Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Open – Bank 1	P0010	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples250 ms / sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft System Performance – Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Intake cam Bank 1) Cam Position Error > 8.00 deg. (**CamPosErrorLimIc1**)	DTC's are NOT active: P0010, IntakeCamSensorTFTKO CrankSensorTFTKO CrankIntakeCamCorrelationFA.	System Voltage > 11 Volts, Engine is running VVT is enabled Desired cam position > 0 Power Take Off (PTO) not active Both Desired & Measured cam positions cannot be < 8.00 (**CamPosErrorLimIc1**) or have both > 18.00 deg. (**PerfMaxIc1**). Desired cam position cannot vary more than 7.50 Cam Deg for at least 3.35 sec. (**StablePositionTimeIc1**)	100.00 failures out of 1,000.00 samples100 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position	2 cam sensor pulses more than -11.0 crank degrees before or 11.0 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	 P0335, P0336 P0340,P0341 5VoltReferenceA_FA 5VoltReferenceB_FA < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table "Cam Correlation Oil Temperature Threshold". One sample per cam rotation	Type B, 2 Trips

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank 2 Sensor 1	P0050	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit).	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0051 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank2 Sensor1	P0051	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground).	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0050 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank2 Sensor1	P0052	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage high during driver on state (indicates short to power).	Short to power: ≤ 0.5 Ω impedance between signal and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	2.8 < Ω < 9.5	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 > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 3.00 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	2.8 < Ω < 9.5	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 > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 3.05 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank 2 Sensor 2	P0056	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit).	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0057 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank2 Sensor2	P0057	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground).	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips Note: In certain controllers P0056 may also set

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank2 Sensor2	P0058	Diagnoses the Heater Output low side driver circuit for circuit faults.	Voltage high during driver on state (indicates short to power).	Short to power: ≤ 0.5 Ω impedance between signal and controller power.	Ignition Voltage Engine Speed	= Crank or Run > 11.0 volts > 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 2 Sensor 1	P0059	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	3.8 < Ω < 10.4	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 > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 3.00 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
HO2S Heater Resistance Bank 2 Sensor 2	P0060	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	3.8 < Ω < 10.4	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 > 28,800 seconds -30.0 < ºC < 45.0 < 32.0 volts < 3.05 seconds	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP and MAF do not match estimated engine airflow as established by the TPS	Difference between 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 Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (MAF circuit hi) have failed this key cycle, or maximum MAF versus RPM (Table) is greater than or equal to maximum MAF versus battery voltage, then MAF portion of diagnostic fails	Table, f(TPS). See supporting tables: **Delta MAP Threshold f(TPS)** Table, f(TPS). See supporting tables: **Delta MAF Threshold f(TPS)** Table, f(RPM). See supporting tables: **Maximum MAF f (RPM)** Table, f(Volts). See supporting tables: **Maximum MAF f (Volts)**	Engine Speed	> 800 RPM Run/Crank voltage > 6.41	Continuously fail MAP and MAF portions of diagnostic for 0.1875 s Continuous in MAIN processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	This DTC detects a short to ground in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ 150ºC)	< 45 Ohms	Engine run time OR IAT min	> 0.0 seconds ≤ 150.0 °C	5 failures out of 25 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ -60ºC)	> 419,000 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -7.0 °C	5 failures out of 25 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp - Engine Coolant Temp (ECT) Correlation	P00B6	This DTC detects a difference between ECT and RCT after a soak condition.	A failure will be reported if any of the following occur: 1) Absolute difference between ECT at power up & RCT at power up is ≥ an IAT based threshold table lookup value(fast fail). 2) Absolute difference between ECT at power up & RCT at power up is > by 19.3 ºC and a block heater has not been detected. 3) ECT at power up > RCT at power up by 19.3 ºC and the time spent cranking the engine without starting is greater than or equal to 10.0 seconds with the LowFuelConditionDiag	See the table named: **P00B6_Fail if power up ECT exceeds RCT by these values** in the Supporting tables section = False	No Active DTC's Engine Off Soak Time Propulsion Off Soak Time Non-volatile memory initization Test complete this trip Test aborted this trip IAT LowFuelCondition Diag ========== Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time ========== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs. 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is	VehicleSpeedSensor_FA IAT_SensorCircuitFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid > 28,800 seconds > 0 seconds = Not occurred = False = False ≥ -7 ºC = False ========== > 19.3 ºC < 10.0 Seconds ========== > 400 Seconds with > 14.9 MPH and 0.50 times the seconds with vehicle speed below	1 failure 500 msec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					below 1b as follows: 1d) IAT drops from power up IAT 2a) ECT drops from power up ECT 2b) Engine run time ========== Diagnostic is aborted when 3) or 4) occurs: 3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	1b ≥ 3.3 ºC > 1 ºC Within > 30 Seconds ========== > 1800 Seconds ≤ -7.0 ºC		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow System Performance (naturally aspirated)	P0101	Determines if the MAF sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 300 kPa*(g/s) > 20 grams/sec > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs:	>= 465 RPM <= 4,600 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 100 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit Low Frequency	P0102	Detects a continuous short to low or a open in either the signal circuit or the MAF sensor	MAF Output	<= 1,950 Hertz (~ 2.15 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	400 failures out of 500 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit High Frequency	P0103	Detects a high frequency output from the MAF sensor	MAF Output	>= 14,500 Hertz (~ 1236.4 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	400 failures out of 500 samples 1 sample every cylinder firing event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Performance (naturally aspirated)	P0106	Determines if the MAP sensor is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 300 kPa*(g/s) > 20.0 kPa > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs:	>= 465 RPM <= 4,600 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 100 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculations are performed every 12.5 msec	Type B, 2 Trips
			Manifold Pressure OR	< 50.0 kPa	Time between current ignition cycle and the last		4 failures out of 5 samples	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Manifold Pressure	> 115.0 kPa	time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 409.6 seconds EngineModeNotRunTimer Error MAP_SensorFA AAP_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP	1 sample every 12.5 msec	

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects an open sensor ground or continuous short to high in either the signal circuit or the MAP sensor.	MAP Voltage	> 90.0 % of 5 Volt Range (This is equal to 4.50 Volts, or 115.1 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Performance (applications with manifold temperature sensor, but no humidity sensor)	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)	> 25 deg C	Time between current ignition cycle and the last time the engine was running No Active DTCs:	> 28,800 seconds ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit Low	P0112	Detects a continuous short to ground in the IAT signal circuit or the IAT sensor	Raw IAT Input	< 48 Ohms (~150 deg C)	Engine Run Time	> 0.00 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit High	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 404,973 Ohms (~-60 deg C)	Engine Run Time	> 0.00 seconds	40 failures out of 50 samples 1 sample every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic IAT signal circuit or IAT sensor	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 80.00 DegC 10 consecutive IAT samples	Continuous		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects ECT temp sensor stuck in mid range.	A failure will be reported if any of the following (1-3) occur after the following soak conditions, Engine off time > 28,800 seconds Propulsion system off time > 0 seconds 1) ECT at power up > IAT at power up by an IAT based table lookup value (fast fail). 2) ECT at power up > IAT at power up by 19.3 Deg C and a block heater has not been detected. 3) ECT at power up > IAT at power up by 19.3 Deg C and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag	See the table named: **P0116_Fail if power up ECT exceeds IAT by these values** in the Supporting tables section = False	No Active DTC's Non-volatile memory initization Test complete this trip Test aborted this trip IAT LowFuelCondition Diag ========== Block Heater detection is enabled when either of the following occurs: 1) ECT at power up > IAT at power up by 2) Cranking time ========== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs: 1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 1d) IAT drops from power	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTime Valid TimeSinceEngineRunning Valid = Not occurred = False = False ≥ -7 ºC = False ========== > 19.3 ºC < 10.0 seconds ========== > 400 seconds > 14.9 MPH 0.00 times the seconds with vehicle speed below 1b	1 failure 500 msec/ sample Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					up IAT 2a) ECT drops from power up ECT 2b) Engine run time ========== Diagnostic is aborted when 3) or 4) occurs: 3) Engine run time with vehicle speed below 1b 4) Minimum IAT during test	≥ 3.3 ºC ≥ 1 ºC Within ≤ 30 seconds ========== > 1800 seconds ≤ -7 ºC		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ 150ºC)	< 45 Ohms			5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ -60ºC)	> 419,000 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ -7.0 °C	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Continuity This DTC detects large step changes in the ECT signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample.	ECT temperature step change: 1) postive step change is greater than calculated high limit OR 2) negitive step change is lower than calculated low limit. The calculated high and low limits use the following calibrations: 1) Sensor time constant 2) Sensor low limit 3) Sensor high limit *****Generic Example***** If the last ECT reading was 90 Deg C, the Time constant was calibrated at 10 seconds, the low limit was calibrated to -80 Deg C and the high limit was calibrated to 200 Deg C the caluculated limits are 101 Deg C and 73 Deg C. The next reading (after the 90 Deg C reading) must be between 73 Deg C and 101 Deg C to be valid. **********	 13.0 seconds -70.0 Deg C 180.0 Deg C	No Active DTC's	P0117 P0118	3 failures out of 4 samples 1 sec/ sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position Sensor Performance (naturally aspirated)	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	Filtered Throttle Model Error AND ABS(Measured Flow – Modeled Air Flow) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	> 300 kPa*(g/s) > 20 grams/sec <= 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs: No Pending DTCs:	>= 465 RPM <= 4,600 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 100 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage <	0.3250		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit High	P0123	Detects a continuous or intermittent short or open in TPS1 circuit	TPS1 Voltage >	4.750		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Below Stat Regulating Temperature) (time based method for Dual temp sensor applications	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault	Engine run time is accumulated when airflow is ≥ 17 grams per sec during Range #1 or #2: ========== Range #1 (Primary) ECT reaches Commanded temperature minus 11 °C when IAT min is < 55 °C and ≥ 10 °C. ========== Range #2 (Alternate) ECT reaches Commanded temperature minus 31 °C when IATmin is < 10 °C and ≥ -7 °C. ==========	See the two tables named: **P0128_Maximum Accumulated Time for IAT and Start-up ECT conditions (Primary Test)** and **P0128_Maximum Accumulated Time for IAT and Start-up ECT conditions (Alternate Test)** in the Supporting tables section	No Active DTC's Engine not run time Engine run time Fuel Condition == Range #1 == (Primary) Test ECT at start run Average AirflowT-Stat Heater duty commanded cycle ========== == Range #2 == (Alternate) Test ECT at start run Average AirflowT-Stat Heater duty commanded cycle ==========	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA ≥ 1,800 seconds 10 ≤ Eng Run Tme ≤ 1,370 seconds Ethanol ≤ 87 % ========== -40 ≤ ECT ≤ 70 °C ≥ 17.0 gps ≤ 0 % ========== -40 ≤ ECT ≤ 60 °C ≥ 17.0 gps ≤ 0 % ==========	1 failure to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50.0 mVolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State All of the above met for	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9922 < ratio < 1.0137 50 < mgram < 700 = Closed Loop = TRUE Enabled (On) Ethanol ≤ 87 % DFCO not active > 2.0 seconds	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1,050 mvolts	== Open Test Criteria == No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition ========== No Active DTC's Low Fuel Condition Diag Fuel Condition Initial delay after Open Test Criteria met (cold start condition) Initial delay after Open Test Criteria met (not cold start condition) Equivalence Ratio Air Per Cylinder Fuel Control State	========== TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds ≤ 87 % Ethanol ========== MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 40.0 seconds when engine soak time > 28,800 seconds > 40.0 seconds when engine soak time ≤ 28,800 seconds 0.9922 ≤ ratio ≤ 1.0137 50 ≤ mgram ≤ 700 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for	> 2.0 seconds		

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						in Supporting Tables tab.		
					O2 Heater on for Learned Htr resistance	≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant IAT Engine run Accum	> 50 ºC > -40 ºC > 120 seconds		
					Time since any AFM status change Time since Purge On to Off change Time since Purge Off to On change	> 0.0 seconds > 0.0 seconds > 0.0 seconds		
					Engine airflow Engine speed Fuel Condition Baro Air Per Cylinder	20 ≤ grams/second ≤ 55 1,200 <= RPM <= 3,000 < 87 % Ethanol > 70 kpa ≥ 200 mGrams		
					Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain	= Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 %		
					========== All of the above met for	========== > 3.5 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 < Amps < 3.1	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State All of the above met for	TPS_ThrottleAuthorityDefaultedMAP_SensorFAAIR System FAEthanol Composition Sensor FAEvapPurgeSolenoidCircuit_FAEvapFlowDuringNonPurge_FAEvapVentSolenoidCircuit_FAEvapSmallLeak_FAEvapEmissionSystem_FAFuelTankPressureSnsrCkt_FAFuelInjector Circuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9922 ≤ ratio ≤ 1.0137 50 ≤ mgrams ≤ 700 = Closed Loop = TRUE Enabled (On) Ethanol <= 87 % DFCO not active > 2.0 seconds	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1,050 mvolts	== Open Test Criteria == No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Fuel Condition ========== No Active DTC's Low Fuel Condition Diag Fuel Condition Initial delay after Open Test Criteria met (cold start condition) Initial delay after Open Test Criteria met (not cold start condition) Equivalence Ratio Air Per Cylinder Fuel Control State	========== TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds ≤ 87 Ethanol ========== MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 40.0 seconds when engine soak time > 28,800 seconds > 40.0 seconds when engine soak time ≤ 28,800 seconds 0.9922 ≤ ratio ≤ 1.0137 50 ≤ mgrams ≤ 700 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for	> 2.0 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Rich to Lean voltages range during Rich to Lean transition. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.3 units > 75.0 grams (upper voltage threshold is 500 mvolts and lower voltage threshold is 200 mvolts)	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell DTC's Passed	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013B, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable)	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Lean to Rich voltages range during Lean to Rich transition. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.3 units > 150 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 650 mvolts)	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Green Cat System Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = Not Valid, System is not valid until accumulated airflow is greater than	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Diag Post fuel cell	= False = enabled		
					DTC's Passed	P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable) P013F (and P014B if applicable)		
					========== After above conditions are met: Fuel Enrich mode continued. ========== During this test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Rich to Lean Bank 2 Sensor 2	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 OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.3 units > 75.0 grams (upper voltage threshold is 500 mvolts and lower voltage threshold is 200 mvolts)	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013D, P014A, P014B, P2272 or P2273 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. = False = enabled	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Lean to Rich Bank 2 Sensor 2	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 increases the delivered A/F ratio to achieve the required rich threshold.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.3 units > 150 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 650 mvolts)	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Green Cat System Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013C, P014A, P014B, P2272 or P2273 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. = Not Valid, System is not valid until accumulated airflow is greater than	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Diag Post fuel cell	= False = enabled		
					DTC's Passed	P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable) P013F (and P014B if applicable)		
					========== After above conditions are met: Fuel Enrich mode continued. ========== During this test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is greater or equal to	> 500 mvolts > 78 grams > 0 secs > 10 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False = enabled	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTC's Passed Number of fueled cylinders ========== After above conditions are met: DFCO mode entered (wo driver initiated pedal input).	P2270 (and P2272 if applicable) ≤ 6 cylinders ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 1,185 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Green Cat System Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P2270 or P2271 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = Not Valid, System is not valid until accumulated airflow is greater than	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Diag Post fuel cell	= False = enabled		
					DTC's Passed	P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable)		
					Number of fueled cylinders ========== After above conditions are met: Fuel Enrich mode entered. ========== During this test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	≥ 2 cylinders ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0140	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 2) (For Dual Bank Exhaust Only	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 > amps > 2.9	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 2	P014A	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is greater or equal to	> 500 mvolts > 78 grams > 0 secs > 10 grams	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013C, P013D, P014B, P2272 or P2273 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. = False = enabled	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTC's Passed Number of fueled cylinders ========== After above conditions are met: DFCO mode entered (wo driver initiated pedal input).	P2270 (and P2272 if applicable) ≤ 6 cylinders ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 2	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 AND The Accumulated mass air flow monitored during the Delayed Response Test	< 350 mvolts > 1,185 grams.	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Green Cat System Condition	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FAFuelInjectorCircuit_FAFuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013C, P013D, P014A, P2272 or P2273 10.0 < Volts < 32.0 = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. = Not Valid, System is not valid until accumulated airflow is greater than	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						720,000 grams. Airflow accumulation is only enabled when estimated Cat temperature is above 600 Deg C. (Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).		
					Low Fuel Condition Diag Post fuel cell	= False = enabled		
					DTC's Passed	P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if applicable) P2271 (and P2273 if applicable)		
					Number of fueled cylinders ========== After above conditions are met: Fuel Enrich mode entered. ========== During this test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	≥ 2 cylinders ==========		

Component/ System	Fault Code	Monitor 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.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State All of the above met for	TPS_ThrottleAuthority DefaultedMAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9922 ≤ equiv. ratio ≤ 1.0137 50 ≤ APC ≤ 700 mgrams = Closed Loop = TRUE Enabled (On) ≤ 87 % Ethanol DFCO not active > 2.0 seconds	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 2 Sensor 1	P0152	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1,050 mvolts	== Open Test Criteria == No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition ========== No Active DTC's Low Fuel Condition Diag Fuel Condition Initial delay after Open Test Criteria met (cold start condition) Initial delay after Open Test Criteria met (not cold start condition) Equivalence Ratio Air Per Cylinder	========== TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds <= 87 % Ethanol ========== MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 85.0 seconds when engine soak time > 28,800 seconds > 85.0 seconds when engine soak time ≤ 28,800 seconds 0.9922 ≤ ratio ≤ 1.0137 50 ≤ mgrams ≤ 700	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fuel Control State All of the above met for	not = Power Enrichment > 2 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Slow Response Bank 2 Sensor 1) (For use with ESPD	P0153	This DTC determines if the O2 sensor response time is degraded.	Fault condition present when the average response time is caluclated over the test time, and compared to the threshold.	Refer to **P0153_O2S Slow Response Bank 2 Sensor 1 "Pass/Fail Threshold table"** in the Supporting Tables tab	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips
			OR					
			Slope Time L/R Switches	< 3				
			OR					
			Slope Time R/L Switches	< 3				
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		
					System Voltage	10.0 < Volts < 32.0		
					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, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S1, B2S1 in Supporting		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Tables tab.		
					O2 Heater on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Time since any AFM status change	> 0.0 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 0.0 seconds		
					Engine airflow	20 ≤ grams/second ≤ 55		
					Engine speed	1,200 ≤ RPM ≤ 3,000		
					Fuel Condition	< 87 % Ethanol		
					Baro	> 70 kpa		
					Air Per Cylinder	>= 200 mGrams		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	≤ 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	≥ 0.0 %		
					==========	==========		
					All of the above met for	> 3.5 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 2 Sensor 1	P0154	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 2 Sensor 1	P0155	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 > amps > 3.1	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 2 Sensor 2	P0157	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test EGR intrusive test System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active All Fuel Injectors for active Cylinders Fuel Condition Fuel State All of the above met for	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9922 ≤ ratio ≤ 1.0137 50 ≤ mgrams ≤ 700 = Closed Loop = TRUE Enabled (On) ≤ 87 % Ethanol DFCO not active > 2.0 seconds	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 2 Sensor 2	P0158	This DTC determines if the O2 sensor circuit is shorted to high.	Oxygen Sensor Signal	> 1,050 mvolts	== Open Test Criteria == No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition ========== No Active DTC's Low Fuel Condition Diag Fuel Condition Initial delay after Open Test Criteria met (cold start condition) Initial delay after Open Test Criteria met (not cold start condition) Equivalence Ratio Air Per Cylinder Fuel Control State	========== TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds ≤ 87 % Ethanol ========== MAP_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 85.0 seconds when engine soak time > 28,800 seconds > 85.0 seconds when engine soak time ≤ 28,800 seconds 0.9922 ≤ ratio ≤ 1.0137 50 ≤ mgrams ≤ 700 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for	> 2 seconds		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1	P015A	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized R2L time delay value OR [The Accumulated time monitored during the R2L Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is	> 0.4 EWMA (sec) ≥ 1.8 Seconds > 550 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.		
					O2 Heater (pre sensor) on for Learned Htr resistance	≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant IAT Engine run Accum	> 50 ºC > -40 ºC > 120 seconds		
					Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled)	1,100 ≤ RPM ≤ 2,500 1,050 ≤ RPM ≤ 2,650		
					Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled)	3 ≤ gps ≤ 20 40.4 ≤ MPH ≤ 82.0 36.0 ≤ MPH ≤ 87.0		
					Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell	0.74 ≤ C/L Int ≤ 1.08 = TRUE not in control of purge not in estimate mode = enabled		
					EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State	= not active = not active ≥ 80.0 sec 600 ≤ ºC ≤ 900 = DFCO possible		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					========== All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested. ========== Pre O2S voltage B1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders ========== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).	========== ========== ≥ 690 mvolts = DFCO active ≤ 6 cylinders ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1	P015B	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.4 EWMA (sec) ≥ 1.8 Seconds < 350 mvolts < 690 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to initially enable test	1,100 ≤ RPM ≤ 2,500		
					Engine Speed range to keep test enabled (after initially enabled)	1,050 ≤ RPM ≤ 2,650		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to initially enable test	40.4 ≤ MPH ≤ 82.0		
					Vehicle Speed range to keep test enabled (after initially enabled)	36.0 ≤ MPH ≤ 87.0		
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 80.0 sec		
					Predicted Catalyst temp	600 ≤ ºC ≤ 900		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fuel State Number of fueled cylinders ========== When above conditions are met: Fuel Enrich mode is entered. ========== During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec must be :	= DFCO inhibit ≥ 2 cylinders ========== ========== 6 ≤ gps ≤ 20 ≤ 1.5 gps		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 1	P015C	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized R2L time delay value OR [The Accumulated time monitored during the R2L Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is above]	> 0.4 EWMA (sec) ≥ 1.8 Seconds > 550 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						the following locations: B1S1, B2S1 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to initially enable test	1,100 ≤ RPM ≤ 2,500		
					Engine Speed range to keep test enabled (after initially enabled)	1,050 ≤ RPM ≤ 2,650		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to initially enable test	40.4 ≤ MPH ≤ 82.0		
					Vehicle Speed range to keep test enabled (after initially enabled)	36.0 ≤ MPH ≤ 87.0		
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 80.0 sec		
					Predicted Catalyst temp	600 ≤ ºC ≤ 900		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fuel State ========== All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested. ========== Pre O2S voltage B1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders ========== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).	= DFCO possible ========== ========== ≥ 690 mvolts = DFCO active ≤ 6 cylinders ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 1	P015D	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is below] OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.4 EWMA (sec) ≥ 1.8 Seconds < 350 mvolts < 690 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						the following locations: B1S1, B2S1 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")		
					Engine Coolant	> 50 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to initially enable test	1,100 ≤ RPM ≤ 2,500		
					Engine Speed range to keep test enabled (after initially enabled)	1,050 ≤ RPM ≤ 2,650		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to initially enable test	40.4 ≤ MPH ≤ 82.0		
					Vehicle Speed range to keep test enabled (after initially enabled)	36.0 ≤ MPH ≤ 87.0		
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 80.0 sec		
					Predicted Catalyst temp	600 ≤ ºC ≤ 900		
					Fuel State	= DFCO inhibit		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Number of fueled cylinders ========== When above conditions are met: Fuel Enrich mode is entered. ========== During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec must be :	≥ 2 cylinders ========== ========== 6 ≤ gps ≤ 20 ≤ 1.5 gps		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Insufficient Activity Bank 2 Sensor 2	P0160	This DTC determines if the O2 sensor circuit is open.	Oxygen Sensor Signal	> 1,700 mvolts	No Active DTC's System Voltage AFM Status Heater Warm-up delay Engine Run Time Engine Run Accum Fuel Condition	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 225 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 2 Sensor 2	P0161	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 > amps > 2.9	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Lean Bank 1	P0171	Determines if the fuel control system is in a lean condition, based on the filtered long-term and short-term fuel trim.	The filtered long-term fuel trim metric AND The filtered short-term fuel trim metric (a value < 0.95 effectively nullifies the short-term fuel trim criteria)	>= 1.295 >= 0.100	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis Closed Loop Long Term FT Fuel Consumed EGR Diag.	375 <rpm< 7,000 > 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty > 33.0 seconds of data must accumulate on each trip, with at least 23.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made. (Please see "**Long-Term Fuel Trim Cell Usage**" in Supporting Tables for a list of cells utilized for diagnosis) Enabled Enabled (Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables.) > 0.1 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only) Intrusive Test Not Active Intrusive Test Not Active	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Catalyst Diag. Post O2 Diag. Device Control EVAP Diag. No active DTC:	Intrusive Test Not Active Not Active “tank pull down” Not Active IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPrgePsbl_FA Ethanol Comp Snsr FA FuelInjectorCkt_FA EngMisfireDetected_FA EGRValvePerf_FA EGRValveCkt_FA MAP_EngVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2Snsr_B1_Snsr_1_FA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision cannot be made when Purge is enabled. The Intrusive test is described below: Intrusive Test: When the filtered Purge Long Term Fuel Trim metric is <= 0.715 , purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge Long Term Fuel Trim metric > 0.715 , the test passes without checking the filtered Non-Purge Long Term Fuel Trim metric. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	Passive Test: The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria) Intrusive Test: For 3 out of 5 intrusive segments, the filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria) Segment Def'n: Segments can last up to 30 seconds and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 16 grams of vapor.	<= 0.710 <= 2.000 <= 0.715 <= 0.710 <= 2.000		Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			A maximum of 5 completed segments or 20 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 > 0.715 for at least 200 seconds, indicating that the canister has been purged.					

