	TPS1 Voltage >	1.897		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4969sec continuous	Type: C
			AND		Throttle de-energized			
			TPS2 Voltage >	1.997	No TPS circuit faults			MIL: NO
			On the Primary processor		PT Relay Voltage >	5.5		Trips: 1
			OR					
			TPS1 Voltage >	1.897				
			AND					
			TPS2 Voltage >	1.997				
			On the Secondary processor					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Accelerator Pedal Position (APP) Sensor #1	P2120	Detects a continuous or intermittent short or open in APP1 circuit on the secondary processor but sensor is in range on the primary processor	Secondary APP1 Voltage <	0.463		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	Type: A
			or Secondary APP1 Voltage >	4.75	No 5 V reference error No 5 V reference DTCs			MIL: YES Trips: 1
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detects a continuous or intermittent short or open in APP1 circuit on both processors or just the primary processor	1. Primary APP1 Voltage <	0.463		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39counts or 14counts continuous; 12.5 msec/count in the primary processor	Type: A
					No 5 V reference error			MIL: YES
			2. Secondary APP1 Voltage <	0.463	No 5 V reference DTCs		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	Trips: 1
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detect a continuous or intermittent short in the APP1 sensor on on both processors or just the primary processor	1. Primary APP1 Voltage >	4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39counts or 14counts continuous; 12.5 msec/count in the primary processor	Type: A
			2. Secondary APP1 Voltage >	4.75	No 5 V reference error No 5 V reference DTCs		2. 19/39counts or 14counts	MIL: YES

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
							continuous; 12.5 msec/count in the secondary processor	Trips: 1
Accelerator Pedal Position (APP) Sensor 2	P2125	Detects a continuous or intermittent short or open in APP2 circuit on the secondary processor but sensor is in range on the primary processor	Seondary APP2 Voltage < or Secondary APP2 Voltage >	0.325 2.6	No 5 V reference error No 5 V reference DTCs	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	Type: A MIL: YES Trips: 1
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detects a continuous or intermittent short or open in APP2 circuit on both processors or just the primary processor	1. Primary APP2 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39counts or 14counts continuous; 12.5 msec/count in the primary processor	Type: A
			2. Secondary APP2 Voltage <	0.325	No 5 V reference error No 5 V reference DTCs		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	MIL: YES Trips: 1

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detect a continuous or intermittent short in the APP2 sensor on on both processors or just the primary processor	1. Primary APP2 Voltage >	2.6	No 5 V reference error	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39 counts or 14counts continuous; 12.5 msec/count in the primary processor	Type: A
			2. Secondary APP2 Voltage >	2.6	No 5 V reference DTCs		2. 19/39counts or 14counts continuous; 12.5 msec/count in the secondary processor	MIL: YES Trips: 1
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detects a continuous or intermittent correlation fault between TP sensors #1 and #2 on either processor	1. On the Primary processor, the difference between TPS1 displaced and TPS2 displaced >	6.998% offset at min. throttle position with it linearly increasing to 10% at max. throttle position	No TPS Sensor Faults No 5 V reference DTCs	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79/159 counts or 58 counts continuous; 3.125 msec/count in the primary processor	Type: A MIL: YES Trips: 1
			On the Secondary processor, the difference between TPS1 displaced and TPS2 displaced >	7.00% offset at min. throttle position with it linearly increasing to 10% at max. throttle position				
			2. On the primary processor, the difference between (raw min TPS1) and (raw_min TPS2) >	5.00%	No TPS Sensor Faults No 5 V reference DTCs	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19/39 counts or 15 counts continuous; 12.5 msec/count in the secondary processor	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			On the secodary processor, the difference between (raw min TPS1) and (raw min TPS2) >	5.00%				
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on either processor	1. On the primary processor, the difference between APP 1 displaced and APP 2 displaced is >	5.000% offset at min. throttle position with it linearly increasing to 10% at max pedal position	No APP Sensor Faults No 5 V reference DTCs	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1. 19/39 counts intermittent or 15 counts continuous, 12.5 msec/count in the primary processor	Type: A MIL: YES
			On the secondary processor, the difference between APP 1 displaced and APP 2 displaced is >	5.00% offset at min. throttle position with it linearly increasing to 10% at max pedal position				
			2. On the primary processor, the difference between the learned PPS1 min and PPS2 min >	5.00%		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2. 19/39 counts intermittent or 15 counts continuous, 12.5 msec/count in the secondary processor	Trips: 1
			On the primary processor, the difference between the learned PPS1 min and PPS2 min >	5.00%				
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 Primary processor, TPS Voltage >	18.70%		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2.0secs continuous	Type: A
			or During TPS min learn on the Secondary processor, TPS Voltage >	18.70%	No TPS circuit errors No TPS circuit faults Ignition voltage failure is false (P1682) Minimum TPS learn active			MIL: YES Trips: 1

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			and Number of learn attempts >	10counts				
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 (Split volume catalyst only)	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 cannot achieve the rich threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal < 775 mvolts AND 2) Accumulated air flow during stuck lean test > 48 grams.	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed to enable test Engine Speed to disable test Engine Airflow Vehicle Speed to enable test Vehicle Speed to disable test Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell	TPS_ThrottleAuthority Defaulted 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 < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False 1175 <= RPM <= 1850 975 <= RPM <= 2100 3 gps <= Airflow <= 12 gps 46.6 mph <= Veh Speed <= 69.6 mph 42.3 mph <= Veh Speed <= 74.6 mph 0.92 <= C/L Int <= 1.07 = TRUE not in control of purge not in estimate mode = enabled	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed. <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY 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 on Time Predicted Catalyst temp Fuel State All of the above met for at least 3.0 seconds, and then the Force Cat Rich intrusive stage is requested.	= not active = not active = not active >= 180.0 sec 580 ºC <= Cat Temp <= 825 ºC = DFCO possible	new and cannot be enabled in service	
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2 (Split volume catalyst only)	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 cannot achieve the lean threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal > 100 mvolts AND 2) Accumulated air flow during stuck rich test > 32 grams.	No Active DTC's B1S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed	TPS_ThrottleAuthority Defaulted 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 < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False 1175 <= RPM <= 1850 3 gps <= Airflow <= 12	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed. <u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine Airflow Vehicle Speed Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell Power Take Off EGR Intrusive diagnostic All post sensor heater delays O2S Heater on Time Predicted Catalyst temp Fuel State DTC's Passed DTC's Passed DTC's Passed	[illegible] gps 46.6 mph <= Veh Speed <= 69.6 mph 0.92 <= C/L Int <= 1.07 = TRUE not in control of purge not in estimate mode = enabled = not active = not active = not active >= 180.0 sec 580 ºC <= Cat Temp <= 825 ºC = DFCO possible = P2270 (and P2272 (if applicable)) = P013E (and P014A (if applicable)) = P013A (and P013C (if applicable)) After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
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 Error and Signal Variation	< 0.50 kPa < 1.00 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts	Stuck in range cumulative time > 5.0 seconds	Type B 2 trips
				disable conditions:	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRValveControlCircuit FA AIRPumpControlCircuit FA	Frequency: Once per trip when SAI pump commanded On	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		
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 Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 10.0 kPa < -10.0 kPa > 50.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage **Skewed sensor cumulatative test weight is based on distance from the last Baro update** **Baro Skewed Sensor Weight Factor**	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts	Skewed sensor cumulative test weight > 5.0 seconds Continuous 6.25ms loop	Type B 2 trips
				disable conditions:	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds Transfer Case not in 4WD Low AIRValveControlCircuitFA AIRPumpControlCircuitFA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA MAF_SensorFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		
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	< 5 % of 5Vref			400 failures out of 500 samples	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				disable conditions:	No active DTCs:	ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	6.25 ms loop Continuous	
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 **disable** **conditions:**	No active DTCs:	ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	400 failures out of 500 samples 6.25 ms loop Continuous	Type B 2 trips
Secondary AIR System Shut-off Valve Stuck Open (Single Bank System)	P2440	This DTC detects if one or both of the AIR system control valves is stuck open This test is run during Phase 2 (Pump commanded On, valve commanded closed)	AIR pressure error	< **Bank 1 Valve Pressure Error** table or > 32.0 kPa **disable** **conditions:**	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage Stability Time **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** MAP Engine Speed MAF No active DTCs:	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts > 0.5 seconds AIR diagnostic Phase 1 passed < 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA MAP_SensorFA IAT_SensorFA	Phase 2 Conditional test weight > 1.5 seconds Frequency: Once per trip when AIR pump commanded On	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
Secondary AIR System Pump Stuck On (Single Bank System)	P2444	This DTC detects if the SAI pump is stuck On This test is run during Phase 3 (Pump commanded Off, valve commanded closed)	AIR pressure error	> **Bank 1 Pump Pressure Error** table or < -32 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage Stability Time	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts > 10.0 seconds AIR diagnostic Phase 1 passed AIR diagnostic Phase 2 passed	Phase 3 Cumlatative test weight > 3.0 seconds Frequency: Once per trip when AIR pump commanded On	Type: A 1 trip(s)
					Phase 3 cumulatative test weight is based on distance from the last Baro update **Baro Skewed Sensor Weight Factor**			
				disable **conditions:**	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA MAP_SensorFA IAT_SensorFA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	**Protect error** - Serial Communication message - ($150 - PTEI2, $199 - PTEI3)	Message <> two's complement of message	Diagnostic enabled/disabled	Enabled	>= 16 Protect errors during key cycle	Type B 2 trips
			OR					
			Rolling count error - Serial Communication message ($150 - PPEI2, $199 - PPEI3) rolling count value	Message <> previous message rolling count value + one			>= 6 Rolling count errors out of ten samples	
			OR		Power Mode	= Run		
			RAM Error - Serial Communication message ($150 - PPEI2, $199 - PPEI3)	Trans torque reduction or type request portion of message 2's complement values <>	Engine Running	= True		
			OR		Run/Crank Active	> 0.50 Sec	>= 3 RAM errors during key cycle	
			TCM Requested Torque Increase message $199	> 500 Nm			>= 3 range out of 10 samples	
			OR					
			Multi-transition - Trans torque intervention type request change	Request change from not min limit to min limit			>= 3 multi-transitions out of 5 samples	
			OR					
			Serial communication from TCM	Loss of communication			> 0.20 seconds	
							Performed every 12.5 msec	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
ECM/PCM Internal Engine Off Timer Performance	P2610	This DTC determines if the engine off timer does not initialize or count properly. Clock rate test: Checks the accuracy of the 1 second timer by comparing it with the 12.5 ms timer	Initial value test: Initial ignition off timer value OR Initial ignition off timer value Clock rate test: Time between ignition off timer increments Time between ignition off timer increments Time since last ignition off timer increment Current ignition off time < old ignition off time Current ignition off timer minus old ignition off timer	 < 0 seconds > 10 seconds < 1 seconds > 1 seconds ≥ 1 seconds ≠ 1	ECM is powered down IAT Temperature	 -40 °C ≤ Temperature ≤ 125 °C	Initial value test: 3 failures 1.375 sec / sample Clock rate test: 8 failures out of 10 samples 1second / sample test runs once each key-off	Type B 2 trips DTC sets on next key cycle if failure detected
O2Sensor Circuit Range/ Performance Bank 1 Sensor 1	P2A00	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed Loop O2S ready flag A) O2S signal must be 1) O2S signal OR 2) O2S signal To set Closed Loop ready flag Closed Loop O2S ready flag B) Once set to ready O2S cannot be 1) O2S signal AND 2) O2S signal for time Then set Closed Loop ready flag	= False > 550 mvolts < 350 mvolts = True = True > 350 mvolts < 550 mvolts > 10.0 seconds = False	No Active DTC's System Voltage Engine Speed Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp Active Fuel State AFM Status Predicted Exhaust Temp (B1S1) Engine run time Fuel Enrichment **All of the above met for** Time	 TPS_ThrottleAuthority Defaulted MAP_SensorFA ECT_Sensor_FA FuelInjectorCircuit_FA P0131, P0151 P0132, P0152 10.0 volts < system voltage< 18.0 volts 500 RPM <= Engine speed <= 3000 RPM 3.2 gps <= Engine Airflow<= 30.0 gps >= 65.0 ºC = False = False DFCO not active = All Cylinders active >= 0.0 ºC > 100 seconds = Not Active > 5 seconds	200 failures out of 250 samples. Frequency: Continuous 100msec loop	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures out of these samples	≥ 5 counts ≥ 5 counts	CAN hardware is bus OFF for	≥ 0.0375 seconds	Diagnostic runs in 1000 ms loop	Type B 2 trips
Lost Communication With Transmission Control Module	U0101	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for this many counts out of these samples	12 counts 12 counts	Run/Crank Voltage Power mode is RUN Communication bus is not OFF or is typed as a C code Normal Communication is enabled Normal Transmit capability is TRUE The diagnostic system is not disabled The bus has been on for A message has been selected to monitor.	11 volts ≤ Voltage ≤ 18 volts > 3.0000 seconds	The diagnostic runs in the 1000 ms loop	Type B 2 trips

SUPPORTING TABLES

P0442: EONV Pressure Threshold Table (in Pascals)

X axis is fuel level in %
Y axis is temperature in deg C

	0.0000	6.2485	12.4969	18.7454	24.9939	31.2424	37.4908	43.7393	49.9878	56.2363	62.4847	68.7332	74.9817	81.2302	87.4786	93.7271	99.9756
-10.0000	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
-4.3750	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
1.2500	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
6.8750	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
12.5000	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
18.1250	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
23.7500	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
29.3750	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
35.0000	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
40.6250	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
46.2500	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
51.8750	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
57.5000	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
63.1250	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
68.7500	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
74.3750	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905
80.0000	-747.2716	-702.0266	-656.7816	-611.2934	-566.0485	-520.8035	-475.5586	-430.3136	-385.0686	-339.5804	-294.3355	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905	-249.0905

P0442: Estimate of Ambient Temperature Valid Conditioning Time

EAT Valid Conditioning Time (in seconds)
Axis is Ignition Off Time (in seconds)

Axis	Curve
0	300
600	350
1200	380
1800	420
2400	450
3000	450
3600	400
4200	350
4800	300
5400	300
6000	280
6600	250
7200	250
7800	230
8400	230
9000	210
9600	210
10200	200
10800	200
11700	190
12600	190
13500	180
14400	180
15300	180
16200	160
17100	160
18000	160
19200	160
20400	150
21600	150
22800	150
24000	130
25200	130

P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level

Purge Valve Leak Test Engine Vacuum Test Time (in seconds)
Axis is Fuel Level in %

Axis	Curve
0	60
6	60
12	60
19	60
25	60
31	60
37	60
44	60
50	60
56	60
62	60
69	60
75	60
81	60
87	60
94	60
100	60

SUPPORTING TABLES

CATD Section

MinimumEngineRunTime

Coolant Temp	40	50	60	70	80
Engine Run Time	100	60	30	15	0

MinCatTemp

		X_AXIS_PTS
CATD_ExhaustWarmMin_Loc_0	425	0
CATD_ExhaustWarmMin_Loc_1	425	1
CATD_ExhaustWarmMin_Loc_2	425	2
CATD_ExhaustWarmMin_Loc_3	425	3
CATD_ExhaustWarmMin_Loc_4	425	4
CATD_ExhaustWarmMin_Loc_5	425	5
CATD_ExhaustWarmMin_Loc_6	425	6
CATD_ExhaustWarmMin_Loc_7	425	7

MinAirflowToWarmCatalyst

Engine Coolant	0	45	90
MinAirFlowToWrmCat	10	8	6

Define Close Loop

KtFSTA_T_ClosedLoopTemp

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	75	75	72	70	50	45	45	45	45	45	45	45	45	45	45	45	45

KtFSTA_t_ClosedLoopTime

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120	120	120	120	120	110	110	110	110	60	45	20	20	45	60	60	60

P0325/P0330 OpenCircuitThresh

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
OpenCircuitThresh:	0	15	25	50	54	60	65	70	75	80	85	90	95	100	105	110

P0326 Knock Detection Enabled Factors:

FastRtdMax:

X - axis = Engine Speed (RPM)
Y - axis = Manifold Pressure (kPa)

	0	**512**	**1024**	**1536**	**2048**	**2560**	**3072**	**3584**	**4096**	**4608**	**5120**	**5632**	**6144**	**6656**	**7168**	**7680**	**8192**
20	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
30	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
40	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
50	0.0	0.0	0.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
60	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
70	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
80	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
90	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
100	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
110	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
120	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
130	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
140	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
150	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
160	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
170	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
180	14.0	14.0	14.0	14.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Knock Detection Enabled Factors:

Knock Detection Enabled = FastAttackRate * FastAttackCoolGain * FastAttackBaroGain

RPM:	**0**	**512**	**1024**	**1536**	**2048**	**2560**	**3072**	**3584**	**4096**	**4608**	**5120**	**5632**	**6144**	**6656**	**7168**	**7680**	**8192**
FastAttackRate:	3.00	2.90	2.70	2.50	2.50	2.70	3.10	3.24	3.56	4.14	4.50	4.50	5.50	5.50	5.50	5.50	5.50

ECT (deg. C):	**-40**	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**
FastAttackCoolGain:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Baro:	**55.00**	**61.25**	**67.50**	**73.75**	**80.00**	**86.25**	**92.50**	**98.75**	**105.00**
FastAttackBaroGain:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

P0327/P0332 ShortLowThresh

Engine Oil Temperature (deg C):	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
ShortLowThresh:	34000	34000	34000	34000	34000	34000	34000	34000	34000	32000	30000	28000	26000	24000	22000