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Lean Bank 2	P0174	Determines if the fuel control system is in a lean condition, based on the filtered long-term and short-term fuel trim.	The filtered long-term fuel trim metric AND The filtered short-term fuel trim metric (a value < 0.95 effectively nullifies the short-term fuel trim criteria)	>= 1.295 >= 0.100	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level Long Term Fuel Trim data accumulation: Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis Closed Loop Long Term FT Fuel Consumed EGR Diag.	375 <rpm< 7,000 > 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty > 33.0 seconds of data must accumulate on each trip, with at least 23.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made. (Please see "**Long-Term Fuel Trim Cell Usage**" in Supporting Tables for a list of cells utilized for diagnosis) Enabled Enabled (Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables.) > 0.1 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only) Intrusive Test Not Active Intrusive Test Not Active	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Catalyst Diag. Post O2 Diag. Device Control EVAP Diag. No active DTC:	Intrusive Test Not Active Not Active “tank pull down” Not Active IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPrgePsbl_FA Ethanol Comp Snsr FA FuelInjectorCkt_FA EngMisfireDetected_FA EGRValvePerf_FA EGRValveCkt_FA MAP_EngVacuumStatus AmbPresDfltdStatus TC_BoostPresSnsrFA O2Snsr_B2_Snsr_1_FA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Rich Bank 2	P0175	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two methods to determine a Rich fault. They are Passive and Intrusive. A Passive Test decision cannot be made when Purge is enabled. The Intrusive test is described below:Intrusive Test: When the filtered Purge Long Term Fuel Trim metric is <= 0.715 , purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge Long Term Fuel Trim metric > 0.715 , the test passes without checking the filtered Non-Purge Long Term Fuel Trim metric. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	Passive Test: The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria) Intrusive Test: For 3 out of 5 intrusive segments, the filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric AND The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria) Segment Def'n: Segments can last up to 30 seconds and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 16 grams of vapor.	<= 0.710 <= 2.000 <= 0.715 <= 0.710 <= 2.000		Secondary Parameters and Enable Conditions are identical to those for P0174, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			A maximum of 5 completed segments or 20 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 > 0.715 for at least 200 seconds, indicating that the canister has been purged.					

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

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

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Open Circuit (PFI) - 3 DTC Implmentation	P0205	This DTC Diagnoses Injector 5 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0273 may also set (Injector 5 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Open Circuit (PFI) - 3 DTC Implmentation	P0206	This DTC Diagnoses Injector 6 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0276 may also set (Injector 6 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 7 Open Circuit (PFI) - 3 DTC Implmentation	P0207	This DTC Diagnoses Injector 7 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0279 may also set (Injector 7 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 8 Open Circuit (PFI) - 3 DTC Implmentation	P0208	This DTC Diagnoses Injector 8 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0282 may also set (Injector 8 Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage <	0.250		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit High	P0223	Detects a continuous or intermittent short or open in TPS2 circuit	TPS2 Voltage >	4.590		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

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

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Low side circuit shorted to ground (PFI)	P0273	This DTC Diagnoses Injector 4 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0205 may also set (Injector 5 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 5 Low side circuit shorted to power (PFI)	P0274	This DTC Diagnoses Injector 5 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Low side circuit shorted to ground (PFI)	P0276	This DTC Diagnoses Injector 6 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0206 may also set (Injector 6 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 6 Low side circuit shorted to power (PFI)	P0277	This DTC Diagnoses Injector 6 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 7 Low side circuit shorted to ground (PFI)	P0279	This DTC Diagnoses Injector 7 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0207 may also set (Injector 7 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 7 Low side circuit shorted to power (PFI)	P0280	This DTC Diagnoses Injector 7 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 8 Low side circuit shorted to ground (PFI)	P0282	This DTC Diagnoses Injector 8 low side driver circuit for circuit faults.	Voltage low during driver off state indicates short-to-ground or open circuit	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips Note: In certain controllers P0208 may also set (Injector 8 Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 8 Low side circuit shorted to power (PFI)	P0283	This DTC Diagnoses Injector 8 low side driver circuit for circuit faults.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Powertrain Relay Voltage within range for a duration Engine Running	>= 11 Volts >= 5 Seconds >= 0 Seconds	50 failures out of 63 samples 100 ms /sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0300 P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity. The rate of misfire over an interval is compared to both emissions and catalyst damaging thresholds. The pattern of crankshaft acceleration after the misfire is checked to differentiate between real misfire and other sources of crank shaft noise.	Deceleration Value vs. Engine Speed and Engine load The equation used to calculate deceleration value is tailored to specific vehicle operating conditions. The selection of the equation used is based on the 1st tables encountered that are not max of range. If all tables are max of range at a given speed/load, that speed load region is an ***Undetectable region*** see Algorithm Description Document for additional details. Misfire Percent Emission Failure Threshold Misfire Percent Catalyst Damage	[(>**IdleSCD_Decel** AND > **IdleSCD_Jerk**) OR (>**SCD_Decel** AND > **SCD_Jerk**) OR (>**IdleCylModeDecel** AND > **IdleCylModeJerk)** OR (>**CylMode_Decel** AND > **CylMode_Jerk**) OR (>**RevMode_Decel**) OR WHILE in Cylinder Deactivation mode: (> **AFM_Decel**)] - see details on Supporting Tables Tab (P0300 Section) ≥ 0.81 % P0300 > **Catalyst_Damage_ Misfire_Percentage** in Supporting Tables	Engine Run Time Engine Coolant Temp Or If ECT at startup Then ECT System Voltage + Throttle delta - Throttle delta Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.) (at low speed/loads, one cylinder may not cause cat damage)	> 2 crankshaft revolution -7 ºC < ECT < 130 ºC < -7 ºC 21 ºC < ECT < 130 ºC 9.00 < volts < 32.00 < 85.00 % per 25 ms < 85.00 % per 25 ms Not Enabled	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter. OR when Early Termination Reporting = Enabled and engine rev > 1,000 revs and < 3,200 revs at end of trip any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage. Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				whenever secondary conditions are met.	Engine Speed Engine Load Misfire counts	> 1,200 rpm AND > 20 % load AND < 180 counts on one cylinder	Continuous	
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load				
				disable conditions:	Engine Speed	350 < rpm < ((Engine Over Speed Limit) - 400 Engine speed limit is a function of inputs like Gear and temperature see **EngineOverSpeedLimit** in supporting tables	4 cycle delay	
					No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensorTFTKO CrankSensorFA CamLctnIntFA CamLctnExhFA CamSensorAnyLctnTFTKO AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltdStatus	4 cycle delay	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	7 cycle delay	
					Undetectable engine speed and engine load region	***Undetectable region*** from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 8,192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	< **ZeroTorqueEngLoad** in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	 ≤ 1 % > 30 mph	4 cycle delay	
					EGR Intrusive test	Active	0 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 95.00 %	7 cycle delay	
					Driveline Ring Filter active			

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early. Filter Driveline ring: Stop filter early: Abnormal engine speed oscillations: (Rough road etc) Off Idle, number of consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation) TPS Engine Speed Veh Speed Consecutive decels while in SCD Mode Cyl Mode Rev Mode Misfire Crankshaft Pattern Recognition checks each "misfire" candidate in 100 engine Cycle test to see if it looks like real misfire, or some disturbance like rough road. The check is	> "**Ring Filter**" # of engine cycles after misfire in Supporting Tables > "**Number of Normals**" # of engine cycles after misfire in Supporting Tables tab > 3 % > 950 rpm > 3 mph > **Abnormal SCD Mode** > **Abnormal Cyl Mode** > **Abnormal Rev Mode** in Supporting Tables		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					based on a multiplier times the ddt_jerk value used to detect misfire at that speed and load. At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.			
					Pattern Recog Enabled:	Enabled		
					Engine Speed	900 < rpm < 3,000		
					Veh Speed	> 0.6 mph		
					"misfire" unrecognized if:			
					Crankshaft snap after:			
					isolated "misfire"	> **Min_PatternMultiplier**		
					repetative "misfire"	> **Max_PatternMultiplier** in Supporting Tables		
					Ratio of Unrecog/Recog	> 0.60	discard test	
					Rough Road:			
					Non-Crankshaft based:	Enabled		
					Rough Road Source	Wheel Speed processed in ABS		
					IF Rough Road Source = WheelSpeedInECM			
					ABS/TCS		discard test	
					Wheel speed noise	active		
					VSES	> WSSRoughRoadThres active		
					IF Rough Road Source = "FromABS"			
					ABS/TCS		discard test	
					RoughRoad	active		
					VSES	detected active		
					IF Rough Road Source = "TOSS"			

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors. Each Cylinder pair shares one compensation factor. A perfect factor would be 1.0000. Unlearned factors are defaulted out of range so the sum of factors would be out of range.	≥ 4.0040 OR ≤ 3.9960	OBD Manufacturer Enable Counter	MEC = 0	0.50 seconds Frequency Continuous100 msec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to: 1. Excessive knock or 2. Abnormal engine noise or 3. Flat signal	Common Enable Criteria (Applies to all 3 parts of the performance diag)		Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≤ 8,500 RPM ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C		Type B, 2 Trips
			Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:				First Order Lag Filters with Weight Coefficients	
			1. Excessive Knock Diag: Filtered Knock Intensity VaKNKD_k_PerfCylKnockIntFilt (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> 1.70 (no units)	Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 1,500 RPM ≥ 84 Revs	Excessive Knk Weight Coefficient = 0.0480 Updated each engine event	
			2. Abnormal Noise Diag: Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background noise)	< **AbnormalNoise_Threshold** (see Supporting Tables)	Individual Cylinders enabled for Abnormal Noise Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key	See **AbnormalNoise_CylsEnabled** (Supporting Tables) ≥ 2,500 RPM ≥ 84 Revs	Abn Noise Weight Coefficient = 0.0480 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			- - - - - - - - - - - - - - - - - - 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock) VaKNKD_k_PerfCylFlatFiltInt	- - - - - - - - - - - - - - - - - < 0.008 (no units)	cycle) - - - - - - - - - - - - - - - - - - Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per keycycle)	- - - - - - - - - - - - - - - - - - ≥ 8,500 RPM ≥ 400 Revs	- - - - - - - - - - - - Flat Signal Weight Coefficient = 0.010 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Bank 1	P0325	This diagnostic checks for an open in the knock sensor circuit	Filtered FFT Output	> **OpenCktThrshMin** and < **OpenCktThrshMax** **See Supporting Tables** Thresholds for OpenMethod = 20 kHz: **OpenCktThrshMin (20 kHz)** & **OpenCktThrshMax (20 kHz)** Thresholds for OpenMethod = NormalNoise: **OpenCktThrshMin (Normal Noise)** & **OpenCktThrshMax (Normal Noise)**	Diagnostic Enabled? Engine Run Time Engine Speed Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≥ 400 RPM and ≤ 8,500 RPM ≥ 100 revs ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis, due to 1. Excessive knock or 2. Abnormal engine noise or 3. Flat signal	Common Enable Criteria (Applies to all 3 parts of the performance diag)		Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≤ 8,500 RPM ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C		Type B, 2 Trips
			Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:				First Order Lag Filters with Weight Coefficients	
			1. Excessive Knock Diag: Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> 1.50 (no units)	Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 1,500 RPM ≥ 167 Revs	Excessive Knk Weight Coefficient = 0.0060 Updated each engine event	
			2. Abnormal Noise Diag: Filtered FFT Intensity: (where 'FFT Intensity' = Non-knocking, background noise)	< **AbnormalNoise_ Threshold** (see Supporting Tables)	Individual Cylinders enabled for Abnormal Noise Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key	See **AbnormalNoise_ CylsEnabled** (Supporting Tables) ≥ 2,500 RPM ≥ 167 Revs	Abnormal Noise Weight Coefficient = 0.0060 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			- 3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock)	- < 0.008 (no units)	cycle) - Engine SpeedCumlative Number of Engine Revs Above Min Eng Speed (per keycycle)	- ≥ 8,500 RPM ≥ 100 Revs	- Flat Signal Weight Coefficient = 0.010 Updated each engine event	

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Bank 2	P0330	This diagnostic checks for an open in the knock sensor circuit	Filtered FFT Output	> OpenCktThrshMin and < OpenCktThrshMax **See Supporting Tables** Thresholds for OpenMethod = 20 kHz: **OpenCktThrshMin (20 kHz)** & **OpenCktThrshMax (20 kHz)** Thresholds for OpenMethod = NormalNoise: **OpenCktThrshMin (Normal Noise)** & **OpenCktThrshMax (Normal Noise)**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≥ 400 RPM and ≤ 8,500 RPM 100 revs ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Bank 2	P0331	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis, due to 1. Excessive knock or 2. Abnormal engine noise on a per bank basis or 3. Flat signal	Common Enable Criteria (Applies to all 3 parts of the performance diag)		Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow ECT IAT	Yes ≥ 2.0 seconds ≤ 8,500 RPM ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C		Type B, 2 Trips
			Specific Enable Criteriaand Thresholds for 3 individual parts of the performance diag:				First Order Lag Filters with Weight Coefficients	
			1. Excessive Knock Diag: Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> 1.50 (no units)	Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 1,500 RPM ≥ 167 Revs	Excessive knk Weight Coefficient = 0.0060 Updated each engine event	
			2. Abnormal Noise Diag: Filtered FFT Intensity: (where 'FFT Intensity' = Non-knocking, background noise)	< **AbnormalNoise_Threshold** (see Supporting Tables)	Individual Cylinders enabled for Abnormal Noise Engine Speed Cumlative Number of Engine Revs Above Min Eng Speed (per key cycle)	See **AbnormalNoise_CylsEnabled**(Supporting Tables) ≥ 2,500 RPM ≥ 167 Revs	Abnormal Noise Weight Coefficient = 0.0060 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			3. Flat Signal Diag: Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock)	< 0.008 (no units)	Engine SpeedCumlative Number of Engine Revs Above Min Eng Speed (per keycycle)	≥ 8,500 RPM≥ 100 Revs	Flat Signal Weight Coefficient = 0.010 Updated each engine event	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Low Bank 2	P0332	This diagnostic checks for an out of range low knock sensor signal	Sensor Input or Return Signal Line	< 8.0 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit High Bank 2	P0333	This diagnostic checks for an out of range high knock sensor signal	Sensor Input or Return Signal Line	> 39.00 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	 = FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			No crankshaft pulses received	>= 0.3 seconds	Engine is Running Starter is not engaged No DTC Active:	 5VoltReferenceB_FA	Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	2 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	>= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335	Continuous every 250 msec	Type B, 2 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged No DTC Active:	5VoltReferenceB_FA	Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	 = FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 51 > 65	Engine is Running OR Starter is engaged No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Determines if a fault exists with the cam position bank 1 sensor A signal	Time since last camshaft position sensor pulse received OR Time that starter has been engaged without a camshaft sensor pulse	>= 5.5 seconds >= 4.0 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	 = FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged No DTC Active:	 5VoltReferenceA_FA	Continuous every 100 msec	
			No camshaft pulses received during first 24 MEDRES events (There are 24 MEDRES events per engine cycle		Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Continuous every MEDRES event	
			The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	The number of camshaft pulses received during first 24 MEDRES events is OR (There are 24 MEDRES events per engine cycle)	< 4 > 8	Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	Continuous every MEDRES event	Type B, 2 Trips
			The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT	P0351	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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 circuit do not match. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 Short to ground: ≤ 0.5 Ω impedance between signal and controller ground Open Circuit: ≥ 200 kΩ impedance between signal and controller ground Short to power: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT	P0352	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 Short to ground: ≤ 0.5 Ω impedance between signal and controller ground Open Circuit: ≥ 200 kΩ impedance between signal and controller ground Short to power: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT	P0353	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 <u>Short to ground</u>: ≤ 0.5 Ω impedance between signal and controller ground <u>Open Circuit</u>: ≥ 200 kΩ impedance between signal and controller ground <u>Short to power</u>: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT	P0354	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 <u>Short to ground</u>: ≤ 0.5 Ω impedance between signal and controller ground <u>Open Circuit</u>: ≥ 200 kΩ impedance between signal and controller ground <u>Short to power</u>: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #5 CIRCUIT	P0355	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 <u>Short to ground</u>: ≤ 0.5 Ω impedance between signal and controller ground <u>Open Circuit</u>: ≥ 200 kΩ impedance between signal and controller ground <u>Short to power</u>: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #6 CIRCUIT	P0356	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 <u>Short to ground</u>: <u>≤</u> 0.5 Ω impedance between signal and controller ground <u>Open Circuit</u>: <u>≥</u> 200 kΩ impedance between signal and controller ground <u>Short to power</u>: <u>≤</u> 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #7 CIRCUIT	P0357	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 <u>Short to ground</u>: ≤ 0.5 Ω impedance between signal and controller ground <u>Open Circuit</u>: ≥ 200 kΩ impedance between signal and controller ground <u>Short to power</u>: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #8 CIRCUIT	P0358	Diagnoses the Ignition Control (EST) low side driver circuit for circuit faults. 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. Voltage low during driver off state (indicates short-to-ground or open circuit) Voltage high during driver on state (indicates short-to-power)	 <u>Short to ground</u>: ≤ 0.5 Ω impedance between signal and controller ground <u>Open Circuit</u>: ≥ 200 kΩ impedance between signal and controller ground <u>Short to power</u>: ≤ 0.5 Ω impedance between signal and controller power	Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Catalyst System Low Efficiency Bank 1	P0420	NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen StorageThe catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value (EWMA filtered)	< 0.35	All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. General Enable Criteria In addition to the p-codes listed under P2270, the following DTC's shall also not be set:	> 0.46 < 0.10 12 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 8 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Catalyst System Low Efficiency Bank 2	P0430	Note: The information below applies to applications that use the Decel Catalyst Monitor Algorithm Oxygen StorageThe catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Rich (intrusive rich) and Lean (decel fuel cutoff) A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration	Normalized Ratio OSC Value (EWMA filtered)	< 0.35	All enable criteria associated with P0430 can be found under P2272 - (O2 Sensor Signal Stuck Lean Bank 2 Sensor 2) Rapid Step Response (RSR) feature will initiate multiple tests: If the difference between current EWMA value and the current OSC Normalized Ratio value is and the current OSC Normalized Ratio value is Maximum number of RSR tests to detect failure when RSR is enabled. General Enable Criteria In addition to the p-codes listed under P2272, the following DTC's shall also not be set:	> 0.46 < 0.10 12 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA	1 test attempted per valid decel period Minimum of 1 test per trip Maximum of 8 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 12.5ms	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part. The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich instrusive fueling event initiated by the O2 Sensor Signal Stuck Lean Bank 2 Sensor 2 test (P2272). Several conditions must be met in order to execute this test. These conditions and their related values are listed in the "Secondary Parameters" and "Enable Conditions" section of this document for P2272 (O2 Sensor Signal Stuck Lean Bank 2 Sensor 2)						

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Small Leak Detected (Not Sealed Fuel System)	P0442	This DTC will detect a small leak (≥ 0.020”) in the EVAP system between the fuel fill cap and the purge solenoid. On some applications a small leak is defined as ≥ 0.025”, 0.030”, or 0.150”. The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut 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.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 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. (Please see **P0442: EONV Pressure Threshold (Pascals) Table** in Supporting Tables). 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). 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 3 additional consecutive trips.	> 0.70 (EWMA Fail Threshold), ≤ 0.35 (EWMA Re-Pass Threshold)	Fuel Level Drive Time Drive length ECT Baro Distance since assembly plant Engine not run time before key off must be Time since last complete test 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 ****************************** Conditions for Estimate of Ambient Air Temperature to be valid: 1. Cold Start	10 % ≤ Percent ≤ 90 % ≥ 900 seconds ≥ 9.7 miles ≥ 63 °C ≥ 70 kPa ≥ 10.0 miles ≤ refer to **P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature Table** in Supporting Tables. ≥ 17 hours ≥ 10 hours 0 °C≤Temperature≤ 34 °C ******************************	Once per trip, during hot soak (up to 2,400 sec.). No more than 2 unsuccessful attempts between completed tests.	Type A, 1 Trips EWMA Average run length is 8 to 12 trips under normal conditions Run length is 3 to 6 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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.			Startup delta deg C (ECT-IAT) OR 2. Short Soak and Previous EAT Valid Previous time since engine off OR 3. Less than a short soak and Previous EAT Not Valid Previous time since engine off AND Vehicle Speed AND Mass Air Flow Must expire Estimate of Ambient Temperature Valid Conditioning Time. Please see **P0442: Estimate of Ambient Temperature Valid Conditioning Time Table** in Supporting Tables. OR 4. Not a Cold Start and greater than a Short Soak Previous time since engine off AND Vehicle Speed AND Mass Air Flow	≤ 8 °C ≤ 7,200 seconds ≤ 7,200 seconds ≥ 10.0 mph ≥ 10 g/sec > 7,200 seconds ≥ 10.0 mph ≥ 10 g/sec		

Component/ System	Fault Code	Monitor 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 Table** in Supporting Tables. 1. High Fuel Volatility During the volatility phase, pressure in the fuel tank is integrated vs. time. If the integrated pressure is 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	< -5		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 OR 7. Key up during EONV test No active DTCs:	0.50 seconds MAF_SensorFA ECT_Sensor_FA IAT_SensorFA VehicleSpeedSensor_FA IgnitionOffTimeValid AmbientAirDefault		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						P0443 P0446 P0449 P0452 P0453 P0455 P0496		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM) (Not Sealed Fuel System and For Single DTC Implementation Only)	P0443	Diagnoses the canister purge solenoid low side driver circuit for circuit faults	Voltage low during driver off state (indicates open circuit or short-to-ground) Voltage high during driver on state (indicates short to power)	Open circuit: ≥ 200 K Ω impedence between signal and controller ground Short to ground: ≤ 0.5 Ω impedence between signal and controller ground Short to power: ≤ 0.5 Ω impedence between signal and controller power	PT Relay Voltage	Voltage ≥ 11.0 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) Vent System Performance (Not Sealed Fuel System)	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 for OR Vented Vacuum for Vent Restriction Test: Tank Vacuum for before Purge Volume After setting the DTC for the first time, 2 liters of fuel must be consumed before setting the DTC for the second time.	 < -623 Pa 60 seconds > 1,245 Pa 60 seconds > 2,989 Pa 5 seconds ≥ 14 liters	Fuel Level System Voltage Startup IAT Startup ECT BARO No active DTCs:	10 % ≤ Percent ≤ 90 % 11 volts ≤ Voltage ≤ 32 volts 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C ≥ 70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454	Once per Cold Start Time is dependent on driving conditions Maximum time before test abort is 1,000 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) Vent Solenoid Control Circuit (ODM) (Not Sealed Fuel System and For Single DTC Implementation Only)	P0449	Diagnoses the vent solenoid low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit or short-to-ground) Voltage high during driver on state (indicates short to power) If the P0449 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	Open circuit: ≥ 200 K Ω impedence between signal and controller ground Short to ground: ≤ 0.5 Ω impedence between signal and controller ground Short to power: ≤ 0.5 Ω impedence between signal and controller power			20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Performance (Not Sealed Fuel System)	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 3 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.	Type A, 1 Trips EWMA Average run length: 6 Run length is 2 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (Not Sealed Fuel System)	P0452	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	< 0.15 volts (3.0 % of Vref or ~ 1,681 Pa)	Time delay after sensor power up for sensor warm-up is	0.10 seconds	640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (Not Sealed Fuel System)	P0453	This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range.	FTP sensor signal The normal operating range of the FTP sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	> 4.85 volts (97 % of Vref or ~ -4,172 Pa)	Time delay after sensor power up for sensor warm-up is	0.10 seconds	640 failures out of 800 samples 12.5 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent (Not Sealed Fuel System)	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. An abrupt change is defined as a change in vacuum: in the span of 1.0 seconds. But in 12.5 msec. A refueling event is confirmed if the fuel level has a persistent change of for 30 seconds.	> 112 Pa < 249 Pa 10 %	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes and the canister vent solenoid is closed		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 2 out of 3 samples are failures. 12.5 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Large Leak Detected (Not Sealed Fuel System)	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 while Tank vacuum After setting the DTC for the first time, 2 liters of fuel must be consumed before setting the DTC for the second time. Weak Vacuum Follow-up Test (fuel cap replacement test) Weak Vacuum Test failed. Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	> 64 liters ≤ 2,740 Pa ≥ 2,740 Pa	Fuel Level System Voltage BARO Purge Flow No active DTCs: Cold Start Test If ECT > IAT, Startup temperature delta (ECT-IAT): Cold Test Timer Startup IAT Startup ECT Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart.	10 % ≤ Percent ≤ 90 % 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa ≥ 3.75 % MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454 ≤ 8 °C ≤ 1,000 seconds 4 °C≤Temperature≤ 30 °C ≤ 35 °C	Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1,000 seconds Weak Vacuum Follow-up Test With large leak detected, the follow-up test is limited to 1,300 seconds. Once the MIL is on, the follow-up test runs indefinitely.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Performance (For use on vehicles with a single fuel tank)	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.	Delta fuel volume change over an accumulated 83 miles.	< 3 liters	Engine Running No active DTCs:	 VehicleSpeedSensor_FA	250 ms / sample	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit Intermittent (Not Sealed Fuel System)	P0464	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If a change in fuel level 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 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 intermittent change in fuel level is defined as: The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test.	10 % > 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 2 out of 3 samples are failures. 100 ms / sample	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Flow During Non-Purge (Not Sealed Fuel System)	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 Test time	> 2,491 Pa 5 seconds ≥ refer to **P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level Table** in Supporting Tables.	Fuel Level System Voltage BARO Startup IAT Startup ECT Engine Off Time No active DTCs:	10 % ≤ Percent ≤ 90 % 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa 4 °C≤Temperature≤ 30 °C ≤ 35 °C ≥ 28,800.0 seconds MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454	Once per cold start Cold start: max time is 1,000 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Engine Speed Idle System	P0506	This DTC will determine if a low idle exists	Filtered Engine Speed Error	> 89.00 rpm	Baro	> 70 kPa	Diagnostic runs in every 12.5 ms loop	Type B, 2 Trips
			filter coefficient	0.00275	Coolant Temp	> 60 °C and < 128 °C	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
					Engine run time	≥ 60 sec		
					Ignition voltage	32 ≥ volts ≥ 11		
					Time since gear change	≥ 3 sec		
					Time since a TCC mode change	> 3 sec		
					IAT	> -20 °C		
					Vehicle speed	≤ 1.24 kph		
					Commanded RPM delta	≤ 25 rpm		
					Idle time	> 10 sec		
					For manual transmissions: Clutch Pedal Position or Clutch Pedal Position	 > 88.00 pct < 20.00 pct		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						PTO not active Transfer Case not in 4WD LowState Off-vehicle device control (service bay control) must not be active. following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion) Clutch is not depressed		
					No active DTCs	TC_BoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnostic Clutch Sensor FA AmbPresDfltdStatus P2771		
					All of the above met for Idle time	> 10 sec		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Engine Speed Idle System	P0507	This DTC will determine if a high idle exists	Filtered Engine Speed Error	< -178.00 rpm	Baro	> 70 kPa	Diagnostic runs in every 12.5 ms loop	Type B, 2 Trips
			filter coefficient	0.00275	Coolant Temp	> 60 °C and < 128 °C	Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	
					Engine run time	≥ 60 sec		
					Ignition voltage	32 ≥ volts ≥ 11		
					Time since gear change	≥ 3 sec		
					Time since a TCC mode change	> 3 sec		
					IAT	> -20 °C		
					Vehicle speed	≤ 1.24 kph		
					Commanded RPM delta	≤ 25 rpm		
					For manual transmissions: Clutch Pedal Position or Clutch Pedal Position	 > 88.00 pct < 20.00 pct		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs	PTO not active Transfer Case not in 4WD LowState Off-vehicle device control (service bay control) must not be active. following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimit AND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion) Clutch is not depressed TC_BoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						FuelLevelDataFaultLow FuelConditionDiagnostic Clutch SensorFA AmbPresDfltdStatus P2771		
					All of the above met for Idle time	> 10 sec		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Performance	P0521	Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range	If enabled: To pass a currently failing test: The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.): To fail a currently passing test: The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.):	 < -50.0 kPa OR > 50.0 kPa > -47.0 kPa AND < 47.0 kPa	Diagnostic enabled/ disabled Oil Pressure Sensor In Use Quality or weighting factor values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Regions where diagnosis is possible have a quality or weighting factor value that is a function of engine speed, engine oil temperature, predicted oil pressure, and engine load stability. (**RPM_Weighting_Factor** * **Oil_Temp_Weighting_Factor** * **Eng_Load_Stability_Weighting_Factor** * **Eng_Oil_Pred_Weighting_Factor**) with a first order filter coefficient of 0.01 Details on P0521 Supporting Tables Tab: **RPM_Weighting_Factor** **RPM_Weighting_Factor_X_Axis** **Oil_Temp_Weighting_Factor**	Enabled Present >= 0.30 weighting	Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Oil_Temp_Weighting_Factor_Axis **Eng_Load_Stability_Weighting_Factor** **Eng_Load_Stability_Weighting_Factor_Axis** **Eng_Oil_Pred_Weighting_Factor** **Eng_Oil_Pred_Weighting_Factor_Axis** No active DTC's	Fault bundles: EngOilPressureSensorCktFA CrankSensorFA ECT_Sensor_FA MAF_SensorFA IAT_SensorFA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low	(Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts	< 5.00 percent	Engine Speed Enable Engine Speed Disable Sensor Present Diagnostic enabled/ disabled	> 400 rpm < 350 rpm Present Enabled	50 failures out of 63 samples Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high	(Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts	> 85.00 percent	Sensor Present Diagnostic enabled/ disabled	Present Enabled	204 failures out of 255 samples Performed every 100 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an illegal range	Cruise Control analog circuit voltage must be in an "illegal range" or "between ranges" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 0.500 seconds	MIL: Type C, No MIL

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state	Cruise Control Resume switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 90.000 seconds	MIL: Type C, No MIL

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state	Cruise Control Set switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	1.00	fail continuously for greater than 90.000 seconds	MIL: Type C, No MIL

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Not Programmed	P0602	This DTC will be stored if the 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 and once per second continuously after that	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects a mismatch between the data and dual data is found during RAM updates. Detects a mismatch in data and dual data updates >	0.47088 s			When dual store updates occur.	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	65,534 counts			Diagnostic runs continuously (background loop)	
			Indicates that the secondary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault	Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was received by the Primary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved		Run/Crank voltage >= 6.41 or Run/Crank voltage >= 11.00 , else the failure will be reported for all conditions	In the primary processor, 159 / 399 counts intermittent or 39 counts continuous; 39 counts continuous @ initialization. 12.5 ms /count in the ECM main processor	Type A, 1 Trips
			Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was received by the Secondary Processor	Loss or invalid message at initialization detected or loss or invalid message after a valid message was recieved			In the secondary processor, 20 / 200 counts intermittent or 0.1875 s continuous; 0.4750 s continuous @ initialization. 12.5 ms /count in the ECM secondary processor	
			Checks for stack over or underflow in secondary processor by looking for corruption of known pattern at stack boundaries. Checks number of stack over/ under flow since last powerup reset >=	5		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys	2 incorrect seeds within 8 messages, 0.2000 seconds		ignition in Run or Crank	150 ms for one seed continually failing	

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Software background task first pass time to complete exceeds			Run/Crank voltage > 6.41	360.000 seconds	
			2 fails in a row in the MAIN processor's ALU check			KePISD_b_ALU_TestEnbld == 1 Value of KePISD_b_ALU_TestEnbld is: 1 . (If 0, this test is disabled)	25 ms	
			2 fails in a row in the MAIN processor's configuration register masks versus known good data			KePISD_b_ConfigRegTestEnbld == 1 Value of KePISD_b_ConfigRegTestEnbld is: 1 . (If 0, this test is disabled)	12.5 to 25 ms	
			Checks number of stack over/under flow since last powerup reset >=	5		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Voltage deviation >	0.4950		KePISD_b_A2D_CnvrtrTestEnbld == 1 Value of KePISD_b_A2D_CnvrtrTestEnbld is: 1 . (If 0, this test is disabled)	5 / 10 counts or 0.150 seconds continuous; 50 ms/count in the ECM main processor	
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occured since last	3 (results in MIL), 5 (results in MIL and remedial action)		KeMEMD_b_FlashECC_CktTestEnbl == 1 Value of KeMEMD_b_FlashECC_CktTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

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

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

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

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1	ECM Vref1 < or ECM Vref1 > or the difference between ECM filtered Vref1 and Vref1 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Open - For 3 DTC implementation only	P0650	Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P263A may also set (MIL Control Short to Ground)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2	ECM Vref2 < or ECM Vref2 > or the difference between ECM filtered Vref2 and Vref2 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

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

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

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3	ECM Vref3 < or ECM Vref3 > or the difference between ECM filtered Vref3 and Vref3 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4	ECM Vref4 < or ECM Vref4 > or the difference between ECM filtered Vref4 and Vref4 >	4.8750 5.1250 0.0495		Run/Crank voltage > 6.41	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit Diagnostic	FFT Diagnostic Output	> OpenTestCktThrshMin and < OpenTestCktThrshMax **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes ≥ 2.0 seconds > 400 RPM and < 3,500 RPM ≥ 200 Revs ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Knock Sensor Processor 2 Performance	P06B7	This diagnostic checks for a fault with the internal test circuit used only for the '20 kHz' method of the Open Circuit Diagnostic	FFT Diagnostic Output	> OpenTestCktThrshMin and < OpenTestCktThrshMax **See Supporting Tables**	Diagnostic Enabled? Engine Run Time Engine Speed Cumlative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes ≥ 2.0 seconds > 400 RPM and < 3,500 RPM ≥ 200 Revs ≥ 10 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Inlet Airflow System Performance (naturally aspirated)	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	Filtered Throttle Model Error AND (ABS(Measured Flow – Modeled Air Flow) Filtered OR ABS(Measured MAP – MAP Model 1) Filtered AND ABS(Measured MAP – MAP Model 2) Filtered	<= 300 kPa*(g/s) > 20 grams/sec > 20.0 kPa) > 20.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs:	>= 465 RPM <= 4,600 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 100 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Est MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Metal Over temperature Active	P1258	The objective of the algorithm is to protect the engine in the event of engine metal overtemperature, mainly due to loss of coolant	Engine Coolant For a period	>= 129 °C >= 10 seconds	Engine Run Time 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.	>= 10 Seconds	Fault present for >= 0 seconds	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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. If Misfire P0300 then sets while the ABS fault is present, P1380 will set as a diagnostic aid.	GMLan Message: "Wheel Sensor Rough Road Magnitude Validity"	= FALSE	Vehicle Speed Engine Speed Engine LoadRunCrankActive Active DTC	VSS ≥ 5 mph rpm < 8,192 load < 60 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	Type C, No MIL "Special Type C"

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Engine Speed Request Circuit	P150C	Determines if engine speed request from the TCM is valid	Serial Communication rolling count value	+ 1 from previous $19D message (PTEI3)	Diagnostic enable bit	1	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
			Transmission engine speed protection	not equal to 2's complement of transmission engine speed request + Transmission alive rolling count	Engine run time	0.50 sec		
					# of Protect Errors	10 protect errors out of 10 samples		
					# of Alive Rolling Errors	6 rolling count errors out of 10 samples		
					No idle diagnostic 506/507 code	IAC_SystemRPM_FA		
					No Serial communication loss to TCM	(U0101)		
					Engine Running	= TRUE		
					Power mode	Run Crank Active		