P0328P0333 ShortHiThresh

Engine Oil Temperature (deg C):	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
ShortHiThresh:	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000

SUPPORTING TABLES

AFIM Section

KtOXYD_cmp_AFIM_LngthThrsh1

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
80	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
120	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
160	50000	50000	50000	50000	8320	9968	11408	11120	11920	12272	11696	10304	50000	50000	50000	50000	50000
200	50000	50000	50000	50000	10352	10992	10912	12256	11456	13136	12720	11376	50000	50000	50000	50000	50000
240	50000	50000	50000	50000	13216	14704	13600	14208	13664	14512	13712	11872	50000	50000	50000	50000	50000
280	50000	50000	50000	50000	14688	15472	17776	16336	13568	13584	13760	13040	50000	50000	50000	50000	50000
320	50000	50000	50000	50000	14272	15392	15216	17984	14256	14288	14992	14096	50000	50000	50000	50000	50000
360	50000	50000	50000	50000	13248	15664	14128	13872	13440	13200	15184	14832	50000	50000	50000	50000	50000
400	50000	50000	50000	50000	14368	14048	13760	14368	12864	15680	16480	15584	50000	50000	50000	50000	50000
440	50000	50000	50000	50000	13712	14272	13056	13584	13808	14496	15216	50000	50000	50000	50000	50000	50000
480	50000	50000	50000	50000	13168	14752	13744	13488	13856	14176	15472	50000	50000	50000	50000	50000	50000
520	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
560	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
640	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
720	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
800	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000

KtOXYD_K_AFIM_QualFactor1

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
200	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
240	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
280	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
320	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
360	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
400	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
440	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0
480	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0
520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
720	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Tables supporting AIR Diagnostics

P0411

SL Threshold Bank 1 Table — axis is average engine airflow during test in gm/sec

Axis	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
Curve	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0

P0411

Phase 1 Baro Test Weight Factor — axis is Baro in Kpa

Axis	40	50	60	70	80	90	100	110	120
Curve	0.0	0.0	0.5	1.0	1.0	1.0	1.0	0.5	0.0

P0411

Phase 1 MAF Test Weight Factor — axis is engine airflow in gm/sec

Axis	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
Curve	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

P0411

Phase 1 System Volt Test Weight Factor — axis is engine airflow in gm/sec

Axis	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
Curve	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.0	0.0	0.0

P0411

Phase 1 Amb Temp Test Weight Factor — axis is Deg C

Axis	-30	-20	-10	0	10	20	30	40	50
Curve	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0

P2440

Bank 1 Valve Pressure Error — axis weighted time in seconds

Axis	0	1	2	3	4	5	6	7	8
Curve	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0

P2440

Phase 2 Baro Test Weight Factor — axis is Baro in Kpa

Axis	40	50	60	70	80	90	100	110	120
Curve	0.0	0.0	0.5	1.0	1.0	1.0	1.0	0.5	0.0

P2440

Phase 2 MAF Test Weight Factor — axis is engine airflow in gm/sec

Axis	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
Curve	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

P2440

Phase 2 System Volt Test Weight Factor — axis is engine airflow in gm/sec

Axis	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

SUPPORTING TABLES

Curve	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.0	0.0	0.0

P2440

Phase 2 Amb Temp Test Weight Factor — **axis is Deg C**

Axis	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**	**40**	**50**
Curve	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0

P2444

Bank 1 Pump Pressure Error — **axis weighted time in seconds**

Axis	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Curve	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

FASD Section

P0171 & P0174 (LONG TERM ONLY Long Term Trim Lean

% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Long Term Fuel Trim Lean Threshold	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29

P0172 & P0175 (LONG TERM ONLY Non Purge Rich Limit

% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Long Term Fuel Non-Purge Rich Thre	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76

P0172 & P0175 (LONG TERM ONLY Purge Rich Limit

% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Long Term Fuel Purge Rich Threshold	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77

The following tables define when the engine goes closed loop

P0171, P0172, P0174 & P0175 **Closed Loop Enable Temp vrs Coolant Temp**

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	75	75	72	70	50	45	45	45	45	45	45	45	45	45	45	45	45

P0171, P0172, P0174 & P0175 **Closed Loop Enable Time vrs Coolant Temp**

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120	120	120	120	120	110	110	110	110	60	45	20	20	45	60	60	60

P0101, P0106, P0121, P012B, P1101: IFRD Residual Weighting Factors

TPS Residual Weight Factor based on RPM

RPM	0	500	1500	1800	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	0.000	0.250	0.300	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

MAF Residual Weight Factor based on RPM

RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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

MAF Residual Weight Factor Based on MAF Estimate

gm/sec	0.0	50.0	70.0	73.0	76.0	79.0	82.0	85.0	89.0	95.0	100.0	110.0	120.0	150.0	200.0	280.0	350.0
	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

MAP1 Residual Weight Factor based on RPM

RPM	0	500	1500	1800	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	0.000	0.500	0.600	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

MAP2 Residual Weight Factor based on RPM

RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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

SCIAP1 Residual Weight Factor based on RPM

RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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

SCIAP2 Residual Weight Factor based on RPM

RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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

Boost Residual Weight Factor based on % of Boost

% Boost	0.00	0.06	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00
	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

Supercharger Intake Flow Rationality Diagnostic Failure Matrix

DTC Set	TPS Model Failure	MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	SCIAP 1 Model Failure	SCIAP 2 Model Failure
No DTC	F	F	F	F	F	F
No DTC	F	F	F	F	F	T
No DTC	F	F	F	F	T	F
P012B	F	F	F	F	T	T
No DTC	F	F	F	T	F	F
P1101	F	F	F	T	F	T
P1101	F	F	F	T	T	F
P1101	F	F	F	T	T	T
No DTC	F	F	T	F	F	F
P1101	F	F	T	F	F	T
P1101	F	F	T	F	T	F
P1101	F	F	T	F	T	T
P0106	F	F	T	T	F	F
P1101	F	F	T	T	F	T
P1101	F	F	T	T	T	F
P1101	F	F	T	T	T	T
No DTC	F	T	F	F	F	F
P0101	F	T	F	F	F	T
No DTC	F	T	F	F	T	F
P0101, P012B	F	T	F	F	T	T
P1101	F	T	F	T	F	F

SUPPORTING TABLES

P0101	F	T	F	T	F	T
P1101	F	T	F	T	T	F
P0101, P012B	F	T	F	T	T	T
P1101	F	T	T	F	F	F
P1101	F	T	T	F	F	T
P1101	F	T	T	F	T	F
P1101	F	T	T	F	T	T
P1101	F	T	T	T	F	F
P1101	F	T	T	T	F	T
P1101	F	T	T	T	T	F
P1101	F	T	T	T	T	T
P0121	T	F	F	F	F	F
No DTC	T	F	F	F	F	T
P0121	T	F	F	F	T	F
P1101	T	F	F	F	T	T
P1101	T	F	F	T	F	F
P1101	T	F	F	T	F	T
P1101	T	F	F	T	T	F
P1101	T	F	F	T	T	T
P0121	T	F	T	F	F	F
P1101	T	F	T	F	F	T
P0121	T	F	T	F	T	F
P1101	T	F	T	F	T	T
P1101	T	F	T	T	F	F
P1101	T	F	T	T	F	T
P1101	T	F	T	T	T	F
P1101	T	F	T	T	T	T
P0121	T	T	F	F	F	F
P1101	T	T	F	F	F	T
P0121	T	T	F	F	T	F
P1101	T	T	F	F	T	T
P1101	T	T	F	T	F	F
P1101	T	T	F	T	F	T
P1101	T	T	F	T	T	F
P1101	T	T	F	T	T	T
P0121	T	T	T	F	F	F
P1101	T	T	T	F	F	T
P0121	T	T	T	F	T	F
P1101	T	T	T	F	T	T

P0116: Fail if power up ECT exceeds IAT by these values

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

-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
80	80	80	60	60	40	40	30	30	30	30	30	30	30	30	30	30

P0128: Maximum Accumulated Airflow for IAT and Start-up ECT conditions

Z axis is the accumulated airflow failure threshold (grams)
X axis is ECTTemperature at Power up (°C)
Y axis is IAT min during test (°C)

	IAT Range Low	IAT Range Hi	-40	-28	-16	-4	8	20	32	44	56	68	80
Primary	10.0 ° C	54.5 ° C	8530	8530	8530	8530	8530	7450	6370	5290	4210	3130	2050
Alternate	-7.0 ° C	10.0 ° C	9626	9626	9626	8594	7562	6530	5498	4466	3434	2402	1370

P0300-P0308: Idle SCD

(decel index (> Idle SCD AND > Idle SCD ddt Tables))

load
Load

	500	600	700	800	900	1000	1200	1400	1600
8	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Idle SCD ddt

load

	500	600	700	800	900	1000	1200	1400	1600
8	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767

SUPPORTING TABLES

25	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: SCD Delta

OR (decel index >SCD Delta **AND** > SCD Delta ddt Tables))

load
Load

	400	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**	**1400**	**1600**	**1800**	**2000**
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: SCD Delta ddt

load

	400	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**	**1400**	**1600**	**1800**	**2000**
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Idle Cyl Mode

OR (decel index (>Idle Cyl Mode **AND** > Idle Cyl Mode ddt Tables))

load
Load

	500	**600**	**700**	**800**	**900**	**1000**	**1200**	**1400**	**1600**
8	1700	1600	1350	900	420	350	215	170	110
9	1600	1480	1300	800	400	296	200	160	97
11	1550	1460	1170	720	450	349	235	158	80
12	1500	1427	1221	886	586	425	275	173	92
13	1650	1568	1365	900	665	470	290	190	116
15	1850	1775	1385	975	779	561	323	196	146
17	2000	1864	1498	1031	797	576	349	218	149
19	2200	2151	1650	1120	865	699	394	263	158
22	2450	2326	1808	1537	1169	866	487	307	188
25	2800	2743	1900	1669	1309	985	557	332	221
29	3100	3000	2100	1800	1490	1054	606	355	252
33	3200	3100	2200	1900	1600	1058	700	413	271
38	3300	3200	2300	2000	1750	1277	774	480	330
42	3400	3300	2550	2250	1850	1371	897	503	367
48	3500	3400	2800	2475	1907	1521	1196	594	399
54	3600	3500	3000	2700	2300	2063	1250	699	478
61	3700	3600	3400	3010	2500	2300	1345	775	550

P0300-P0308: Idle Cyl Mode ddt

load

	500	**600**	**700**	**800**	**900**	**1000**	**1200**	**1400**	**1600**
8	1700	1600	1475	900	540	420	285	185	115
9	1600	1500	1208	771	500	397	269	175	107
11	1500	1400	1150	870	600	438	275	166	105
12	1600	1500	1307	1025	675	476	290	190	119
13	1800	1700	1539	1050	745	550	325	200	135
15	1975	1887	1657	1067	830	571	372	206	144
17	2000	1900	1700	1111	831	669	402	241	160
19	2400	2170	1775	1273	949	765	428	260	205
22	2600	2400	1839	1524	1067	892	462	269	221
25	3000	2800	1970	1636	1305	1001	471	343	264
29	3200	3000	2400	1850	1527	1083	552	361	304
33	3400	3200	2600	2050	1600	1277	685	489	360
38	3600	3400	2850	2300	2007	1400	825	552	368
42	3800	3600	3300	2550	2025	1665	950	575	400
48	4000	3800	3500	2900	2057	1896	1050	624	418
54	4200	4000	3700	3100	2500	2071	1150	750	475
61	4400	4200	3900	3300	2600	2300	1250	850	550

SUPPORTING TABLES

P0300-P0308: Cyl Mode

OR (decel index > Cyl Mode AND > Cyl Mode ddt Tables)

load
Load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	1800	1700	1600	1350	900	420	350	289	215	170	110	88	60	40	34	28	23	20	9	8	7	6	6	5	5	5
9	1700	1600	1480	1300	800	400	296	272	200	160	97	75	52	35	30	25	21	17	8	7	6	5	5	4	4	4
11	1650	1550	1460	1170	720	450	349	306	235	158	80	60	54	37	31	24	19	15	9	7	6	5	5	4	4	4
12	1600	1500	1427	1221	886	586	425	310	275	173	92	71	58	42	35	26	23	17	10	7	7	6	5	4	4	4
13	1750	1650	1568	1365	900	665	470	359	290	190	116	81	62	44	33	28	22	18	12	8	7	6	5	4	4	4
15	1950	1850	1775	1385	975	779	561	433	323	196	146	93	69	54	41	32	26	20	14	10	8	7	5	4	4	4
17	2100	2000	1864	1498	1031	797	576	472	349	218	149	98	75	57	44	35	29	23	15	11	8	7	6	5	4	4
19	2300	2200	2151	1650	1120	865	699	534	394	263	158	121	89	70	53	41	33	25	17	13	9	8	6	5	5	5
22	2550	2450	2326	1808	1537	1169	866	566	487	307	188	136	101	80	60	48	39	30	20	15	10	9	7	6	6	6
25	2900	2800	2743	1900	1669	1309	985	631	557	332	221	152	119	99	71	53	46	32	24	16	12	10	8	7	7	7
29	3200	3100	3000	2100	1800	1490	1054	828	606	355	252	178	138	109	80	63	50	40	26	19	14	10	9	7	7	7
33	3300	3200	3100	2200	1900	1600	1058	909	700	413	271	197	159	121	94	70	59	45	29	22	16	11	10	8	8	8
38	3400	3300	3200	2300	2000	1750	1277	991	774	480	330	239	179	133	94	85	65	50	33	23	17	12	11	8	8	8
42	3500	3400	3300	2550	2250	1850	1371	1161	897	503	367	259	204	146	119	88	68	51	37	28	19	14	12	9	9	9
48	3600	3500	3400	2800	2475	1907	1521	1328	1196	594	399	311	236	175	138	106	87	67	45	31	22	16	13	9	9	9
54	3700	3600	3500	3000	2700	2300	2063	1490	1250	699	478	343	276	196	161	125	96	74	50	35	24	19	14	10	10	10
61	3800	3700	3600	3400	3010	2500	2300	1550	1345	775	550	400	335	235	200	146	112	85	56	41	28	21	15	11	11	11

P0300-P0308: Cyl Mode ddt

load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	1800	1700	1600	1475	900	540	420	340	285	185	115	92	58	47	33	32	23	20	12	9	8	7	6	6	6	6
9	1700	1600	1500	1208	771	500	397	320	269	175	107	86	66	48	39	31	22	19	11	8	7	6	6	6	6	6
11	1600	1500	1400	1150	870	600	438	360	275	166	105	80	61	45	36	30	21	18	12	8	6	6	5	5	5	5
12	1700	1600	1500	1307	1025	675	476	375	290	190	119	91	71	48	43	35	26	20	14	10	7	6	5	5	5	5
13	1900	1800	1700	1539	1050	745	550	437	325	200	135	95	73	49	43	36	26	23	15	11	7	6	6	6	6	6
15	2075	1975	1887	1657	1100	856	571	478	372	206	144	106	83	60	47	40	31	24	17	12	9	6	6	6	6	6
17	2100	2000	1900	1700	1146	875	690	550	402	241	160	120	98	68	52	47	35	28	19	13	9	6	6	6	6	6
19	2500	2400	2170	1775	1313	1055	851	575	442	271	205	136	113	81	64	53	40	29	23	15	11	7	6	6	6	6
22	2700	2600	2400	1839	1572	1256	1050	683	497	281	221	159	131	94	77	61	48	32	26	18	12	8	6	6	6	6
25	3100	3000	2800	1970	1687	1451	1164	814	507	362	264	184	149	126	84	67	54	41	30	20	14	10	7	6	6	6
29	3300	3200	3000	2400	1850	1591	1178	819	588	380	304	207	186	140	99	81	59	49	35	22	17	11	8	7	7	7
33	3500	3400	3200	2600	2050	1600	1277	1000	707	505	360	252	196	152	119	93	73	52	39	25	19	13	9	7	7	7
38	3700	3600	3400	2850	2300	2007	1400	1075	825	552	368	304	227	173	127	107	79	60	45	28	21	14	11	8	8	8
42	3900	3800	3600	3300	2550	2025	1665	1200	950	575	400	353	260	201	151	111	83	63	48	34	26	17	12	9	9	9
48	4100	4000	3800	3500	2900	2057	1896	1300	1050	624	418	373	306	232	170	134	103	94	56	41	29	20	13	10	10	10
54	4300	4200	4000	3700	3100	2500	2071	1400	1150	750	475	400	325	267	204	150	124	95	68	43	30	22	14	10	10	10
61	4500	4400	4200	3900	3300	2600	2300	1500	1250	850	550	440	385	323	246	175	137	100	72	48	35	26	18	11	11	11

P0300-P0308: Rev Mode Table

OR (decel index > Rev Mode Table)

load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: AFM Mode Table

OR (decel index > AFM Table if active fuel management)

load
Load

	400	500	600	700	800	900	1000	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Zero torque engine load

RPM	Pct load
400	9.80
500	9.43
600	9.32

Note: Zero torque is adjusted for Baro since load for misfire thresholds is relative to (maximum air density PID $1188 SAE xxx), not (current density as defined PID $04 SAE1979)

SUPPORTING TABLES

700	9.22
800	9.13
900	9.11
1000	9.01
1100	8.87
1200	8.83
1400	8.75
1600	8.63
1800	8.55
2000	8.61
2200	8.72
2400	8.84
2600	9.08
2800	9.28
3000	9.43
3500	11.71
4000	14.00
4500	16.28
5000	18.57
5500	20.85
6000	23.14
6500	25.42
7000	27.71