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

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Voltage Correlation	P1682	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage & the Powertrain Relay Ignition Voltage	|Run/Crank – PT Relay Ignition| >	3.00 Volts		Powertrain commanded on AND (Run/Crank voltage > Table, f(IAT). See supporting tables: **PT Relay Pull-in Run/Crank Voltage f(IAT)** OR PT Relay Ignition voltage > 5.50) AND Run/Crank voltage > 5.50 .	240 / 480 counts or 0.1750 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance	P16F3	Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this indivudual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable.	Desired Throttle Area calculated does not equal its redundant calculation	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	Type A, 1 Trips
			Equivance Ratio torque compensation exceeds threshold	-100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	118.03 mg	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Absolute difference between the previous Final Advance and the current Final Advance not Adjusted for Equivalence Ratio is out of bounds given by threshold range	8.09 degrees		Engine speed >0rpm	Up/down timer 158 ms continuous, 0.5 down time multipier	
			Torque Learn offset is out of bounds given by threshold range	High Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold 0.00 Nm			multipier	
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 515 rpm	Up/down timer 458 ms continuous, 0.5 down time multipier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	8.10 degrees	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multipier	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1,503.00 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1,503.00 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multipier	
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 0.074	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 7,900.00 or 8,000.00 rpm (hysteresis pair)	Up/down timer 158 ms continuous, 0.5 down time multipier	
			Rate limited vehicle speed and its dual store do not equal	N/A		Time since first CAN message with vehicle speed >= 0.500 sec	10 / 20 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Preload Throttle Area and its dual store do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded engine torque due to fast actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded engine torque due to slow actuators and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			TOS to wheel speed conversion factor is out of bounds given by threshold	High Threshold: 1.10	Ignition State	Accessory, run or crank	255 / 6 counts; 25.0msec/count	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			range	T/C Range Hi 0.10 T/C Range Lo Low Threshold: 1.10 T/C Range Hi 0.10 T/C Range Lo				
			TOS to wheel speed conversion factor and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	255 / 6 counts; 25.0msec/count	
			Cylinders active greater than commanded	2 cylinders		Engine run flag = TRUE > 2.00 s Number of cylinder events since engine run > 24 No fuel injector faults	Up/down timer 158 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						active		
			Transfer case neutral request from four wheel drive logic does not match with operating conditions	N/A	Ignition State	Accessory, run or crank Transfer case range valid and not over-ridden FWD Apps only	32 / 0 counts; 25.0msec/count	
			Transfer case neutral and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	8 / 16 counts; 25.0msec/count	
			Driver progression mode and its dual store do not equal	N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). See supporting tables + 100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	99.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold	99.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Positive Torque Offset is greater than its redundant calculation plus threshold OR Positive Torque Offset is less than its redundant calculation minus threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Hybrid Predicted Crankshaft Request is greater than its redundant calculation plus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold	4,096.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Regeneration Brake Assist is not within a specified range	Brake Regen Assist < 0 Nm or Brake Regen Assist >	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous,	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				0.00 Nm			0.5 down time multipier	
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	8.10 degrees	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			1. Cylinder Torque Offset exceeds step size threshold OR 2. Sum of Cylinder Torque Offset exceeds sum threshold	1. 100.00 Nm 2. 100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Engine Off is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine Capacity Minimum Engine Immediate Without Motor is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			PTO Torque Request exceeds allowed rate limited PTO Torque Request	12.50 Nm/25ms	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant	N/A		Engine speed greater than 0rpm	Up/down timer 158 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			calculation				down time multipier	
			Engine Speed Lores Intake Firing timing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than 0rpm	Up/down timer 158 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque request exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 100.00	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Nm				
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1,503.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Driver Immediate Request is less than its redundant calculation minus threshold	1,503.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Commanded Immediate Request is greater than its redundant calculation plus threshold	1,503.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR Commanded Immediate Request is less than its redundant calculation minus threshold					
			Commanded Immediate Response Type is set to Inactive	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Cylinders active greater than commanded	1 cylinder		Engine speed greater than 0rpm and less than 3,200 rpm AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Difference between			Cruise has been engaged	Up/down timer	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cruise Axle Torque Arbitrated Request and Cruise Axle Torque Request exceeds threshold	187.88 Nm		for more than 4.00 seconds	2,048 ms continuous, 0.5 down time multipier	
			Desired engine torque request greater than redundant calculation plus threshold	99.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine min capacity above threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 75 ms continuous, 0.5 down time multipier	
			No fast unmanaged retarded spark above the applied spark plus the threshold	Table, f(RPM,APC). See supporting tables: **Delta Spark Threshold f (RPM,APC)**		Engine speed greater than 0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	2.76 m/s	Ignition State	Accessory, run or crank	Up/down timer 104 ms continuous, 0.5 down time multipier	
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 158 ms continuous, 0.5 down time multipier	
			After throttle blade pressure and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Speed Control's Preditcted Torque Request and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 250 ms continuous, 0.5 down time multipier	
			Desired throttle position greater than redundant calculation plus threshold	8.41 percent	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of the rate limited pre-throttle pressure and its redundant calculation greater than threshold	0.06 kpa	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Throttle desired torque above desired torque plus threshold	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Torque feedback proportional term is out of	High Threshold	Ignition State	Accessory, run or crank	Up/down timer 475	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			allowable range or its dual store copy does not match	50.00 Nm Low Threshold -50.00 Nm			ms continuous, 0.5 down time multipier	
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store copy do not match	High Threshold 93.75 Nm Low Threshold -100.00 Nm Rate of change threshold 6.25 Nm/loop	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of Final Torque	High Threshold	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	100.00 Nm Low Threshold - 100.00 Nm			475 ms continuous, 0.5 down time multipier	
			Difference of torque desired throttle area and its redundant calculation is out of bounds given by threshold range	High Threshold 0.50 % Low Threshold - 0.50 %	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.0001266 Low Threshold - 0.0001266	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 100.00 Nm Low Threshold - 100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 100.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			AC friction torque is	High Threshold	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			greater than commanded by AC control software or less than threshold limit	55.00 Nm Low Threshold 0.00 Nm			475 ms continuous, 0.5 down time multipier	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 100.00 Nm Low Threshold - 100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Generator friction torque is out of bounds given by threshold range	High Threshold 100.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Supercharger friction torque is out of bounds given by threshold range	High Threshold 100.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Filtered Torque error magnitude or its increase rate of change is out of allowable range or its dual store copy do not match	High Threshold 100.00 Nm		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 475 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold -100.00 Nm Rate of change threshold 6.25 Nm/loop			multipier	
			Torque error compensation is out of bounds given by threshold range	High Threshold 100.00 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 10.92 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold 0.00 Nm			multipier	
			1. Difference of reserve torque value and its redundant calculation exceed threshold OR 2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exeed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	1. 99.00 Nm 2. N/A 3. 99.00 Nm 4. 99.00 Nm	3. & 4.: Ignition State	1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 100.00 Nm 3. & 4.: Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Engine Vacuum and its ~~dual store do not match~~	N/A	Ignition State	Accessory, run or crank	Up/down timer ~~175~~	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated Intake Manifold Pressure during engine event versus during time event is greater than threshold	Table, f(Desired Engine Torque). See supporting tables: **Delta MAP Threshold f(Desired Engine Torque)**		Engine speed >0rpm	Up/down timer 158 ms continuous, 0.5 down time multipier	
			Min. Axle Torque Capacity is greater than threshold	0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Driver Predicted Request is greater than its redundant calculation plus threshold OR Driver Predicted Request	1,503.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			is less than its redundant calculation minus threshold					
			Cold Delta Friction Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Predicted torque for zero pedal determination is greater than calculated limit.	Table, f(Oil Temp, RPM). See supporting tables: **Speed Control External Load f(Oil Temp, RPM)** + 100.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Commanded Predicted Axle Torque and its dual store do not match	1 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous,	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							0.5 down time multipier	
			Steady State Estimated Engine Torque and its dual store are not equal	N/A		AFM not changing from Active to Inactive and preload torque not changing and one loop after React command Engine speed >0rpm	Up/down timer 1,988 ms continuous, 0.5 down time multipier	
			Difference of Weighting factor for number of cylinders fueled and its redundant calculation is above threshold	0.26		Engine run flag = TRUE > 10.00 s	Up/down timer 175 ms continuous, 0.5 down time multipier	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	8.09 degrees	Ignition State	Accessory, run or crank	Up/down timer 158 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of commanded spark advance and adjusted delivered is out of bounds given by threshold range	8.09 degrees		Engine speed >0rpm	Up/down timer 158 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	100.00 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	100.00 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Difference of desired spark advance for	8.09 degrees		Torque reserve (condition when spark control	Up/down timer 458	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			managed torque and its redundant calculation is out of bounds given by threshold range			greater than optimum to allow fast transitions for torque disturbances) > 100.00 Nm	ms continuous, 0.5 down time multipier	
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	100.00 Nm		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			One step ahead calculation of air-per-cylinder greater than two step ahead calculation by threshold for time	Threshold: Dynamically calculated based on current engine conditions Fault Pending Threshold: 100 ms		Engine speed > 515 rpm	Up/down timer 458 ms continuous, 0.5 down time multipier	
			Rate limited cruise axle torque request and its dual store do not match within a threshold	187.88 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multipier	
			1. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its redundant calculation is out of bounds given by threshold range OR 2. Absolute difference of	1. 5.00 % 2. N/A 3. N/A	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal OR 3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal					
			Commanded axle torque is greater than its redundant calculation by threshold	1,503.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded axle torque is less than its redundant calculation by threshold	-65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multipier	
			Preload Throttle Area is greater than its redundant calculation by threshold	0.10 %		Engine speed >0rpm AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Preload timer and its redundant calculation do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			AC friction torque is greater than commanded by AC control software	55.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multipier	
			Engine Speed Lores	N/A		Engine speed >0rpm	Up/down timer	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Intake Firing (time based) calculation does not equal its redundant calculation				175 ms continuous, 0.5 down time multipier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant cacluation is greater than a threshold	8.09 degrees		Engine speed >0rpm	Up/down timer 158 ms continuous, 0.5 down time multipier	
			Transmission Torque Request cacluations do not equal their dual stores	N/A		Run or Crank = TRUE > 0.50 s	6 / 10 counts; 25.0msec/count	
			Absolute difference of the predicted motor torque ACS and its redundant cacluation is greater than a threshold	0.01 Nm			Up/down timer 2,048 ms continuous, 0.5 down time multipier	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Low– Bank 1	P2088	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.	Short to ground: ≤ 0.5 Ω to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND	System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples250 ms / sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit High – Bank 1	P2089	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples250 ms / sample, continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System Low Limit Bank 1 (Too Rich)	P2096	Determines if the post catalyst O2 sensor based fuel control system has reached it's low limit authority, indicating a rich emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too rich, the post catalyst O2 integral offset control is decreased. This results in lean bias fuel control in an attempt to correct the rich post O2 voltage.	Rich Fail counter High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 15 % for >= 20.0 seconds.	>= 300 counts per 375 sample counts Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again.	The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration The following conditions must be true for > 0.0 seconds: Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp. PTO Intrusive diag. fuel control Long Term Secondary Fuel Trim Enabled (see "**Long Term Secondary Fuel Trim Enable Criteria**" in Supporting Tables) High Vapor Conditions No Fault Active for:	 No No Yes Yes Yes >= 70 kPa >= 0.0 g/s <= 10,000.0 >= 0 kPa <= 200 >= -20 deg. C <= 45 >= -20 deg. C Not Active Not Active Not Present AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA	Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						EvapFlowDuringNonPurge_FA FuelTankPressureSnsrCkt_FA EvapPurgeSolenoidCircuit_FA EvapSmallLeak_FA EvapVentSolenoidCircuit_FA FuelInjectorCircuit_FA MAF_SensorFA MAF_SensorTFTKO MAP_SensorFA MAP_EngineVacuumStatus EngineMisfireDetected_FA A/F Imbalance Bank1 O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA		
					The above general enable conditions must be true for: Minimum accumulated counts in each cell required before counters will increment: Deceleration Idle Cruise Light Acceleration Heavy Acceleration Fail counter will increment if sample counter increments AND Post oxygen sensor control integral offset (in	> 0.0 seconds 300 300 300 300 300		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					mV) is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration	<= -140 (control min.= -150) -140 (control min.= -150) -390 (control min.= -400) -390 (control min.= -400) -390 (control min.= -400) > 800 mV 800 mV 780 mV 780 mV 780 mV		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System High Limit Bank 1 (Too Lean)	P2097	Determines if the post catalyst O2 sensor based fuel control system has reached it's high limit authority, indicating a lean emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too lean, the post catalyst O2 integral offset control is increased. This results in rich bias fuel control in an attempt to correct the lean post O2 voltage.	Lean Fail counter High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 15 % for >= 20.0 seconds.	>= 300 counts per 375 sample counts Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again.	Same as P2096 except for the following: Fail counter will increment if sample counter increments AND Post oxygen sensor control integral offset (in mV) is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration	 >= 130 (control max.= 150) 130 (control max.= 150) 380 (control max.= 400) 380 (control max.= 400) 380 (control max.= 400) < 660 mV 660 mV 660 mV 660 mV 660 mV	Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System Low Limit Bank 2 (Too Rich)	P2098	Determines if the post catalyst O2 sensor based fuel control system has reached it's low limit authority, indicating a rich emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too rich, the post catalyst O2 integral offset control is decreased. This results in lean bias fuel control in an attempt to correct the rich post O2 voltage.	Rich Fail counter High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 15 % for >= 20.0 seconds.	>= 300 counts per 375 sample counts Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again.	Same as P2096 except for the following: Bank1 Fault Active criteria are replaced by the equivalent Bank2 Fault Active criteria. Fail counter will increment if sample counter increments AND Post oxygen sensor control integral offset is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration	<= -140 (control min.= -150) -140 (control min.= -150) -390 (control min.= -400) -390 (control min.= -400) -390 (control min.= -400) > 800 mV 800 mV 780 mV 780 mV 780 mV	Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System High Limit Bank 2 (Too Lean)	P2099	Determines if the post catalyst O2 sensor based fuel control system has reached it's high limit authority, indicating a lean emissions/exhaust gas condition. Note: If the post catalyst O2 voltage is too lean, the post catalyst O2 integral offset control is increased. This results in rich bias fuel control in an attempt to correct the lean post O2 voltage.	Lean Fail counter High Vapor Feature: The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions are present. This HV condition is indicated when the purge valve is open AND percent vapor is >= 18 % for >= 5.0 seconds. Diagnosis resumes if the purge valve is closed OR the percent vapor is <= 15 % for >= 20.0 seconds.	>= 300 counts per 375 sample counts Note: Counters increment at a rate of 10 per second when enable conditions are met. If the fail count threshold is reached, a fail is reported and the diagnostic will not report again until the next trip. If the sample count threshold is reached before a fail is reported, a pass is reported, the counters are reset to 0, and evaluation starts again.	Same as P2096 except for the following: Bank1 Fault Active criteria are replaced by the equivalent Bank2 Fault Active criteria. Fail counter will increment if sample counter increments AND Post oxygen sensor control integral offset is Deceleration Idle Cruise Light Acceleration Heavy Acceleration AND Post O2 Voltage is Deceleration Idle Cruise Light Acceleration Heavy Acceleration	>= 130 (control max.= 150) 130 (control max.= 150) 380 (control max.= 400) 380 (control max.= 400) 380 (control max.= 400) < 660 mV 660 mV 660 mV 660 mV 660 mV	Frequency: Continuous Monitoring in 100ms loop. Counters increment when enable conditions are met. When sample count threshold is reached or fail threshold is reached, counters are reset to 0 and start over.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error2) Throttle control is driving the throttle in the incorrect direction3) Throttle control exceeds the reduced power limit	Difference between measured throttle position and modeled throttle position >	8.41 percent	TPS minimum learn is not active and Throttle is being Controlled and (Engine Running or Ignition Voltage > or Ignition Voltage >)	Run/Crank voltage > 6.41 Ignition voltage failure is false (P1682)	15 counts; 12.5 ms/count in the primary processor	Type A, 1 Trips
			OR Difference between modeled throttle position and measured throttle position >	8.41 percent	Ignition voltage failure is false (P1682)	TPS minimum learn is not active and Throttle is being Controlled AND ((Engine Running AND Ignition Voltage > 5.50) OR Ignition Voltage > 11.00)		
			Throttle Position >	39.26 percent		Powertrain Relay voltage > 6.41 TPS minimum learn is active	11 counts; 12.5 ms/count in the primary processor	
			Throttle Position >	38.26 percent		Powertrain Relay voltage > 6.41 Reduced Power is True	11 counts; 12.5 ms/count in the primary processor	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle return to default	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	(Normalized TPS1 Voltage > AND Normailzed TPS2 Voltage > On the main processor) OR (Normalized TPS1 Voltage < AND Normailzed TPS2 Voltage < On the main processor)	1.6890 1.7890 1.1150 1.0150		Throttle de-energized for Actuator, Controller, or Ignition Faults (P21104, P2100, P2101, P2102, P2103, P1682, P0068, P16F3) No TPS circuit faults PT Relay Voltage > 5.500 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	0.4969 s	Type C, No MIL
			(Normalized TPS1 Voltage > AND Normailzed TPS2 Voltage > On the main processor) OR (Normalized TPS1 Voltage < AND Normailzed TPS2 Voltage < On the main processor)	1.6890 1.7890 1.1150 1.0150		Throttle de-energized for Battery Saver Mode Engine not running No TPS circuit faults PT Relay Voltage > 5.500 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	1.5000 s	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage <	0.4625		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detect a continuous or intermittent short or open in the APP sensor #1 on Main processor	APP1 Voltage >	4.7500		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P06A3)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage <	0.3250		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P0697)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detect a continuous or intermittent short or open in the APP sensor #2 on Main processor	APP2 Voltage >	2.6000		Run/Crank voltage > 6.41 No 5V reference error or fault for # 4 5V reference circuit (P0697)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	Difference between TPS1 displaced and TPS2 displaced >	6.999 % offset at min. throttle position with a linear threshold to 9.673 % at max. throttle position		Run/Crank voltage > 6.41 No TPS sensor faults (P0122, P0123, P0222, P0223) No 5V reference error or fault for # 4 5V reference circuit (P06A3)	79 / 159 counts or 58 counts continuous; 3.125 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref		Run/Crank voltage > 6.41 No TPS sensor faults (P0122, P0123, P0222, P0223) No 5V reference error or fault for # 4 5V reference circuit (P06A3)	79 / 159 counts or 58 counts continuous; 3.125 ms/count in the main processor	

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Minimum Throttle Position Not Learned	P2176	TP sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS Voltage >	0.9350		Run/Crank voltage > 6.41 TPS minimum learn is active	2.0 secs	Type A, 1 Trips
			AND					
			Number of learn attempts >	10 counts				

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling System Performance	P2181	This DTC detects thermostat malfunction (i.e. stuck open)	Engine Coolant Temp (ECT) is ≤ commanded temperature minus 11 Deg C and normalized ratio is ≤ than 1.75 . When above is present for more than 5 seconds, fail counts start. Engine total airgrams is accumulated when 17 ≤ AirFlow ≤ 450 grams per second. == Ratio Definition:=== Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 500.0 grams.		No Active DTC's Engine not run time Engine run time Fuel Condition ECT at Power Up IAT min T-Stat Heater duty cycle commanded Airflow	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt _FA THMR_ECT_Sensor_Ckt _FA ≥ 1,800 seconds 90 ≤ Time ≤ 1,370 seconds Ethanol ≤ 87 % -40.0 ≤ ECT ≤ 70.0 °C -7 °C ≤ IAT ≤ 55 °C. ≤ 0 % 17.0 ≤ Airflow ≤ 450.0 gps	30 failures out of 90 samples 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Bank 1 Air-Fuel Ratio Imbalance	P219A	This monitor determines if a cylinder-to-cylinder air-fuel ratio imbalance is present on bank 1.	Filtered Ratio > Note: The input to this metric is the pre catalyst oxygen sensor voltage. This voltage is used to generate a Variance metric that represents the statistical variation of the O2 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). Multiple samples are collected in making a decision. The observed Variance is dependant on engine speed and load and so each result is normalized for speed and load by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (Supporting Table "**Variance Threshold Bank1**") and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table	1.55 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 1.49 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 1.55 .	System Voltage Fuel Level Engine Coolant Temperature Cumulative engine run time Diagnostic enabled at Idle (regardless of other operating conditions) Engine speed range Engine speed delta during a short term sample period Mass Airflow (MAF) range Cumulative delta MAF during a short term sample period Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF = 0.050 Air Per Cylinder (APC) APC delta during short term sample period Filtered APC delta between samples	no lower than 11.0 Volts for more than 0.2 seconds > 10.0 percent AND no fuel level sensor fault > -20 degrees C > 120.0 seconds No 1,160 to 3,150 RPM < 100 RPM 10 to 1,000 g/s < 3 g/s < 2.20 g/s 160 to 585 mg/cylinder < 25 mg/cylinder < 8.00 percent	Minimum of 1 test per trip, up to 18 tests per trip during RSR or FIR. The front O2 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 7.20 seconds of data is required at 1000 rpm while double this time is required at 500 rpm and half this time is required at 2000 rpm. This data is collected only when enable conditions are met, and as such significantly more operating time is required than is indicated above. Generally, a report will be	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(Supporting Table "**Normalizer Bank1**"). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (Supporting Table "**Quality Factor Bank1**"). This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the		Note: first order lag filter coefficient applied to APC = 0.050 Spark Advance Throttle Area (percent of max) Intake Cam Phaser Angle Exhaust Cam Phaser Angle Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (Supporting Table "**Quality Factor Bank1**"). QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Fuel Control Status Closed Loop and Long Term FT Enabled for: AIR pump not on CASE learn not active EGR - no device control, no intrusive diagnostics EVAP - no device control, no intrusive diagnostics Engine OverSpeed	 0 to 40 degrees 1 to 200 percent 0 to 25 degrees 0 to 25 degrees >= 0.99 >= 2.0 seconds (Please see "**Closed Loop Enable Criteria**" and "**Long Term FT Enable Criteria**" in Supporting Tables)	made within 5 minutes of operation. For RSR or FIR, 36 tests must complete before the diagnostic can report.	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature.		Protection Not Active Idle speed control normal PTO Not Active Injector base pulse width above min limit Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by Once triggered, the filtered ratio is reset to: Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to: No Fault Active for:	 >= 1.55 >= 1.55 0.00 0.00 EngineMisfireDetected_FA MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDefaulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_FA CamSensorAnyLocationFA		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Bank 2 Air-Fuel Ratio Imbalance	P219B	This monitor determines if a cylinder-to-cylinder air-fuel ratio imbalance is present on bank 2.	Filtered Ratio > Note: The input to this metric is the pre catalyst oxygen sensor voltage. This voltage is used to generate a Variance metric that represents the statistical variation of the O2 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without). Multiple samples are collected in making a decision. The observed Variance is dependant on engine speed and load and so each result is normalized for speed and load by comparing it to a known "good system" result for that speed and load, and generating a Ratio metric. The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (Supporting Table "**Variance Threshold Bank2**") and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table	0.65 If the diagnostic has reported a failure on the prior trip, the Filtered Ratio must fall below 0.62 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing when the Filtered Ratio remains near the initial failure threshold of 0.65 .	See Bank 1 (P219A) Secondary Parameters and Enable Conditions. Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (Supporting Table "**Quality Factor Bank2**"). QF values less than “1” indicate that we don’t have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data. Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by Once triggered, the filtered ratio is reset to: Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to:	>= 0.99 >= 0.65 >= 0.65 0.00 0.00	See Bank 1 info	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(Supporting Table "**Normalizer Bank2**"). This quotient is then multiplied by a quality factor calibration from a 17 x 17 table (Supporting Table "**Quality Factor Bank2**"). This result is referred to as the Ratio. Note that the quality factor ranges between 0 and 1 and represents robustness to false diagnosis in the current operating region. Regions with low quality factors are not used. Finally, a EWMA filter is applied to the Ratio metric to generate the Filtered Ratio malfunction criteria metric. Generally, a normal system will result in a negative Filtered Ratio while a failing system will result in a positive Filtered Ratio. The range of the Filtered Ratio metric is application specific since both the emissions sensitivity and relationship between imbalance and the Variance metric are application specific. Some applications may need to command a unique cam phaser value before performing the					

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature.					

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Performance (naturally aspirated)	P2227	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 OR Difference between baro sensor reading and estimated baro when distance since last estimated baro update	> 15.0 kPa <= 0.06 miles > 20.0 kPa > 0.06 miles	Engine Run Time No Active DTCs:	> 0.00 seconds AmbPresSnsrCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips
			Barometric Pressure OR Barometric Pressure	< 50.0 kPa > 115.0 kPa	Time between current ignition cycle and the last time the engine was running Engine is not rotating No Active DTCs: No Pending DTCs:	> 409.6 seconds EngineModeNotRunTimer Error MAP_SensorFA TC_BoostPresSnsrCktFA AAP2_SnsrFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP	4 failures out of 5 samples 1 sample every 12.5 msec	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Low (non-boosted applications)	P2228	Detects a continuous short to low or open in either the signal circuit or the BARO sensor.	BARO Voltage	< 40.0 % of 5 Volt Range (2.0 Volts = 51.0 kPa)	Engine Run Time	> 0.00 seconds	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit High (non-boosted applications)	P2229	Detects an open sensor ground or continuous short to high in either the signal circuit or the BARO sensor.	BARO Voltage	> 90.0 % of 5 Volt Range (4.5 Volts = 115.1 kPa)	Engine Run Time	> 0.00 seconds	320 failures out of 400 samples 1 sample every 12.5 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Intermittent	P2230	Detects a noisy or erratic barometric pressure input	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current BARO reading - BARO reading from 12.5 milliseconds previous)	> 100 kPa 80 consecutive BARO samples	No Active DTCs:	AmbPresSnsrCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA	4 failures out of 5 samples Each sample takes 1.00 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	This DTC determines if the post catalyst O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test (during coast) which increases the delivered fuel to achieve the required rich threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 825 mvolts > 183 grams	No Active DTC's B1S2 DTC's Not active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Pedal position Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F, P2270 or P2271 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False ≤ 100.0 % 1,100 ≤ RPM ≤ 2,500 1,050 ≤ RPM ≤ 2,650 3 ≤ gps ≤ 20	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State ========== All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested. ========== During Stuck Lean test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	40.4 ≤ MPH ≤ 82.0 36.0 ≤ MPH ≤ 87.0 0.74 ≤ C/L Int ≤ 1.08 = TRUE not in control of purge not in estimate mode = enabled = not active = not active ≥ 80.0 sec 600 ≤ ºC ≤ 900 = DFCO possible ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 150 mvolts > 82 grams	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed Engine Airflow Vehicle Speed Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013A, P013B, P013E, P013F or P2270 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False 1,100 ≤ RPM ≤ 2,500 3 ≤ gps ≤ 20 40.4 ≤ MPH ≤ 82.0 0.74 ≤ C/L Int ≤ 1.08 = TRUE not in control of purge not in estimate mode = enabled	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Power Take Off EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State DTC's Passed ========== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	= not active = not active = not active ≥ 80.0 sec 600 ≤ ºC ≤ 900 DFCO possible = P2270 (and P2272 if applicable) = P013E (and P014A if applicable) = P013A (and P013C if applicable) ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Lean Bank 2 Sensor 2	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 signal AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test	< 825 mvolts > 183 grams.	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Pedal position Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013C, P013D, P014A, P014B, P2272 or P2273 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. = False ≤ 100.0 % 1,100 ≤ RPM ≤ 2,500 1,050 ≤ RPM ≤ 2,650 3 ≤ gps ≤ 20	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State ========== All of the above met for at least 2.0 seconds, and then the Force Cat Rich intrusive stage is requested. ========== During Stuck Lean test the following must stay TRUE or the test will abort: 0.95 ≤ Fuel EQR ≤ 1.10	40.4 ≤ MPH ≤ 82.0 36.0 ≤ MPH ≤ 87.0 0.74 ≤ C/L Int ≤ 1.08 = TRUE not in control of purge not in estimate mode = enabled = not active = not active ≥ 80.0 sec 600 ≤ ºC ≤ 900 = DFCO possible ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 2 Sensor 2	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 requests the DFCO mode to achieve the required lean threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 150 mvolts > 82 grams.	No Active DTC's B2S2 DTC's Not Active this key cycle System Voltage ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Engine Speed Engine Airflow Vehicle Speed Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA P013C, P013D, P014A, P014B or P2272 10.0 < Volts < 32.0 = Not Valid = Not Valid, See definition of **Multiple DTC Use_Green Sensor Delay Criteria - Airflow** and **Multiple DTC Use_Green Sensor Delay Criteria - Limit** for the following locations: B1S2, B2S2 in Supporting Tables tab. = False 1,100 ≤ RPM ≤ 2,500 3 ≤ gps ≤ 20 40.4 ≤ MPH ≤ 82.0 0.74 ≤ C/L Int ≤ 1.08 = TRUE not in control of purge not in estimate mode = enabled	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Power Take Off EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State DTC's Passed ========== After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).	= not active = not active = not active ≥ 80.0 sec 600 ≤ ºC ≤ 900 = DFCO possible = P2270 (and P2272 if applicable) = P013E (and P014A if applicable) = P013A (and P013C if applicable) ==========		

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	Protect error - Serial Communication message - ($199 - PTEI3)	Message <> two's complement of message	Diagnostic enabled/ disabled	Enabled	>= 16 Protect errors during key cycle.	Type B, 2 Trips
					Power Mode	= Run	Performed on every received message	
			OR					
			Rolling count error - Serial Communication message ($199 - PPEI3) rolling count value	Message <> previous message rolling count value + one	Ignition Voltage	> 6.41 volts	>= 6 Rolling count errors out of 10 samples.	
					Engine Running	= True	Performed on every received message	
			OR		Run/Crank Active	> 0.50 Sec		
			Range Error - Serial Communication message - ($199 - PTEI3) TCM Requested Torque Increase	> 450 Nm	No Serial communication loss to TCM (U0101)	No loss of communication	>= 6 range errors out of 10 samples. Performed on every received message	
			OR					
			Multi-transition error - Trans torque intervention type request change	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples. Performed every 200 msec	

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Off Timer Performance	P262B	This DTC determines if the hardware timer does not initialize or count properly. There are two tests to ensure proper functioning of the timer: Count Up Test (CUT) and Range Test (RaTe). Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment. Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when module shutdown is initiated or run/crank becomes active.	Count Up Test: Time difference between the current read and the previous read of the timer Range Test: The variation of the HWIO timer and mirror timer is	> 1.50 seconds > 25 %.			Count Up Test: 4 failures out of 20 samples 1 sec / sample Continuous while run/crank is not active and until controller shutdown is initiated. Range Test: Once per trip when controller shutdown is initiated or run/crank becomes active.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM) Low	P263A	Diagnoses the malfunction indicator lamp control low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Run/Crank Voltage Remote Vehicle Start is not active	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	Type B, No MIL NO MIL Note: In certain controllers P0650 may also set (MIL Control Open Circuit)

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Serial Number (ESN) Not Programmed or Incompatible	P264F	This DTC will be stored if the Engine Serial Number (ESN) has not been programmed.	Any ESN digits	= FF	OBD Manufacturer Enable Counter	= 0	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures exceeds before the sample time of is reached	5 counts (equivalent to 0.06 seconds) 0.56 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds CAN hardware is bus OFF for	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00 > 0.1125 seconds	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the transmission control module	Message is not received from controller for Message $0AB Message $0BD Message $0C7 Message $0F9 Message $189 Message $199 Message $19D Message $1AF Message $1BE Message $1BF Message $1F5 Message $4C9	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for Message $0F1 Message $12A Message $1E1 Message $1F1 Message $1F3 Message $3C9 Message $3CB Message $3F1 Message $451 Message $4D7 Message $4E1 Message $4E9	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds	General Enable Criteria: U0073 Normal CAN transmission on Bus A Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line and Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is	 Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00 > 0.4000 seconds	Diagnostic runs in 12.5 ms loop	Type C, No MIL "Special Type C"

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

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

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

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

and
KtFSTA_t_ClosedLoopTime

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

and pre converter 02 sensor voltage less than
KfFULC_U_O2_SensorReadyThrsh
Lo

Voltage < *XXXX* milliVolts

for
KcFULC_O2_SensorReadyEvents

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

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

Long Term FT Enable Criteria

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

Closed Loop Enable and
Coolant greater than
KfFCLL_T_AdaptiveLoCoolant

Coolant	> *XXXX*Celcius

or less than
KfFCLL_T_AdaptiveHiCoolant

Coolant	< *XXXX*Celcius

and
KtFCLL_p_AdaptiveLowMAP_Limit

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

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

Secondary Fuel Trim Enable Criteria

Closed Loop Enable and
KfFCLP_U_O2ReadyThrshLo

Voltage	< *XXXX*milliVolts

for
KcFCLP_Cnt_O2RdyCyclesThrsh

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

Long Term Secondary Fuel Trim Enable Criteria

KtFCLP_t_PostIntglDisableTime

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

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

Plus
KtFCLP_t_PostIntglRampInTime

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

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

Modeled converter sulfur percent < XXXX Percent

and
Post Integral < KaFCLP_U_SlphrIntglOfst_Thrsh)

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

Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Notes:

y/x	0	500	850	1,200	1,550	1,900	2,250	2,600	2,950	3,300	3,650	4,000	4,350	4,700	5,050	5,400	5,750
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on RPM

Notes:

y/x	0	500	850	1,200	1,550	1,900	2,250	2,600	2,950	3,300	3,650	4,000	4,350	4,700	5,050	5,400	5,750
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.892	0.554	0.515	0.564	0.657	1.000	1.000

Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on MAF Est

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAF Residual Weight Factor based on MAF Est

Notes:

y/x	0	50	70	73	76	79	82	85	89	95	100	110	150	170	200	280	350
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP1 Residual Weight Factor based on RPM

Notes:

y/x	0	500	850	1,200	1,550	1,900	2,250	2,600	2,950	3,300	3,650	4,000	4,350	4,700	5,050	5,400	5,750
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM

Notes:

y/x	0	500	850	1,200	1,550	1,900	2,250	2,600	2,950	3,300	3,650	4,000	4,350	4,700	5,050	5,400	5,750
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Supporting Table - P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM

Notes:

y/x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

Description: P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

Notes:

y/x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset

Notes:

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset

Notes:

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow

Notes:

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow

Notes:

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP

Notes:

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Supporting Table - P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

Description: P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP

Notes:

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Supporting Table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopAutostart

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

Notes: Time in seconds: Hybrid use Only

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	360.0	300.0	240.0	180.0	130.0	90.0	60.0	40.0	20.0	15.0	11.0	7.0	7.0	11.0	11.0	11.0	11.0

Supporting Table - Closed Loop Enable Clarification - KtFSTA_t_ClosedLoopTime

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

Notes: Time in seconds

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	360.0	300.0	240.0	180.0	130.0	90.0	60.0	40.0	20.0	15.0	11.0	7.0	7.0	11.0	11.0	11.0	11.0

Supporting Table - Closed Loop Enable Clarification - KtFCLL_p_AdaptiveLowMAP_Limit

Description: KtFCLL_p_AdaptiveLowMAP_Limit

Notes: MAP in KPa

y/x	65	70	75	80	85	90	95	100	105
1	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Supporting Table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglDisableTime

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

Notes: Time in seconds

y/x	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
1	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0

Supporting Table - Closed Loop Enable Clarification - KtFCLP_t_PostIntglRampInTime

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

Notes: Time in seconds

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

Supporting Table - Closed Loop Enable Clarification - KfFULC_U_O2_SensorReadyThrshLo

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

Notes: Voltage in millivolts

y/x	1
1	1,795

Supporting Table - Closed Loop Enable Clarification - KcFULC_O2_SensorReadyEvents

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

Notes: Time (events * 12.5 milliseconds)

y/x	1
1	10

Supporting Table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveLoCoolant

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

Notes: Degrees Celcius

y/x	1
1	39

Supporting Table - Closed Loop Enable Clarification - KfFCLL_T_AdaptiveHiCoolant

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

Notes: Degrees Celcius

y/x	1
1	140

Supporting Table - Closed Loop Enable Clarification - KfFCLP_U_O2ReadyThrshLo

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

Notes: Voltage in millivolts

y/x	1
1	1,100

Supporting Table - Closed Loop Enable Clarification - KcFCLP_Cnt_O2RdyCyclesThrsh

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

Notes: Time (events * 12.5 milliseconds)

y/x	1
1	10

Supporting Table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMax

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

Notes: Modeled catalyst Temperature in Celcius

y/x	1
1	950

Supporting Table - Closed Loop Enable Clarification - KeFCLP_T_IntegrationCatalystMin

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

Notes: Modeled catalyst Temperature in Celcius

y/x	1
1	500

Supporting Table - Closed Loop Enable Clarification - KeFCLP_Pct_CatAccuSlphrPostDsbl

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

Notes: Percent

y/x	1
1	75

Supporting Table - Closed Loop Enable Clarification - KaFCLP_U_SlphrIntglOfst_Thrsh

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

Notes: millivolts

y/x	CiOXYR_O2_PostCat1	CiOXYR_O2_PostCat2
CiFCLP_Decel	1,000	1,000
CiFCLP_Idle	1,000	1,000
CiFCLP_Cruise	1,000	1,000
CiFCLP_LightAccel	1,000	1,000
CiFCLP_HeavyAccel	1,000	1,000

Supporting Table - P00B6_Fail if power up ECT exceeds RCT by these values

Description: KtTHMD_T_DCRD_FastFailTempDiff

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	141	152
1	80	80	80	60	60	40	40	30	30	30	30	30	30	30	30	30	30

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

Description: KtECTD_T_HSC_FastFailTempDiff

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	80	80	80	60	60	40	40	30	30	30	30	30	30	30	30	30	30

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

Description: KaECTD_E_EnergyLevelStartRun_kJ[0]

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80
1	14,200	14,200	14,200	14,200	14,200	12,640	11,080	9,520	7,960	6,400	4,840

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

Description: KaECTD_E_EnergyLevelStartRun_kJ[1]

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

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80
1	17,431	15,859	14,287	12,715	11,143	9,571	7,999	6,427	4,850	4,850	4,850

Supporting Table - P0128_Maximum Accumulated Time for IAT and Start-up ECT conditions (Primary Test)

Description: KtTHMD_t_WrmUpTempTimeLimTest0

Notes: Z axis is the accumulated time failure threshold (seconds), X axis is ECT Temperature at Power up (° C) The 11 X-axis breakpoints for the table below are (L to R) -40, -28, -16, -4, 8, 20, 32, 44, 56, 68 and 80. Note: Remove for applications with single coolant sensor (Old time based version)

y/x	-40	-28	-16	-4	8	20	32	44	56	69	80
1	950	865	780	695	610	525	440	355	270	185	100

Supporting Table - P0128_Maximum Accumulated Time for IAT and Start-up ECT conditions (Alternate Test)

Description: KtTHMD_t_WrmUpTempTimeLimTest1

Notes: Z axis is the accumulated time failure threshold (seconds), X axis is ECT Temperature at Power up (° C) The 11 X-axis breakpoints for the table below are (L to R) -40, -28, -16, -4, 8, 20, 32, 44, 56, 68 and 80. Note: Remove for applications with single coolant sensor (Old time based version)

y/x	-40	-28	-16	-4	8	20	32	44	56	69	80
1	870	785	700	615	530	445	360	275	190	105	20

Supporting Table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Primary

Description: Maximum Total Energy transferred to Cooling System for Ambient and Start-up ECT conditions (Primary Test)

Notes: Z axis is the cooling system energy failure threshold (kJ), X axis is ECT Temperature at Power up (° C) , (Deluxe version)

y/x	-20	-5	10	30	45	60	75
1	2,100	1,800	1,500	1,200	900	600	300

Supporting Table - P0128_Maximum Accumulated Energy for Start-up ECT conditions - Alternate

Description: Maximum Total Energy transferred to Cooling System for Ambient and Start-up ECT conditions (Alternate Test)

Notes: Z axis is the cooling system energy failure threshold (kJ), X axis is ECT Temperature at Power up (° C), (Deluxe version)

y/x	-20	-5	10	30	45	60	75
1	2,100	1,800	1,500	1,200	900	600	300

Supporting Table - P0011_CamPosErrorLimIc1

Description: P0011 - Cam Position Error Limit for performance diagnostic

Notes: KtPHSD_phi_CamPosErrorLimIc1

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1,200	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1,600	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2,000	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2,400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2,800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
3,200	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
3,600	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4,000	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4,400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
4,800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
5,200	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
5,600	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
6,000	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
6,400	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
6,800	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

Supporting Table - P0011_StablePositionTimeIc1

Description: P0011 - Delay after transient move

Notes: KtPHSD_t_StablePositionTimeIc1

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1,200	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1,600	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
2,000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
2,400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
2,800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
3,200	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
3,600	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
4,000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
4,400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
4,800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
5,200	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
5,600	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
6,000	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
6,400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
6,800	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4

Supporting Table - P0011_PerfMaxIc1

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

Notes:

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
2	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
3	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
4	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
6	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
7	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
8	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
9	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
10	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
11	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
12	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
13	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
14	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
15	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
16	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
17	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0

Supporting Table - P0016 P0017 P0018 P0019 Cam Correlation Oil Temperature Threshold

Description: KtEPSI_t_RtnHomeDlyLmt

Notes:

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	300.0	300.0	160.0	18.0	18.0	18.0	18.0	10.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Supporting Table - P0442: Estimate o Ambient Temperature Valid Conditioning Time as a Function o Ignition O Time Table

Description: Data is EAT Valid Conditioning Time (in seconds) and Axis is Ignition Off Time (in seconds)

Notes: KtEONV_t_IdleCondTimePreset

P0442: Estimate o Ambient Temperature Valid Conditioning Time as a Function o Ignition O Time Table - Part 1

y/x	0	600	1,200	1,800	2,400	3,000	3,600	4,200	4,800	5,400	6,000	6,600	7,200	7,800	8,400	9,000	9,600
1	200	300	300	300	300	300	300	300	300	300	300	300	300	295	290	285	280

P0442: Estimate o Ambient Temperature Valid Conditioning Time as a Function o Ignition O Time Table - Part 2

y/x	10,200	10,800	11,700	12,600	13,500	14,400	15,300	16,200	17,100	18,000	19,200	20,400	21,600	22,800	24,000	25,200	
1	275	270	265	260	255	250	245	240	235	230	225	220	215	210	205	200	

Supporting Table - P0442: Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature Table

Description: Data is Engine Off Time Before Vehicle Off Maximum Table (in seconds) and Axis is Estimated Ambient Coolant in Deg C

Notes: KtEONV_t_EngOffTimeBefVehOffMax

y/x	-10	-4	1	7	13	18	24	29	35	41	46	52	58	63	69	74	80
1	70	70	70	70	74	82	105	153	320	480	480	480	480	480	480	480	480

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

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

Notes: KtEVPD_t_PVLT_EngineVacTimeCold

y/x	0	6	12	19	25	31	37	44	50	56	62	69	75	81	87	94	100
1	70	67	65	62	59	57	54	52	49	46	44	41	39	36	34	31	28

Supporting Table - P0461, P2066, P2636: Transfer Pump Enable Time Table

Description: Data is TransferPumpOnTimeLimit (in seconds) and Axis is Fuel Level in %

Notes: KtFLVC_t_XferFuelPmpOnTmLim

y/x	0	3	6	9	13	16	19	22	25	28	31	34	38	41	44	47	50	53	56	59	63	66	69	72	75	78	81	84	88	91	94	97	100
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Supporting Table - P0442: EONV Pressure Threshold (Pascals) Table

Description: Data is EONV Pressure Threshold in Pascals, X axis (horizontal) is fuel level in % from 0 to 100 with step size 6.25, and Y axis (vertical) is temperature in deg C from -10 to 80 with step size 5.625

Notes: KtEONV_p_PressureThreshold

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
2	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
3	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
4	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
6	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
7	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
8	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
9	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
10	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
11	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
12	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
13	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
14	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
15	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
16	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5
17	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5	-124.5

Supporting Table - P219A Variance Threshold Bank1 Table

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

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

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
150	450.00	450.00	450.00	10.00	10.00	11.25	18.00	31.50	14.75	6.75	6.75	450.00	450.00	450.00	450.00	450.00	450.00
180	450.00	450.00	450.00	10.00	10.00	11.25	18.00	31.50	14.75	6.75	6.75	450.00	450.00	450.00	450.00	450.00	450.00
210	450.00	450.00	450.00	17.00	17.00	17.25	36.50	12.25	12.00	7.50	7.50	450.00	450.00	450.00	450.00	450.00	450.00
240	450.00	450.00	450.00	24.00	24.00	13.75	25.25	14.75	10.75	11.25	11.25	450.00	450.00	450.00	450.00	450.00	450.00
270	450.00	450.00	450.00	29.00	29.00	26.00	25.50	15.25	9.75	13.50	13.50	450.00	450.00	450.00	450.00	450.00	450.00
300	450.00	450.00	450.00	23.25	23.25	23.00	28.25	16.75	10.00	13.75	13.75	450.00	450.00	450.00	450.00	450.00	450.00
330	450.00	450.00	450.00	20.50	20.50	25.50	32.00	23.00	9.00	15.00	15.00	450.00	450.00	450.00	450.00	450.00	450.00
360	450.00	450.00	52.00	36.50	21.25	30.25	39.50	20.50	13.00	26.00	26.00	450.00	450.00	450.00	450.00	450.00	450.00
390	450.00	450.00	52.00	52.00	23.75	41.50	44.50	24.75	16.00	35.00	35.00	450.00	450.00	450.00	450.00	450.00	450.00
420	450.00	450.00	50.75	50.75	29.25	43.00	51.00	25.50	17.50	47.00	47.00	450.00	450.00	450.00	450.00	450.00	450.00
450	450.00	450.00	52.00	52.00	44.75	43.00	75.00	24.50	27.50	37.25	47.00	450.00	450.00	450.00	450.00	450.00	450.00
480	450.00	450.00	65.00	65.00	34.50	42.75	63.00	34.50	44.00	44.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
510	450.00	450.00	71.75	71.75	38.25	48.75	60.50	45.75	86.75	86.75	450.00	450.00	450.00	450.00	450.00	450.00	450.00
540	450.00	450.00	77.25	77.25	45.75	43.75	89.75	63.25	74.75	74.75	450.00	450.00	450.00	450.00	450.00	450.00	450.00
570	450.00	450.00	80.50	80.50	48.25	56.25	105.75	92.25	79.25	79.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00
600	450.00	450.00	80.50	80.50	48.25	56.25	105.75	92.25	79.25	79.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00

Supporting Table - P219B Variance Threshold Bank2 Table

Description: Bank 2 lookup table of Variance metric used to calculate the Ratio for the current sample period

Notes: DTCs: P219A; Calibration Name: KtFABD_U_VarThresh2; Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
150	450.00	450.00	8.25	8.25	9.75	13.75	13.75	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
180	450.00	450.00	8.25	8.25	9.75	13.75	13.75	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
210	450.00	450.00	13.50	13.50	14.25	15.25	15.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
240	450.00	450.00	21.50	21.50	19.50	16.25	15.75	15.25	11.00	13.25	13.00	8.50	8.50	450.00	450.00	450.00	450.00
270	450.00	450.00	27.00	27.00	21.50	19.50	15.00	15.25	11.00	13.25	13.00	8.50	8.50	450.00	450.00	450.00	450.00
300	450.00	450.00	25.00	25.00	23.00	25.25	39.50	17.00	18.00	11.75	14.75	21.25	24.75	28.00	450.00	450.00	450.00
330	450.00	450.00	23.50	23.50	49.75	33.75	51.50	16.25	18.25	16.00	17.75	19.00	28.00	28.00	450.00	450.00	450.00
360	450.00	450.00	33.00	33.00	40.50	47.75	53.25	28.25	31.25	25.25	22.50	27.00	31.00	31.00	450.00	450.00	450.00
390	450.00	450.00	63.75	63.75	75.00	55.50	44.00	35.75	50.00	32.75	25.50	33.25	38.25	38.25	450.00	450.00	450.00
420	450.00	450.00	64.00	64.00	68.25	70.50	70.50	67.50	63.25	50.50	37.25	32.25	35.25	35.25	450.00	450.00	450.00
450	450.00	450.00	59.50	59.50	98.75	74.50	92.00	64.25	70.00	60.25	48.50	59.75	59.75	59.75	450.00	450.00	450.00
480	450.00	450.00	75.75	75.75	89.50	79.50	99.75	72.75	82.50	82.50	59.75	59.75	59.75	59.75	450.00	450.00	450.00
510	450.00	450.00	82.25	82.25	78.25	94.50	112.75	92.75	106.00	106.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
540	450.00	450.00	86.50	86.50	118.50	119.00	144.00	108.75	124.00	124.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
570	450.00	450.00	112.75	112.75	136.50	161.75	187.25	148.25	133.00	133.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
600	450.00	450.00	112.75	112.75	136.50	161.75	187.25	148.25	133.00	133.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00

Supporting Table - P219A Quality Factor Bank1 Table

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

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

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
210	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
270	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
330	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
390	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
420	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
450	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
510	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
540	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Supporting Table - P219B Quality Factor Bank2 Table

Description: Bank 2 lookup table of Quality Factors used in the calculation of the Ratio for the current sample period

Notes: DTCs: P219B; Calibration Name: KtFABD_K_QualFactor2; Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
210	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
270	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
330	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
390	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
420	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
450	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
510	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
540	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
570	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Supporting Table - P219A Normalizer Bank1 Table

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

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

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
150	450.00	450.00	450.00	40.25	40.25	42.75	38.00	24.00	22.50	26.50	26.50	450.00	450.00	450.00	450.00	450.00	450.00
180	450.00	450.00	450.00	40.25	40.25	42.75	38.00	24.00	22.50	26.50	26.50	450.00	450.00	450.00	450.00	450.00	450.00
210	450.00	450.00	450.00	62.75	62.75	52.75	28.50	49.75	33.00	27.25	27.25	450.00	450.00	450.00	450.00	450.00	450.00
240	450.00	450.00	450.00	76.50	76.50	53.75	39.75	49.25	36.50	29.50	29.50	450.00	450.00	450.00	450.00	450.00	450.00
270	450.00	450.00	450.00	75.75	75.75	60.50	42.50	50.75	37.25	30.00	30.00	450.00	450.00	450.00	450.00	450.00	450.00
300	450.00	450.00	450.00	84.75	84.75	57.50	46.75	55.75	45.00	35.00	35.00	450.00	450.00	450.00	450.00	450.00	450.00
330	450.00	450.00	450.00	93.00	93.00	73.50	66.00	73.00	85.00	77.50	77.50	450.00	450.00	450.00	450.00	450.00	450.00
360	450.00	450.00	50.50	77.75	105.25	78.00	60.50	77.50	83.00	68.00	68.00	450.00	450.00	450.00	450.00	450.00	450.00
390	450.00	450.00	50.50	50.50	115.25	64.00	60.50	75.25	82.00	63.00	63.00	450.00	450.00	450.00	450.00	450.00	450.00
420	450.00	450.00	74.25	74.25	118.00	65.25	59.00	84.50	90.25	55.25	55.25	450.00	450.00	450.00	450.00	450.00	450.00
450	450.00	450.00	78.75	78.75	112.50	97.00	50.00	88.00	85.75	70.50	55.25	450.00	450.00	450.00	450.00	450.00	450.00
480	450.00	450.00	67.75	67.75	133.50	98.75	75.00	100.50	96.00	96.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
510	450.00	450.00	107.00	107.00	133.75	107.25	94.50	109.25	73.00	73.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
540	450.00	450.00	102.75	102.75	130.75	114.25	65.25	83.50	81.00	81.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
570	450.00	450.00	105.50	105.50	132.00	108.75	54.25	65.75	77.25	77.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00
600	450.00	450.00	105.50	105.50	132.00	108.75	54.25	65.75	77.25	77.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00

Supporting Table - P219B Normalizer Bank2 Table

Description: Bank 2 Normalizer table used in the calculation of the Ratio for the current sample period.

Notes: DTCs: P219B; Calibration Name: KtFABD_U_Normalizer2; Horizontal axis is RPM; Vertical Axis is Air Per Cylinder (APC) in mg/cylinder

y/x	800	980	1,160	1,340	1,520	1,700	1,880	2,060	2,240	2,420	2,600	2,780	2,960	3,140	3,320	3,500	3,680
120	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
150	450.00	450.00	17.50	17.50	13.50	16.25	16.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
180	450.00	450.00	17.50	17.50	13.50	16.25	16.25	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
210	450.00	450.00	29.25	29.25	26.00	27.00	27.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
240	450.00	450.00	20.00	20.00	25.50	30.50	26.25	11.00	30.50	16.50	12.75	13.25	13.25	450.00	450.00	450.00	450.00
270	450.00	450.00	34.50	34.50	35.25	41.00	22.00	11.00	30.50	16.50	12.75	13.25	13.25	450.00	450.00	450.00	450.00
300	450.00	450.00	58.00	58.00	56.75	60.25	23.50	35.00	20.00	27.50	13.00	13.00	16.00	19.00	450.00	450.00	450.00
330	450.00	450.00	81.25	81.25	54.25	58.50	34.25	67.25	25.75	38.50	18.25	21.75	19.00	19.00	450.00	450.00	450.00
360	450.00	450.00	94.25	94.25	109.75	51.75	44.00	68.25	56.50	47.00	27.00	33.50	37.50	37.50	450.00	450.00	450.00
390	450.00	450.00	93.75	93.75	98.50	66.00	60.75	108.00	69.75	65.50	44.50	36.25	42.25	42.25	450.00	450.00	450.00
420	450.00	450.00	115.50	115.50	90.75	67.50	60.50	87.50	120.50	97.00	59.75	69.50	65.50	65.50	450.00	450.00	450.00
450	450.00	450.00	155.25	155.25	97.25	94.75	77.75	94.25	143.00	120.00	63.25	66.50	75.75	75.75	450.00	450.00	450.00
480	450.00	450.00	151.50	151.50	99.25	95.25	63.75	85.75	91.00	91.00	66.50	66.50	75.75	75.75	450.00	450.00	450.00
510	450.00	450.00	115.25	115.25	106.50	91.00	73.25	83.50	89.00	89.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
540	450.00	450.00	105.25	105.25	91.25	97.75	110.50	95.00	102.50	102.50	450.00	450.00	450.00	450.00	450.00	450.00	450.00
570	450.00	450.00	108.00	108.00	44.75	56.25	67.50	59.00	83.00	83.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
600	450.00	450.00	108.00	108.00	44.75	56.25	67.50	59.00	83.00	83.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00

Supporting Table - P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage

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

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

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1				
y/x	CeFADR_e_Cell00_PurgOnAirMode5	CeFADR_e_Cell01_PurgOnAirMode4	CeFADR_e_Cell02_PurgOnAirMode3	CeFADR_e_Cell03_PurgOnAirMode2
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell
P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2				
y/x	CeFADR_e_Cell04_PurgOnAirMode1	CeFADR_e_Cell05_PurgOnAirMode0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell
P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3				
y/x	CeFADR_e_Cell08_PurgOffAirMode5	CeFADR_e_Cell09_PurgOffAirMode4	CeFADR_e_Cell10_PurgOffAirMode3	CeFADR_e_Cell11_PurgOffAirMode2
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell
P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4				
y/x	CeFADR_e_Cell12_PurgOffAirMode1	CeFADR_e_Cell13_PurgOffAirMode0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

Supporting Table - P0420_P0430_CatmonMinEngineRunTimeToEnable

Description: This cal value is a 1x5 array of minimum engine run time values based on powerup coolant temperatures. When the appropriate required minimum engine run time value is chosen based on the coolant temperature at powerup, this value is the minimum time from engine start before stabilized conditions are met. Used in determining if a ValidIdleIsMet condition exists.