KcMISF_OneCylNoCatDamLvl

Catalyst Damaging Misfire Percentage

load
Load

	0	1000	2000	3000	4000	5000	6000	7000
0	14	14	14	14	14	10	5	5
10	14	14	14	14	14	10	5	5
20	14	14	14	15	14	9	5	5
30	14	14	14	14	13	8	5	5
40	14	14	14	13	10	7	5	5
50	14	13	13	10	8	6	5	5
60	14	13	13	7	6	5	5	5
70	14	11	9	5	5	5	5	5
80	14	9	8	5	5	5	5	5
90	14	8	5	5	5	5	5	5
100	14	8	5	5	5	5	5	5

P0133 - O2S Slow Response Bank 1 Sensor 1" Pass/Fail Threshold table

Z axis is the pass/fail result (see note below)
X axis is Lean to Rich response time (msec)
Y axis is Rich to Lean response time (msec)
Note: If the cell contains a "0" then the fault is not indicated, if it contains a "1" a fault is indicated

	0.000	0.024	0.036	0.048	0.060	0.072	0.084	0.096	0.108	0.120	0.132	0.144	0.156	0.168	0.180	0.192	1.000
0.000	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0.036	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0.048	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0.060	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0.072	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0.084	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.096	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.108	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.132	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.144	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.156	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.168	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.180	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.192	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.204	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

P1133 - O2S HC L to R Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for L/R HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	20.0	50.0	80.0
0.0	22	22	22	22	22
6.3	22	22	22	22	22
12.5	22	22	22	22	22
18.8	23	23	23	23	23
25.0	24	24	24	24	24
31.3	25	25	25	25	25
37.5	27	27	27	27	27
43.8	28	28	28	28	28
50.0	30	30	30	30	30
56.3	30	30	30	30	30
62.5	30	30	30	30	30

SUPPORTING TABLES

68.8	30	30	30	30	30
75.0	30	30	30	30	30
81.3	30	30	30	30	30
87.5	30	30	30	30	30
93.8	30	30	30	30	30
100.0	30	30	30	30	30

P1133 - O2S HC R to L Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for R/L HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	20.0	50.0	80.0
0.0	22	22	22	22	22
6.3	22	22	22	22	22
12.5	22	22	22	22	22
18.8	23	23	23	23	23
25.0	24	24	24	24	24
31.3	25	25	25	25	25
37.5	27	27	27	27	27
43.8	28	28	28	28	28
50.0	30	30	30	30	30
56.3	30	30	30	30	30
62.5	30	30	30	30	30
68.8	30	30	30	30	30
75.0	30	30	30	30	30
81.3	30	30	30	30	30
87.5	30	30	30	30	30
93.8	30	30	30	30	30
100.0	30	30	30	30	30

P2270/P2272 - O2 Sensor Signal Stuck Lean Bank 1/2 Sensor 2 Rich Equiv Ratio

	0.0	500.0	1000.0	1500.0	2000.0
0.0	1.174805	1.174805	1.174805	1.174805	1.174805
25.0	1.174805	1.174805	1.174805	1.174805	1.174805
50.0	1.174805	1.174805	1.174805	1.174805	1.174805
75.0	1.174805	1.174805	1.174805	1.174805	1.174805
100.0	1.174805	1.174805	1.174805	1.174805	1.174805

Z axis is Equiv ratio during the test
Y axis is MAP (kpa)
X axis RPM

P2271/P2273 - O2 Sensor Signal Stuck Rich Bank 1/2 Sensor 2 Lean Equiv Ratio

	0.0	500.0	1000.0	1500.0	2000.0
0.0	0.875000	0.875000	0.875000	0.875000	0.875000
25.0	0.875000	0.875000	0.875000	0.875000	0.875000
50.0	0.875000	0.875000	0.875000	0.875000	0.875000
75.0	0.875000	0.875000	0.875000	0.875000	0.875000
100.0	0.875000	0.875000	0.875000	0.875000	0.875000

Z axis is Equiv ratio during the test
Y axis is MAP (kpa)
X axis RPM

CSED Section

KtIDLC_n_CLO_ThrshOfst

Coolant Temperature	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Offset to be considered Cat Light Off	1000	1000	250	125	125	125	125	125	125	500	1000	1000	1000	1000	1000	1000	1000

KaIDLC_n_EngDsrdBase[CilDLR_PN]

Coolant Temperature	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Base RPM	1350	1350	1325	1200	1100	950	900	850	800	750	650	650	650	675	700	750	750

KaIDLC_n_EngDsrdBase[CilDLR_DR]

Coolant Temperature	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Base RPM	1025	1025	1000	950	850	800	800	750	700	650	600	600	600	625	675	725	725

Phaser Section

KtPHSD_phi_CamPosErrorLimIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000

SUPPORTING TABLES

800	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
1200	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
1600	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
2000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
2400	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
2800	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
3200	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
3600	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
4000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
4400	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
4800	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
5200	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
5600	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
6000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
6400	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
6800	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000

KtPHSD_t_StablePositionTimeIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
800	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
1200	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
1600	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
2000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
2400	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
2800	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
3200	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
3600	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
4000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
4400	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
4800	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
5200	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
5600	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
6000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
6400	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
6800	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

P0068: MAP / MAF / TPS Correleation

X-axis is TPS (%)
Data is MAP threshold (kPa)

X-axis	14.9994	17.8574	20.7138	23.5703	26.4297	29.2862	32.1426	35.0006	99.9985
Data	25.3438	28.8125	47.5313	38.2188	24.7188	21.4766	100.0000	100.0000	100.0000

X axis is TPS (%)
Data is MAF threshold (grams/sec)

X-axis	14.9994	17.8574	20.7138	23.5703	26.4297	29.2862	32.1426	35.0006	99.9985
Data	20.8047	20.3594	41.9219	32.7891	25.3359	32.2891	255.0000	255.0000	255.0000

P1682: Ignition Voltage Correleation

X-axis is IAT (DegC)
Data is Voltage threshold (V)

X-axis	23.0000	85.0000	95.0000	105.0000	125.0000
Data	7.0000	8.6992	9.0000	9.1992	10.0000

FAULT BUNDLE DEFINITIONS

Bundle Name	Pcodes											
CatalystSysEfficiencyLoB1_FA	P0420											
CatalystSysEfficiencyLoB2_FA	P0430											
EvapPurgeSolenoidCircuit_FA	P0443											
EvapFlowDuringNonPurge_FA	P0496											
EvapVentSolenoidCircuit_FA	P0449											
EvapSmallLeak_FA	P0442											
EvapEmissionSystem_FA	P0455	P0446										
FuelTankPressureSnsrCkt_FA	P0452	P0453										
CoolingFanSpeedTooHigh_FA	P0495											
FuelLevelDataFault	P0461	P0462	P0463	P2066	P2067	P2068						
PowertrainRelayFault	P1682											
PowertrainRelayStateOn_FA	P0685											
PowertrainRelayStateOn_Error	P0685											
IgnitionOffTimer_FA	P2610											
IgnitionOffTimeValid	P2610											
TimeSinceEngineRunningValid	P2610											
VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723								
VehicleSpeedSensorError	P0502	P0503	P0722	P0723								
FuelTrimSystemB1_FA	P0171	P0172										
FuelTrimSystemB2_FA	P0174	P0175										
A/F Imbalance Bank1	P1174											
A/F Imbalance Bank2	P1175											
AIRSystemPressureSensor FA	P2430	P2431	P2432	P2433	P2435	P2436	P2437	P2438				
AIR System FA	P0411	P2440	P2444									
AIRValveControlCircuit FA	P0412											
AIRPumpControlCircuit FA	P0418											

FAULT BUNDLE DEFINITIONS

Clutch Sensor FA	P0806	P0807	P0808									
ClutchPositionSensorCktLo FA	P0807											
ClutchPositionSensorCktHi FA	P0808											
EthanolCompositionSensor_FA	P0178	P0179										
EngineMisfireDetected_TFTKO	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
KS_Ckt_Perf_B1B2_FA	P0324	P0325	P0326	P0327	P0328	P0330	P0332	P0333				
IgnitionOutputDriver_FA	P0351	P0352	P0353	P0354	P0355	P0356	P0357	P0358				
O2S_Bank_ 1_TFTKO	P0131	P0132	P0134	P2A00								
O2S_Bank_ 2_TFTKO	P0151	P0152	P0154	P2A03								
O2S_Bank_1_Sensor_1_FA	P2A00	P0131	P0132	P0133	P0134	P0135	P0053	P1133				
O2S_Bank_1_Sensor_2_FA	P013A	P013B	P013E	P013F	P2270	P2271	P0137	P0138	P0140	P0141	P0054	
O2S_Bank_2_Sensor_1_FA	P2A03	P0151	P0152	P0153	P0154	P0155	P0059	P1153				
O2S_Bank_2_Sensor_2_FA	P013C	P013D	P014A	P014B	P2272	P2273	P0157	P0158	P0160	P0161	P0060	
ECT_Sensor_Ckt_FA	P0117	P0118										
ECT_Sensor_Ckt_TPTKO	P0117	P0118										
ECT_Sensor_Ckt_TFTKO	P0117	P0118										
ECT_Sensor_DefaultDetected	P0117	P0118	P0116	P0125								
ECT_Sensor_FA	P0117	P0118	P0116	P0125	P0128							
ECT_Sensor_TFTKO	P0117	P0118	P0116	P0125								
ECT_Sensor_Perf_FA	P0116											
ECT_Sensor_Ckt_FP	P0117	P0118										
ECT_Sensor_Ckt_High_FP	P0118											
ECT_Sensor_Ckt_Low_FP	P0117											
AmbientAirPressCktFA	P2228	P2229										
AmbientAirPressCktFA_NoSnsr	P0106	P0107	P0108									
AmbientAirDefault_NA	P0106	P0107	P0108	P2227	P2228	P2229						
AmbientAirDefault_SC	P012B	P012C	P012D	P2227	P2228	P2229						
AmbientAirDefault_NoSnsr	P0106	P0107	P0108									

FAULT BUNDLE DEFINITIONS

AmbientAirDefault	AmbientAirDefault_NA		OR	AmbientAirDefault_SC		OR	AmbientAirDefault_NoSnsr					
IAT_SensorCircuitTFTKO	P0112	P0113										
IAT_SensorCircuitFA	P0112	P0113										
IAT_SensorCircuitFP	P0112	P0113										
IAT_SensorTFTKO	P0111	P0112	P0113									
IAT_SensorFA	P0111	P0112	P0113									
IAT2_SensorCktTFTKO	P0097	P0098										
IAT2_SensorCktTFTKO_NoSnsr	P0112	P0113										
IAT2_SensorCircuitFA	P0097	P0098										
IAT2_SensorCircuitFA_NoSnsr	P0112	P0113										
IAT2_SensorcircuitFP	P0097	P0098										
IAT2_SensorcircuitFP_NoSnsr	P0112	P0113										
IAT2_SensorTFTKO	P0096	P0097	P0098									
IAT2_SensorTFTKO_NoSnsr	P0111	P0112	P0113									
IAT2_SensorFA	P0096	P0097	P0098									
IAT2_SensorFA_NoSnsr	P0111	P0112	P0113									
SuperchargerBypassValveFA	P2261											
CylDeacSystemTFTKO	P3400											
MAF_SensorPerfFA	P0101											
MAF_SensorPerfTFTKO	P0101											
MAP_SensorPerfFA	P0106											
MAP_SensorPerfTFTKO	P0106											
SCIAP_SensorPerfFA	P012B											
SCIAP_SensorPerfTFTKO	P012B											
ThrottlePositionSnsrPerfFA	P0121											
ThrottlePositionSnsrPerfTFTKO	P0121											
MAF_SensorFA	P0101	P0102	P0103									
MAF_SensorTFTKO	P0101	P0102	P0103									
MAF_SensorFP	P0102	P0103										
MAF_SensorCircuitFA	P0102	P0103										
MAF_SensorCircuitTFTKO	P0102	P0103										
MAP_SensorTFTKO	P0106	P0107	P0108									
MAP_SensorFA	P0106	P0107	P0108									
SCIAP_SensorFA	P012B	P012C	P012D									

FAULT BUNDLE DEFINITIONS

SCIAP_SensorTFTKO	P012B	P012C	P012D									
SCIAP_SensorCircuitFP	P012C	P012D										
AfterThrottlePressureFA_NA	P0106	P0107	P0108									
AfterThrottlePressureFA_SC	P012B	P012C	P012D									
AfterThrottleVacuumTFTKO_NA	P0106	P0107	P0108									
AfterThrottleVacuumTFTKO_SC	P012B	P012C	P012D									
SCIAP_SensorCircuitFA	P012C	P012D										
AfterThrottlePressTFTKO_NA	P0106	P0107	P0108									
AfterThrottlePressTFTKO_SC	P012B	P012C	P012D									
MAP_SensorCircuitFA	P0107	P0108										
MAP_EngineVacuumStatus	MAP_SensorFA OR P0107, P0108 Pending											
CrankCamCorrelationTFTKO	P0016	P0017	P0018	P0019								
CrankSensorFA	P0335	P0336										
CrankSensorTFTKO	P0335	P0336										
CamSensorFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensorTFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CrankIntakeCamCorrelationFA	P0016	P0018										
CrankExhaustCamCorrelationFA	P0017	P0019										
IntakeCamSensorTFTKO	P0016	P0018	P0340	P0341	P0345	P0346						
IntakeCamSensorFA	P0016	P0018	P0340	P0341	P0345	P0346						
ExhaustCamSensorTFTKO	P0017	P0019	P0365	P0366	P0390	P0391						
ExhaustCamSensorFA	P0017	P0019	P0365	P0366	P0390	P0391						
IntakeCamSensor_FA	P0016	P0018	P0340	P0341	P0345	P0346						
IntakeCamSensor_TFTKO	P0016	P0018	P0340	P0341	P0345	P0346						
ExhaustCamSensor_FA	P0017	P0019	P0365	P0366	P0390	P0391						
ExhaustCamSensor_TFTKO	P0017	P0019	P0365	P0366	P0390	P0391						
CrankIntakeCamCorrFA	P0016	P0018										
CrankExhaustCamCorrFA	P0017	P0019										
CrankSensorFaultActive	P0335	P0336										
CrankSensor_FA	P0335	P0336										
CrankSensorTestFailedTKO	P0335	P0336										
CrankSensor_TFTKO	P0335	P0336										
CamSensor_FA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensorAnyLocationFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensor_TFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
AnyCamPhaser_FA	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				
AnyCamPhaser_TFTKO	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024				

FAULT BUNDLE DEFINITIONS

IntkCamPhaser_FA	P0010	P0011	P0020	P0021								
EGRValvePerformance_FA	P0401	P042E										
EGRValveCircuit_FA	P0403	P0404	P0405	P0406								
EGRValve_FP	P0405	P0406	P042E									
EGRValveCircuit_TFTKO	P0403	P0404	P0405	P0406								
EGRValvePerformance_TFTKO	P0401	P042E										
EngineMetalOvertempActive	P1258											
	no codes?											
A/C_FailedOn	P0645											
EngOilTempSensorCircuitFA	P0197	P0198										
EngOilModeledTempValid	ECT_Sensor_FA or IAT_SensorCircuitFA											
EngOilPressureSensorCktFA	P0522	P0523										
EngOilPressureSensorFA	P0521	P0522	P0523									
see Trans Summary Tables												
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449					
BrakeBoosterSensorFA	P0556	P0557	P0558									
BrakeBoosterVacuumValid	P0556	P0557	P0558									
BrakeBoosterVacuumValid	VehicleSpeedSensorError or MAP_SensorFA											
FuelInjectorCircuit_FA	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208				
FuelInjectorCircuit_TFTKO	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208				
ControllerProcessorPerf_FA	P0606											
ControllerRAM_Error_FA	P0604											
TPS_Performance_FA	P0068	P0121	P1516	P2101								

FAULT BUNDLE DEFINITIONS

EnginePowerLimited	P0068	P0606	P0120	P0122	P0123	P0220	P0222	P0223	P0641	P0651		
	P1516	P2101	P2120	P2122	P2123	P2125	P2127	P2128	P2135	P2138	P2176	
TPS1_OutOfRange_Composite	P0120	P0122	P0123									
TPS2_OutOfRange_Composite	P0220	P0222	P0223									
TPS_FA	P2135	(TPS1_OutOfRange_Composite and TPS2_OutOfRange_Composite)										
TPS_FaultPending	Always set to FALSE, As ETC diagnostics are set within 200 msec there is no real need for a pending flag											
TPS_ThrottleAuthorityDefaulted	P0068	P0606	P1516	P2101	P2135	P2176	V5B_OutOfRange_Composite					
	(TPS1_OutOfRange_Composite and TPS2_OutOfRange_Composite)											
	(MAP_OutOfRange_Composite and MAF_OutOfRange_Composite)											
AcceleratorEffectivePstnValid	Always set to TRUE, no P codes will set to FALSE											
5VoltReferenceA_FA	P0641											
5VoltReferenceB_FA	P0651											
IAC_SystemRPM_FA	P0506	P0507										
TransmissionGearDefaulted	P182E	P1915										
TransmissionEngagedState_FA	P182E	P1915										
FourWheelDriveLowStateValid	P2771											
EngineTorqureInaccurate	EngineMisfireDetected_FA or											
	FuelInjectorCircuit_FA or											
	FuelInjectorCircuit_TFTKO or											
	FuelTrimSystemB1_FA or											
	FuelTrimSystemB2_FA or											
	MAF_SensorTFTKO or											
	MAP_SensorTFTKO or											
	EGRValvePerformance_FA											
Long Name	**Short Name**											
Bank	B											
Brake	Brk											
Circuit	Ckt											
Engine	Eng											
Fault Active	FA											