Notes: KtCATD_t_EngRunTimeMin - Used for P0420 and P0430. Axis is the coolant and the output is the min engine run time

y/x	40	50	60	70	80
1	100	100	100	100	100

Supporting Table - P0420_P0430_CatmonMinAirflowForWarmCatalystDetermination

Description: This is a 1x3 table with the axis being engine coolant temperature. The implementation of this cal value as a table also included some changes to the way that the WarmedUpEvents counter increments and resets. To summarize, whenever WarmedUpEvents resets to 0 (this could be either at startup, if the closed throttle time exceeds a cal value, or if the predicted exhaust temperature falls below the ExhWarmMin cal value), the appropriate MinAirflowToWrmupCat value is chosen from the table based on engine coolant at the time the WarmedUpEvents counter reset to 0. This cal value is used along with the min exhaust temp to increment the WarmedUpEvents counter.

Notes: KtCATD_dm_MinAirFlowToWrmCat - Used for P0420 and P0430. Axis is the engine coolant and the output is the minimum airflow required to warmup the catalyst.

y/x	0	45	90
1	20	18	18

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

Description: KaEOSD_x_ST_ResponseLimRS1[x][y]

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

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

Supporting Table - P0153_O2S Slow Response Bank 2 Sensor 1 "Pass/Fail Threshold table"

Description: KaEOSD_x_ST_ResponseLimRS2[x][y]

Notes: X axis is Lean to Rich response time (in sec), Please see the table below named "KnEOSD_t_ST_LRC_LimRS2" for the 17 X axis table breakpoints. Y axis is Rich to Lean response time (sec), Please see the cal table below named "KnEOSD_t_ST_RLC_LimRS2" for the 17 Y axis table breakpoints. Z axis is the pass/fail result, Note: If the cell contains a "0" then the fault is indicated, if it contains a "1" a fault is not indicated.

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

Supporting Table - Multiple DTC Use_Green Sensor Delay Criteria - Airflow

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

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

y/x	1
1	22

Supporting Table - Multiple DTC Use_Green Sensor Delay Criteria - Limit

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

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

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

Supporting Table - P0133_KnEOSD_t_ST_LRC_LimRS1

Description: KnEOSD_t_ST_LRC_LimRS1. X Table Axis (in sec) for P0133, L2R Reponse time breakpoints for table

Notes:

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.090	0.100	0.120	0.140	0.160	0.180	0.200	0.210	2.000

Supporting Table - P0133_KnEOSD_t_ST_RLC_LimRS1

Description: KnEOSD_t_ST_RLC_LimRS1. Y Table Axis (in sec) for P0133, R2L Reponse time breakpoints for table

Notes:

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.100	0.120	0.130	0.140	0.150	0.160	0.170	0.180	2.000

Supporting Table - P0153_KnEOSD_t_ST_LRC_LimRS2

Description: KnEOSD_t_ST_LRC_LimRS2. X Table Axis (in sec) for P0153, L2R Reponse time breakpoints for table

Notes:

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.090	0.100	0.120	0.140	0.160	0.180	0.200	0.210	2.000

Supporting Table - P0153_KnEOSD_t_ST_RLC_LimRS2

Description: KnEOSD_t_ST_RLC_LimRS2. Y Table Axis (in sec) for P0153, R2L Reponse time breakpoints for table

Notes:

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.100	0.120	0.130	0.140	0.150	0.160	0.170	0.180	2.000

Supporting Table - P0068_Delta MAP Threshold f(TPS)

Description: Table of delta MAP values as a function of desired throttle position. The output of this table provides a delta MAP that if the measured minus the estimated MAP exceeds, is considered a fail.

Notes: P0068, KtTPSD_p_MAP_DesThrDelt

y/x	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	100.00
1.00	21.45	22.81	22.56	18.69	19.59	19.23	100.00	100.00	100.00

Supporting Table - P0068_Delta MAF Threshold f(TPS)

Description: Table of delta MAF values as a function of desired throttle position. The output of this table provides a delta MAF that if the measured minus the estimated MAF exceeds, is considered a fail.

Notes: P0068, KtTPSD_dm_MAF_DesThrDelt

y/x	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	100.00
1.00	15.43	19.72	25.32	26.87	36.79	45.05	255.00	255.00	255.00

Supporting Table - P0068_Maximum MAF f(RPM)

Description: Table of maximum MAF values vs. engine speed. This is the maximum MAF the engine can see under all ambient conditions.

Notes: P0068, KtTPSD_dm_MaxMAF_VsRPM

y/x	600.00	1,400.00	2,200.00	3,000.00	3,800.00	4,600.00	5,400.00	6,200.00	7,000.00
1.00	25.00	60.00	100.00	140.00	180.00	220.00	250.00	280.00	300.00

Supporting Table - P0068_Maximum MAF f(Volts)

Description: Table of maximum MAF values vs. system voltage. The output of the air meter is clamped to lower values as system voltage drops off.

Notes: P0068, KtTPSD_dm_MaxMAF_VsVoltage

y/x	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
1.00	0.00	18.00	40.00	75.00	135.00	250.00	500.00	500.00	500.00

Supporting Table - P0606_Last Seed Timeout f(Loop Time)

Description: The max time for the Last Seed Timeout as a function of operating loop time sequence.

Notes: P0606, KaPISD_t_LastSeedTimeout[x]

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

Supporting Table - P0606_Program Sequence Watch Enable f(Loop Time)

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

Notes: P0606, KaPISD_b_ProgSeqWatchEnbl

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

Supporting Table - P0606_PSW Sequence Fail f(Loop Time)

Description: Fail threshold for PSW per operating loop.

Notes: P0606, KaPISD_Cnt_SequenceFail[x]

y/x	CePISR_e_6p25msSeq	CePISR_e_12p5msSeq	CePISR_e_25msSeq	CePISR_e_LORES_C
1	3	3	3	5

Supporting Table - P0606_PSW Sequence Sample f(Loop Time)

Description: Sample threshold for PSW per operating loop.

Notes: P0606, KaPISD_Cnt_SequenceSmpl[x]

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

Supporting Table - P1682_PT Relay Pull-in Run/Crank Voltage f(IAT)

Description: The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.

Notes: P1682, KtPMDD_U_PT_RelayPullInEnbl

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

Supporting Table - P16F3_Delta Spark Threshold f(RPM,APC)

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

Notes: P16F3, KtSPRK_phi_DeltTorqueScrtyAdv

y/x	500.00	980.74	1,461.48	1,942.23	2,422.97	2,903.71	3,384.45	3,865.20	4,345.94	4,826.68	5,307.42	5,788.16	6,268.91	6,749.65	7,230.39	7,711.13	8,191.88
80.00	125.00	37.22	42.06	44.30	47.05	38.06	33.09	34.55	36.41	38.25	36.81	33.89	31.56	31.56	31.56	31.56	31.56
160.00	125.00	29.72	32.08	35.61	37.69	32.50	29.64	30.55	30.75	30.64	30.38	29.36	28.42	28.42	28.42	28.42	28.42
240.00	125.00	24.28	25.63	28.77	30.16	27.98	26.84	27.39	26.69	25.56	25.86	25.95	25.86	25.86	25.86	25.86	25.86
320.00	125.00	19.69	20.77	24.03	24.95	24.64	24.55	24.83	23.61	21.94	22.53	23.27	23.70	23.70	23.70	23.70	23.70
400.00	125.00	16.58	17.47	20.58	21.27	21.30	21.64	22.48	21.19	19.19	19.69	20.88	21.89	21.89	21.89	21.89	21.89
480.00	125.00	14.30	15.06	17.95	18.52	18.59	18.95	19.80	18.70	16.98	17.31	18.84	20.33	20.33	20.33	20.33	20.33
560.00	125.00	12.58	13.25	15.92	16.41	16.50	16.83	17.53	16.50	14.92	15.34	16.81	18.17	18.17	18.17	18.17	18.17
640.00	125.00	11.23	11.83	14.30	14.72	14.84	15.14	15.72	14.77	13.30	13.66	15.03	16.36	16.36	16.36	16.36	16.36
720.00	125.00	10.14	10.67	12.98	13.34	13.47	13.73	14.25	13.36	11.98	12.22	13.44	14.64	14.64	14.64	14.64	14.64
800.00	125.00	9.25	9.73	11.88	12.20	12.27	12.50	13.03	12.19	10.91	11.05	12.14	13.25	13.25	13.25	13.25	13.25
880.00	125.00	8.50	8.94	10.95	11.25	11.27	11.47	11.98	11.22	10.02	10.09	11.06	12.11	12.11	12.11	12.11	12.11
960.00	125.00	8.42	8.86	10.86	11.16	11.16	11.36	11.89	11.13	9.92	10.00	10.95	12.00	12.00	12.00	12.00	12.00
1,040.00	125.00	8.42	8.86	10.86	11.16	11.16	11.36	11.89	11.13	9.92	10.00	10.95	12.00	12.00	12.00	12.00	12.00
1,120.00	125.00	8.42	8.86	10.86	11.16	11.16	11.36	11.89	11.13	9.92	10.00	10.95	12.00	12.00	12.00	12.00	12.00
1,200.00	125.00	8.42	8.86	10.86	11.16	11.16	11.36	11.89	11.13	9.92	10.00	10.95	12.00	12.00	12.00	12.00	12.00
1,280.00	125.00	8.42	8.86	10.86	11.16	11.16	11.36	11.89	11.13	9.92	10.00	10.95	12.00	12.00	12.00	12.00	12.00
1,360.00	125.00	8.42	8.86	10.86	11.16	11.16	11.36	11.89	11.13	9.92	10.00	10.95	12.00	12.00	12.00	12.00	12.00

Supporting Table - P16F3_Delta MAP Threshold f(Desired Engine Torque)

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

Notes: P16F3, KtMAPI_p_ES_TB_MAP_DeltaThresh

y/x	0.00	50.00	100.00	150.00	200.00	300.00
1.00	18.69	18.69	18.69	18.69	18.69	18.69

Supporting Table - P16F3_Speed Control External Load f(Oil Temp, RPM)

Description: Specifies the external load table for SPDR torque security as a function of engine oil temperature and engine RPM.

Notes: P16F3, KtSPDC_M_ExternalLoad

y/x	-40.00	-15.00	5.00	32.00	55.00	90.00
200.00	650.00	650.00	650.00	650.00	650.00	650.00
305.00	650.00	650.00	650.00	650.00	650.00	650.00
410.00	650.00	650.00	650.00	650.00	650.00	650.00
515.00	650.00	650.00	650.00	650.00	290.00	200.00
560.00	650.00	650.00	650.00	650.00	245.00	169.32
705.00	348.47	305.43	285.05	280.99	199.88	100.99
875.00	343.45	309.26	288.32	259.00	132.30	80.73
1,050.00	258.44	233.76	218.54	197.74	70.27	49.43
1,300.00	115.81	97.59	86.21	71.41	34.89	27.82
1,600.00	65.57	48.09	37.02	23.41	21.72	21.27
2,000.00	59.37	41.21	29.58	15.93	21.17	22.20
2,500.00	65.40	45.82	33.19	18.80	25.78	26.95
3,200.00	72.68	51.86	38.36	23.32	32.77	34.35
4,000.00	98.94	77.23	63.10	47.61	55.31	56.65
5,000.00	125.20	102.77	88.15	72.28	77.07	76.52
6,100.00	150.57	127.63	112.65	96.51	99.66	98.30
8,000.00	162.74	139.25	123.88	107.45	107.43	104.65

Supporting Table - P0300_IdleSCD_Decel

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

Notes: Used for P0300-P0308. Cal Name: KtMISF_dt_SCD_IdleMode
Note: Misfire's Load term is %, but not PID$04. PID $04 is not robust to temperature and alititude shifts. (especially decel and jerk thresholds since they track actual air trapped in cylinder)

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
8	550	500	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
9	550	500	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
11	550	500	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
12	550	450	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
13	550	475	360	230	150	110	110	90	50	32,767	32,767	32,767	32,767
14	550	475	330	260	190	130	110	80	50	32,767	32,767	32,767	32,767
15	550	475	360	260	190	140	110	75	50	32,767	32,767	32,767	32,767
16	600	525	400	270	190	130	95	70	50	32,767	32,767	32,767	32,767
17	600	550	400	250	190	120	100	75	40	32,767	32,767	32,767	32,767
18	600	550	425	270	190	130	110	80	50	32,767	32,767	32,767	32,767
19	700	600	425	270	200	140	120	80	55	32,767	32,767	32,767	32,767
21	800	700	450	270	200	140	120	80	60	32,767	32,767	32,767	32,767
22	900	750	475	300	200	150	100	80	60	32,767	32,767	32,767	32,767
24	1,000	800	500	325	220	160	100	80	60	32,767	32,767	32,767	32,767
25	1,100	900	600	350	240	170	120	80	60	32,767	32,767	32,767	32,767
27	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
29	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Supporting Table - P0300_IdleSCD_Jerk

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
8	550	500	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
9	550	500	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
11	550	500	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
12	550	450	400	200	150	110	100	90	50	32,767	32,767	32,767	32,767
13	550	500	375	230	150	110	100	90	50	32,767	32,767	32,767	32,767
14	550	500	375	240	170	110	100	80	50	32,767	32,767	32,767	32,767
15	550	500	375	240	170	110	90	75	50	32,767	32,767	32,767	32,767
16	600	550	375	250	170	110	75	70	50	32,767	32,767	32,767	32,767
17	600	550	375	250	180	120	80	75	40	32,767	32,767	32,767	32,767
18	600	550	375	270	180	130	100	80	50	32,767	32,767	32,767	32,767
19	700	600	375	270	180	140	110	80	50	32,767	32,767	32,767	32,767
21	800	700	400	270	180	115	105	80	55	32,767	32,767	32,767	32,767
22	900	750	400	300	180	120	90	80	55	32,767	32,767	32,767	32,767
24	1,000	800	500	325	200	130	100	70	50	32,767	32,767	32,767	32,767
25	1,100	900	600	350	220	140	120	80	50	32,767	32,767	32,767	32,767
27	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
29	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Supporting Table - P0300_SCD_Decel

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
8	600	450	300	220	150	130	90	70	55	32,767	32,767	32,767	32,767
9	570	420	275	180	135	110	85	65	50	32,767	32,767	32,767	32,767
11	550	400	250	180	135	110	85	60	45	32,767	32,767	32,767	32,767
12	550	400	275	190	140	115	75	60	50	32,767	32,767	32,767	32,767
13	650	500	320	220	160	115	80	60	50	32,767	32,767	32,767	32,767
15	700	550	350	240	170	115	90	70	55	32,767	32,767	32,767	32,767
17	700	550	380	260	180	120	90	70	60	32,767	32,767	32,767	32,767
19	750	600	425	300	200	140	100	80	65	32,767	32,767	32,767	32,767
22	750	600	500	350	220	160	120	90	75	32,767	32,767	32,767	32,767
25	1,050	900	750	400	275	180	140	120	90	32,767	32,767	32,767	32,767
29	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
33	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
38	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
42	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
48	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
54	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
61	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Supporting Table - P0300_SCD_Jerk

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000
8	600	450	300	220	150	130	90	70	55	32,767	32,767	32,767	32,767
9	570	420	275	180	135	110	85	65	50	32,767	32,767	32,767	32,767
11	550	400	250	180	135	110	85	60	45	32,767	32,767	32,767	32,767
12	550	400	275	190	140	115	75	60	50	32,767	32,767	32,767	32,767
13	650	500	320	220	160	115	80	60	50	32,767	32,767	32,767	32,767
15	700	550	350	240	170	115	90	70	55	32,767	32,767	32,767	32,767
17	700	550	380	260	180	120	90	70	60	32,767	32,767	32,767	32,767
19	750	600	425	300	200	140	100	80	65	32,767	32,767	32,767	32,767
22	750	600	500	350	220	160	120	90	75	32,767	32,767	32,767	32,767
25	1,050	900	750	400	275	180	140	120	90	32,767	32,767	32,767	32,767
29	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
33	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
38	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
42	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
48	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
54	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
61	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Supporting Table - P0300_IdleCylModeDecel

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
8	1,100	1,000	650	450	350	250	225	150	120	100	75	70	60
9	1,200	1,100	650	450	350	300	225	150	130	100	75	70	60
11	1,200	1,100	700	450	350	300	225	150	130	100	75	70	60
12	1,300	1,200	800	450	350	300	225	150	130	100	75	70	60
13	1,300	1,200	800	550	350	300	225	150	130	100	75	70	60
14	1,200	1,100	800	550	350	300	225	150	130	100	75	70	60
15	1,100	1,000	800	650	450	325	225	150	120	90	75	70	60
16	1,100	1,000	900	650	425	325	250	160	120	90	75	70	60
17	1,300	1,200	900	650	425	300	250	175	120	110	75	70	60
18	1,400	1,300	900	650	425	300	250	175	130	110	80	70	60
19	1,500	1,400	900	650	425	325	250	175	130	120	80	80	60
21	1,600	1,500	900	650	450	325	250	175	130	120	85	80	70
22	1,700	1,600	1,000	650	450	325	250	190	130	120	100	80	70
24	1,800	1,700	1,000	750	450	325	230	190	150	120	100	80	70
25	1,900	1,800	1,050	750	450	325	230	190	160	130	100	80	80
27	2,000	1,900	1,100	800	500	325	250	190	150	140	110	80	80
29	2,100	2,000	1,150	900	550	350	275	200	160	140	110	110	100

Supporting Table - P0300_IdleCylModeJerk

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
8	1,100	1,100	600	450	350	300	200	150	130	100	75	70	60
9	1,200	1,100	600	450	350	300	200	150	130	100	75	70	60
11	1,200	1,100	650	450	350	300	200	150	130	100	75	70	60
12	1,300	1,100	700	450	350	300	200	150	130	100	75	70	60
13	1,300	1,100	700	550	350	300	200	150	130	100	75	70	60
14	1,200	1,000	700	550	350	300	200	150	130	100	75	70	60
15	1,100	900	700	600	450	280	200	150	120	100	75	70	60
16	1,100	1,000	800	600	425	280	200	150	120	90	75	70	60
17	1,300	1,200	800	600	425	280	200	175	110	100	75	70	60
18	1,400	1,300	800	600	425	250	200	170	110	100	80	70	60
19	1,500	1,400	800	600	375	250	200	150	110	100	80	80	60
21	1,600	1,500	800	600	375	250	200	140	110	100	80	80	70
22	1,700	1,600	900	600	375	250	200	150	110	100	80	80	70
24	1,800	1,700	1,000	700	400	275	200	150	120	100	90	80	70
25	1,900	1,800	1,050	700	400	275	210	150	120	100	95	80	80
27	2,000	1,900	1,100	800	500	300	250	160	120	100	100	80	80
29	2,100	2,000	1,150	900	550	350	275	180	120	100	100	90	100

Supporting Table - P0300_CylMode_Decel

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
8	1,300	1,100	800	650	400	280	200	170	160	110	60	50	36	27	20	15	13	12	6	5	5	4	3	3	3	3
9	1,200	1,000	750	600	380	280	200	170	160	100	60	45	36	27	19	15	12	11	6	5	4	4	3	3	3	3
11	1,200	1,000	650	500	360	275	200	160	125	80	55	40	30	25	17	14	12	10	6	4	4	4	3	3	3	3
12	1,300	1,100	700	550	375	275	200	150	120	75	50	35	26	22	16	13	10	10	5	4	4	4	3	3	3	3
13	1,200	1,000	700	550	350	250	175	150	125	65	50	35	28	22	15	12	10	10	6	4	4	4	3	3	3	3
15	1,400	1,200	800	600	400	275	200	150	140	80	60	40	30	25	17	14	12	10	6	4	4	4	3	3	3	3
17	1,500	1,300	900	600	400	300	225	160	140	90	65	45	42	26	18	16	14	11	6	5	4	4	3	3	3	3
19	1,600	1,400	1,000	700	500	325	275	175	160	100	75	55	40	30	22	16	15	12	6	5	4	4	3	3	3	3
22	1,700	1,500	1,100	800	500	350	300	200	180	120	90	65	50	35	26	20	16	14	7	5	4	4	3	3	3	3
25	1,800	1,600	1,200	900	700	450	350	250	200	140	100	70	55	40	30	24	20	16	8	6	5	4	3	3	3	3
29	1,900	1,700	1,300	1,000	800	550	400	300	220	150	110	80	60	42	35	25	22	18	8	6	5	4	3	3	3	3
33	2,000	1,800	1,400	1,200	900	650	500	350	235	160	130	90	60	45	40	30	24	20	9	7	5	4	3	3	3	3
38	2,000	1,800	1,600	1,400	1,000	750	600	400	250	180	140	100	70	55	45	35	30	22	10	7	6	5	3	3	3	3
42	2,200	2,000	1,800	1,600	1,100	950	700	500	300	220	150	110	80	60	50	40	32	25	11	8	6	5	4	4	4	4
48	2,200	2,000	1,800	1,600	1,200	1,000	800	550	375	230	150	125	95	75	55	45	35	30	12	9	6	5	4	4	4	4
54	2,200	2,000	1,800	1,600	1,200	1,000	800	600	400	240	180	125	100	80	60	50	40	30	14	10	7	6	5	5	5	5
61	2,200	2,000	1,800	1,600	1,200	1,000	800	700	500	300	250	170	110	85	65	55	45	40	16	11	8	6	6	6	6	6

Supporting Table - P0300_CylMode_Jerk

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
8	1,300	1,100	800	650	400	280	200	170	160	110	50	50	35	27	20	15	13	12	0	0	0	0	0	0	0	0
9	1,200	1,000	750	600	380	280	200	170	160	100	60	45	35	27	19	15	12	11	0	0	0	0	0	0	0	0
11	1,200	1,000	650	500	360	275	200	150	110	80	50	40	28	25	17	14	12	10	0	0	0	0	0	0	0	0
12	1,300	1,100	700	550	350	275	200	140	110	80	50	35	24	22	16	13	10	10	0	0	0	0	0	0	0	0
13	1,200	1,000	700	550	350	250	175	150	115	80	50	35	28	22	15	12	10	10	0	0	0	0	0	0	0	0
15	1,400	1,200	800	600	400	275	200	150	140	85	50	40	30	25	17	14	12	10	0	0	0	0	0	0	0	0
17	1,500	1,300	900	600	400	300	225	160	140	90	50	45	35	26	18	16	14	11	0	0	0	0	0	0	0	0
19	1,600	1,400	1,000	700	500	325	275	175	160	100	70	55	38	30	22	16	15	12	0	0	0	0	0	0	0	0
22	1,700	1,500	1,100	800	500	350	300	200	180	120	75	65	40	35	26	20	16	14	0	0	0	0	0	0	0	0
25	1,800	1,600	1,200	900	700	450	350	250	200	140	90	70	50	40	30	24	20	16	0	0	0	0	0	0	0	0
29	1,900	1,700	1,300	1,000	900	550	400	300	220	150	90	80	50	42	35	25	22	18	0	0	0	0	0	0	0	0
33	2,000	1,800	1,500	1,200	1,000	650	500	350	235	160	110	90	60	45	40	30	24	20	0	0	0	0	0	0	0	0
38	2,000	1,800	1,600	1,400	1,100	750	600	400	250	180	140	100	70	55	45	35	30	22	0	0	0	0	0	0	0	0
42	2,200	2,000	1,800	1,600	1,200	950	700	500	300	220	150	110	80	60	50	40	32	25	0	0	0	0	0	0	0	0
48	2,200	2,000	1,800	1,600	1,200	1,000	800	550	375	230	175	125	95	75	55	45	35	30	0	0	0	0	0	0	0	0
54	2,200	2,000	1,800	1,600	1,200	1,000	800	600	400	240	180	125	100	80	60	50	40	30	0	0	0	0	0	0	0	0
61	2,200	2,000	1,800	1,600	1,200	1,000	800	700	500	300	250	170	110	85	65	55	45	40	0	0	0	0	0	0	0	0

Supporting Table - P0300_RevMode_Decel

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

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

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	110	75	45	35	26	25	25	25	25
9	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	100	60	40	30	25	24	24	24	24
11	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	95	60	40	35	26	24	24	24	24
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	100	60	40	35	28	24	24	24	24
13	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	110	70	50	40	28	24	24	24	24
15	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	115	80	55	45	32	26	26	26	26
17	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	120	90	65	50	35	32	32	32	32
19	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	140	100	75	55	45	35	35	35	35
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	160	120	80	65	50	40	40	40	40
25	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	180	140	100	75	60	45	45	45	45
29	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	200	150	110	85	70	55	55	55	55
33	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	220	180	120	100	80	60	60	60	60
38	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	280	220	140	120	80	70	70	70	70
42	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	320	240	160	130	100	80	80	80	80
48	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	350	290	180	145	110	90	90	90	90
54	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	370	320	200	150	120	100	100	100	100
61	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	400	350	230	155	140	140	140	140	140

Supporting Table - P0300_AFM_Decel

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
9	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
11	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
13	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
15	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
17	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
19	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
25	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
29	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
33	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
38	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
42	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
48	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
54	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
61	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Supporting Table - P0300_ZeroTorqueEngLoad

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

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
1	11.00	9.50	8.75	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.75	9.00	9.00	9.00	9.00	11.23	13.46	15.69	17.92	20.14	22.38	24.60	26.83

Supporting Table - P0300_ZeroTorqBaro

Description: adjusts zero torque for altitude

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

y/x	65	70	75	80	85	90	95	100	105
1	0.82	0.85	0.88	0.90	0.93	0.95	0.97	1.00	1.03

Supporting Table - P0300_ZeroTorqDoD

Description: Zero torque engine load while in Active Fuel Management

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

y/x	400	500	600	700	800	900	1,000	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
1	11.00	9.50	8.75	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.75	9.00	9.00	9.00	9.00	11.23	13.46	15.69	17.92	20.14	22.38	24.60	26.83

Supporting Table - P0300_Catalyst_Damage_Misfire_Percentage

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

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

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000
0	10.6	10.6	10.6	10.0	4.8	4.8	4.8	4.8
10	10.6	10.6	10.6	10.0	4.8	4.8	4.8	4.8
20	10.6	10.6	10.6	10.0	4.8	4.8	4.8	4.8
30	10.6	10.6	9.8	8.1	4.8	4.8	4.8	4.8
40	10.6	10.6	8.1	8.1	4.8	4.8	4.8	4.8
50	8.1	8.1	6.8	4.8	4.8	4.8	4.8	4.8
60	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
70	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
80	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
90	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
100	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

Supporting Table - P0300_TOSSRoughRoadThres

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

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

y/x	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
900	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,500	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,800	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2,100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2,400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2,700	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3,300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3,600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4,200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Supporting Table - P0300_WSSRoughRoadThres

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

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

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00	1.04

Supporting Table - P0300_Abnormal Cylinder Mode

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

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

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

Supporting Table - P0300_Abnormal SCD Mode

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

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

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

Supporting Table - P0300_Abnormal Rev Mode

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

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

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

Supporting Table - P0300_Min_PatternMultiplier

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

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

y/x	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
1	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90

Supporting Table - P0300_Max_PatternMultiplier

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

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

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

Supporting Table - P0300 Ring Filter

Description: Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

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

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

Supporting Table - P0300 Number of Normals

Description: Number of Normals for the Driveline Ring Filter
After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

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

y/x	0	1	2	3	4	5	6	7	8
1	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Supporting Table - P0300 EngineOverSpeedLimit

Description: Engine OverSpeed Limit versus gear

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

P0300 EngineOverSpeedLimit - Part 1

y/x	CeTGRR_e_TransGr1	CeTGRR_e_TransGr2	CeTGRR_e_TransGr3	CeTGRR_e_TransGr4	CeTGRR_e_TransGr5	CeTGRR_e_TransGr6
1	5,000	5,000	5,000	5,000	5,000	5,000

P0300 EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGrEVT1	CeTGRR_e_TransGrEVT2	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrRvrs	CeTGRR_e_TransGrPark	
1	5,000	5,000	4,000	5,000	4,000	

Supporting Table - P0324_P0326_P0331_AbnormalNoise_Threshold

Description: Fail threshold for the Knock Performance Abnormal Noise Diagnostic

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.290	0.290	0.290	0.290	0.290	0.380	0.440	0.520	0.590	0.540	0.630	0.660	0.660	0.660	0.660	0.660	0.660

Supporting Table - P0325_P0330_OpenCktThrshMin (20 kHz)

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

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

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	12.7773	12.8477	12.5645	12.1777	12.1191	10.0938	8.9297	9.0586	9.4688	7.9785	6.4531	6.4492	6.4492	6.4492	6.4492	6.4492	6.4492

Supporting Table - P0325_P0330_OpenCktThrshMax (20 kHz)

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

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

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	43.1348	42.6289	42.0293	41.0059	40.6895	35.9766	33.5293	30.9180	31.5039	26.7090	22.8516	20.3320	18.0234	15.9980	14.3320	13.0996	12.3770

Supporting Table - P0325_P0330_OpenCktThrshMin (Normal Noise)

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

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

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

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Supporting Table - P0325_P0330_OpenCktThrshMax (Normal Noise)

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

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

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

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Supporting Table - P06B6_P06B7_OpenTestCktThrshMin

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

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

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.199	0.186	0.176	0.188	0.223	0.279	0.385	0.521	0.701	0.928	1.207	1.545	1.943	2.408	2.945	3.559	4.252

Supporting Table - P06B6_P06B7_OpenTestCktThrshMax

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

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

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.689	0.689	0.689	0.689	0.725	0.980	1.363	1.887	2.563	3.406	4.432	5.650	7.076	8.727	10.611	12.744	15.141

Supporting Table - P0325_P0330_OpenMethod

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

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

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

P0325_P0330_OpenMethod - Part 1					
y/x	0	1	2	3	4
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz
P0325_P0330_OpenMethod - Part 2					
y/x	5	6	7	8	9
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz
P0325_P0330_OpenMethod - Part 3					
y/x	10	11	12	13	14
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz
P0325_P0330_OpenMethod - Part 4					
y/x	15	16			
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz			

Supporting Table - P0324_P0326_P0331_AbnormalNoise_CylsEnabled

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

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

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

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

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

Supporting Table - P0196_FastFailTempDiff

Description: EOT Sensor Cold Start Fast Fail Threshold

Notes: For P0196: KtEOTD_T_FastFailTempDiff with X Axis is defined as PowerUp Coolant Temperature

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	80.0	80.0	80.0	60.0	60.0	40.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

Supporting Table - P0196_TotalAccumulatedFlow

Description: Total accumulated air consumed by engine since engine start as a function of powerup undefaulted Oil Temperature

Notes: For P0196: KtEOTD_m_TotalAirGramsMin

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	15,000	14,000	13,000	12,000	11,000	10,000	9,000	8,000	7,000	6,000	5,000	4,000	5,000	4,000	3,000	3,000	3,000

Supporting Table - P0521_RPM_Weighting_Factor_X_Axis

Description: Engine RPM Weighting Factor Axis

Notes: KnEOPD_n_EngSpdFilteredBpt Engine RPM Axis for use by KtEOPD_r_EngSpdWeight

y/x	1	2	3	4	5	6	7	8	9
1	0	500	900	1,000	2,000	3,000	3,500	4,000	5,000

Supporting Table - P0521_RPM_Weighting_Factor

Description: Engine RPM Weighting Factor

Notes: KtEOPD_r_EngSpdWeight with axis as Engine RPM defined by KnEOPD_n_EngSpdFilteredBpt

y/x	0	500	900	1,000	2,000	3,000	3,500	4,000	5,000
1	0.00	0.00	0.00	0.45	0.45	0.45	0.45	0.20	0.00

Supporting Table - P0521_Oil_Temp_Weighting_Factor_Axis

Description: Oil Temperature Weighting Factor Axis

Notes: KnEOPD_T_EngFilteredBpt oil temperature axis for use by KtEOPD_r_EOT_Weight

y/x	1	2	3	4	5	6	7	8	9
1	-10	-5	60	80	90	100	120	130	140

Supporting Table - P0521_Oil_Temp_Weighting_Factor

Description: Oil Temperature Weighting Factor

Notes: KtEOPD_r_EOT_Weight with axis as Oil Temperature defined by KnEOPD_T_EngFilteredBpt

y/x	-10	-5	60	80	90	100	120	130	140
1	0.00	0.70	0.70	0.70	0.70	0.70	0.70	0.35	0.00

Supporting Table - P0521_Eng_Load_Stability_Weighting_Factor_Axis

Description: Engine Load Stability Weighting Factor Axis

Notes: KnEOPD_m_EngLoadStabilityBpt engine load axis used by KtEOPD_r_EngLoadStblWeight

y/x	1	2	3	4	5	6	7	8	9
1	0	5	10	20	30	50	100	200	399

Supporting Table - P0521_Eng_Load_Stability_Weighting_Factor

Description: Engine Load Stability Weighting Factor

Notes: KtEOPD_r_EngLoadStblWeight with axis as Engine Load Stability defined by KnEOPD_m_EngLoadStabilityBpt

y/x	0	5	10	20	30	50	100	200	399
1	1.00	1.00	1.00	0.30	0.00	0.00	0.00	0.00	0.00

Supporting Table - P0521_Eng_Oil_Pred_Weighting_Factor_Axis

Description: Oil Pressure Predicted Weighting Factor Axis

Notes: KnEOPD_p_EngOilPredictedBpt predicted oil pressure axis used by KtEOPD_r_EOP_PredictWeight

y/x	1	2	3	4	5	6	7	8	9
1	160	170	250	275	360	375	400	450	600

Supporting Table - P0521_Eng_Oil_Pred_Weighting_Factor

Description: Oil Pressure Predicted Weighting Factor

Notes: KtEOPD_r_EOP_PredictWeight with axis as Predicted Oil Pressure defined by KnEOPD_p_EngOilPredictedBpt

y/x	160	170	250	275	360	375	400	450	600
1	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00

Fault Bundle Definitions

Bundle Name: 5VoltReferenceA_FA
P0641
Bundle Name: 5VoltReferenceB_FA
P0651
Bundle Name: 5VoltReferenceMAP_OOR_Flt
P0697
Bundle Name: A/F Imbalance Bank1
P219A
Bundle Name: A/F Imbalance Bank2
P219B
Bundle Name: AAP_SnsrCktFP
Naturally aspirated: P2228, P2229. Turbocharged: P0237, P0238
Bundle Name: AAP_SnsrFA
Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238.
Bundle Name: AAP_SnsrTFTKO
Naturally Aspirated: P2227, P2228, P2229, P2230. Turbocharged: P0237, P0238.
Bundle Name: AAP2_SnsrCktFP
P2228, P2229
Bundle Name: AAP2_SnsrFA
P2227, P2228, P2229, P2230
Bundle Name: AAP2_SnsrTFTKO
P2227, P2228, P2229, P2230
Bundle Name: AccCktLo_FA
P2537
Bundle Name: AcceleratorPedalFailure
P2122, P2123, P2127, P2128, P2138, P0697, P06A3
Bundle Name: ACCMLostComm
U016B
Bundle Name: ACFailedOnSD
See ACCM Document
Bundle Name: ACHighSidePressSnsrCktFA
P0532, P0533
Bundle Name: ACThrmlRefrigSpdVld
See ACCM Document
Bundle Name: AfterThrottlePressTFTKO
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.
Bundle Name: AfterThrottlePressureFA
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.

Fault Bundle Definitions

Bundle Name: AfterThrottleVacuumTFTKO
Naturally Aspirated or Turbocharged: P0106, P0107, P0108. Supercharged: P012B, P012C, P012D.
Bundle Name: AIR System FA
P0411, P2440, P2444
Bundle Name: AIRPumpControlCircuit FA
P0418
Bundle Name: AIRSystemPressureSensor FA
P2430, P2431, P2432, P2433, P2435, P2436, P2437, P2438
Bundle Name: AIRValveControlCircuit FA
P0412
Bundle Name: AmbientAirDefault
Baro Sensor Present: P2227, P2228, P2229, P2230. No Baro Sensor Present: P0101, P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0114, P0121, P0122, P0123, P012B, P012C, P012D, P0222, P0223, P1221
Bundle Name: AmbPresDfltdStatus
Baro Sensor Present: P2227, P2228, P2229, P2230. No Baro Sensor Present: P0101, P0102, P0103, P0106, P0107, P0108, P0111, P0112, P0113, P0114, P0121, P0122, P0123, P012B, P012C, P012D, P0222, P0223, P1221
Bundle Name: AmbPresSnsrCktFA
P2228, P2229
Bundle Name: AmbPresSnsrCktFP
P2228, P2229
Bundle Name: AnyCamPhaser_FA
P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024
Bundle Name: AnyCamPhaser_TFTKO
P0010, P0011, P0013, P0014, P0020, P0021, P0023, P0024
Bundle Name: BrakeBoosterSensorFA
P0556, P0557, P0558
Bundle Name: BrakeBoosterVacuumValid
P0556, P0557, P0558
Bundle Name: BSTR_b_ExcsvBstFA
P226B
Bundle Name: BSTR_b_ExcsvBstTFTKO
P226B
Bundle Name: BSTR_b_IC_PmpCktFA
P023A, P023C
Bundle Name: BSTR_b_PCA_CktFA
P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_CktLoFA

Fault Bundle Definitions

P0034, P0047, P0245, P0249
Bundle Name: BSTR_b_PCA_CktLoTFTKO
P0034, P0047, P0245, P0249
Bundle Name: BSTR_b_PCA_CktTFTKO
P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_FA
P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250
Bundle Name: BSTR_b_PCA_PstnSnsrFA
P003A, P2564, P2565
Bundle Name: BSTR_b_PCA_PstnSnsrTFTKO
P003A, P2564, P2565
Bundle Name: BSTR_b_PCA_TFTKO
P0234, P0299, P0033, P0034, P0035, P0045, P0047, P0048, P0243, P0245, P0246, P2261, P0247, P0249, P0250
Bundle Name: BSTR_b_PresCntrlTooHiFA
P0234
Bundle Name: BSTR_b_PresCntrlTooHiTFTKO
P0234
Bundle Name: BSTR_b_PresCntrlTooLoFA
P0299
Bundle Name: BSTR_b_PresCntrlTooLoTFTKO
P0299
Bundle Name: BSTR_b_PstnCntrlFA
P166D, P166E
Bundle Name: BSTR_b_PstnCntrlTooHiFA
P166E
Bundle Name: BSTR_b_PstnCntrlTooHiTFTKO
P166E
Bundle Name: BSTR_b_PstnCntrlTooLoFA
P166D
Bundle Name: BSTR_b_PstnCntrlTooLoTFTKO
P166D
Bundle Name: BSTR_b_TurboBypassCktFA
P0033, P0034, P0035, P00C0, P00C1, P00C2
Bundle Name: BSTR_b_TurboBypassCktTFTKO
P0033, P0034, P0035, P00C0, P00C1, P00C2
Bundle Name: BSTR_b_TurboBypB_CktFA
P00C0, P00C1, P00C2
Bundle Name: BSTR_b_TurboBypB_CktTFTKO

Fault Bundle Definitions

P00C0, P00C1, P00C2
Bundle Name: CamLctnExhFA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: CamLctnIntFA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: CamSensor_FA
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensor_TFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorAnyLctnTFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorAnyLocationFA
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorFA
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CamSensorTFTKO
P0016, P0017, P0018, P0019, P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391
Bundle Name: CatalystSysEfficiencyLoB1_FA
P0420
Bundle Name: CatalystSysEfficiencyLoB2_FA
P0430
Bundle Name: ClutchPstnSnsr FA
P0806, P0807, P0808
Bundle Name: ClutchPstnSnsrCktHi FA
P0808
Bundle Name: ClutchPstnSnsrCktLo FA
P0807
Bundle Name: ClutchPstnSnsrNotLearned
P080A
Bundle Name: CoolingFanSpeedTooHigh_FA
P0495
Bundle Name: CrankCamCorrelationTFTKO
P0016, P0017, P0018, P0019
Bundle Name: CrankExhaustCamCorrelationFA
P0017, P0019
Bundle Name: CrankExhaustCamCorrFA
P0017, P0019
Bundle Name: CrankIntakeCamCorrelationFA

Fault Bundle Definitions

P0016, P0018
Bundle Name: CrankIntakeCamCorrFA
P0016, P0018
Bundle Name: CrankSensor_FA
P0335, P0336
Bundle Name: CrankSensor_TFTKO
P0335, P0336
Bundle Name: CrankSensorFA
P0335, P0336
Bundle Name: CrankSensorFaultActive
P0335, P0336
Bundle Name: CrankSensorTestFailedTKO
P0335, P0336
Bundle Name: CrankSensorTFTKO
P0335, P0336
Bundle Name: CylDeacSystemTFTKO
P3400
Bundle Name: CylnderDeacDriverTFTKO
P3401, P3409, P3417, P3425, P3433, P3441, P3449
Bundle Name: ECT_Sensor_Ckt_FA
P0117, P0118, P0119
Bundle Name: ECT_Sensor_Ckt_FP
P0117, P0118
Bundle Name: ECT_Sensor_Ckt_High_FP
P0118
Bundle Name: ECT_Sensor_Ckt_Low_FP
P0117
Bundle Name: ECT_Sensor_Ckt_TFTKO
P0117, P0118, P0119
Bundle Name: ECT_Sensor_Ckt_TPTKO
P0117, P0118, P0019
Bundle Name: ECT_Sensor_DefaultDetected
P0117, P0118, P0116, P0125
Bundle Name: ECT_Sensor_FA
P0117, P0118, P0116, P0125, P0128
Bundle Name: ECT_Sensor_Perf_FA
P0116
Bundle Name: ECT_Sensor_TFTKO

Fault Bundle Definitions

P0117, P0118, P0116, P0125, P0119
Bundle Name: EGRValve_FP
P0405, P0406, P042E
Bundle Name: EGRValveCircuit_FA
P0403, P0404, P0405, P0406
Bundle Name: EGRValveCircuit_TFTKO
P0403, P0404, P0405, P0406
Bundle Name: EGRValvePerformance_FA
P0401, P042E
Bundle Name: EGRValvePerformance_TFTKO
P0401, P042E
Bundle Name: EngineMetalOvertempActive
P1258
Bundle Name: EngineMisfireDetected_FA
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308
Bundle Name: EngineMisfireDetected_TFTKO
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308
Bundle Name: EngineModeNotRunTimer_FA
P2610
Bundle Name: EngineModeNotRunTimerError
P2610
Bundle Name: EnginePowerLimited
P0068, P0122, P0123, P0222, P0223, P0601, P0604, P0606, P1682, P16F3, P1104, P2100, P2101, P2102, P2103, P2176, P160E, P160D, P0191, P0192, P0193, P00C8, P00C9, P16A0, P16A1, P16A2
Bundle Name: EngineTorqueEstInaccurate
EngineMisfireDetected_FA, FuelInjedtorCircuit_FA, FuelInjedtorCircuit_TFTKO, FuelTrimSystemB1_FA, FuelTrimSystemB2_FA, MAF_SensorTFTKO, MAP_SensorTFTKO, EGRValuePerforamnce_FA
Bundle Name: EngModeNotRunTmErr
P2610
Bundle Name: EngOilModeledTempValid
ECT_Sensor_FA, IAT_SensorCircuitFA
Bundle Name: EngOilPressureSensorCktFA
P0522, P0523
Bundle Name: EngOilPressureSensorFA
P0521, P0522, P0523
Bundle Name: EngOilTempFA
EngOilTempSensorCircuitFA, EngOilModeledTempValid, P16F3
EngOilTempFA - Other Definitions: P16F3 with GetXOYR_b_SecurityFlt(CeXOYR_e_EOTR_SecurityFlt)

Fault Bundle Definitions

Bundle Name: EngOilTempSensorCircuitFA
P0197, P0198
Bundle Name: Ethanol Composition Sensor FA
P0178, P0179, P2269
Bundle Name: EvapExcessPurgePsbl_FA
Conventional fuel system, P0442, P0455, P0458, P0496
Bundle Name: EvapPurgeSolenoidCircuit_FA
P0443, P0458, P0459
Bundle Name: EvapReducedPurgePsbl_FA
Only EREV sealed fuel system, P0443, P0446, P0449, P0459, P0497, P0499, P2419, P2422
Bundle Name: EvapVentSolenoidCircuit_FA
P0449, P0498, P0499
Bundle Name: ExhaustCamSensor_FA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustCamSensor_TFTKO
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustCamSensorFA
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: ExhaustCamSensorTFTKO
P0017, P0019, P0365, P0366, P0390, P0391
Bundle Name: FanOutputDriver_FA
P0480, P0481, P0482, P0691, P0692, P0693, P0694, P0695, P0696, P1485 (EREV), P1486 (EREV), P1487 (EREV)
Bundle Name: FHPD_b_HPC_PresErrNeg_FA
P228D
Bundle Name: FHPD_b_HPC_PresErrNeg_TFTKO
P228D
Bundle Name: FHPD_b_HPC_PresErrPos_FA
P228C
Bundle Name: FHPD_b_HPC_PresErrPos_TFTKO
P228C
Bundle Name: FHPD_b_HPC_Windup_ TFTKO
P0089
Bundle Name: FHPD_b_HPC_Windup_FA
P0089
Bundle Name: FHPD_b_PumpCurr_FA
P163A
Bundle Name: FHPD_b_PumpCurr_TFTKO
P163A

Fault Bundle Definitions

Bundle Name: FHPR_b_FRP_SnsrCkt_FA
P0192, P0193
Bundle Name: FHPR_b_FRP_SnsrCkt_TFTKO
P0192, P0193
Bundle Name: FHPR_b_FRP_SnsrPerfDiag_FA
P0191
Bundle Name: FHPR_b_FRP_SnsrPerfDiag_TFTKO
P0191
Bundle Name: FHPR_b_PumpCkt_FA
P0090, P0091, P0092, P00C8, P00C9, P00CA
Bundle Name: FHPR_b_PumpCkt_TFTKO
P0090, P0091, P0092, P00C8, P00C9, P00CA
Bundle Name: FuelInjectorCircuit_FA
P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, PP0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F
Bundle Name: FuelInjectorCircuit_TFTKO
P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208, P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282, P0262, P0265, P0268, P0271, PP0274, P0277, P0280, P0283, P2147, P2150, P2153, P2156, P216B, P216E, P217B, P217E, P2148, P2151, P2154, P2157, P216C, P216F, P217C, P217F, P1248, P1249, P124A, P124B, P124C, P124D, P124E, P124F
Bundle Name: FuelLevelDataFault
P0461, P0462, P0463, P2066, P2067, P2068
Bundle Name: FuelTrimSystemB1_FA
P0171, P0172
Bundle Name: FuelTrimSystemB1_TFTKO
P0171, P0172
Bundle Name: FuelTrimSystemB2_FA
P0174, P0175
Bundle Name: FuelTrimSystemB2_TFTKO
P0174, P0175
Bundle Name: HumidityFA
P0097, P0098, P11C2, P11C3, P2227, P2228, P2229, P2230
Bundle Name: HumTempSnsrCktFA
P0097, P0098
Bundle Name: HumTempSnsrCktFP
P0097, P0098
Bundle Name: HumTempSnsrFA
P0096, P0097, P0098, P0099
Bundle Name: IAC_SystemRPM_FA

Fault Bundle Definitions

P0506, P0507
Bundle Name: IAT_ContCorrFA
P2199
Bundle Name: IAT_SensorCircuitFA
P0112, P0113
Bundle Name: IAT_SensorCircuitFP
P0112, P0113
Bundle Name: IAT_SensorCircuitTFTKO
P0112, P0113
Bundle Name: IAT_SensorFA
P0111, P0112, P0113, P0114
Bundle Name: IAT_SensorTFTKO
P0111, P0112, P0113, P0114
Bundle Name: IgnitionOffTimer_FA
P2610
Bundle Name: IgnitionOffTimeValid
P2610
Bundle Name: IgnitionOutputDriver_FA
P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358
Bundle Name: IntakeCamSensor_FA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeCamSensor_TFTKO
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeCamSensorFA
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntakeCamSensorTFTKO
P0016, P0018, P0340, P0341, P0345, P0346
Bundle Name: IntkCamPhaser_FA
P0010, P0011, P0020, P0021
Bundle Name: KS_Ckt_Perf_B1B2_FA
P0324, P0325, P0326, P0327, P0328, P0330, P0332, P0333, P06B6, P06B7
Bundle Name: Long Name
Short Name
Bundle Name: LowFuelConditionDiagnostic
LowFuelConditionDiagnostic - Other Definitions: Flag set to TRUE if the fuel level < 10.0 % AND No Active DTCs: FuelLevelDataFault, P0462, P0463 for at least 30.0 seconds

Fault Bundle Definitions

Bundle Name: MAF_SensorCircuitFA
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorCircuitTFTKO
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorFA
P0101, P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorFP
P0102, P0103, P010C, P010D
Bundle Name: MAF_SensorPerfFA
P0101
Bundle Name: MAF_SensorPerfTFTKO
P0101
Bundle Name: MAF_SensorTFTKO
P0101, P0102, P0103, P010C, P010D
Bundle Name: MAF_SnsrCktFA
P121B, P121C
Bundle Name: MAF_SnsrCktTFTKO
P121B, P121C
Bundle Name: MAP_EngineVacuumStatus
P0106, P0107, P0108 Fault Active OR P0107, P0108 Fault Pending
Bundle Name: MAP_SensorCircuitFA
P0107, P0108
Bundle Name: MAP_SensorCircuitFP
P0107, P0108
Bundle Name: MAP_SensorFA
P0106, P0107, P0108
Bundle Name: MAP_SensorPerfFA
P0106
Bundle Name: MAP_SensorPerfTFTKO
P0106
Bundle Name: MAP_SensorTFTKO
P0106, P0107, P0108
Bundle Name: MnfdTempSensorCktFA
Turbocharged or Supercharged, with Humidity sensor: P112C, P112D. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.
Bundle Name: MnfdTempSensorCktFP
Turbocharged or Supercharged, with Humidity sensor: P112C, P112D. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.
Bundle Name: MnfdTempSensorCktTFTKO
Turbocharged or Supercharged, with Humidity sensor: P112C, P112D. Turbocharged or Supercharged, without Humidity sensor: P0097, P0098. Naturally Aspirated: P0112, P0113.