FAULT BUNDLE DEFINITIONS

Intake	Intk											
Naturally Aspirated	NA											
Performance	Perf											
Position	Pstn											
Pressure	Press											
Sensor	Snsr											
Supercharged	SC											
System	Sys											
Test Failed This Key On	TFTKO											
LowFuelConditionDiagnostic	Flag set to TRUE if the fuel level < 10 %											
	AND											
	No Active DTCs:		FuelLevelDataFault									
			P0462									
			P0463									
	for at least 30 seconds.											
Transfer Pump is Commanded On	Fuel Volume in Primary Fuel Tank < 0.0 liters											
	AND											
	Fuel Volume in Secondary Fuel Tank ≥ 0.0 liters											
	AND											
	Transfer Pump on Time < **TransferPumpOnTimeLimit** Table											
	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											

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Exhaust Camshaft Actuator Solenoid Circuit – Bank 1	P0013	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 18 Volts	90 failures out of 100 samples 250 ms /sample, continuous	Type B 2 trips
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 > KtPHSD_phi_CamPosErrorLimEc1 Deg (see Supporting Table)	The following DTC's are NOT active: P0013 ExhCMP B1 Circuit P0365, P0366, Exh B1 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	System Voltage > 11 Volts, and System Voltage < 18 Volts Desired cam position cannot vary more than 3.5 Cam Deg for at least KtPHSD_t_StablePositionTimeEc1 seconds (see Supporting Table)	100 failures out of 300 samples 100 ms /sample	Type B 2 trips
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 crank degrees before or 11 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized Cam phaser is in "parked" position No Active DTCs:	< 1200 P0335, P0336 P0365, P0366	4 failures out of 5 samples if the engine is being assisted by the starter 25 failures out of 35 samples if the engine is running without assistance from the starter	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						5VoltReferenceA_FA 5VoltReferenceB_FA		
					No Pending DTCs:	P0366	One sample per cam rotation	
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 2 Sensor A	P0018	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 2 sensor A occurs during the incorrect crank position	4 cam sensor pulses more than 10 crank degrees before or 11 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized Cam phaser is in "parked" position	< 1200	4 failures out of 5 samples if the engine is being assisted by the starter	Type B 2 trips
					No Active DTCs:	P0335, P0336 P0345, P0346 5VoltReferenceA_FA 5VoltReferenceB_FA	25 failures out of 35 samples if the engine is running without assistance from the starter	
					No Pending DTCs:	P0346	One sample per cam rotation	
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 2 Sensor B	P0019	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 2 sensor B occurs during the incorrect crank position	4 cam sensor pulses more than 10 crank degrees before or 11 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized Cam phaser is in "parked" position	< 1200	4 failures out of 5 samples if the engine is being assisted by the starter	Type B 2 trips
					No Active DTCs:	P0335, P0336 P0390, P0391 5VoltReferenceA_FA 5VoltReferenceB_FA	25 failures out of 35 samples if the engine is running without assistance from the starter	
					No Pending DTCs:	P0391	One sample per cam rotation	
Crankshaft - Sprocket Correlation Diagnostic (for intermediate sprocket)	P0016, P0017, P0018 and P0019	On engines with an intermediate sprocket between the crankshaft and the camshafts, this diagnostic detects a timing misalignment between the crankshaft and the	Bank 1 Cam Sensor A pulses more than 7 crank degrees before or 9 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized	< 1200	25 failures out of 35 samples if the engine is running without assistance from the starter	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		sprocket	+ Bank 1 Cam Sensor B pulses more than 7 crank degrees before or 9 crank degrees after nominal position in one cam revolution. + Bank 2 Cam Sensor A pulses more than 7 crank degrees before or 9 crank degrees after nominal position in one cam revolution. + Bank 2 Cam Sensor B pulses more than 7 crank degrees before or 9 crank degrees after nominal position in one cam revolution.	>= 16	Cam phasers are in "parked" position No Active DTCs: No Pending DTCs:	P0335, P0336 P0340, P0341 P0345, P0346 P0365, P0366 P0390, P0391 5VoltReferenceA_FA 5VoltReferenceB_FA P0341, P0346, P0366, P0391	One sample per cam rotation	
Intake Camshaft Actuator Solenoid Circuit – Bank 2	P0020	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 18 Volts	90 failures out of 100 samples 250 ms /sample, continuous	Type B 2 trips
Intake Camshaft System Performance – Bank 2	P0021	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 2)Cam Position Error > KtPHSD_phi_CamPosErrorLimIc2 Deg (see Supporting Table)	The following DTC's are NOT active: P0020 IntkCMP B2 Circuit P0345, P0346, Intake B2 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality	System Voltage > 11 Volts, and System Voltage < 18 Volts Desired cam position cannot vary more than 3.5 Cam Deg for at least KtPHSD_t_StablePositionTimeIc2 seconds (see Supporting Table)	100 failures out of 300 samples	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active		100 ms /sample	
Exhaust Camshaft Actuator Solenoid Circuit – Bank 2	P0023	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 18 Volts	90 failures out of 100 samples 250 ms /sample, continuous	Type B 2 trips
Exhaust Camshaft System Performance – Bank 2	P0024	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 2)Cam Position Error > KtPHSD_phi_CamPosErrorLimEc 2 Deg (see Supporting Table)	The following DTC's are NOT active: P0023 ExhCMP B2 Circuit P0390, P0391, Exh B2 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality	System Voltage > 11 Volts, and System Voltage < 18 Volts Desired cam position cannot vary more than 3.5 Cam Deg for at least KtPHSD_t_StablePositionTimeEc2 seconds (see Supporting Table)	100 failures out of 300 samples	Type B 2 trips
					Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active		100 ms /sample	
Supercharger Bypass Valve Control Circuit	P0033	Electrical Integrity of Supercharger Bypass Valve Control Circuitry	ECM detects that commanded and actual states of output driver do not match		Ignition Voltage Ignition Voltage Engine Speed	>= 11.00 Volts <= 18.00 Volts > 0	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips
Manifold Absolute Pressure - Barometric Pressure Correlation (naturally aspirated applications)	P0069	Compares baro sensor to the calculated baro estimate (part throttle calculation or unthrottled MAP)	Difference between baro sensor reading and estimated baro when distance since last estimated baro update	> 15.0 kPa <= 0.01 kilometers	No Active DTCs:	AmbientAirPressCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA_NA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA	20 failures out of 25 samples 1 sample every 250 msec	Type X 0 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			OR Difference between baro sensor reading and estimated baro when distance since last estimated baro update	 > 20.0 kPa > 0.01 kilometers				
Barometric Pressure (BARO) - Supercharger Inlet Pressure Correlation (supercharged application)	P006D	Compares baro sensor to the calculated baro estimate (part throttle calculation or unthrottled Supercharger Inlet Pressure)	Difference between baro sensor reading and estimated baro when distance since last estimated baro update OR Difference between baro sensor reading and estimated baro when distance since last estimated baro update	> 15.0 kPa <= 0.01 kilometers > 20.0 kPa > 0.01 kilometers	No Active DTCs:	AmbientAirPressCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA_SC TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips
Intake Air Temperature Sensor 2 Circuit Performance	P0096	Detects an IAT2 sensor that has stuck in range by comparing to IAT and engine coolant temperature at startup	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up ECT – Power Up IAT2) > ABS(Power Up ECT – Power Up IAT) AND P0116 is passing	> 20 deg C	Time between current ignition cycle and the last time the engine was running No Active DTCs:	 > 28800 seconds ECT_Sensor_FA ECT_Sensor_Ckt_FA IAT_SensorFA IAT2_SensorFA P0116 Test Aborted = FALSE P0116 Test Complete = TRUE	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Intake Air Temperature Sensor 2 Circuit Low (High Temperature)	P0097	Detects a continuous short to ground in the IAT 2 signal circuit or the IAT 2 sensor	Raw IAT 2 Input	< 48 Ohms (~150 deg C)	Engine Run Time Coolant Temp Vehicle Speed No Active DTCs:	> 10.0 seconds < 150 deg C >= 0 KPH ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor 2 Circuit High (Low Temperature)	P0098	Detects a continuous open circuit in the IAT 2 signal circuit or the IAT 2 sensor	Raw IAT 2 Input	> 420000 Ohms (~-60 deg C)	Engine Run Time Coolant Temp Vehicle Speed Engine Air Flow No Active DTCs:	> 10.0 seconds > -40 deg C <= 512 KPH >= 512 gm/sec ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError MAF_SensorFA MAF_SensorFP MAF_SensorTFTKO	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor Circuit Performance	P0111	Detects an IAT sensor that has stuck in range by comparing to IAT2 and engine coolant temperature at startup	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up ECT – Power Up IAT) > ABS(Power Up ECT – Power Up IAT2) AND P0116 is failing	> 20 deg C	Time between current ignition cycle and the last time the engine was running No Active DTCs:	 > 28800 seconds ECTSensor_FA ECT_Sensor_Ckt_FA IAT_SensorCircuitFA IAT2_SensorCircuitFA P0116 Test Aborted = FALSE P0116 Test Complete = TRUE	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B 2 trips
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Performance	P012B	Determines if the Supercharger Inlet Absolute Pressure Sensor input is stuck within the normal operating range	See table "Supercharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this		Engine Speed Engine Speed Coolant Temp	 >= 500 RPM <= 5000 RPM > 70 Deg C	Continuous Calculation are performed every	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			DTC.		Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	< 125 Deg C > -20 Deg C < 100 Deg C	12.5 msec	
			Filtered Throttle Model AND	> 500 kPa/(g/s)		< 0.26		
			ABS(Measured Flow – Modeled Air Flow) Filtered	> 21 grams/sec		Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM		
			AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	> 22.0 kPa		Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate		
			AND ABS(Measured SCIAP – SCIAP Model 1) Filtered AND ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 16.0 kPa > 17.0 kPa > 24.0 kPa		MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
						SCIAP Model 1 multiplied by SCIAP1 Residual Weight Factor based on RPM and		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						Boost Residual Weight Factor based on % of Boost SCIAP Model 2 multiplied by SCIAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO IAT2_SensorFA IAT2_SensorCircuitFP SCIAP_SensorCircuitFA SCIAP_SensorCircuitFP AmbientAirDefault_SC		
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Circuit Low (sensor without deadbands)	P012C	Detects a continuous short to low or open in either the signal circuit or the SCIAP sensor.	SCIAP Voltage	< 2.0 % of 5 Volt Range (0.1 Volts = 12.2 kPa)	MAP Model 1 Engine Running OR Engine Cranking No Active DTCs:	> 40.0 kPa TPS_FA	320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						TPS_Performance_FA MAF_SensorFA		
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Circuit High (sensor without deadbands)	P012D	Detects an open sensor ground or continuous short to high in either the signal circuit or the SCIAP sensor.	SCIAP Voltage	> 98.0 % of 5 Volt Range (4.9 Volts = 102.9 kPa)	MAP Model 1 Engine Run Time Engine Running OR Engine Cranking No Active DTCs:	< 80.0 kPa >= Threshold as a function of Engine See table "MAP/SCIAP Cold Run Time Threshold". TPS_FA TPS_Performance_FA MAF_SensorFA	320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
Fuel System Too Lean Bank 2 (LONG TERM AND SHORT TERM)	P0174	Determines if the fuel control system is in a lean condition, based on the filtered combined fuel trim correction of the long-term fuel trim and the short-term fuel trim.	The filtered combined fuel trim metric.	> **Combined Fuel Trim Lean Threshold Table**	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF VSS Fuel Level Long Fuel Trim data accumulation:	400 <rpm< 6000 > 70 kPa -38 <°C< 150 5 <kPa< 255 -20 <°C< 150 0.5 <g/s< 510.0 < 255 mph > 10 % or if fuel sender is faulty > 55 seconds of data must accumulate on each trip, with at least 10 seconds of data in the current fuel trim cell before a pass or fail decision can be made.	> 100 ms Frequency: Continuous Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during 90 % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	Type B 2 Trip(s)
			Before a pass or fail decision can be made. Greater than 55 seconds of data must accumulate on each trip, with at least 10 seconds of data in the current fuel trim cell and the short term fuel trim is stable (at least 10.0 seconds since the last fuel trim cell change or the short fuel trim has not changed by more than 0.04 in the past 3.0 seconds.) OR Greater than 10 seconds of data must accumulate on each trip, with at least 0 seconds of data in the current fuel trim cell and the combined fuel trim is stable (it has not changed by more than 0.04 in 4.0 seconds.)		**Closed loop fueling Enabled** Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > -10 and < 120		
				disable **conditions:**	Engine speed Fuel Level	rpm< 400 or rpm> 6000 < 10 % for at least 30 seconds		
					EGR Flow Diag. Intrusive Test Active Catalyst Monitor Diag. Intrusive Test Active Post O2 Diag. Intrusive Test Active Device Control Active EVAP Diag. “tank pull down” portion of the test Active			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					fuel trim metric updated during decels? NO No active DTCs:	IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit FA EvapFlowDuringNonPurge FA EvapVentSolenoidCircuit FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected FA EGRValvePerformance FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
Fuel System Too Rich Bank 2 (LONG TERM AND SHORT TERM)	P0175	Determines if the fuel control system is in a rich condition, based on the filtered combined fuel trim correction of the long-term fuel trim and the short-term fuel trim. There are two different, yet related tests that are used to determine a Rich fault, they are Passive and Intrusive and are described below:	Before a Passive or an Intrusive test pass or fail decision can be made. Greater than 55 seconds of data must accumulate on each trip, with at least 10 seconds of data in the current fuel trim cell and the short term fuel trim is stable (at least 10.0 seconds since the last fuel trim cell change or the short fuel trim has not changed by more than 0.04 in the past 3.0 seconds.) OR Greater than 10 seconds of data must accumulate on each trip, with at least 0 seconds of data in the current fuel trim cell and the combined fuel trim is stable (it has not changed by more than 0.04 in 4.0 seconds.)		BARO Coolant Temp MAP IAT MAF VSS Fuel Level Long Fuel Trim data accumulation: **Closed loop fueling Enabled**	> 70 kPa -38 <°C< 150 5 <kPa< 255 -20 <°C< 150 0.5 <g/s< 510.0 < 255 mph < 10 % for at least 30 seconds > 55 seconds of data must accumulate on each trip, with at least 10 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		Type B 2 Trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Long Fuel Trim enabled	Closed Loop Enabled and coolant temp > -10 and < 120		
		Passive Test: Non-purge cells are monitored to determine if a rich condition exists.	The filtered Combined Non-Purge Fuel Trim metric	≤ **Combined Non-Purge Rich Limit** Table			> 100 ms Frequency: Continuous	
		Intrusive Test- When the filtered Combined Purge-On Fuel Trim metric is ≤ **the Combined Purge-On Rich Limit Table,** Purge is ramped off to determine if excess purge vapor is the cause of the Rich condition. If the filtered Combined Purge-on Fuel Trim metric > **Combined Purge-On Rich Limit Table** the test passes without checking the Combined Non-Purge Fuel Trim metric.	If the Combined Purge-On Fuel Trim metric AND The filtered Combined Non-Purge Fuel Trim metric	≤ **Combined Purge-On Rich Limit** Table ≤ **Combined Non-Purge Rich Limit**Table		Passive Test decision cannot be made. A passive decision cannot be made when Purge is enabled.	Fail determinations require that the Malfunction Criteria be satisfied for 2 out of 3 intrusive segments.	
			Segment Definition -					
				disable **conditions:**	Engine speed EGR Flow Diag. Intrusive Test Not Active Fuel Level Catalyst Monitor Diag. Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” portion of the test Not Active fuel trim metric updated during decels? NO No active DTCs:	rpm< 400 or rpm> 6000 < 10 % for at least 30 seconds IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit FA EvapFlowDuringNonPurge FA EvapVentSolenoidCircuit FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit FA Ethanol Composition Sensor FA	Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during 90 % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA		
Engine Oil Temperature Sensor Performance	P0196	Determines if the engine oil temperature (EOT) sensor is stuck or biased in range. Three independent tests can be used. 1) Cold Start Test Compares EOT to ECT and IAT at powerup after a long soak (Fast and regular tests) 2) Warm Up Test Compares EOT to a target EOT after a large enough accumulated airflow has occurred 3) Continuous Test Compares the measured EOT to modeled EOT on a continuous basis on a warm engine	**Fast Cold Start Test Pass** Absolute value of Powerup EOT - Powerup ECT Absolute value of Powerup EOT - IAT **Regular Cold Start Test Pass** Vehicle speed for **Note:** Vehicle speed for resets above timer **AND** Absolute value of Powerup EOT - Powerup ECT Absolute value of power up EOT - min. observed IAT **OR** Absolute value of Powerup EOT - Powerup ECT **AND** IAT minimum observed **OR** IAT minimum observed Absolute value of power up IAT - min. observed IAT	 <= 16 Deg C <= 16 Deg C > 15 KPH for > 400 seconds < 15 KPH for > 20 seconds <= 16 Deg C <= 16 Deg C > 16 Deg C <= 30 Deg C <= -10 Deg C > 5 Deg C	**All three tests (Cold/Warm/Continuous)** EOP Diagnostic main enable Engine Running **Cold Start EOT Test** Use Cold Start Diagnostic Engine Off Time **Warm Up EOT Test** Use Warm Up EOT Diagnostic Power up ECT Power up ECT **Continuous EOT Test** Use Continuous Diagnostic Power up ECT ECT **All of three criteria above AND** EOT Model **OR** Use quick transition to equilibrium state ECT **DISABLE CONDITIONS (for all three tests)** No active DTC's	 Enabled = True Enabled > 540 Seconds Disabled > 200 Deg C <= 200 Deg C Enabled >= -7 and <= 105 Deg C >= 45 and <= 95 Deg C >= 70 Deg C Enabled >= ECT from 5 sec previous Fault bundles: IAT_SensorFA	Cold Start (Fast/Regular) and Warm up Tests - one failure out of one sample - test performed once per second Continuous Test - 70 failures out of 100 samples performed once per second	Type B 2 Trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Warm Up Test Pass			ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuitFA IgnitionOffTimer_FA VehicleSpeedSensor_FA		
			Total accumulated engine flow	>= TotalAccumulatedFlow - See details on Supporting Tables Tab (P0196 Section)				
			EOT	>= 70 Deg C				
			Continuous Test Pass					
			EOT Sensed - EOT Model	>= 0 Deg C and <= 40 Deg C				
			OR					
			EOT Sensed - EOT Model	< 0 Deg C				
			Absolute value of EOT Sensed - EOT Model	<= 40 Deg C				
			Fast Cold Start Test Fail					
			Absolute value of Powerup EOT - Powerup ECT	> FastFailTempDiff See details on Supporting Tables Tab (P0196 Section)				
			Absolute value of power up ECT - IAT	<= 16 Deg C				
			Regular Cold Start Test Fail					
			Vehicle speed for	> 15 KPH > 400 seconds				
			Note:					
			Vehicle speed for resets above timer	< 15 KPH > 20 seconds				
			AND					
			Absolute value of Powerup EOT - Powerup ECT	> 16 Deg C				
			IAT minimum observed	> 30 Deg C				
			AND					
			IAT minimum observed	> -10 Deg C				
			OR					
			Power up IAT - minimum					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			observed IAT	<= 5 Deg C				
			AND					
			Absolute value of Power up EOT - Power up IAT	> 16 Deg C				
			OR					
			Absolute value of Power up EOT - Min. observed IAT	> 16 Deg C				
			AND					
			Absolute value of Power up ECT - Power up IAT	> 16 Deg C				
			OR					
			Absolute value of Power up ECT - Min. observed IAT	> 16 Deg C				
			Warm Up Test Fail					
			Total accumulated engine flow	>= TotalAccumulatedFlow - See details on Supporting Tables Tab (P0196 Section)				
			EOT	< 70 Deg C				
			Continuous Test Fail					
			EOT Sensed - EOT Model	< 0 Deg C or > 40 Deg C				
			AND					
			EOT Sensed - EOT Model	>= 0 Deg C				
			OR					
			Absolute value of EOT Sensed - EOT Model	> 40 Deg C				
Engine Oil Temperature (EOT) Circuit Low	P0197	Detects a short to ground in the Engine Oil Temperature (EOT) Sensor signal	Engine Oil Temperature Sensor (EOT) Circuit Resistance	< 25 ohms	Diagnostic enabled/disabled Engine Run Time OR ECT Sensor Circuit Resistance	Enabled > 20.0 seconds <= 25 Ohms	25 failures out of 50 samples Sampled every 1 second	2 trip(s) Type B
Engine Oil Temperature (EOT) Circuit High	P0198	Detects an open circuit or continuous short to high in the Engine Oil Temperature (EOT) Sensor signal	Engine Oil Temperature Sensor (EOT) Circuit Resistance	> 1800000 ohms	Diagnostic enabled/disabled Engine Run Time	Enabled > 20.0 seconds	25 failures out of 50 samples Sampled every 1 second	2 trip(s) Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					OR ECT Sensor Circuit Resistance	>= 450000 Ohms		
Camshaft Position (CMP) Sensor Circuit Bank 2 Sensor A	P0345	Determines if a fault exists with the cam position bank 2sensor A signal	Engine Cranking Camshaft Test: Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse Time-Based Camshaft Test: Fewer than 4 camshaft pulses received in a time Fast Event-Based Camshaft Test: No camshaft pulses received during first 24 MEDRES events (There are 24 MEDRES events per engine cycle) Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	 >= 5.5 seconds >= 4.0 seconds > 3.0 seconds	Engine Cranking Camshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Time-Based Camshaft Test: Engine is Running Starter is not engaged No DTC Active: Fast Event-Based Camshaft Test: 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: Slow Event-Based Camshaft Test: Crankshaft is synchronized	 = FALSE = FALSE = FALSE > 3.0 grams/second)) 5VoltReferenceA_FA 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Engine Cranking Camshaft Test: Continuous every 100 msec Time-Based Camshaft Test: Continuous every 100 msec Fast Event-Based Camshaft Test: Continuous every MEDRES event Slow Event-Based Camshaft Test: 8 failures out of 10 samples	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				= 0	No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 2 Sensor A	P0346	Determines if a performance fault exists with the cam position bank 2 sensor A signal	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 24 MEDRES events is less than 4 or greater than 10 (There are 24 MEDRES events per engine cycle) Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles AND	< 397 > 403	Fast Event-Based Camshaft Test: 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: Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Fast Event-Based Camshaft Test: Continuous every MEDRES event Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	Type B 2 trips
IGNITION CONTROL #4 CIRCUIT	P0354	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 4 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	100 Failures out of 120 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #5 CIRCUIT	P0355	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 5 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	100 Failures out of 120 Samples 100 msec rate	Type: B MIL: YES Trips: 2

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
IGNITION CONTROL #6 CIRCUIT	P0356	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 6 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	100 Failures out of 120 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #7 CIRCUIT	P0357	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 7 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	100 Failures out of 120 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #8 CIRCUIT	P0358	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 8 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	**> 6.00 Volts**	100 Failures out of 120 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Determines if a fault exists with the cam position bank 1 sensor B signal	<u>Engine Cranking Camshaft Test:</u> Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse <u>Time-Based Camshaft Test:</u> Fewer than 4 camshaft pulses received in a time	 >= 5.5 seconds >= 4.0 seconds	<u>Engine Cranking Camshaft Test:</u> Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow <u>Time-Based Camshaft Test:</u> Engine is Running Starter is not engaged	 = FALSE = FALSE = FALSE > 3.0 grams/second))	<u>Engine Cranking Camshaft Test:</u> Continuous every 100 msec <u>Time-Based Camshaft Test:</u> Continuous every 100 msec	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
				> 3.0 seconds	No DTC Active:	5VoltReferenceA_FA		
			Fast Event-Based Camshaft Test: No camshaft pulses received during first 24 MEDRES events (There are 24 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged		Fast Event-Based Camshaft Test: Continuous every MEDRES event	
					No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA		
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	= 0	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
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	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 24 MEDRES events is less than 4 or greater than 10 (There are 24 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged		Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips
					No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles AND	 < 397 > 403	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
Camshaft Position (CMP) Sensor Circuit Bank 2 Sensor B	P0390	Determines if a fault exists with the cam position bank 2sensor B signal	Engine Cranking Camshaft Test: Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse Time-Based Camshaft Test: Fewer than 4 camshaft pulses received in a time Fast Event-Based Camshaft Test: No camshaft pulses received during first 24 MEDRES events (There are 24 MEDRES events per engine cycle)	 >= 5.5 seconds >= 4.0 seconds > 3.0 seconds	Engine Cranking Camshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow Time-Based Camshaft Test: Engine is Running Starter is not engaged No DTC Active: Fast Event-Based Camshaft Test: 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:	 = FALSE = FALSE = FALSE > 3.0 grams/second)) 5VoltReferenceA_FA 5VoltReferenceA_FA	Engine Cranking Camshaft Test: Continuous every 100 msec Time-Based Camshaft Test: Continuous every 100 msec Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						5VoltReferenceB_FA CrankSensor_FA		
			<u>Slow Event-Based Camshaft Test:</u> The number of camshaft pulses received during 100 engine cycles	= 0	<u>Slow Event-Based Camshaft Test:</u> Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	<u>Slow Event-Based Camshaft Test:</u> 8 failures out of 10 samples Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 2 Sensor B	P0391	Determines if a performance fault exists with the cam position bank 2 sensor B signal	<u>Fast Event-Based Camshaft Test:</u> The number of camshaft pulses received during first 24 MEDRES events is less than 4 or greater than 10 (There are 24 MEDRES events per engine cycle)		<u>Fast Event-Based Camshaft Test:</u> 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	<u>Fast Event-Based Camshaft Test:</u> Continuous every MEDRES event	Type B 2 trips
			<u>Slow Event-Based Camshaft Test:</u> The number of camshaft pulses received during 100 engine cycles AND	< 397 > 403	<u>Slow Event-Based Camshaft Test:</u> Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	<u>Slow Event-Based Camshaft Test:</u> 8 failures out of 10 samples Continuous every engine cycle	
Fuel Level Sensor 1 Performance (For use on vehicles with mechanical transfer pump	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.			Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample Continuous	Type B 2 trips
			<u>Fuel Level in Primary Tank Remains in an Unreadable Range too Long</u>					

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
dual fuel tanks)			If fuel volume in primary tank is AND Fuel volume in secondary tank and remains in this condition for OR	>= 21.0 liters < 5.0 liters 109 miles				
			After Refuel Event					
			If the secondary fuel volume changes by 9.0 liters from engine “off” to engine “on” the primary volume should change by 3.0 liters. OR		The shutdown primary tank volume + 3.0 liters must be	< 21.0 liters		
			Distance Traveled without a Primary Fuel Level Change					
			Delta Fuel Volume change over an accumulated 50 miles.	< 3 liters				
ABS Rough Road malfunction	P1380	This diagnostic detects if the ABS controller is indicating a fault, and misfire is present. When this occurs, misfire will continue to run.	GMLan Message: "Wheel Sensor Rough Road Magnitude Validity"	= FALSE	Vehicle Speed Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 8 kph rpm < 8192 load < 200 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	"Special" Type C 1 trip
ABS System Rough Road Detection Communication Fault	P1381	This diagnostic detects if the rough road information is no longer being received from the ABS controller, and misfire is present. When this occurs, misfire will continue to run.	Loss of GMLan Message: "Wheel Sensor Rough Road Magnitude"	= FALSE	Vehicle Speed Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 8 kph rpm < 8192 load < 200 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	"Special" Type C 1 trip
Barometric Pressure (BARO) Sensor Performace	P2227	Detects stability of barometric pressure input	Difference between the current Baro sensor reading and the previous Baro sensor reading	> 10.0 kPa	Ignition has been on Vehicle Speed No Active DTCs:	> 10.0 seconds < 100 KPH AmbientAirPressCktFA ECT_Sensor_FA IAT_SensorFA MAF_SensorFA	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips 2 Trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						AfterThrottlePressure_NA or AfterThrottlePressure_SC TPS_FA TPS_Performance_FA VehicleSpeedSensorError		
Barometric Pressure(BARO) Sensor Circuit Low	P2228	Detects a continuous short to low or open in either the signal circuit or the BARO sensor.	BARO Voltage	< 21.0 % of 5 Volt Range (1.0 Volts = 50.0 kPa)	Continuous		20 failures out of 25 samples 1 sample every 12.5 msec	Type B 2 trips
Barometric Pressure(BARO) Sensor Circuit High	P2229	Detects an open sensor ground or continuous short to high in either the signal circuit or the BARO sensor.	BARO Voltage	> 53.5 % of 5 Volt Range (2.7 Volts = 115.0 kPa)	Continuous		20 failures out of 25 samples 1 sample every 12.5 msec	Type B 2 trips
O2 Sensor Signal Stuck Lean Bank 2 Sensor 2 POVD DTC description	P2272	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 cannot achieve the rich threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal >= 775 mvolts AND 2) Accumulated air flow during stuck lean test > 550 grams.	No Active DTC's	TPS_ThrottleAuthority Defaulted P0131, P0137, P0151, P0157 P0132, P0138, P0152, P0158 P0134, P0140, P0154, P0160 P0053, P0054, P0059, P0060 P0135, P0141, P0155, P0161 P1133, P1153, P0133, P0153 EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensor Circuit FA MAF_SensorFA MAP_SensorFA	Frequency: Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 66000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						AIR System FA	run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
						FuelInjectorCircuit_FA		
						FuelTrimSystemB1_FA		
						FuelTrimSystemB2_FA		
						EngineMisfireDetected_FA		
						EthanolCompositionSensor_FA		
					DTC passed	P2273		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Engine Speed	500 <= RPM <= 1800		
					Engine Airflow	3 gps <= Airflow <= 12 gps		
					Vehicle Speed	3.1 mph <= Veh Speed <= 82.0 mph		
					Closed loop integral	0.95 <= C/L Int <= 1.05		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					All above met and then fuel is commanded Rich			
					Fuel State	= Refer to **"P2270/P2272 - O2 Sensor Signal Stuck Lean Bank 1/2 Sensor 2"** Rich Equiv Ratio		
					During Stuck Lean test the following can cause the test to abort			
					Fuel State	= DFCO		
					Fuel State	= PE		
					Purge duty cycle	> 0 %		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2 Sensor Signal Stuck Rich Bank 2 Sensor 2 POVD DTC description	P2273	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 reduces delivered fuel to achieve the required lean threshold.	Post O2 sensor cannot achieve the lean threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal <= 100 mvolts AND 2) Accumulated air flow during stuck rich test > 550 grams.	No Active DTC's System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag	TPS_ThrottleAuthority Defaulted P0131, P0137, P0151, P0157 P0132, P0138, P0152, P0158 P0134, P0140, P0154, P0160 P0053, P0054, P0059, P0060 P0135, P0141, P0155, P0161 P1133, P1153, P0133, P0153 EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit FA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA 10.0 volts < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False	Frequency: Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 0 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine Speed	500 <= RPM <= 1800		
					Engine Airflow	3 gps <= Airflow <= 12 gps		
					Vehicle Speed	3.1 mph <= Veh Speed <= 82.0 mph		
					Closed loop integral	0.95 <= C/L Int <= 1.05		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					All of the above met for at least 1.0 seconds, Purge is commanded off, and then wait 2.0 seconds before a commanding lean ratio.			
					Fuel State	= Refer to **"P2271/P2273 - O2 Sensor Signal Stuck Rich Bank 1/2 Sensor 2"** Lean Equiv Ratio		
					During Stuck Lean test the following can cause the test to abort			
					Piston Protection	= Active		
					Converter Mode	= Over Temperature		
					Hot Coolant Enrichment	= Active		
					Fuel State	= PE		
					Purge duty cycle	> 0 %		

Look-up Tables

FASD Section																	
P0171 & P0174 (COMB TERM ONLY)	**Combined Fuel Trim Lean Threshold**																
% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Comb Fuel Trim Lean Threshold	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
P0172 & P0175 (COMB TERM ONLY)	**Combined Non Purge Rich Limit**																
% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Comb Fuel Trim Non-Purge RichThre	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
P0172 & P0175 (COMB TERM ONLY)	**Combined Purge Rich Limit**																
% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Comb Fuel Trim Purge Rich Threshol	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
The following tables define when the engine goes closed loop																	
P0101, P0106, P0121, P012B, P1101: IFRD Residual Weighting Factors																	
	TPS Residual Weight Factor based on RPM																
RPM	0	1500	2200	2500	2700	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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
	MAF Residual Weight Factor based on RPM																
RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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
	MAF Residual Weight Factor Based on MAF Estimate																
gm/sec	0.0	50.0	70.0	73.0	76.0	79.0	82.0	85.0	89.0	95.0	100.0	110.0	120.0	150.0	200.0	280.0	350.0
	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	0.900	0.900	0.900
	MAP1 Residual Weight Factor based on RPM																
RPM	0	1500	2200	2500	2700	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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
	MAP2 Residual Weight Factor based on RPM																
RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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
	SCIAP1 Residual Weight Factor based on RPM																
RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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
	SCIAP2 Residual Weight Factor based on RPM																
RPM	0	1500	2200	2500	2800	3100	3200	3300	3500	3700	4000	4200	4500	5000	5500	6500	8000
	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
	Boost Residual Weight Factor based on % of Boost																
% Boost	0.00	0.06	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00
	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

Supercharger Intake Flow Rationality Diagnostic Failure Matrix

DTC Set	TPS Model Failure	MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	SCIAP 1 Model Failure	SCIAP 2 Model Failure
No DTC	F	F	F	F	F	F
No DTC	F	F	F	F	F	T
No DTC	F	F	F	F	T	F
P012B	F	F	F	F	T	T
No DTC	F	F	F	T	F	F
P1101	F	F	F	T	F	T

Look-up Tables

P1101	F	F	F	T	T	F												
P1101	F	F	F	T	T	T												
No DTC	F	F	T	F	F	F												
P1101	F	F	T	F	F	T												
P1101	F	F	T	F	T	F												
P1101	F	F	T	F	T	T												
P0106	F	F	T	T	F	F												
P1101	F	F	T	T	F	T												
P1101	F	F	T	T	T	F												
P1101	F	F	T	T	T	T												
No DTC	F	T	F	F	F	F												
P0101	F	T	F	F	F	T												
No DTC	F	T	F	F	T	F												
P0101, P012B	F	T	F	F	T	T												
P1101	F	T	F	T	F	F												
P0101	F	T	F	T	F	T												
P1101	F	T	F	T	T	F												
P0101, P012B	F	T	F	T	T	T												
P1101	F	T	T	F	F	F												
P1101	F	T	T	F	F	T												
P1101	F	T	T	F	T	F												
P1101	F	T	T	F	T	T												
P1101	F	T	T	T	F	F												
P1101	F	T	T	T	F	T												
P1101	F	T	T	T	T	F												
P1101	F	T	T	T	T	T												
P0121	T	F	F	F	F	F												
No DTC	T	F	F	F	F	T												
P0121	T	F	F	F	T	F												
P1101	T	F	F	F	T	T												
P1101	T	F	F	T	F	F												
P1101	T	F	F	T	F	T												
P1101	T	F	F	T	T	F												
P1101	T	F	F	T	T	T												
P0121	T	F	T	F	F	F												
P1101	T	F	T	F	F	T												
P0121	T	F	T	F	T	F												
P1101	T	F	T	F	T	T												
P1101	T	F	T	T	F	F												
P1101	T	F	T	T	F	T												
P1101	T	F	T	T	T	F												
P1101	T	F	T	T	T	T												
P0121	T	T	F	F	F	F												
P1101	T	T	F	F	F	T												
P0121	T	T	F	F	T	F												
P1101	T	T	F	F	T	T												
P1101	T	T	F	T	F	F												
P1101	T	T	F	T	F	T												
P1101	T	T	F	T	T	F												
P1101	T	T	F	T	T	T												
P0121	T	T	T	F	F	F												
P1101	T	T	T	F	F	T												
P0121	T	T	T	F	T	F												
P1101	T	T	T	F	T	T												

Look-up Tables

P0108, P012D: MAP/SCIAP Cold Run Time Threshold

X axis is Engine Coolant Temperature in Deg C

Temp	-30	-15	0	15	30
	242.0	188.0	134.0	80.0	0.0

P2270/P2272 - O2 Sensor Signal Stuck Lean Bank 1/2 Sensor 2 Rich Equiv Ratio

	0.0	500.0	1000.0	1500.0	2000.0
0.0	1.100098	1.100098	1.100098	1.100098	1.100098
25.0	1.100098	1.100098	1.100098	1.100098	1.100098
50.0	1.120117	1.120117	1.120117	1.120117	1.120117
75.0	1.120117	1.120117	1.120117	1.149902	1.149902
100.0	1.174805	1.174805	1.174805	1.174805	1.174805

Z axis is Equiv ratio during the test
Y axis is MAP (kpa)
X axis RPM

P2271/P2273 - O2 Sensor Signal Stuck Rich Bank 1/2 Sensor 2 Lean Equiv Ratio

	0.0	500.0	1000.0	1500.0	2000.0
0.0	0.899902	0.899902	0.899902	0.899902	0.899902
25.0	0.899902	0.899902	0.899902	0.899902	0.899902
50.0	0.899902	0.899902	0.899902	0.899902	0.899902
75.0	0.899902	0.899902	0.899902	0.899902	0.899902
100.0	0.899902	0.899902	0.899902	0.899902	0.899902

Z axis is Equiv ratio during the test
Y axis is MAP (kpa)
X axis RPM

Tables supporting Engine Oil Temperature Sensor

P0196

FastFailTempDiff — **AXIS is Engine Coolant Temperature at ECM Power-up, Degrees C**

Axis	**-40**	**-28**	**-16**	**-4**	**8**	**20**	**32**	**44**	**56**	**68**	**80**	**92**	**104**	**116**	**128**	**140**	**152**
Curve	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

TotalAccumulatedFlow — **Axis is Power up Engine Oil temperature, Curve is accumulated engine grams airflow**

Axis	**-40**	**-28**	**-16**	**-4**	**8**	**20**	**32**	**44**	**56**	**68**	**80**	**92**	**104**	**116**	**128**	**140**	**152**
Curve	15000	14000	13000	12000	11000	10000	9000	8000	7000	6000	5000	4000	5000	4000	3000	3000	3000

Phaser Section

KtPHSD_phi_CamPosErrorLimIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000

Look-up Tables

3200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000

KtPHSD_phi_CamPosErrorLimEc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000

KtPHSD_phi_CamPosErrorLimIc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000

Look-up Tables

KtPHSD_phi_CamPosErrorLimEc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
1600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
2800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
3600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
4800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5200	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
5600	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6000	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6400	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000
6800	20.0000	20.0000	20.0000	10.0000	7.0000	5.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	6.0000

KtPHSD_t_StablePositionTimeIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000

KtPHSD_t_StablePositionTimeEc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000

Look-up Tables

2800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000

KtPHSD_t_StablePositionTimeIc2

X axis is Deg C

Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000

KtPHSD_t_StablePositionTimeEc2

X axis is Deg C

Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
1600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
2800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
3600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
4800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5200	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
5600	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6000	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6400	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000
6800	16.000	16.000	12.000	10.000	8.500	7.000	5.000	4.000	4.000	3.000	3.000	3.000	3.000	4.000	4.000	4.000	5.000

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Heater Control Circuit Bank 2 Sensor 1	P0050	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 18.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
O2S Heater Control Circuit Bank 2 Sensor 2	P0056	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 18.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
HO2S Heater Resistance Bank 2 Sensor 1	P0059	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 3.1 ohms -OR- Calculated Heater Resistance > 9.3 ohms	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 18.0 volts >= 0.17 seconds	Once per valid cold start	2 trips Type B
HO2S Heater Resistance Bank 2 Sensor 2	P0060	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 3.1 ohms -OR- Calculated Heater Resistance > 9.3 ohms	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC > 28800 seconds -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 18.0 volts >= 0.17 seconds	Once per valid cold start	2 trips Type B
O2 Sensor Slow Response Rich to Lean Bank 2 Sensor 2 (Split volume catalyst only)	P013C	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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the	1) B1S2 EWMA normalized integral value > 8.0 units OR 2) Accumulated air flow during slow rich to lean test > 32 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid	1 trips Type A EWMA

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			upper and lower voltage thresholds) is greater than the airflow threshold.			FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	ResponseActive = TRUE, multiple tests per trip are allowed	
					B2S2 Failed this key cycle	P013D, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			
O2 Sensor Slow Response Lean to Rich Bank 2 Sensor 2 (Split volume catalyst only)	P013D	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	The EWMA of the Post O2 sensor normalized integral value is greater than the threshold. OR	1) B1S2 EWMA normalized integral value > 8.0 units OR 2) Accumulated air flow during	No Active DTC's	TPS_ThrottleAuthority Defaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_Reset FastRespFunc= FALSE for the	1 trips Type A EWMA

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
		increases the delivered A/F ratio to achieve the required rich threshold.	The Accumulated mass air flow monitored during the Slow Response Test (between the lower and upper voltage thresholds) is greater than the airflow threshold.	slow lean to rich test > 22 grams (lower threshold is 350 mvolts and upper threshold is 650 mvolts)		AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	
					B2S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed DTC's Passed DTC's Passed DTC's Passed DTC's Passed	P013C, P014A, P014B, P2272 or P2273 10.0 volts < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False = enabled = 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))	Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					After above conditions are met: Fuel Enrich mode continued.			
O2 Sensor Delayed Response Rich to Lean	P014A	This DTC determines if the post catalyst O2 sensor has an initial	Post O2 sensor cannot go below the threshold voltage.	1) Post O2S signal > 450 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted	Frequency: Once per trip	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Bank 2 Sensor 2 (Split volume catalyst only)		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.	AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	AND 2) Accumulated air flow during stuck rich test > 32 grams.		ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	
					B2S2 Failed this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	P013C, P013D, P014B, P2272 or P2273 10.0 volts < system voltage< 18.0 volts = Valid = Not Valid = Not Valid = False = enabled = P2270 and P2272 (if applicable)	<u>Green Sensor Delay Criteria</u> The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					After above conditions are met: DFCO mode entered (wo driver initiated pedal input).			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 2 (Split volume catalyst only)	P014B	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 cannot go above the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal < 350 mvolts AND 2) Accumulated air flow during lean to rich test > 52 grams.	No Active DTC's	TPS_ThrottleAuthority Defaulted 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_Reset FastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_Rapid ResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					B2S2 Failed this key cycle	P013C, P013D, P014A, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					Learned heater resistance	= Valid	Green Sensor Delay Criteria	
					ICAT MAT Burnoff delay	= Not Valid	The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					Green O2S Condition	= Not Valid		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					After above conditions are met: Fuel Enrich mode entered.			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Circuit Low Voltage Bank 2 Sensor 1	P0151	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	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	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	2 % <= Throttle <= 45 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 4.0 seconds		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Circuit High Voltage Bank 2 Sensor 1	P0152	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	0.0 % <= Throttle <= 45.0 %		
					Fuel Control State	= Closed Loop		
					Fuel Control State	not = Power Enrichment		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for Time	> 2 seconds		
O2S Slow Response Bank 2 Sensor 1	P0153	This DTC determines if the O2 sensor response time is degraded.	The average response time is caluclated over the test time, and compared to the threshold. Refer to **"P0153 - O2S Slow Response Bank 2 Sensor 1"** Pass/Fail		No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA	Sample time is 60 seconds Frequency:	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Threshold table in the Supporting Tables tab.			AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 1.5 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 1.5 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	15 gps <= engine airflow <= 45 gps		
					Engine speed	1250 <= RPM <= 2550		
					Fuel	< 87 % Ethanol		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Baro Throttle Position Low Fuel Condition Diag Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain **All of the above met for** Time	> 70 kpa >= 5 % = False = Closed Loop = TRUE = Enabled <= 1.3 mgrams = Not Defaulted not = Power Enrichment DFCO not active >= 0.0 % > 4.5 seconds		
O2S Circuit Insufficient Activity Bank 2 Sensor 1	P0154	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	380 mvolts < Oxygen Sensor signal < 525 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Predicted Exhaust Temp (by location) Engine Run Time Fuel	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 volts < system voltage< 18.0 volts = All Cylinders active = Complete = Wamed Up > 124 seconds <= 87 % Ethanol	400 failures out of 500 samples. Minimum of 0 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 3.0 % Frequency: Continuous 100msec loop	2 trips Type B
O2S Heater Performance Bank 2 Sensor 1	P0155	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 1.5 amps	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** Time	ECT_Sensor_FA 10.0 volts < system voltage< 18.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 10 seconds delay between tests and 1 second execution rate	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Circuit Low Voltage Bank 2 Sensor 2	P0157	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	2 % <= Throttle <= 45 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for Time	> 4.0 seconds		
O2S Circuit High Voltage Bank 2 Sensor 2	P0158	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA	100 failures out of 125 samples	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA	Frequency: Continuous in 100 milli - second loop	
						FuelInjectorCircuit_FA		
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9 <= equiv. ratio <= 1.1		
					Throttle Position	2.5 % <= Throttle <= 45.0 %		
					Fuel Control State	= Closed Loop not = Power		
					Fuel Control State	Enrichment		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for			
					Time	> 4 seconds		
O2S Circuit Insufficient Activity Bank 2 Sensor 2	P0160	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	380 mvolts < Oxygen Sensor signal < 525 mvolts	No Active DTC's	TPS_ThrottleAuthority Defaulted MAF_SensorFA EthanolCompositionSensor_FA	590 failures out of 740 samples. Minimum of 1 delta TPS changes required to report fail. Delta TPS is incremented when	2 trips Type B
					System Voltage	10.0 volts < system voltage< 18.0 volts		
					AFM Status	= All Cylinders active		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Heater Warm-up delay Predicted Exhaust Temp (by location) Engine Run Time Fuel	= Complete = Wamed Up > 124 seconds <= 87 % Ethanol	the TPS % change >= 3.0 % Frequency: Once per trip for post sensors 100msec loop	
O2S Heater Performance Bank 2 Sensor 2	P0161	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 1.5 amps	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** Time	ECT_Sensor_FA 10.0 volts < system voltage< 18.0 volts = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 10 seconds delay between tests and 1 second execution rate	2 trips Type B
Knock Sensor (KS) Module Performance	P0324	This diagnostic will detect a failed internal ECM component associated with knock control	Any Cylinder's Avg Gain Signal **or** All Cylinder's Actual Signals	> 4.50 Volts ≤ 0.20 Volts	Engine Speed Engine Air Flow No Active DTC's Engine Speed Engine Air Flow No Active DTC's	≥ 450 RPM > 60 mg/cylinder KS_Ckt_Perf_B1B2_FA ≥ 450 RPM > 60 mg/cylinder KS_Ckt_Perf_B1B2_FA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Secondary AIR Incorrect Airflow (Dual Bank Systems)	P0411	Detects an insufficient flow condition This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open) A leak or blockage downstream of the valve is detected via an evaluation of the pressure difference between Bank 1 and Bank 2.	Predicted System Pressure versus Actual System Pressure Error OR OR Pressure Difference between Bank 1 and	> 5.0 kPa Bank 1 or > 5.0 kPa Bank 2 < -3.0 kPa Bank 1 or < -3.0 kPa Bank 2	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage **Conditional test weight is calculated by multiplying the following Factors** **Phase 1 Baro Test Weight Factor** **Phase 1 MAF Test Weight Factor**	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts	Phase 1 Conditional test weight > 7.0 seconds	2 trip(s) Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Bank 2	> 0.66 kPa or < -0.66 kPa	**Phase 1 System Volt Test Weight Factor** **Phase 1 Ambient Temp Test Weight Factor**			
				disable	MAP	< 20 kPa for 2 seconds		
				conditions:	Engine Speed MAF No active DTCs:	> 5000 RPM > 50 gm/s for 0 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA MAP_SensorFA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Frequency: Once per trip when AIR pump commanded On	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Catalyst System Low Efficiency Bank 2	P0430	Oxygen Storage The 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 Lean and Rich 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 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. The Catalyst Monitoring Test is done during idle. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document.	Normalized Ratio OSC Value (EWMA filtered)	< 0.350	***Valid Idle Period Criteria*** Throttle Position Vehicle Speed Engine speed Engine run time Tests attempted this trip The catalyst diagnostic has not yet completed for the ***Catalyst Idle Conditions Met Criteria*** General Enable met and the Green Converter Delay Induction Air Intrusive test(s): Fueltrim Post O2 EVAP EGR RunCrank Voltage Ethanol Estimation ECT Barometric Pressure	< 2.00 % < *2.00 Kph* > 1100 RPM for a minimum of 15 seconds since end of last idle period. ≥ MinimumEngineRunTime**, This is a function of Coolant Temperture, please see Supporting Tables** < 255 Not Active *-20 < ° C < 250* Not Active > 10.90 Volts NOT in Progress *40 < ° C < 126* > 70 KPA	1 test attempted per valid idle period Minimum of 1 test per trip Maximum of 8 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction:	Type A 1 Trip(s)

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Idle Time before going intrusive is	< 50 Seconds		
					Idle time is incremented if Vehicle speed	< 2 Kph and the throttle position < 2.00 % as identified in the Valid Idle Period Criteria section.		
					Short Term Fuel Trim	*0.90 < ST FT < 1.10*		
					Predicted catalyst temp > MinCatTemp table (degC) (refer			
					Closed loop fueling Enabled			
					PRNDL			
					Idle Stable Criteria :: Must hold true from after			
					MAF	*2.80 < g/s < 13.50*		
					Predicted catalyst temperature	< 812 degC		
					Engine Fueling Criteria at Beginning of Idle Period			
					The following fueling related must also be met from			
					Number of pre-O2 switches	> 2		
					Short Term Fuel Trim Avg	*0.90 < ST FT Avg < 1.04*		
					Rapid Step Response (RSR) feature will initiate			
					If the difference between current EWMA value and the			
					Maximum of 24 RSR tests to detect failure when RSR is			
					Green Converter Delay Criteria			
					This is part of the check for the Catalyst Idle Conditions			
					The diagnostic will not be enabled until the following has			
					Predicted catalyst temperature > 590 ° C for 3600			
					PTO Not Active			
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					AmbientAirDefault_SC			
					IAT_SensorCircuitFA			
					ECT_Sensor_FA			
					O2S_Bank_1_Sensor_1_FA			
					O2S_Bank_1_Sensor_2_FA			
					O2S_Bank_2_Sensor_1_FA			
					O2S_Bank_2_Sensor_2_FA			
					FuelTrimSystemB1_FA			
					FuelTrimSystemB2_FA			
					EngineMisfireDetected_FA			
					EvapPurgeSolenoidCircuit_FA			
					IAC_SystemRPM_FA			
					EGRValvePerformance_FA			
					EGRValveCircuit_FA			
					CamSensor_FA			
					CrankSensorFaultActive			
					TPS_Performance_FA			
					EnginePowerLimited			
					VehicleSpeedSensor_FA			

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
O2S Insufficient Switching Bank 2 Sensor 1	P1153	This DTC determines if the O2 sensor is no longer sufficiently switching.	Fault condition present if Half Cycle L/R or R/L Switches are below the threshold. OR If Slope Time L/R or R/L Switches are below the threshold.	H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to table named "P1153 - O2S HC L to R Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table & "P1153 - O2S HC R to L Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table in Supporting tables tab) OR S/T L/R switches < 3, or S/T R/L switches < 3	No Active DTC's Bank 2 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 O2 Heater on for Learned Htr resistance Engine Coolant IAT Engine Run Time Time since any AFM status change Time since Purge On to Off change Time since Purge Off to On change Purge duty cycle	TPS_ThrottleAuthority Defaulted 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 = P0151, P0152 or P0154 10.0 volts < system voltage< 18.0 volts = Not active = Not active = Not active = Not active = False = Not Valid >= 40 seconds = Valid > 50 ºC > -40 ºC > 120 seconds > 1.5 seconds > 0.0 seconds > 1.5 seconds >= 0 % duty cycle	Sample time is 60 seconds Frequency: Once per trip Green Sensor Delay Criteria The diagnostic will not be enabled until the next ignition cycle after the following has been met: Airflow greater than 22 gps for 120000 grams of accumulated flow non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle). Note: This feature is only enabled when the vehicle is new and cannot be enabled in service	2 trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					Engine airflow	15 gps <= engine airflow <= 45 gps		
					Engine speed	1250 <= RPM <= 2550		
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 5 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 1.3 mgrams		
					Baro	= Not Defaulted not = Power		
					Fuel Control State	Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for			
					Time	> 4.5 seconds		
Air Fuel Imbalance Bank 2	P1175	Determines if the air-fuel delivery system is imbalanced by monitoring the pre-catalyst O2 sensor voltage characteristics	The Bank 2 AFIM Filtered Length Ratio variable exceeds a value of	> 1.000	System Voltage	*10 < V < 18 for > 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop	Type B 2 Trip(s)
					Engine Run Time	> 50 seconds	AFIM Filtered Length Ratio variable is updated after every 2.5 seconds of valid data.	
					ECT	> 10 oC		
					Engine speed	*1250 < rpm < 3500*		
					Mass Airflow	*9 < g/s < 400*		
					PerCent Ethanol	< 85 %		
					Delta O2 voltage during previous 12.5ms	> 5 and -5		
					O2 sensor switches	> 0 times during current 2.5 second sample period		
					Quality Factor	> 0 in the current operating region		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					For DoD equipped vehicles only	No DoD state change during current 2.5 second sample period.		
					The AFIM Filtered Length Ratio is determined by The first report is delayed for 100 seconds to allow time for **Closed Loop fueling enabled**			
					Fuel System Status	LONG FT Enabled		
					Disable Conditions:			
					EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA Ethanol Composition Sensor FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA O2S_Bank_1_Sensor_1_FA O2S_Bank_2_Sensor_1_FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA			
					Device Control	Not Active		
					Intrusive Diagnostics	Not Active		
					Engine OverSpeed Protection	Not Active		
					Reduced Power Mode (ETC DTC)	Not Active		
					PTO	Not Active		
					Traction Control	Not Active		
Secondary AIR System Pressure Sensor Circuit Bank 2	P2435	This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on.	Average Error and Signal Variation	< 0.50 kPa < 1.00 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts	Stuck in range cumulative time > 5.0 seconds	2 trip(s) Type B
				disable conditions:	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA	Frequency: Once per trip when SAI pump commanded On	

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						AIRSysPressSnsrB1CktHiFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		
Secondary AIR System Pressure Sensor Performance Bank 2	P2436	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 Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 10.0 kPa < -10.0 kPa > 10.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage **Skewed sensor cumulatative test weight is based on distance from the last Baro update Baro Skewed Sensor Weight Factor**	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts	Skewed sensor cumulative test weight > 5.0 seconds Continuous 6.25ms loop	2 trip(s) Type B
				disable conditions:	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds Transfer Case not in 4WD Low AIRValveControlCircuitFA AIRPumpControlCircuitFA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA MAF_SensorFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		
Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 2	P2437	This DTC detects an out of range low AIR pressure sensor signal	AIR Pressure Sensor signal	< 5 % of 5Vref disable conditions:	No active DTCs:	ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	800 failures out of 1000 samples 6.25 ms loop Continuous	2 trip(s) Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Secondary AIR System Pressure Sensor Circuit Hi Voltage Bank 2	P2438	This DTC detects an out of range high AIR pressure sensor signal	AIR Pressure Sensor signal	> 94 % of 5Vref disable conditions:	No active DTCs:	ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	800 failures out of 1000 samples 6.25 ms loop Continuous	2 trip(s) Type B
Secondary AIR System Shut-off Valve Stuck Open (Dual Bank System)	P2440	This DTC detects if one or both of the AIR system control valves is stuck open This test is run during Phase 2 (Pump commanded On, valve commanded closed)	AIR pressure error	< **Bank 1 Valve Pressure Error** table or < **Bank 2 Valve Pressure Error** table or > 32 kPa for either Bank	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage Stability Time	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts > 0.5 seconds AIR diagnostic Phase 1 passed	Phase 2 Conditional test weight > 1.5 seconds Frequency: Once per trip when AIR pump commanded On	2 trip(s) Type B
					Conditional test weight is calculated by <u>multiplying the following Factors</u> 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			
				disable **conditions:**	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA MAP_SensorFA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
Secondary AIR System Pump Stuck On (Dual Bank System)	P2444	This DTC detects if the SAI pump is stuck On This test is run during Phase 3 (Pump commanded Off, valve commanded closed)	AIR pressure error	> **Bank 1 Pump Pressure Error** table or > **Bank 2 Pump Pressure Error** table or < -32 kPa either Bank	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage Stability Time	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 80.0 deg C. > 7200.0 seconds > 10.7 OR < 18.0 Volts > 10.0 seconds AIR diagnostic Phase 1 passed AIR diagnostic Phase 2 passed	Phase 3 Cumlatative test weight > 3.0 seconds Frequency: Once per trip when AIR pump commanded On	1 trip(s) Type A
					Phase 3 cumulatative test weight is based on <u>distance from the last Baro update</u> Baro Skewed Sensor Weight Factor			
				disable **conditions:**	MAP Engine Speed MAF No active DTCs:	< 20 kPa for 2 seconds > 5000 RPM > 50 gm/s for 0 seconds AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA MAP_SensorFA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
						IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
O2Sensor Circuit Range/ Performance Bank 2 Sensor 1	P2A03	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed Loop O2S ready flag	= False	No Active DTC's	TPS_ThrottleAuthority Defaulted MAP_SensorFA ECT_Sensor_FA FuelInjectorCircuit_FA P0131, P0151 P0132, P0152	200 failures out of 250 samples. Frequency: Continuous 100msec loop	2 trips Type B
			A) O2S signal must be 1) O2S signal OR 2) O2S signal To set Closed Loop ready flag	> 550 mvolts < 350 mvolts = True	System Voltage	10.0 volts < system voltage< 18.0 volts		
			Closed Loop O2S ready flag	= True	Engine Speed	500 RPM <= Engine speed <= 3000 RPM		
			B) Once set to ready O2S cannot be 1) O2S signal AND 2) O2S signal for time Then set Closed Loop ready flag	 > 350 mvolts < 550 mvolts > 10.0 seconds = False	Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp Active Fuel State AFM Status Predicted Exhaust Temp (B1S1) Engine run time Fuel Enrichment **All of the above met for** Time	3.2 gps <= Engine Airflow<= 30.0 gps >= 65.0 ºC = False = False DFCO not active = All Cylinders active >= 0.0 ºC > 100 seconds = Not Active > 5 seconds		

LOOK-UP TABLES

CATD Section

MinimumEngineRunTime

Coolant Temp	40	50	60	70	80
Engine Run Time	100	60	30	15	0

MinCatTemp

	X_AXIS_PTS
CATD_ExhaustWarmMin_Loc_0	0
CATD_ExhaustWarmMin_Loc_1	1
CATD_ExhaustWarmMin_Loc_2	2
CATD_ExhaustWarmMin_Loc_3	3
CATD_ExhaustWarmMin_Loc_4	4
CATD_ExhaustWarmMin_Loc_5	5
CATD_ExhaustWarmMin_Loc_6	6
CATD_ExhaustWarmMin_Loc_7	7

MinAirflowToWarmCatalyst

Engine Coolant	0	45	90
MinAirFlowToWrmCat	10	8	6

Define Close Loop

KtFSTA_T_ClosedLoopTemp

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	75	75	72	70	50	45	45	45	45	45	45	45	45	45	45	45	45

KtFSTA_t_ClosedLoopTime

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	160	160	160	160	120	120	110	110	110	60	45	30	30	45	60	60	60

AFIM Section

KtOXYD_cmp_AFIM_LngthThrsh2

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
80	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
120	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
160	50000	50000	50000	50000	7040	9104	10320	10672	10656	11648	12064	11952	50000	50000	50000	50000	50000
200	50000	50000	50000	50000	8928	11696	14720	15168	13232	12768	12016	12576	50000	50000	50000	50000	50000
240	50000	50000	50000	50000	10928	12736	15008	14048	12064	12000	13888	14768	50000	50000	50000	50000	50000
280	50000	50000	50000	50000	11008	13776	14672	12896	12000	12160	14224	14480	50000	50000	50000	50000	50000
320	50000	50000	50000	50000	12720	15328	15232	13856	13472	12128	14064	15344	50000	50000	50000	50000	50000
360	50000	50000	50000	50000	13184	14816	13552	13024	13152	12720	13152	14256	50000	50000	50000	50000	50000
400	50000	50000	50000	50000	18912	17008	14848	13696	12960	12896	12864	14480	50000	50000	50000	50000	50000
440	50000	50000	50000	50000	18448	19088	15280	14448	15440	50000	50000	50000	50000	50000	50000	50000	50000
480	50000	50000	50000	50000	50000	21408	17456	17152	50000	50000	50000	50000	50000	50000	50000	50000	50000
520	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
560	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
640	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
720	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
800	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000

KtOXYD_K_AFIM_QualFactor2

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LOOK-UP TABLES

120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
200	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
240	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
280	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
320	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
360	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
400	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
440	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0
480	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
720	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Define Close Loop

KtFSTA_T_ClosedLoopTemp																	
Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	75	75	72	70	50	45	45	45	45	45	45	45	45	45	45	45	45
KtFSTA_t_ClosedLoopTime																	
Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	160	160	160	160	120	120	110	110	110	60	45	30	30	45	60	60	60

Tables supporting AIR Diagnostics

P0411

SL Threshold Bank 1 Table — **axis is average engine airflow during test in gm/sec**

Axis	**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**
Curve	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4

P0411

SL Threshold Bank 2 Table (dual Bank systems only) — **axis is average engine airflow during test in gm/sec**

Axis	**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**
Curve	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4

P0411

Phase 1 Baro Test Weight Factor — **axis is Baro in Kpa**

Axis	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**
Curve	0.0	0.0	0.5	1.0	1.0	1.0	1.0	0.5	0.0

P0411

Phase 1 MAF Test Weight Factor — **axis is engine airflow in gm/sec**

Axis	**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**
Curve	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

P0411

Phase 1 System Volt Test Weight Factor — **axis is engine airflow in gm/sec**

Axis	**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**
Curve	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.0	0.0	0.0

P0411

Phase 1 Amb Temp Test Weight Factor — **axis is Deg C**

LOOK-UP TABLES

Axis	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**	**40**	**50**								
Curve	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0								
P2431	**P2436**	**P2440**															
	Baro Skewed Sensor Weight Factor				**axis is distance traveled from last Baro update in Km**												
Axis	**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**
Curve	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
P2440																	
	Bank 1 Valve Pressure Error				**axis weighted time in seconds**												
Axis	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**								
Curve	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0								
P2440																	
	Bank 2 Valve Pressure Error				**axis weighted time in seconds**												
Axis	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**								
Curve	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0								
P2440																	
	Phase 2 Baro Test Weight Factor				**axis is Baro in Kpa**												
Axis	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**								
Curve	0.0	0.0	0.5	1.0	1.0	1.0	1.0	0.5	0.0								
P2440																	
	Phase 2 MAF Test Weight Factor				**axis is engine airflow in gm/sec**												
Axis	**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**
Curve	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
P2440																	
	Phase 2 System Volt Test Weight Factor				**axis is engine airflow in gm/sec**												
Axis	**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**
Curve	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.5	0.0	0.0	0.0
P2440																	
	Phase 2 Amb Temp Test Weight Factor				**axis is Deg C**												
Axis	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**	**40**	**50**								
Curve	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0								
P2444																	
	Bank 1 Pump Pressure Error				**axis weighted time in seconds**												
Axis	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**								
Curve	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5								
P2444																	
	Bank 2 Pump Pressure Error				**axis weighted time in seconds**												
Axis	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**								
Curve	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5								
FASD Section																	
P0171 & P0174 (LONG TERM ONLY	**Long Term Trim Lean**																
% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Long Term Fuel Trim Lean Threshold	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29

LOOK-UP TABLES

P0172 & P0175 (LONG TERM ONLY	**Non Purge Rich Limit**																
% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Long Term Fuel Non-Purge Rich Thre	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
P0172 & P0175 (LONG TERM ONLY	**Purge Rich Limit**																
% Ethanol	0.00	6.25	12.50	18.75	24.99	31.24	37.49	43.74	49.99	56.24	62.48	68.73	74.98	81.23	87.48	93.73	99.98
Long Term Fuel Purge Rich Threshold	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
The following tables define when the engine goes closed loop																	
P0171, P0172, P0174 & P0175	**Closed Loop Enable Temp vrs Coolant Temp**																
Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Temp	75	75	72	70	50	45	45	45	45	45	45	45	45	45	45	45	45
P0171, P0172, P0174 & P0175	**Closed Loop Enable Time vrs Coolant Temp**																
Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	160	160	160	160	120	120	110	110	110	60	45	30	30	45	60	60	60
P0153 - O2S Slow Response Bank 2 Sensor 1" Pass/Fail Threshold table																	
		Z axis is the pass/fail result (see note below)															
		X axis is Lean to Rich response time (msec)															
		Y axis is Rich to Lean response time (msec)															
		Note: If the cell contains a "0" then the fault is not indicated, if it contains a "1" a fault is indicated															
	0.000	0.024	0.036	0.048	0.060	0.072	0.084	0.096	0.108	0.120	0.132	0.144	0.156	0.168	0.180	0.192	1.000
0.000	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
0.036	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0.048	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
0.060	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0.072	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
0.084	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0.096	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.108	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.120	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.132	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.144	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.156	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.168	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.180	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.192	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
0.204	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P1153 - O2S HC L to R Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table																	
		Z axis is Limit for L/R HC switches															
		Y axis is Average flow during the response test (gps)															
		X axis is estimated Ethanol percentage															
		Note: The cell contains the minumum switches															
	0.0	10.0	20.0	50.0	80.0												
0.0	23	23	23	23	23												
6.3	23	23	23	23	23												
12.5	23	23	23	23	23												
18.8	24	24	24	24	24												
25.0	25	25	25	25	25												

LOOK-UP TABLES

31.3	26	26	26	26	26
37.5	27	27	27	27	27
43.8	27	27	27	27	27
50.0	27	27	27	27	27
56.3	27	27	27	27	27
62.5	27	27	27	27	27
68.8	27	27	27	27	27
75.0	27	27	27	27	27
81.3	27	27	27	27	27
87.5	27	27	27	27	27
93.8	27	27	27	27	27
100.0	27	27	27	27	27

P1153 - O2S HC R to L Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table

Z axis is Limit for R/L HC switches
Y axis is Average flow during the response test (gps)
X axis is estimated Ethanol percentage
Note: The cell contains the minumum switches

	0.0	10.0	20.0	50.0	80.0
0.0	23	23	23	23	23
6.3	23	23	23	23	23
12.5	23	23	23	23	23
18.8	24	24	24	24	24
25.0	25	25	25	25	25
31.3	26	26	26	26	26
37.5	27	27	27	27	27
43.8	27	27	27	27	27
50.0	27	27	27	27	27
56.3	27	27	27	27	27
62.5	27	27	27	27	27
68.8	27	27	27	27	27
75.0	27	27	27	27	27
81.3	27	27	27	27	27
87.5	27	27	27	27	27
93.8	27	27	27	27	27
100.0	27	27	27	27	27

P2270/P2272 - O2 Sensor Signal Stuck Lean Bank 1/2 Sensor 2 Rich Equiv Ratio

	0.0	500.0	1000.0	1500.0	2000.0
0.0	1.174805	1.174805	1.174805	1.174805	1.174805
25.0	1.174805	1.174805	1.174805	1.174805	1.174805
50.0	1.174805	1.174805	1.174805	1.174805	1.174805
75.0	1.174805	1.174805	1.174805	1.174805	1.174805
100.0	1.174805	1.174805	1.174805	1.174805	1.174805

Z axis is Equiv ratio during the test
Y axis is MAP (kpa)
X axis RPM

P2271/P2273 - O2 Sensor Signal Stuck Rich Bank 1/2 Sensor 2 Lean Equiv Ratio

	0.0	500.0	1000.0	1500.0	2000.0
0.0	0.875000	0.875000	0.875000	0.875000	0.875000
25.0	0.875000	0.875000	0.875000	0.875000	0.875000

		LOOK-UP TABLES			
50.0	0.875000	0.875000	0.875000	0.875000	0.875000
75.0	0.875000	0.875000	0.875000	0.875000	0.875000
100.0	0.875000	0.875000	0.875000	0.875000	0.875000

Z axis is Equiv ratio during the test
Y axis is MAP (kpa)
X axis RPM

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Exhaust Gas Recirculation (EGR) Flow Insufficient	P0401	During a closed throttle decel condition, the EGR valve is normally closed. This diagnostic opens the valve to a pre-determined position, and the change in MAP is computed. This change in MAP correlates to the flow rate of the EGR system	With EGR valve open, the peak + MAP change is monitored over a period of time. This value is compared with a threshold from Engine Speed vs Baro table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit.	DTC is set when the filtered pressure change (NeEGRD_p_EWMA) exceeds 0.75	Run multiple tests (KtEGRD_Cnt_StepSamplesPerTrip) IF the difference between the current EWMA and the current map diff > KtEGRD_p_StepDelta AND current map diff > KtEGRD_p_StepMAP_DIFF, until KtEGRD_Cnt_SamplesAfterStep tests have been completed. Initiate multiple tests upon code clear or a non-volatile memory failure: Several tests per trip will run until KtEGRD_Cnt_SamplesAfterReset tests have been completed. (see Supporting Tables)	***The following DTC's should NOT be active:*** Injector circuit DTC's P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208 No CKP DTCs set P0335, P0336 No TP sensor DTC's set P0068, P0121, P1516, P2101, P2135 No MAP DTC's P0106, P0107, P0108 No VSS DTC's set P0502, P0503, P0722, P0723 No 5 volt reference DTC's set P0641, P0651 No IAT DTC's P0111, P0112, P0113 No ECT DTC's P0117, P0118 No IAC DTC's P0506, P0507 No EGR DTC's P0403, P0404, P0405, P0406 No Misfire DTC's P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308 No MAF DTC's P0101, P0102, P0103 No PCM DTC's set P0604, P0606 No E85 Sensor DTC's P0178, P0179	Time to test = 0.5 + 0.3 sec. 6.25 ms operating loop Completes once per trip (typically)	Type A 1 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
	P0401 cont'd					GetEMOC_b_EngMetalOvertempActv = FALSE, Not in Power Take Off (PTO) Mode (GetPTOI_b_PTO_Active = FALSE), Traction control is NOT active, Not in device control, Not in Catalyst protection mode, BARO > 74 BARO data is NOT defaulted Inlet Air Temp (IAT) < 100 IAT > 5 Ignition Voltage < 18.0 Ignition Voltage > 11.0 Transmission gear is stable > 1.5 Decel fuel cut off state is unchanged for time > 1 Vehicle speed < 113 & Vehicle Speed > 45 Clutch Pedal is not depressed Throttle area cannot change more than 100.0 EGR Position < 1.0 1000 < Engine Speed < 1800 MAP fluctuations < 1.3 17.0 < Altitude-compensated MAP < 43.0		

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
	P0401 cont'd					Difference between desired & actual airflow < 1.2 Intrusive Mode Enablements: KPH variation <= 4.8 +Delta RPM <= 100 -Delta RPM <= 200 Number of EGR On-time execution loops < 25 Throttle Area		
EGR Solenoid Circuit	P0403	This DTC checks the Linear EGR circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 18 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Type B 2 trips
EGR Valve - Open Position Performance	P0404	This diagnostic detects if the pintle position error is too large	Pintle position error [absolute value of (desired position - actual position)] > error threshold	Position error > 10 (Include KfEGRP_Pct_PosErrorMax1 cal if utilized)	Desired EGR position > 0%	*The following DTC's should NOT be active: No 5 volt reference DTC's set P0641, P0651.* *Engine is running* *Off-board device not active* *PTO not active* *P0401 not intrusive* *Ignition voltage >= 11.0* *EGR control is enabled* *Desired EGR position variation < 9.5 for 1.0 sec.* *Enable conditions met for 0.2 sec.*	420 failures out of 1200 samples 100ms loop Continuous	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
EGR Valve - Position Sensor - Circuit Low	P0405	This diagnostic detects if the pintle position feedback circuit is open or shorted to ground by comparing the sensor feedback to normal operating ranges	Raw EGR feedback sensor signal is less than the expected low limit	Raw EGR feedback sensor signal < 4		*The following DTC's should NOT be active: No 5 volt reference DTC's set P0641, P0651.* *Engine is running* *Off-board device not active* *PTO not active* *P0401 not intrusive* *Ignition voltage >= 11.0* *EGR control is enabled* *Desired EGR position variation < 9.5 for 1.0 sec.* *Enable conditions met for 0.2 sec.*	50 failures out of 55 samples 100 ms Continuous	Type B 2 trips
EGR Valve - Position Sensor - Circuit High	P0406	This diagnostic detects if the pintle position feedback circuit is shorted to high voltage or the 5V return is open.	Raw EGR feedback sensor signal is greater than the expected high limit	Raw EGR feedback sensor signal > 94.7		*The following DTC's should NOT be active: No 5 volt reference DTC's set P0641, P0651.* *Engine is running* *Off-board device not active* *PTO not active* *P0401 not intrusive* *Ignition voltage >= 11.0* *EGR control is enabled* *Desired EGR position variation < 9.5 for 1.0 sec.* *Enable conditions met for 0.2 sec.*	180 failures out of 200 samples 100 ms Continuous	Type B 2 trips

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
EGR Valve - Closed-Valve Position Performance	P042E	This diagnostic detects if the valve is stuck open when commanded closed.	Actual pintle position is greater than an error threshold (% of reference voltage from learned closed position)	Raw EGR feedback sensor signal > CV_4.0		*The following DTC's should NOT be active: No 5 volt reference DTC's set P0641, P0651.* *Engine is running* *Off-board device not active* *PTO not active* *P0401 is not intrusive* *Ignition voltage >= 11.0* *EGR control is enabled* *Desired EGR position = 0, for at least 1.0 sec.* *Enable conditions met for 0.2 sec*	360 failures out of 400 samples for 4 failed attempts with valve movement (> 25.0 for 2.0 sec.) in-between attempts 100 ms Continuous	Type B 2 trips

LOOK-UP TABLES

EGR Section

KtEGRD_p_StepDelta

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
2.2266	2.2500	2.3125	2.3828	2.4844	2.6250	2.7813	2.9375	3.1406

KtEGRD_p_StepMAP_DIFF

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
0.1484	0.2422	0.3359	0.4297	0.5234	0.6172	0.7109	0.7969	0.8906

KtEGRD_Cnt_StepSamplesPerTrip

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
7.0000	6.0000	6.0000	6.0000	5.0000	5.0000	5.0000	5.0000	5.0000

KtEGRD_Cnt_SamplesAfterStep

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
39.0000	36.0000	34.0000	32.0000	30.0000	29.0000	28.0000	27.0000	27.0000

KtEGRD_Cnt_SamplesAfterReset

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
25.0000	22.0000	19.0000	17.0000	15.0000	15.0000	15.0000	14.0000	14.0000

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Fuel System Control Module:								
Fuel Rail Pressure (FRP) Sensor Performance (Rationality)	P0191	This DTC detects if the fuel pressure sensor is stuck within the normal operating range	Absolute value of change in fuel pressure as sensed during intrusive test.	<= 30 kPa	1. FRP Circuit Low DTC (P0192) 2. FRP Circuit High DTC (P0193) 3. FuelPump Circuit Low DTC (P0231) 4. FuelPump Circuit High DTC (P0232) 5. FuelPump Circuit Open DTC (P023F) 6. Reference Voltage DTC (P0641) 7. Reference Voltage DTC (P0641) 8. Reference Voltage DTC (P0642) 9. Fuel Pump Control Module Driver Over-temperature DTC's (P064A, P1255) 10. Control Module Internal Performance DTC (P0606) 11. Engine run time 12. Emissions fuel level (PPEI $3FB) 13. Fuel pump control 14. Fuel pump control state 15. Engine fuel flow 16. ECM fuel control system failure (PPEI $1ED)	not active not active not active not active not active not active not failed this trip not active not active not active >=5 seconds not low enabled normal or FRP Rationality control Valid failure has not occurred	Frequency: Continuous; 12.5 ms loop. 60 seconds between intrusive tests that pass Intrusive test requested if fuel system is clamped or fuel pressure error variance <= 0.6 for >= 5 seconds; otherwise report Duration of intrusive test is fueling related (5 to 12 seconds).	DTC Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Fuel Rail Pressure (FRP) Sensor Circuit Low Voltage	P0192	This DTC detects if the fuel pressure sensor circuit is shorted to low	FRP sensor voltage	< 0.1 V	Ignition OR HS Comm OR Fuel Pump Control AND Reference Voltage DTC P0641	Run or Crank enabled enabled not active	72 test failures in 80 test samples 1 sample/12.5 ms	DTC Type A
Fuel Rail Pressure (FRP) Sensor Circuit High Voltage	P0193	This DTC detects if the fuel pressure sensor circuit is shorted to high	FRP sensor voltage	> 4.9 V	Ignition OR HS Comm OR Fuel Pump Control AND Reference Voltage DTC P0641	Run or Crank enabled enabled not active	72 test failures in 80 test samples 1 sample/12.5 ms	DTC Type A
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 < 18V	72 test failures in 80 test samples if Fuel Pump Current <100A 3 test failures in 15 test samples if Fuel Pump Current >=100A 1 sample/12.5 ms	DTC Type A
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/12.5 ms Pass/Fail determination made only once per trip on non-hybrid applications.	DTC Type A

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	1 sample/12.5 ms continuous during auto-stop after enable conditons are met on hybrid applications.	
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 < 18V	72 test failures in 80 test samples 1 sample/12.5 ms	DTC Type A
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 OR HS Comm OR Fuel Pump Control AND PPEI Fuel System Request ($1ED)	Run or Crank enabled enabled valid	72 test failures in 80 test samples 1 sample/12.5 ms	DTC Type A
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
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

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
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
Control Module Internal Performance 1. Main Processor Configuration Register Test 2. Processor clock test 3. External watchdog test	P0606	This DTC indicates the FSCM has detected an internal processor fault or external watchdog fault (PID 2032 can tell what causes 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. 3. For External Watchdog Fault: • Software control of viper chip.	Incorrect value. 0x5A5A 0x5A Control Lost	Ignition OR HS Comm OR Fuel Pump Control 1. For all I/O configuration register faults: •KeMEMD_b_ProcFltCfgRegEnbl 2. For Processor Clock Fault: •KeMEMD_b_ProcFltCLKDiagEnbl 3. For External Watchdog Fault: •KeFRPD_b_FPExtWDogDiagEnbl	Run or Crank enabled enabled TRUE TRUE TRUE	Tests 1 and 2 1 test failure Frequency: Continuously (12.5ms) Test 3 3 test failures in 15 test samples Frequency: 1 sample/12.5 ms	DTC Type A

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
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
5 Volt Reference Circuit (Short High/Low)	P0641	Detects a continuous short 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 OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	15 test failures in 20 test samples 1 sample/12.5 ms	DTC Type A
Fuel Pump Control Module Performance - Driver Over Temperature 1	P064A	This DTC detects if an internal fuel pump driver overtemperature condition exists under normal operating conditions. (Motorola's responsibility)	Module Range of Operation **AND** Viper Temp	Normal (- FSCM is in normal operating range for module voltage versus PWM duty cycle. Linear range from 100% @ 12.5V to 70% @ 18V.) >190C	Ignition OR HS Comm OR Fuel Pump Control KeFRPD_b_FPOverTempDiagEnbl Ignition Run/Crank	Run or Crank enabled enabled TRUE 9V<voltage<18V	3 test failures in 15 test samples 1 sample/12.5 ms	DTC Type B
5 Volt Reference Circuit (Out of Range)	P06A6	Detects that the #1 5 V sensor reference circuit is out of range	Reference voltage	> 102.5% nominal (i.e. 5.125V) OR < 97.5% nominal (i.e. 4.875V)	Ignition OR HS Comm OR Fuel Pump Control	Run or Crank enabled enabled	72 test failures in 80 test samples 1 sample/12.5 ms	DTC Type A

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 2	P1255	This DTC detects if an internal fuel pump driver overtemperature condition exists under extreme operating conditions (GM's responsibility)	Module Range of Operation **AND** Viper Temp	Outside normal range (FSCM is NOT in normal operating range for module voltage versus PWM duty cycle. Linear range from 100% @ 12.5V to 70% @ 18V.) > 190C	Ignition OR HS Comm OR Fuel Pump Control KeFRPD_b_FPOverTempDiagEnbl Ignition Run/Crank	Run or Crank enabled enabled TRUE 9V<voltage<18V	3 test failures in 15 test samples 1 sample/12.5 ms	DTC Type B
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	144 test failures in 160 test samples 1 sample/12.5 ms	DTC Type A
Fuel Pump Flow Performance	P2635	This DTC detects degradation in the performance of the electronic return-less fuel system	Filtered fuel rail pressure error	<= Low Threshold (function of desired fuel rail pressure and fuel flow rate. Typical values in the range of -30.0 to -90.0 kPa.) **OR** > High Threshold (function of desired fuel rail pressure and fuel flow rate. Typical values in the range of 30.0 to 90.0 kPa.)	1. FRP Circuit Low DTC (P0192) 2. FRP Circuit High DTC (P0193) 3. Fuel Rail Pressure Sensor Performance DTC (P0191 4. FuelPump Circuit Low DTC (P0231) 5. FuelPump Circuit High DTC (P0232) 6. FuelPump Circuit Open DTC (P023F) 7. Reference Voltage DTC (P0641) 8. Reference Voltage DTC (P0641) 9. Reference Voltage DTC (P0642)	not active not active not active not active not active not active not active not failed this trip not active	Filtered fuel rail pressure error Time Constant = 12.5 seconds Frequency: Continuous 100 ms loop	DTC Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
					10. Fuel Pump Control Module Driver Over-temperature DTC's (P064A, P1255) 11. Control Module Internal Performance DTC (P0606) 12. An ECM fuel control system failure (PPEI $1ED) 13. The Barometric pressure (PPEI $4C1) signal 14. Engine run time 15. Emissions fuel level (PPEI $3FB) 16. Fuel pump control 17. Fuel pump control state 18. Battery Voltage 19. Fuel flow rate 20. Fuel Pressure Control System	not active not active has not occurred valid (for absolute fuel pressure sensor) >= 30 seconds not low enabled normal 11V<=voltage=<18V > 0.05 g/s **AND** <= Max allowed fuel flow rate as a function of desired rail pressure (Typical values in the range of 13 to 20 g/s) Is not responding to an over-pressurization due to pressure build during DFCO or a decreasing desired pressure command.		
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	HS Communication OR Ignition Run/Crank	Enabled on	5 test failures in 5 samples (5 seconds)	DTC Type B
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 2. Ignition Run/Crank Voltage 3. U0073	Run/Crank (11 – 18 V) not active	12 test failures in 12 samples (12 seconds)	DTC Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Intake Manifold Tuning (IMT) Valve Control Circuit	P0660	Electrical Integrity of Intake Manifold Tuning (IMT) Valve Control Circuitry	ECM detects that commanded and actual states of output driver do not match		Ignition Voltage Ignition Voltage	>= 11.00 Volts <= 18.00 Volts	20 failures out of 25 samples 1 sample every 250 msec	two trips Type B
Intake Manifold Tuning (IMT) Valve Stuck Open	P2070	This DTC sets for valve stuck OPEN in normal operation range. This DTC is also set if the IMT position sensor is either outputting an incorrect frequency for its feedback position. This DTC is also set if the valve is having difficulty finding its home position after the ignition is turned on (Shaft Integrity Diagnostic).	Valve Stuck Open: Commanded Valve Position AND Actual Valve Position Valve Position Sensor Frequency Incorrect Test:	 = CLOSED = OPEN	Valve Stuck Open: Time since command for valve to CLOSE No Active DTCs: Valve Position Sensor Frequency Incorrect Test:	 > 1.0 seconds P0660, P2077, P2078	Valve Stuck Open: 400 failures out of 500 samples 1 sample every 12.5 msec Valve Position Sensor Frequency Incorrect Test:	two trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			Time since enable criteria met		Engine Run Time	>= 10.0 seconds	Executes every 12.5 msec after power-up until test has passed or failed	
					Powertrain Relay Voltage	>= 11.0 Volts		
				>= 0.3 seconds				
			AND					
			(Sensor Frequency	< 137 Hz	Powertrain Relay Voltage			
			OR			<= 18.0 Volts		
			Sensor Frequency	> 157 Hz)				
			Shaft Integrity Test:		Shaft Integrity Test:		Shaft Integrity Test:	
			Time without initiating valve position learn sequence after learn request		Engine Run Time	>= 10.0 seconds	Executes every 12.5 msec after power-up or reset until test is complete or valve initiates another learning attempt by outputting a duty cycle between 11.5% and 8%	
					Powertrain Relay Voltage	>= 11.0 Volts		
				>= 2.0 seconds	Powertrain Relay Voltage			
			AND			<= 18.0 Volts		
			(Valve Position	> 11.5%	Sensor Frequency	>= 137 Hz		
			OR		Sensor Frequency	<= 157 Hz		
			Valve Position	< 8%)				

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
			OR Time that valve takes to learn home position AND (Valve Position OR Valve Position OR Number of learn tries during one key cycle	 >= 2.0 seconds > 90% < 12.9%) >= 100				
Intake Manifold Tuning (IMT) Valve Stuck Closed	P2071	This DTC sets for valve stuck CLOSED in normal operation range.	Commanded Valve Position AND Actual Valve Position	= OPEN = CLOSED	Time since command for valve to OPEN No Active DTCs:	 > 1.0 seconds P0660, P2077, P2078	400 failures out of 500 samples 1 sample every 12.5 msec	two trips Type B
Intake Manifold Tuning (IMT) Valve Position Sensor Circuit Low	P2077	This DTC detects a continuous short to low or open in either the signal circuit or the sensor.	Valve Position	>= 94.9%	Ignition Voltage Ignition Voltage	>= 18.0 Volts <= 9.0 Volts	400 failures out of 500 samples 1 sample every 12.5 msec	two trips Type B

COMPONENT/ SYSTEM	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA	THRESHOLD VALUE	SECONDARY PARAMETERS	ENABLE CONDITIONS	TIME REQUIRED	MIL ILLUM.
Intake Manifold Tuning (IMT) Valve Position Sensor Circuit High	P2078	This DTC detects an open sensor ground or continuous short to high in either the signal circuit or the sensor.	Valve Position	<= 5%	Ignition Voltage Ignition Voltage	>= 18.0 Volts <= 9.0 Volts	400 failures out of 500 samples 1 sample every 12.5 msec	two trips Type B