Fault Bundle Definitions

Bundle Name: MnfdTempSensorFA
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: MnfdTempSensorTFTKO
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: ModuleOffTime_FA
P2610
Bundle Name: ModuleOffTimeErr
P2610
Bundle Name: no validity name is assigned to this fault bundle
Bundle Name: OAT_AmbientFilteredFA
ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: not applicable. All other cases: not applicable.
Bundle Name: OAT_AmbientSensorFA
ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: not applicable. All other cases: not applicable.
Bundle Name: OAT_PtEstFiltFA
ECM OAT: P0071, P0072, P0073, P0074, EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected, MAF_SensorFA. VIMC OAT: P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: VehicleSpeedSensor_FA, IAT_SensorFA, MAF_SensorFA. All other cases: EngModeNotRunTmErr, VehicleSpeedSensor_FA, IAT_SensorFA, ECT_Sensor_DefaultDetected.
Bundle Name: OAT_PtEstRawFA
ECM OAT: P0071, P0072, P0073, P0074. VIMC OAT: P0071, P0072, P0073, EngModeNotRunTmErr, VehicleSpeedSensor_FA, ECT_Sensor_DefaultDetected. IAT-Based OAT: IAT_SensorFA. All other cases: IAT_SensorFA, ECT_Sensor_DefaultDetected.
Bundle Name: OilPmpCktFA
P06DA, P06DB, P06DC
OilPmpCktFA - Other Definitions: Output Driver Codes
Bundle Name: OilPmpFA
P06DA, P06DB, P06DC, P06DD, P06DE
OilPmpFA - Other Definitions: FA only for Output Driver and rationality
Bundle Name: OilPmpStuckHigh
P06DA, P06DB, P06DD
OilPmpStuckHigh - Other Definitions: TFTKO and FA
Bundle Name: OilPmpStuckLow
P06DC, P06DE
OilPmpStuckLow - Other Definitions:

Fault Bundle Definitions

TFTKO and FA
Bundle Name: OilPmpTFTKO
P06DA, P06DB, P06DC, P06DD, P06DE
OilPmpTFTKO - Other Definitions: TFTKO only for Output Driver and rationality
Bundle Name: PowertrainRelayFault
P1682
Bundle Name: PowertrainRelayStateOn_Error
P0685
Bundle Name: PowertrainRelayStateOn_FA
P0685
Bundle Name: PPS1_OutOfRange
P2122, P2123
Bundle Name: PPS1_OutOfRange_Composite
P2122, P2123, P06A3
Bundle Name: PPS2_OutOfRange
P2127, P2128
Bundle Name: PPS2_OutOfRange_Composite
P2127, P2128, P0697
Bundle Name: SCIAP_SensorCircuitFA
P012C, P012D
Bundle Name: SCIAP_SensorCircuitFP
P012C, P012D
Bundle Name: SCIAP_SensorFA
P012B, P012C, P012D
Bundle Name: SCIAP_SensorPerfFA
P012B
Bundle Name: SCIAP_SensorPerfTFTKO
P012B
Bundle Name: SCIAP_SensorTFTKO
P012B, P012C, P012D
Bundle Name: SuperchargerBypassValveFA
P2261
Bundle Name: SystemVoltageHigh_FA
P0563
Bundle Name: SystemVoltageLow_FA
P0562
Bundle Name: TC_BoostPresSnsrCktFA

Fault Bundle Definitions

P0237, P0238
Bundle Name: TC_BoostPresSnsrFA
P0236, P0237, P0238
Bundle Name: TCM_EngSpdReqCkt
P150C
Bundle Name: THMR_AHV_FA
P2681, P26A3, P26A6, P26A7, P26A9
Bundle Name: THMR_AWP_AuxPumpFA
B2920, B2923, B2922
Bundle Name: THMR_ECT_Sensor_Ckt_FA
P0116, P0117, P0118, P00B6
Bundle Name: THMR_Insuff_Flow_FA
P00B7
Bundle Name: THMR_RCT_Sensor_Ckt_FA
P00B3, P00B4
Bundle Name: THMR_SWP_Control_FA
P261D, P261A, P261C
Bundle Name: THMR_Therm_Control_FA
P0597, P0598, P0599
Bundle Name: ThrotTempSensorFA
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: ThrotTempSensorTFTKO
Turbocharged or Supercharged, with Humidity sensor: P112B, P112C, P112D, P112E. Turbocharged or Supercharged, without Humidity sensor: P0096, P0097, P0098, P0099. Naturally Aspirated: P0111, P0112, P0113, P0114.
Bundle Name: ThrottlePositionSnsrPerfFA
P0121
Bundle Name: ThrottlePositionSnsrPerfTFTKO
P0121
Bundle Name: TIAP_SensorPerfFA
P0236
Bundle Name: TPS_FA
P0122, P0123, P0222, P0223, P2135
Bundle Name: TPS_FaultPending
P0122, P0123, P0222, P0223, P2135
Bundle Name: TPS_Performance_FA
P0068, P0121, P1104, P2100, P2101, P2102, P2103
Bundle Name: TPS_Performance_TFTKO

Fault Bundle Definitions

P0068, P0121, P1104, P2100, P2101, P2102, P2103
Bundle Name: TPS_TFTKO
P0122, P0123, P0222, P0223, P2135
Bundle Name: TPS_ThrottleAuthorityDefaulted
P0068, P0122, P0123, P0222, P0223, P16F3, P1104, P2100, P2101, P2102, P2103, P2135
Bundle Name: TPS1_OutOfRange_Composite
P0122, P0123, P06A3
Bundle Name: TPS2_OutOfRange_Composite
P0222, P0223, P06A3
Bundle Name: Trans Output Rotations Rolling Count Validity
Bundle Name: Transfer Pump is Commanded On
Transfer Pump is Commanded On - Other Definitions: Fuel Volume in Primary Fuel Tank < 0.0 liters AND Fuel Volume in Secondary Fuel Tank ≥ 0.0 liters AND Transfer Pump on Time < P0461, P2066, P2636: Transfer Pump Enable (see supporting table for numeric value) AND Transfer Pump had been Off for at least 0.0 seconds AND Evap Diagnostic (Purge Valve Leak Test, Large Leak Test, and Waiting for Purge) is not running AND Engine Running
Bundle Name: Transmission Actual Gear Validity
Bundle Name: Transmission Engaged State Validity
Bundle Name: Transmission Estimated Gear Validity
Bundle Name: Transmission Gear Ratio Validity
Bundle Name: Transmission Gear Selector Position Validity
Bundle Name: Transmission Oil Temperature Validity
Bundle Name: Transmission Output Shaft Angular Velocity Validity
Bundle Name: Transmission Overall Actual Torque Ratio Validity
Bundle Name: Transmission Overall Estimated Torque Ratio Validity
Bundle Name: Transmission Shift Lever Position Validity

Fault Bundle Definitions

Bundle Name: Transmission Turbine Angular Velocity Validity
Bundle Name: TransmissionEngagedState_FA
MYD/MYC/MYB:, P182E, P1915
Bundle Name: TransmissionGearDefaulted
MYD/MYC/MYB:, P182E, P1915
Bundle Name: VehicleSpeedSensor_FA
P0502, P0503, P0722, P0723
Bundle Name: VehicleSpeedSensorError
P0502, P0503, P0722, P0723

HD OBD Component System Table

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California Environmental Protection Agency
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HD OBD Gasoline Monitoring Requirements Checklist

Component/System	MONITORING REQUIREMENTS: List the DTC of the monitor that detects the following failure mode:									
Fuel System	(f)(1.2.1)(A)	(f)(1.2.1)(C)	(f)(1.2.2)	(f)(1.2.3)	(f)(1.2.4)	(f)(1.2.5)				
	Emission Threshold	Air-fuel Ratio Cylinder Imbalance	Adaptive Limits Reached	Secondary Fuel Trim Emission Threshold	Fails to Enter Closed Loop	Fails to Enter Closed Loop After Auto Engine Restart				
	P0171, P0172, P0174, P0175	P219A, P219B, P0300	P0171, P0172, P0174, P0175	P2096, P2097, P2098, P2099	NA	NA	NA	NA	NA	NA
Misfire	(f)(2.2.1)	(f)(2.2.2)	(f)(2.2.2)							
	Catalyst Damage Misfire	FTP Level Misfire: First 1000-revs	FTP Level Misfire: 4 x 1000-revs							
	P0300	P0300	P0300	NA	NA	NA	NA	NA	NA	NA
EGR	(f)(3.2.1)	(f)(3.2.2)	(f)(3.2.1)							
	Low Flow Emission Threshold	High Flow Emission Threshold	Functional Monitor in Lieu of Emission Threshold							
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cold Start Strategy	(f)(4.2.1)(A)	(f)(4.2.1)(B)	(f)(4.2.2)(A)	(f)(4.2.2)(B)						
	Emission Threshold	Functional Monitor in Lieu of Emission Threshold	Phase-in Single Element Functional Monitor	Phase-in Emission Threshold						
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Secondary Air	(f)(5.2.1)	(f)(5.2.2)	(f)(5.2.3)							
	Insufficient Flow Emission Threshold	Excessive Flow Emission Threshold	Functional Monitor in Lieu of Emission Threshold							
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Catalyst	(f)(6.2.1)									
	Conversion Efficiency									
	P0420, P0430	NA	NA	NA	NA	NA	NA	NA	NA	NA
Evaporative System	(f)(7.2.2)(A)	(f)(7.2.2) (B)								
	Purge Flow	0.150" Leak Check								
	P0455	P0442	NA	NA	NA	NA	NA	NA	NA	NA
Upstream Exhaust Gas Sensor	(f)(8.2.1)(A)	(f)(8.2.1)(B)	(f)(8.2.1)(B)	(f)(8.2.1)(B)	(f)(8.2.1)(C)	(f)(8.2.1)(D)	(f)(8.2.3)(A)	(f)(8.2.3)(B)		
	Emission Threshold	Open Circuit	Out-of-Range High	Out-of-Range Low	Feedback: Slow/ fails to Enter, Default OL	Sufficient for Other Diagnostics	Heater performance	Heater Circuit Continuity		
	P0133, P0153, P0133, P0153, P015A, P015B, P015C, P015D	P0134, P0154	P0132, P0152	P0131, P0151	NA	P0131, P0151, P0132, P0152, P0134, P0154, P0133, P0153, P015A, P015B, P015C, P015D	P0053, P0059, P0135, P0155	P0030, P0050	NA	NA
	(f)(8.2.2)(A)	(f)(8.2.2)(B)	(f)(8.2.2)(D)	(f)(8.2.2)(D)	(f)(8.2.2)(E)	(f)(8.2.2)(C)	(f)(8.2.3)(A)	(f)(8.2.3)(B)		

HD OBD Component System Table

Downstream Exhaust Gas Sensor	Emission Threshold	Open Circuit	Out-of-Range High	Out-of-Range Low	Feedback: Slow/ fails to Enter, Default OL	Sufficient for Other Diagnostics	Heater Performance	Heater Circuit Continuity		
	P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B	P0140, P0160	P0138, P2271, P2273	P0137, P0157, P2270, P2272	P0054, P0060, P0137, P0157, P0138, P0158, P0140, P0160, P0141, P0161, P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P2270, P2271, P2272, P2273	P013A, P013B, P013C, P013D, P013E, P013F, P014A, P014B, P2270, P2271, P2272, P2273	P0054, P0060, P0141, P0161	P0036, P0056	NA	NA
VVT System	(f)(9.2.1)	(f)(9.2.3)	(f)(9.2.3)	(f)(9.2.3)						
	Target Error Emission Threshold	Target Error Functional Monitor in Lieu of Emission Threshold	Slow Response Emission Threshold	Slow Response Functional Monitor in Lieu of Emission Threshold						
	P0011	P0011	P0011	P0011	NA	NA	NA	NA	NA	NA
Engine Cooling System	(g)(1.2.1)(A)	(g)(1.2.1)(B)	(g)(1.2.2)(A)	(g)(1.2.2)(A)	(g)(1.2.2)(A)	(g)(1.2.2)(B)	(g)(1.2.2)(C)	(g)(1.2.2)(D)		
	Time to Reach Threshold Temp	Maintain Threshold Temp	ECT Open Circuit	ECT Out-of-Range High	ECT Out-of-Range Low	Time to Reach Closed Loop	ECT Stuck Below Highest Minimum Enable Temp	ECT Stuck Above Lowest Maximum Enable Temp		
	P0128, P2181	NA	P0118, P0119, P00B4	P0118, P00B4	P0117, P00B3	NA	P0128, P00B6	P0116, P00B6	NA	NA
Crankcase Ventilation	(g)(2.2.2)									
	Disconnection									
	P0106, P0171, P0174, P0300	NA	NA	NA	NA	NA	NA	NA	NA	NA

HD OBD Monitor System Table

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HD OBD Gasoline Monitoring Requirements Checklist

List the DTC of the comprehensive component monitor that detects the following failure mode:

Monitor/System	Input Out-of-Range High	Input Out-of-Range Low	Input Open Circuit	Input Rationality Low	Input Rationality High	Input Other Rationality	Output Functional	Output Shorted High	Output Shorted Low	Output Open Circuit
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A/C Clutch Relay Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A/C High Side	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AIR Pressure Sensor Bank 1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AIR Pressure Sensor Bank 2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AIR Pump Command Bank 1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AIR Pump Solenoid Relay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barometric Pressure	P2229	P2228	P2228	P2227	P2227	P2230	NA	NA	NA	NA
Brake Booster Pressure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Brake Pedal Postion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CAM Phase Control Bank 1 Exhaust	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CAM Phase Control Bank 1 Intake	NA	NA	NA	NA	NA	NA	P0011	P2089	P2088	P0010
CAM Phase Control Bank 2 Exhaust	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CAM Phase Control Bank 2 Intake	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cam Position Bank1 Exhaust	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cam Position Bank1 Intake	P0340	P0340	P0340	P0341	P0341	P0016	NA	NA	NA	NA
Cam Position Bank2 Exhaust	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cam Position Bank2 Intake	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camshaft Position Output Signal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Canister Vent Solenoid	NA	NA	NA	NA	NA	NA	P0446	NA	P0449	P0449
Charge Intercooler	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Clutch Pedal Position	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Control Canister Purge	NA	NA	NA	NA	NA	NA	P0496	NA	P0443	P0443
Crank Position	P0335	P0335	P0335	P0336	P0336	NA	NA	NA	NA	NA
Crankshaft Position Output Signal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cylinder Deactivate A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cylinder Deactivate B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cylinder Deactivate C	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cylinder Deactivate D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EGR Valve Position	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EST A	NA	NA	NA	NA	NA	NA	NA	P0351	P0351	P0351
EST B	NA	NA	NA	NA	NA	NA	NA	P0352	P0352	P0352
EST C	NA	NA	NA	NA	NA	NA	NA	P0353	P0353	P0353
EST D	NA	NA	NA	NA	NA	NA	NA	P0354	P0354	P0354
EST E	NA	NA	NA	NA	NA	NA	NA	P0355	P0355	P0355
EST F	NA	NA	NA	NA	NA	NA	NA	P0356	P0356	P0356
EST G	NA	NA	NA	NA	NA	NA	NA	P0357	P0357	P0357
EST H	NA	NA	NA	NA	NA	NA	NA	P0358	P0358	P0358
ETC Motor Close	NA	NA	NA	NA	NA	NA	P2101, P1516, P2176	NA	NA	NA
ETC Motor Open	NA	NA	NA	NA	NA	NA	P2101, P1516,	NA	NA	NA

HD OBD Monitor System Table

							P2176			
Fan Control #1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fan Control #2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fan Control #3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Composition	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Economy Mode Switch Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Injector A	NA	NA	NA	NA	NA	NA	NA	P0262	P0201, P0261	P0201, P0261
Fuel Injector B	NA	NA	NA	NA	NA	NA	NA	P0265	P0202, P0264	P0202, P0264
Fuel Injector C	NA	NA	NA	NA	NA	NA	NA	P0268	P0203, P0267	P0203, P0267
Fuel Injector D	NA	NA	NA	NA	NA	NA	NA	P0271	P0204, P0270	P0204, P0270
Fuel Injector E	NA	NA	NA	NA	NA	NA	NA	P0274	P0205, P0273	P0205, P0273
Fuel Injector F	NA	NA	NA	NA	NA	NA	NA	P0277	P0206, P0276	P0206, P0276
Fuel Injector G	NA	NA	NA	NA	NA	NA	NA	P0280	P0207, P0279	P0207, P0279
Fuel Injector H	NA	NA	NA	NA	NA	NA	NA	P0283	P0208, P0282	P0208, P0282
Fuel Level	P0463	P0462	P0463	NA	NA	P0461, P0464	NA	NA	NA	NA
Fuel Level 2	NA	NA	NA	NA	NA	P0464	NA	NA	NA	NA
Fuel Pump 2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Pump Control	NA	NA	NA	NA	NA	NA	NA	NA	P0628	NA
Fuel Tank Vapor Pressure	P0453	P0452	P0452	NA	NA	P0451, P0454	NA	NA	NA	NA
Humidity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hybrid Control Torque Request Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ignition Off Timer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IMTV Position	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Air Temperature	P0113	P0112	P0113	P0111	P0111	P0114	NA	NA	NA	NA
Intake Air Temperature 2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Air Temperature 3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Manifold Runner Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Manifold Tuning Valve Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Knock Internal Circuit	NA	NA	NA	NA	NA	P06B6	NA	NA	NA	NA
Knock Internal Circuit #2	NA	NA	NA	NA	NA	P06B7	NA	NA	NA	NA
Knock Sensor-Flat	P0328	P0327	P0325	P0326	P0324, P0326	NA	NA	NA	NA	NA
Knock Sensor-Flat #2	P0333	P0332	P0330	P0331	P0324, P0331	NA	NA	NA	NA	NA
Malfunction Indicator Lamp	NA	NA	NA	NA	NA	NA	NA	NA	P0650, P263A	P0650, P263A
Manifold Absolute Pressure	P0108	P0107	P0107	P0106	P0106	P1101	NA	NA	NA	NA
Mass Air Flow	P0103	P0102	P0102	P0101	P0101	P1101	NA	NA	NA	NA
Mass Air Flow 2	NA	NA	NA	NA	NA	P1101	NA	NA	NA	NA
Mass Air Flow Supply Voltage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outside Air Temperature	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pedal Position 1	P2123	P2122	P2122	P2138	P2138	NA	NA	NA	NA	NA
Pedal Position 2	P2128	P2127	P2127	P2138	P2138	NA	NA	NA	NA	NA
Performance Traction Torque Request Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Powertrain Relay Control	NA	NA	NA	NA	NA	NA	NA	P0687	P0685, P0686	P0685, P0686
Powertrain Relay Feedback	NA	NA	NA	NA	P0690	NA	NA	NA	NA	NA
Reverse Inhibit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SENT Communication A Circuit (Throttle)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SIDI High Pressure Pump	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SIDI High Pressure Sensor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

HD OBD Monitor System Table

SIDI High Pressure Start	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SIDI Ignition Module Supply Voltage - Group 1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SIDI Ignition Module Supply Voltage - Group 2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SIDI Injector Driver Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Skip Shift Solenoid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Starter Relay Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Supercharger Bypass Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Supercharger Inlet Pressure	NA	NA	NA	NA	NA	P1101	NA	NA	NA	NA
System Voltage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Throttle Position 1	P0123	P0122	P0122	P2135	P2135	P0068, P0121, P2119	NA	NA	NA	NA
Throttle Position 2	P0223	P0222	P0223	P2135	P2135	P0068, P0121, P2119	NA	NA	NA	NA
Traction Control Torque Request Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transmission Control Torque Request Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transmission Mode Switch	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transmission Output Speed Hi : Replicated TOS Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Turbocharger Boost Pressure	NA	NA	NA	NA	NA	P1101	NA	NA	NA	NA
Turbocharger Bypass	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Turbocharger Bypass B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Turbocharger Wastegate B Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Turbocharger Wastegate Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Two Stage Oil Pump	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vehicle Speed	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vehicle Speed Sensor B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA