

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Heater Coolant Pump Control Circuit Open	B269A	Diagnoses the Heater Coolant Pump low side driver circuit for circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit: ≥ 200 K Ω impedance between signal and controller ground.	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Open Circuit Test	= True = True = True =====	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Heater Coolant Pump Control Circuit Low	B269C	Diagnoses the Heater Coolant Pump low side driver circuit for circuit faults.	Voltage low during driver off state (indicates short- to-ground)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Ground Short Circuit Test	= True = True = True =====	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Heater Coolant Pump Control Circuit High	B269D	Diagnoses the Heater Coolant Pump low side driver circuit for circuit faults.	Voltage low during driver on state (indicates short to power)	Short to power: ≤ 0.5 Ω impedance between signal and controller power.	Run Crank Ignition in Range Engine not cranking Run Crank active == Above is true and == Last Power Short Circuit Test	= True = True = True =====	5 failures out of 10 samples 1 sec/ sample Continuous	Type B, 2 Trips

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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 > 6.00 deg. (CamPosErrorLimlc1)	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 < 6.00 (CamPosErrorLimlc1) or have both > 19.00 deg. (PerfMaxlc1). Desired cam position cannot vary more than 3.00 Cam Deg for at least 3.00 sec. (StablePositionTime1c1)	135.00 failures out of 150.00 samples 100 ms / sample	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft System Performance – Bank 1	P0014	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Exhaust cam Bank 1) Cam Position Error > 6.00 deg. (CamPosErrorLimEc1)	DTC's are NOT active: P0013, ExhaustCamSensorTFTKO CrankSensorTFTKO CrankExhaustCamCorrelationFA	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 < 6.00 deg. (CamPosErrorLimEc1) or have both > (19.00) (PerfMaxEc1). Desired cam position cannot vary more than 3.00 Cam Deg for at least 3.00 sec. (StablePositionTimeEc1)	135.00 failures out of 150.00 samples 100 ms / sample	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor A occurs during the incorrect crank position	4 cam sensor pulses more than -7.9 crank degrees before or 12.1 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

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 Sensor B	P0017	Detects cam to crank misalignment by monitoring if cam sensor pulse for bank 1 sensor B occurs during the incorrect crank position	4 cam sensor pulses more than -7.9 crank degrees before or 12.1 crank degrees after nominal position in one cam revolution.		Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser is in "parked" position No Active DTCs: Time since last execution of diagnostic	P0335, P0336 P0365,P0366 5VoltReferenceA_FA 5VoltReferenceB_FA < 1.0 seconds	2 failures out of 3 tests. A failed test is 4 failures out of 5 samples. There is a delay after the first failed test to allow the camshaft position to return to the park position. This time is defined by the table "Cam Correlation Oil Temperature Threshold". One sample per cam rotation	Type B, 2 Trips

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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 open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		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

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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 open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		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

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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	$3.7 < \Omega < 8.7$	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 °C > 28,800 seconds -30.0 < °C < 45.0 < 32.0 volts < 0.20 seconds	Once per valid cold start	Type B, 2 Trips

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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	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Heater Resistance outside of the expected range of	$4.0 < \Omega < 10.7$	No Active DTC's Coolant – IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 °C > 28,800 seconds -30.0 < °C < 45.0 < 32.0 volts < 0.30 seconds	Once per valid cold start	Type B, 2 Trips

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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	<p>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</p> <p>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</p>	<p>Table, f(TPS). See supporting tables: Delta MAP Threshold f(TPS)</p> <p>Table, f(TPS). See supporting tables: Delta MAF Threshold f(TPS)</p> <p>Table, f(RPM). See supporting tables: Maximum MAF f (RPM)</p> <p>Table, f(Volts). See supporting tables: Maximum MAF f (Volts)</p>	Engine Speed	<p>> 800 RPM</p> <p>Run/Crank voltage > 6.41</p>	<p>Continuously fail MAP and MAF portions of diagnostic for 0.1875 s</p> <p>Continuous in MAIN processor</p>	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module SIDI High Pressure Pump min/ max authority	P0089	This DTC Detects pump control windup to its max or min authority	High Pressure Fuel Pump Delivery Angle High Pressure Fuel Pump Delivery Angle	$\geq 240^\circ$ Or $\leq 0^\circ$	Battery Voltage Low Side Fuel Pressure Engine Run Time Barometric Pressure Inlet Air Temp Fuel Temp Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and	≥ 11 Volts > 0.275 MPa \geq KtFHPD_t_PumpCntrlEng RunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking ≥ 70.0 KPA ≥ -20.0 degC $-20 \leq \text{Temp degC} \leq 90$	Windup High - 750 failures out of 938 samples Windup Low - 750 failures out of 938 Samples	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Pump Control Solenoid Enable Low Side Open Circuit	P0090	This DTC checks the circuit for electrical integrity during operation.	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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >= 11 volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Pump Control Solenoid Enable Low Side Short to Ground	P0091	This DTC checks the circuit for electrical integrity during operation.	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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >= 11 volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Pump Cntrl Solenoid Enable Low Side Short to Power	P0092	This DTC checks the circuit for electrical integrity during operation.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Engine Speed Battery Voltage	>= 50 RPM >= 11 Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Start Diagnostic	P00C6	This DTC checks the high side fuel pressure during engine cranking	The ECM detects that the fuel pressure is not rising or has fallen beyond acceptable limits during engine cranking	<p>Pressure Fall Test: High Side Fuel Rail Pressure <= Supporting Table KtFHFD_p_HPS_PressFallLoThrsh</p> <p>Pressure Rise Test: High Side Fuel Pressure < Supporting Table KtFHPC_p_HighPressStart</p>	<p>Low side feed fuel pressure</p> <p>Engine Run Time Run/Crank Voltage Engine Coolant</p> <p>For each engine start, only 1 diagnostic is performed. The pressure rise test will run if High side fuel pressure is less than KtFHPC_p_HighPressStart, otherwise, the pressure fall diagnostic will run. The pressure fall runs when the engine is cranking.</p>	<p>>= 0 KPA</p> <p>< = 0 sec > 8 Volts -100 <= °C <= 80</p> <p>All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT, IAT2 and ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable</p>	<p>Pressure Fall Test: Injected cylinder events >= Supporting Table KtFHFD_Cnt_HPS_PressFallLoThrsh</p> <p>Pressure Rise Test: Time >= Supporting Table KtFHPC_t_HighPressStartTmout</p>	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Barometric Pressure Inlet Air Temp	counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active >= 70.0 KPA >= -20.0 DegC		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control Circuit Open	P00C8	This DTC checks the circuit for electrical integrity during operation.	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 Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control Circuit Low	P00C9	This DTC checks the circuit for electrical integrity during operation.	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 Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Engine Speed Battery Voltage	>= 50 RPM >= 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control Circuit High	P00CA	This DTC checks the circuit for electrical integrity during operation.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Engine Speed Battery Voltage	>= 50 RPM >= 11 Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

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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) > 17 grams/sec > 25.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 575 RPM <= 6,600 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_F A 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

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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	<= 500 Hertz (~ 0.25 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 11.0 Volts >= 1.0 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

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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	>= 11,000 Hertz (~ 328.0 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 300 RPM >= 11.0 Volts >= 1.0 seconds	200 failures out of 250 samples 1 sample every cylinder firing event	Type B, 2 Trips

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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)	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 575 RPM <= 6,600 RPM >= -7 Deg C <= 125 Deg C >= -20 Deg C <= 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables.	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	999 failures out of 5 samples		

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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	

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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

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

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

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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	< 58 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

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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	> 142,438 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

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Intermittent In-Range	P0114	Detects a noisy or erratic IAT signal circuit or IAT sensor	String Length Where: "String Length" = sum of "Diff" calculated over And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)	> 125.00 DegC 10 consecutive IAT samples	Continuous		4 failures out of 5 samples Each sample takes 1.0 seconds	Type B, 2 Trips

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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.	<p>A failure will be reported if any of the following (1-3) occur after the following soak conditions, Engine off time > 25,200 seconds Propulsion system off time > 0 seconds</p> <p>1) ECT at power up > IAT at power up by an IAT based table lookup value (fast fail).</p> <p>2) ECT at power up > IAT at power up by 15.8 Deg C and a block heater has not been detected.</p> <p>3) ECT at power up > IAT at power up by 15.8 Deg C and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag</p>	<p>See the table named: Fail if power up ECT exceeds IAT by these values in the Supporting tables section</p> <p>= False</p>	<p>No Active DTC's</p> <p>Non-volatile memory initialization</p> <p>Test complete this trip Test aborted this trip IAT LowFuelCondition Diag</p> <p>===== Block Heater detection is enabled when either of the following occurs:</p> <p>1) ECT at power up > IAT at power up by</p> <p>2) Cranking time</p> <p>===== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs:</p> <p>1a) Vehicle drive time</p> <p>1b) Vehicle speed</p> <p>1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows:</p> <p>1d) IAT drops from power</p>	<p>VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTime Valid TimeSinceEngineRunning Valid</p> <p>= Not occurred</p> <p>= False = False ≥ -7 °C</p> <p>= False</p> <p>===== > 15.8 °C</p> <p>< 10.0 seconds</p> <p>===== Block Heater is detected and diagnostic is aborted when 1) or 2) occurs:</p> <p>> 400 seconds</p> <p>> 14.9 MPH</p> <p>0.50 times the seconds with vehicle speed below 1b</p>	<p>1 failure</p> <p>500 msec/ sample</p> <p>Once per valid cold start</p>	Type B, 2 Trips

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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	$\geq 5.3^{\circ}\text{C}$ $\geq 5^{\circ}\text{C}$ Within ≤ 60 seconds ===== > 1800 seconds $\leq -7^{\circ}\text{C}$		

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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 (@ 150°C)	< 47 Ohms			5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

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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 (@ -60°C)	> 320,000 Ohms	Engine run time OR IAT min	> 10.0 seconds ≥ 0.0 °C	5 failures out of 6 samples 1 sec/ sample Continuous	Type B, 2 Trips

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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) positive step change is greater than calculated high limit OR 2) negative 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 calculated 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. *****	11.0 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

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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) > 17 grams/sec <= 25.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 575 RPM <= 6,600 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor based on MAF Est See "Residual Weight Factor" tables. No Active DTCs: MAP_SensorCircuitFA EGRValvePerformance_F A MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA No Pending DTCs: EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault.	Total energy transferred to the engine cooling system is greater than the predicted energy before: ===== Range #1 (Primary test) ECT reaches 69.0 °C when IAT min is < 52.0 °C and ≥ 10.0 °C. ===== Range #2 (Alternate test) ECT reaches 55.0 °C when IAT min is < 10.0 °C and ≥ -7.0 °C. =====	See the two tables named: Maximum Total Energy transferred to Cooling System for IAT and Start-up ECT conditions (Primary Test) and Maximum Total Energy transferred to Cooling System 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 Cooling System Energy Vehicle Speed ===== === Range #2 === (Alternate) Test ECT at start run Average Cooling System Energy Vehicle Speed ===== == Cooling System ===== = Energy Adjustments == 1) Max. cooling system power when accumulating energy	MAP_SensorFA MAF_SensorFA TPS_Performance_FA TPS_FA TPS_ThrottleAuthorityDefaulted IAT_SensorFA ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA EngineTorqueInaccurate ≥ 1,800 seconds ≥ 30 seconds Ethanol ≤ 87 % ===== ≤ 64 °C ≥ 5.0 kW > 5.0 mph for at least 0.5 miles ===== ≤ 50 °C ≥ 5.0 kW > 5.0 mph for at least 0.5 miles ===== ===== 32.0 kW	30 failures to set DTC 1 sec/ sample Once per ignition key cycle	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					2) When Cooling system power is <9.0 kW then it is set to 3) With Decel Fuel Cut Off active, Cooling System energy is reduced by multiplying actual power by 4) With Hybrid Engine Off Active, Cooling System Energy is reduced by ===== Diagnostic will restart (using the lower value) if ECT drops	0.0 kW 4.00 times 6.00 kW each second ===== ≥ 3.0 °C below previous minimum ECT		

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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_ThrottleAuthorityDef aulted MAF_SensorFA EthanolCompositionSens or_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol ===== MAP_SensorFA EvapPurgeSolenoidCircuit _FA EvapFlowDuringNonPurg e_FA EvapVentSolenoidCircuit_ FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt _FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 45.0 seconds when engine soak time > 28,800 seconds > 45.0 seconds when engine soak time ≤ 28,800 seconds 0.9912 ≤ ratio ≤ 1.0137 50 ≤ mgram ≤ 500 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

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

13 OBDG05C Engine Diagnostics

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	P0133	This DTC determines if the O2 sensor response time is degraded.	The average response time is calculated over the test time, and compared to the threshold. Refer to O2S Slow Response Bank 1 Sensor 1 "Pass/Fail Threshold table" in the Supporting Tables tab.		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 Green Sensor Delay Criteria - Airflow and Green Sensor Delay Criteria - Limit for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					O2 Heater on for Learned Htr resistance Engine Coolant IAT Engine run Accum Time since any AFM status change Time since Purge On to Off change Time since Purge Off to On change Engine airflow Engine speed Fuel Condition Baro Air Per Cylinder Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain ===== All of the above met for	≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 68 °C > -40 °C > 120 seconds > 2.0 seconds > 0.0 seconds > 1.5 seconds 14 ≤ grams/second ≤ 40 1,000 ≤ RPM ≤ 3,500 < 87 % Ethanol > 70 kpa ≥ 200 mGrams = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 % ===== > 3.0 seconds		

13 OBDG05C Engine Diagnostics

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_ThrottleAuthorityDef aulted MAF_SensorFA EthanolCompositionSens or_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Oxygen Sensor Signal	< 40 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 FuelTankPressureSnrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active = Not active 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False 0.9912 ≤ ratio ≤ 1.0137 120 ≤ mgrams ≤ 500 = Closed Loop = TRUE Enabled (On) Ethanol ≤ 87 %DFCO not active > 5.0 seconds	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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	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_ThrottleAuthorityDef aulted MAF_SensorFA EthanolCompositionSens or_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds ≤ 87 %Ethanol ===== MAP_SensorFA EvapPurgeSolenoidCircuit _FA EvapFlowDuringNonPurg e_FA EvapVentSolenoidCircuit_ FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt _FA FuelInjectorCircuit_FA AIR System FA = False ≤ 87 % Ethanol > 105.0 seconds when engine soak time > 28,800 seconds > 105.0 seconds when engine soak time ≤ 28,800 seconds 0.9912 ≤ ratio ≤ 1.0137 50 ≤ mgrams ≤ 500 not = Power Enrichment	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Rich to Lean voltages range during Rich to Lean transition. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Post O2 sensor normalized integral value OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)	> 8.0 units > 43.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)	No Active DTC's B1S2 DTC's Not Active this key cycle System Voltage Learned heater resistance ICAT MAT Burnoff delay Green O2S Condition Low Fuel Condition Diag Post fuel cell 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 Green Sensor Delay Criteria - Airflow and Green Sensor Delay Criteria - Limit for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable)	Frequency: Once per trip Note: if NaPOPD_b_Res etFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_Rap idResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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)	> 11.0 units > 108 grams (lower voltage threshold is 300 mvolts and upper voltage threshold is 600 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 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 Green Sensor Delay Criteria (B1S2 and B2S2 (if applicable)) in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if	Frequency: Once per trip Note: if NaPOPD_b_Res etFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_Rap idResponseActive = TRUE, multiple tests per trip are allowed.	Type A, 1 Trips EWMA

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>=====</p> <p>After above conditions are met: Fuel Enrich mode continued.</p> <p>=====</p> <p>During this test the following must stay TRUE or the test will abort: 0.96 ≤ Fuel EQR ≤ 1.01</p>	<p>applicable) P2271 (and P2273 if applicable) P013F (and P014B if applicable)</p> <p>=====</p>		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	Post O2 sensor voltage AND The Accumulated mass air flow monitored during the Delayed Response Test under DFCO DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is greater or equal to	> 450 mvolts > 30 grams > 2 secs > 3 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 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 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 Green Sensor Delay Criteria - Airflow and 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 B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Number of fueled cylinders ===== After above conditions are met: DFCO mode entered (wo driver initiated pedal input).	≤ 3 cylinders =====		

13 OBDG05C Engine Diagnostics

Initial DTCs
1 of 2 SECTIONS

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	< 300 mvolts > 100 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 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 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 Green Sensor Delay Criteria (B1S2 and B2S2 (if applicable)) in Supporting Tables tab. = False = enabled P2270 (and P2272 if applicable) P013E (and P014A if applicable) P013A (and P013C if	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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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: $0.96 \leq \text{Fuel EQR} \leq 1.01$	applicable) P2271 (and P2273 if applicable) ≥ 0 cylinders =====		

13 OBDG05C Engine Diagnostics

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	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_ThrottleAuthorityDef aulted MAF_SensorFA EthanolCompositionSens or_FA 10.0 < Volts < 32.0 = All Cylinders active = Complete > 5 seconds > 150 seconds ≤ 87 % Ethanol	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Heater Current outside of the expected range of	0.3 > amps > 2.5	No Active DTC's System Voltage Heater Warm-up delay O2S Heater device control B1S1 O2S Heater Duty Cycle All of the above met for	ECT_Sensor_FA 10.0 < Volts < 32.0 = Complete = Not active > zero > 120 seconds	8 failures out of 10 samples Frequency: 2 tests per trip 30 seconds delay between tests and 1 second execution rate.	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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.	<p>The filtered long-term fuel trim metric</p> <p>AND</p> <p>The filtered short-term fuel trim metric (a value < 0.95 effectively nullifies the short-term fuel trim criteria)</p>	<p>>= 1.385</p> <p>>= 0.100</p>	<p>Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level</p> <p>Long Term Fuel Trim data accumulation:</p> <p>Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis</p> <p>Closed Loop Long Term FT</p> <p>Fuel Consumed</p> <p>EGR Diag.</p>	<p>400 <rpm< 6,600 > 70 kPa -20 <°C< 130 15 <kPa< 255 -20 <°C< 150 1.0 <g/s< 512.0 > 10 % or if fuel sender is faulty</p> <p>> 44.0 seconds of data must accumulate on each trip, with at least 14.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.</p> <p>(Please see "Long-Term Fuel Trim Cell Usage" in Supporting Tables for a list of cells utilized for diagnosis)</p> <p>Enabled Enabled (Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.)</p> <p>> 0.0 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only)</p> <p>Intrusive Test Not Active Intrusive Test Not Active</p>	<p>Frequency: 100 ms Continuous Loop</p>	<p>Type B, 2 Trips</p>

13 OBDG05C Engine Diagnostics

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 AmbPresDfltStatus TC_BoostPresSnsrFA O2Snsr_B1_Snsr_1_FA		

13 OBDG05C Engine Diagnostics

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	<p>Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric.</p> <p>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 ≤ 0.790, 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 > 0.790, the test passes without checking the filtered Non-Purge Long Term Fuel Trim metric.</p> <p>Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.</p>	<p>Passive Test: The filtered Non-Purge Long Term Fuel Trim metric</p> <p>AND</p> <p>The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria)</p> <p>Intrusive Test: For 2 out of 3 intrusive segments, the filtered Purge Long Term Fuel Trim metric</p> <p>AND</p> <p>The filtered Non-Purge Long Term Fuel Trim metric</p> <p>AND</p> <p>The filtered Short Term Fuel Trim metric (a value > 1.05 effectively nullifies the short-term fuel trim criteria)</p> <p>Segment Def'n: Segments can last up to 35 seconds and are separated by the lesser of 30 seconds of purge-on time or enough time to purge 18 grams of vapor.</p>	<p>≤ 0.780</p> <p>≤ 2.000</p> <p>≤ 0.790</p> <p>≤ 0.780</p> <p>≤ 2.000</p>		<p>Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.</p>	<p>Frequency: 100 ms Continuous Loop</p>	<p>Type B, 2 Trips</p>

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>A maximum of 3 completed segments or 30 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 > 0.790 for at least 60 seconds, indicating that the canister has been purged.</p>					

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Sensor Performance	P0191	This DTC detects a skewed fuel rail sensor via a comparison of measured pressure and commanded/ modeled pressure	Idle test (Low Side Fuel Pressure - High Side Fuel Pressure) ----- High Drive Test (Relief Pressure - Measured high Pressure)	SIDI High Pressure Sensor Performance Idle Test Enabled <= -0.650 MPa OR >= 0.600 MPa ----- SIDI High Pressure Sensor Performance High Drive Test Enabled <= -5.00 MPa	Vehicle Speed Pedal Position = 0 for Battery Voltage Low Pressure Fuel Pump Pressure Engine Run Time Delay counts after pump is turned off ----- Engine Speed Desired High Side Pressure Vehicle Speed Battery Voltage Low Pressure Fuel Pump	Enabled when a code clear is not active or not exiting device control Engine is not cranking <= 0.62 MPH 320 Counts (12.5ms per count) >= 11 Volts >= 0.275 MPa >= KtFHPD_t_PumpCntrlEngRunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking >= KtFHPD_Cnt_SnsPrfIdlePumpOffDly(see supporting tables) ----- 1,000 <= RPM <= 2,200 7 <= MPa <= 8 >= 18.64 MPH >= 11 Volts >= 0.275 MPa	Idle Test > = 240 counts (12.5ms per count) ----- KtFHPD_Cnt_SnsPrfIdlePumpOffDly runs in 12.5 ms loopHigh Drive Test >= 160 counts (12.5ms per count)	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			----- Low Drive Test (Commanded high Pressure - Measured high Pressure) AND Modeled Injection Pressure	----- SIDI High Pressure Sensor Performance Low Drive Test Enabled >= 3.000 MPa >= 3.00 MPa	Pressure Engine Run Time ----- Engine Speed Desired High Side Pressure Vehicle Speed Battery Voltage Low Pressure Fuel Pump Pressure Engine Run Time	>= KtFHPD_t_PumpCntrlEng RunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking ----- 1,000 <= RPM <= 2,200 7.00 <= MPa <= 8.00 >= 18.64 MPH >= 11 Volts >= 0.275 MPa >= KtFHPD_t_PumpCntrlEng RunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control	----- LoDrive Test >= 240 counts (12.5ms per count) ----- Stuck Test Engine Run Time >= KtFHPD_t_Pump CntrlEngRunThr sh(See Supporting Tables) or Accumulating engine crank time >= KtFHPD t SnsP	
			----- Sensor Stuck Test Measured High Pressure (max - min)	----- SIDI High Pressure Sensor Performance Stuck Test Enabled <= 0.100 MPa	----- Engine Speed Vehicle Speed	Engine is not cranking ----- >= 2,000 RPM >= 18.64 MPH Enabled when a code clear is not active or not exiting device control Engine is not cranking Additional Enable Conditions: All must be	----- Stuck Test Engine Run Time >= KtFHPD_t_Pump CntrlEngRunThr sh(See Supporting Tables) or Accumulating engine crank time >= KtFHPD t SnsP	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0)Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Fuel InjCkt Not (FA or TFTKO) EST Driver Not(FA) Misfire detected Not(FA) MAFR sensor Not (FA) MAPR sensor Not (FA) APSR Pedal sensor Not(FA) TPSR sensor Not (FA) VSPR speed sensor Not(FA) SystemRPM Not (FA) Manual Clutch not engaged or vehicle has automatic transmission All cylinder are fuel enabled	rfStuckCrankTm out(See Supporting Tables)	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Barometric Pressure Inlet Air Temp Fuel Temp	and >= 70.0 KPA >= -20.0 DegC -20 <= Temp degC <= 90		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Sensor Out of Range Low	P0192	This DTC checks the circuit for electrical integrity during operation.	High Pressure Fuel Sensor	$\leq 5\%$ of 5Vref	Battery Voltage	≥ 11 Volts Engine Running	Both Run Continuously Engine Synchronous Mode 800 failures out of 1,000 samples Time Based Mode 400 failures out of 500 samples 6.25 ms Sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Pressure Sensor Out of Range High	P0193	This DTC checks the circuit for electrical integrity during operation.	High Pressure Fuel Sensor	>= 95 % of 5Vref	Battery Voltage	>= 11 Volts Engine Running	Both Run Continuously Engine Synchronous Mode 800 failures out of 1,000 samples Time Based Mode 400 failures out of 500 samples 6.25 ms Sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Open Circuit - (SIDI)	P0201	This DTC checks the circuit for electrical integrity during operation.	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 Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Open Circuit - (SIDI)	P0202	This DTC checks the circuit for electrical integrity during operation.	Voltage low during driver off state indicates short-to-ground or open circuit		Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 Open Circuit - (SIDI)	P0203	This DTC checks the circuit for electrical integrity during operation.	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 Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Open Circuit - (SIDI)	P0204	This DTC checks the circuit for electrical integrity during operation.	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 Open circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0261	This DTC checks the circuit for electrical integrity during operation.	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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0262	This DTC checks the circuit for electrical integrity during operation.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0264	This DTC checks the circuit for electrical integrity during operation.	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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0265	This DTC checks the circuit for electrical integrity during operation.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0267	This DTC checks the circuit for electrical integrity during operation.	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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0268	This DTC checks the circuit for electrical integrity during operation.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0270	This DTC checks the circuit for electrical integrity during operation.	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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 (SIDI)	P0271	This DTC checks the circuit for electrical integrity during operation.	Voltage high during driver on state indicates short to power	Short to power: ≤ 0.5 Ω impedance between signal and controller power	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Random Misfire Detected	P0300	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	[(>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)	Engine Run Time Engine Coolant Temp Or If ECT at startup Then ECT System Voltage + Throttle delta - Throttle delta	> 2 crankshaft revolution -7 °C < ECT < 125 °C < -7 °C 21 °C < ECT < 125 °C 9.00 < volts < 32.00 < 95.00 % per 25 ms < 95.00 % per 25 ms	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.	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)
Cylinder 1 Misfire Detected	P0301		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.	Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.)	Not Enabled	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.	
Cylinder 2 Misfire Detected	P0302							
Cylinder 3 Misfire Detected	P0303							
Cylinder 4 Misfire Detected	P0304							
			Misfire Percent Emission Failure Threshold	≥ 0.63 % P0300				
			Misfire Percent Catalyst Damage	> Catalyst_Damage_Misfire_Percentage in Supporting Tables	(at low speed/loads, one cylinder may not cause cat damage)			

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			When engine speed and load are less than the FTP calcs (3) catalyst damage exceedences are allowed.	whenever secondary conditions are met. ≤ 0 FTP rpm AND ≤ 0 FTP % load	Engine Speed Engine Load Misfire counts	> 1,000 rpm AND > 20 % load AND < 180 counts on one cylinder	Continuous	
				disable conditions:	Engine Speed	450 < 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 O AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfltStatus	4 cycle delay	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	0 cycle delay	
					Undetectable engine speed and engine load region	Undetectable region from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 8,192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	< ZeroTorqueEngLoad in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	≤ 1 % > 30 mph	4 cycle delay	
					EGR Intrusive test	Active	12 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 100.00 %	7 cycle delay	
					Driveline Ring Filter active			

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.</p> <p>Filter Driveline ring:</p> <p>Stop filter early:</p> <p>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)</p> <p>TPS Engine Speed Veh Speed</p> <p>Consecutive decels while in SCD Mode Cyl Mode Rev Mode</p> <p>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</p>	<p>> "Ring Filter" # of engine cycles after misfire in Supporting Tables</p> <p>> "Number of Normals" # of engine cycles after misfire in Supporting Tables tab</p> <p>> 3 % > 1,000 rpm > 3 mph</p> <p>> Abnormal SCD Mode > Abnormal Cyl Mode > Abnormal Rev Mode in Supporting Tables</p>		

13 OBDG05C Engine Diagnostics

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: Engine Speed Veh Speed "misfire" unrecognized if: Crankshaft snap after: isolated "misfire" repetative "misfire" Ratio of Unrecog/Recog Rough Road: Non-Crankshaft based: Rough Road Source IF Rough Road Source = WheelSpeedInECM ABS/TCS Wheel speed noise VSES IF Rough Road Source = "FromABS" ABS/TCS RoughRoad VSES IF Rough Road Source = "TOSS"	Disabled 700 < rpm < 3,000 > 0.6 mph > Min_PatternMultiplier > Max_PatternMultiplier in Supporting Tables > 1.00 Disabled Wheel Speed in ECM active > WSSRoughRoadThres active active detected active	discard test discard test discard test	

13 OBDG05C Engine Diagnostics

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 TransmissionEngagedStat e_FA (Auto Trans only) Clutch Sensor FA (Manual Trans only)	discard test 4 cycle delay	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors. Each Cylinder pair shares one compensation factor. A perfect factor would be 1.0000. Unlearned factors are defaulted out of range so the sum of factors would be out of range.	≥ 2.0040 OR ≤ 1.9960	OBD Manufacturer Enable Counter	MEC = 0	0.50 seconds Frequency Continuous100 msec	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to: 1. Excessive knock or 2. Abnormal engine noise or 3. Flat signal	Common Enable Criteria (Applies to all 3 parts of the performance diag)		Diagnostic Enabled?	Yes		Type B, 2 Trips
			Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag:		Engine Run Time	≥ 2.0 seconds		
			1. Excessive Knock Diag: Filtered Knock Intensity	> 3.26 (no units)	Engine Speed	≤ 8,500 RPM		
			VaKNKD_k_PerfCylKnock IntFilt (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)		Engine Air Flow	≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder		
			2. Abnormal Noise Diag: Filtered FFT Intensity (where 'FFT Intensity' = Non-knocking, background noise)	< Abnormal Noise Threshold (see Supporting Tables)	ECT	≥ -40 deg's C		
			3. Flat Signal Diag:	< 0.000 (no units)	IAT	≥ -40 deg's C		
					Engine Speed		First Order Lag Filters with Weight Coefficients	
					Cumulative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 400 RPM ≥ 200 Revs	Weight Coefficient = 0.0200	Updated each engine event
					Engine Speed	≥ 8,500 RPM	Weight Coefficient = 0.0100	Updated each engine event
					Cumulative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 400 Revs		
					Engine Speed	≥ 8,500 RPM		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock) VaKNKD_k_PerfCylFlatFil tInt		Cumulative Number of Engine Revs Above Min Eng Speed (per keycycle)	≥ 200 Revs	Weight Coefficient = 0.010 Updated each engine event	

13 OBDG05C Engine Diagnostics

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	<p>> OpenCktThrshMin and < OpenCktThrshMax</p> <p>See Supporting Tables</p> <p>Thresholds for OpenMethod = 20 kHz: OpenCktThrshMin (20 kHz) & OpenCktThrshMax (20 kHz)</p> <p>Thresholds for OpenMethod = NormalNoise: OpenCktThrshMin (Normal Noise) & OpenCktThrshMax (Normal Noise)</p>	<p>Diagnostic Enabled?</p> <p>Engine Run Time</p> <p>Engine Speed</p> <p>Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)</p> <p>Engine Air Flow</p> <p>ECT</p> <p>IAT</p>	<p>Yes</p> <p>≥ 2.0 seconds</p> <p>≥ 400 RPM and ≤ 8,500 RPM</p> <p>≥ 100 revs</p> <p>≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder</p> <p>≥ -40 deg's C</p> <p>≥ -40 deg's C</p>	<p>First Order Lag Filter with Weight Coefficient</p> <p>Weight Coefficient = 0.0100</p> <p>Updated each engine event</p>	Type B, 2 Trips

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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?	Yes		Type B, 2 Trips	
			Specific Enable Criteria and Thresholds for 3 individual parts of the performance diag: 1. Excessive Knock Diag: Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> 3.26 (no units)	Engine Run Time Engine Speed Engine Air Flow ECT IAT	≥ 2.0 seconds ≤ 8,500 RPM ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder ≥ -40 deg's C ≥ -40 deg's C			First Order Lag Filters with Weight Coefficients
			2. Abnormal Noise Diag: Filtered FFT Intensity: (where 'FFT Intensity' = Non-knocking, background noise)	< Abnormal Noise Threshold (see Supporting Tables)	Engine Speed Cumulative Number of Engine Revs Above Min Eng Speed (per key cycle)	≥ 400 RPM ≥ 100 Revs	Weight Coefficient = 0.0050		Updated each engine event
3. Flat Signal Diag:	< 0.000 (no units)	Engine Speed Cumulative	≥ 8,500 RPM	Weight Coefficient = 0.0025	Updated each engine event				

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Filtered Signal Delta (Current FFT Intensity - Ave_Intensity_No-Knock)		Number of Engine Revs Above Min Eng Speed (per keycycle)	≥ 100 Revs	WeightCoefficient t = 0.010 Updated each engine event	

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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	>= 1.0 seconds	Engine is Running Starter is not engaged No DTC Active:	5VoltReferenceB_FA	Continuous every 12.5 msec	
			No crankshaft pulses received		Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366	2 failures out of 10 samples One sample per engine revolution	

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	>= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335	Continuous every 250 msec	Type B, 2 Trips
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged No DTC Active:	5VoltReferenceB_FA	Continuous every 12.5 msec	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 51 > 65	Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0365 P0366	8 failures out of 10 samples One sample per engine revolution	

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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	>= 5.5 seconds	Starter engaged AND (cam pulses being received	= FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			OR					
			Time that starter has been engaged without a camshaft sensor pulse	>= 4.0 seconds	(DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow			
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged No DTC Active:			
No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Continuous every MEDRES event				
The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle				

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 OR > 10	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 OR > 402	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	8 failures out of 10 samples Continuous every engine cycle	

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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).	<p>The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.</p> <p>Voltage low during driver off state (indicates short-to-ground or open circuit)</p> <p>Voltage high during driver on state (indicates short-to-power)</p>	<p><u>Short to ground:</u> ≤ 0.5 Ω impedance between signal and controller ground</p> <p><u>Open Circuit:</u> ≥ 200 kΩ impedance between signal and controller ground</p> <p><u>Short to power:</u> ≤ 0.5 Ω impedance between signal and controller power</p>	<p>Engine running</p> <p>Ignition Voltage</p>	> 5.00 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type B, 2 Trips

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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).	<p>The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.</p> <p>Voltage low during driver off state (indicates short-to-ground or open circuit)</p> <p>Voltage high during driver on state (indicates short-to-power)</p>	<p><u>Short to ground:</u> ≤ 0.5 Ω impedance between signal and controller ground</p> <p><u>Open Circuit:</u> ≥ 200 kΩ impedance between signal and controller ground</p> <p><u>Short to power:</u> ≤ 0.5 Ω impedance between signal and controller power</p>	<p>Engine running</p> <p>Ignition Voltage</p>	> 5.00 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type B, 2 Trips

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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).	<p>The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.</p> <p>Voltage low during driver off state (indicates short-to-ground or open circuit)</p> <p>Voltage high during driver on state (indicates short-to-power)</p>	<p><u>Short to ground:</u> ≤ 0.5 Ω impedance between signal and controller ground</p> <p><u>Open Circuit:</u> ≥ 200 kΩ impedance between signal and controller ground</p> <p><u>Short to power:</u> ≤ 0.5 Ω impedance between signal and controller power</p>	<p>Engine running</p> <p>Ignition Voltage</p>	> 5.00 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type B, 2 Trips

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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).	<p>The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.</p> <p>Voltage low during driver off state (indicates short-to-ground or open circuit)</p> <p>Voltage high during driver on state (indicates short-to-power)</p>	<p><u>Short to ground:</u> ≤ 0.5 Ω impedance between signal and controller ground</p> <p><u>Open Circuit:</u> ≥ 200 kΩ impedance between signal and controller ground</p> <p><u>Short to power:</u> ≤ 0.5 Ω impedance between signal and controller power</p>	<p>Engine running</p> <p>Ignition Voltage</p>	> 5.00 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Determines if a fault exists with the cam position bank 1 sensor B signal	Time since last camshaft position sensor pulse received	>= 5.5 seconds	Starter engaged AND (cam pulses being received	= FALSE = FALSE = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type B, 2 Trips
			OR					
			Time that starter has been engaged without a camshaft sensor pulse	>= 4.0 seconds	(DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow			
			Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	Engine is running Starter is not engaged No DTC Active:			
No camshaft pulses received during first 12 MEDRES events (There are 12 MEDRES events per engine cycle		Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Continuous every MEDRES event				
The number of camshaft pulses received during 100 engine cycles	= 0	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	8 failures out of 10 samples Continuous every engine cycle				

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Determines if a performance fault exists with the cam position bank 1 sensor B signal	The number of camshaft pulses received during first 12 MEDRES events is OR (There are 12 MEDRES events per engine cycle)	< 4 OR > 10	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 OR > 402	Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensorFA	8 failures out of 10 samples Continuous every engine cycle	

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Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Incorrect Airflow	P0411	Detects an insufficient flow condition. This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open). Leaks downstream of the valve are detected via an evaluation of average pressure error and average "String Length" (SL) – a term that represents the absolute pressure delta accumulated every 6.25ms, then averaged over the duration of the test. Low SL values are indicative of downstream leaks or blockages.	Average Pressure Error or Average Pressure Error or OR the following String Length (SL) Test: Average Pressure Error or Average Pressure Error or and the Average String Length or NOTE: Average Pressure Error is the average difference between the predicted pressure and the measured pressure	> 4.5 kPa Bank 1 > 4.5 kPa Bank 2 < -7.5 kPa Bank 1 < -7.5 kPa Bank 2 > 5.0 kPa Bank 1 > 5.0 kPa Bank 2 < -1.0 kPa Bank 1 < -1.0 kPa Bank 2 < SL Threshold Bank 1 Table < SL Threshold Bank 2 Table	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not SL Stability time SL RPM range No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec > 4.0 seconds Bank 1 > 4.0 seconds Bank 2 < 4,700 RPM or > 4,900 AIRSystemPressureSens or FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 1 Conditional test weight > 7.0 seconds Total 'String Length' accumulation time: > 10.0 sec Bank1 > 10.0 sec Bank2 Frequency: Once per trip when AIR pump commanded On Conditional test weight is calculated by multiplying the following Factors: Phase 1 Baro Test Weight Factor, Phase 1 MAF Test Weight Factor, Phase 1 System Volt Test Weight Factor, Phase 1 Ambient Temp Test Weight Factor (see Supporting Tables)	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Solenoid Control Circuit	P0412	This DTC checks the AIR solenoid circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.	20 failures out of 25 samples	System Voltage	> 10.0 Volts < 32.0	25 samples (250 ms per sample) Continuous	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR Pump Control Circuit	P0418	This DTC checks the AIR Pump circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.	20 failures out of 25 samples	System Voltage	> 10.0 Volts < 32.0	25 samples (250 ms per sample) Continuous	Type B, 2 Trips

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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	<p>NOTE: The information below applies to applications that use the Decel Catalyst Monitor Algorithm</p> <p>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</p> <p>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</p>	Normalized Ratio OSC Value (EWMA filtered)	< 0.35	<p>All enable criteria associated with P0420 can be found under P2270 - (O2 Sensor Signal Stuck Lean Bank 1 Sensor 2)</p> <p>Rapid Step Response (RSR) feature will initiate multiple tests:</p> <p>If the difference between current EWMA value and the current OSC Normalized Ratio value is</p> <p>and the current OSC Normalized Ratio value is</p> <p>Maximum number of RSR tests to detect failure when RSR is enabled.</p> <p>General Enable Criteria</p> <p>In addition to the p-codes listed under P2270, the following DTC's shall also not be set:</p>	<p>> 0.33</p> <p>< 0.50</p> <p>15</p> <p>O2S_Bank_1_Sensor_1_FA O2S_Bank_1_Sensor_2_FA O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA</p>	<p>1 test attempted per valid decel period</p> <p>Minimum of 1 test per trip</p> <p>Maximum of 3 tests per trip</p> <p>Frequency: Fueling Related : 12.5 ms</p> <p>OSC Measurements: 100 ms</p> <p>Temp Prediction: 12.5ms</p>	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow)</p> <p>Normalized Ratio Calculation = (1-2) / (3-2)</p> <p>A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.</p> <p>The Catalyst Monitoring Test is completed during a decel fuel cutoff event. This fuel cutoff event occurs following a rich intrusive 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.</p> <p>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)</p>						

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>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.</p>			<p>Startup delta deg C (ECT-IAT)</p> <p>OR</p> <p>2. Short Soak and Previous EAT Valid</p> <p>Previous time since engine off</p> <p>OR</p> <p>3. Less than a short soak and Previous EAT Not Valid</p> <p>Previous time since engine off</p> <p>AND</p> <p>Vehicle Speed</p> <p>AND</p> <p>Mass Air Flow</p> <p>Must expire Estimate of Ambient Temperature Valid Conditioning Time. Please see P0442: Estimate of Ambient Temperature Valid Conditioning Time Table in Supporting Tables.</p> <p>OR</p> <p>4. Not a Cold Start and greater than a Short Soak</p> <p>Previous time since engine off</p> <p>AND</p> <p>Vehicle Speed</p> <p>AND</p> <p>Mass Air Flow</p>	<p>≤ 8 °C</p> <p>≤ 7,200 seconds</p> <p>≤ 7,200 seconds</p> <p>≥ 19.9 mph</p> <p>≥ 8 g/sec</p> <p>> 7,200 seconds</p> <p>≥ 19.9 mph</p> <p>≥ 8 g/sec</p>		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>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.</p> <p>1. High Fuel Volatility</p> <p>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.</p> <p>OR</p> <p>2. Vacuum Refueling Detected</p> <p>See P0454 Fault Code for information on vacuum refueling algorithm.</p> <p>OR</p> <p>3. Fuel Level Refueling Detected</p> <p>See P0464 Fault Code for information on fuel level refueling.</p> <p>OR</p>	<p>< -5</p>		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>4. Vacuum Out of Range and No Refueling</p> <p>See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.</p> <p>OR</p> <p>5. Vacuum Out of Range and Refueling Detected</p> <p>See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.</p> <p>OR</p> <p>6. Vent Valve Override Failed</p> <p>Device control using an off-board tool to control the vent solenoid, cannot exceed during the EONV test</p> <p>OR</p> <p>7. Key up during EONV test</p> <p>No active DTCs:</p>	<p>0.50 seconds</p> <p>MAF_SensorFA ECT_Sensor_FA IAT_SensorFA VehicleSpeedSensor_FA IgnitionOffTimeValid AmbientAirDefault</p>		

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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		

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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)	P0443	Diagnoses the canister purge solenoid low 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.		PT Relay Voltage	Voltage ≥ 11 volts	20 failures out of 25 samples 250 ms / sample	Type B, 2 Trips

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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 ≥ 10 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

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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)	P0449	Diagnoses the vent solenoid low side driver circuit for circuit faults.	<p>The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.</p> <p>If the P0449 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.</p>				<p>20 failures out of 25 samples</p> <p>250 ms / sample</p>	Type B, 2 Trips

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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.	<p>The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts)</p> <p>Upper voltage threshold (voltage addition above the nominal voltage)</p> <p>Lower voltage threshold (voltage subtraction below the nominal voltage)</p> <p>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).</p> <p>When EWMA is</p> <p>the DTC light is illuminated.</p> <p>The DTC light can be turned off if the EWMA is</p> <p>and stays below the EWMA fail threshold for 3 additional consecutive trips.</p>	<p>0.2 volts</p> <p>0.2 volts</p> <p>> 0.73 (EWMA Fail Threshold),</p> <p>≤ 0.40 (EWMA Re-Pass Threshold)</p>	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

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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

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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

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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

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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.	> 25 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 ≥ 3.00 % 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

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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 155 miles.	< 3 liters	Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample	Type B, 2 Trips

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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

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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

13 OBDG05C Engine Diagnostics

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.	<p>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.</p> <p>An intermittent change in fuel level is defined as:</p> <p>The fuel level changes by and does not remain for 30 seconds during a 600 second refueling rationality test.</p>	10 % > 10 %	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		<p>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.</p> <p>100 ms / sample</p>	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Relay Control Circuit Open (ODM) (Not used on EREV)	P0480	Diagnoses the cooling fan 1 relay control 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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit Open (ODM)	P0481	Diagnoses the cooling fan 2 relay control 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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

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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

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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 filter coefficient	> 91.00 rpm 0.00300	Baro Coolant Temp Engine run time Ignition voltage Time since gear change Time since a TCC mode change IAT Vehicle speed Commanded RPM delta Idle time For manual transmissions: Clutch Pedal Position or Clutch Pedal Position	> 70 kPa > KeSPDD_T_EnbIECT_Mi n (60 °C) and < KfECTI_T_EngCoolHotHi Thresh (125 °C) Must verify KfECTI_T_EngCoolHotLo Thresh (120) is less than KfECTI_T_EngCoolHotHi Thresh (125) ≥ 60 sec 32 ≥ volts ≥ 11 ≥ 3 sec Time since a TCC mode change > 3 sec > -20 °C ≤ 1.24 kph ≤ 25 rpm > 5 sec > 12.00 pct or < 75.00 pct	Diagnostic runs in every 12.5 ms loop Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	Type B, 2 Trips

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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_BoostPresSnrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver FA		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for Idle time	TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnos tic Clutch Sensor FA AmbPresDfstdStatus P2771 > 5 sec		

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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 filter coefficient	< -182.00 rpm 0.00300	Baro Coolant Temp Engine run time Ignition voltage Time since gear change Time since a TCC mode change IAT Vehicle speed Commanded RPM delta For manual transmissions: Clutch Pedal Position or Clutch Pedal Position	> 70 kPa > KeSPDD_T_EnbIECT_Mi n (60 °C) and < KfECTI_T_EngCoolHotHi Thresh (125 °C) Must verify KfECTI_T_EngCoolHotLo Thresh (120) is less than KfECTI_T_EngCoolHotHi Thresh (125) ≥ 60 sec 32 ≥ volts ≥ 11 ≥ 3 sec > 3 sec > -20 °C ≤ 1.24 kph ≤ 25 rpm > 12.00 pct or < 75.00 pct	Diagnostic runs in every 12.5 ms loop Diagnostic reports pass or fail in 10 seconds once all enable conditions are met	Type B, 2 Trips

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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_EngSpdReqI ntvType = CeTESR_e_EngSpdMinLi mit AND VeTESR_e_EngSpdReqR espType = CeTESR_e_NoSuggestio n) Clutch is not depressed TC_BoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_F A IAT_SensorCircuitFA EvapFlowDuringNonPurg e_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_F A IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor FA		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for Idle time	FuelLevelDataFaultLow FuelConditionDiagnostic Clutch SensorFA AmbPresDfitedStatus P2771 > 5 sec		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Rough Idle	P050D	Monitors the combustion performance when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that have less than complete combustion relative to the total number of engine cycles in which Dual Pulse is active.	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific vehicle. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. see Algorithm Description Document for additional details. Incomplete combustion identified by P0300 threshold tables:	(>Idle SCD AND >Idle SCD ddt Tables) OR (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables)	Misfire Algorithm Enabled (Refer to P0300 for Enablement Requirements) OBD Manufacturer Enable Counter To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following: Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure In addition, Dual Pulse Strategy Is Enabled and Active Per the following: Engine Speed Accel Position For the engine speeds and loads in which Dual Pulse is active: Dual Pulse Error induced misfires percentage	= 0 < 500.00 degC > -10.00 degC <= 56.00 degC >= 60.00 KPa >= 250.00 RPM <= 3,000.00 RPM <= 1.00 Pct >= catalyst damaging misfire	Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active. Frequency: 100ms Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Error induced misfires percentage Engine Cycles The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following: Catalyst Temperature AND Engine Run Time OR Engine Run Time OR Barometric Pressure Dual Pulse Strategy will exit per the following: Engine Speed OR Accel Position	< 90% of the maximum achievable catalyst damaging misfire. >= 50 < 501 >= 1,000.00 degC >= 17.50 seconds > CatalystLightOffExtendedEngineRunTimeExit This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details. < 60.00 KPa > 3,200.00 RPM > 2.00 Pct		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Strategy will also exit if the any of the "Additional Dual Pulse Enabling Criteria" is not satisfied: "Additional Dual Pulse Enabling Criteria": Green Engine Enrichment Misfire Converter Protection strategy Engine Metal Overtemp strategy Fuel control state Output State Control DOD Or DFCO Power Enrichment Piston Protection Hot Coolant Enrichment Injector Flow Test General Enable DTC's Not Set:	Not Enabled Not being requested Not being requested Open Loop Not being requested for fuel Not Active Not Active Not Active Not Active Not Active		
						AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFA CrankSensorFaultActive FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						AnyCamPhaser_TFTKO Clutch Sensor FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA FuelInjectorCircuit_TFTK O FHPR_b_FRP_SnsrCkt_F A FHPR_b_FRP_SnsrCkt_T FTKO FHPR_b_PumpCkt_FA FHPR_b_PumpCkt_TFTK O TransmissionEngagedStat e_FA EngineTorqueInaccurate FuelPumpRlyCktFA		

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Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Switch	P0520	When criteria are met that assure no oil pressure should be present, read state of oil pressure switch circuit	State of Engine Oil Pressure (EOP) switch circuit	Detecting a ground w/ l.set a fault	Run/Crank powermode active Engine movement detected Key in crank position Power down engine coolant Powertrain relay voltage Run/Crank Ignition voltage AND Time since engine last running Timer for time since engine last running validity OR Engine coolant at power up Diagnostic enabled/disabled No active DTC's	= True = False = False > 80 Deg C >= 11 volts >= 11 volts AND > 3,600 Seconds = True OR < (Power down engine coolant) minus an additional 10 Deg C Disabled Fault bundles: ECT_Sensor_Ckt_FA	Fail detected for >= 12 Sec. 250 msec loop Continuous	Type X, No MIL

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit Low Voltage	P0532	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too low	(AC High Side Pressure Sensor Circuit Voltage) / 5 Volts	< 2 percent	Sensor Present Diagnostic enabled/ disabled	Enabled Enabled	80 failures out of 100 samples Performed every 25 msec	Type C, No MIL

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning High Side Pressure Sensor (HSPS) Circuit High Voltage	P0533	Determines if the Air Conditioning High Side Pressure Sensor circuit voltage is too high	(AC High Side Pressure Sensor Circuit Voltage) / 5 Volts	> 98 percent	Sensor Present Diagnostic enabled/ disabled	Enabled Enabled	80 failures out of 100 samples Performed every 25 msec	Type C, No MIL

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage Low	P0562	This DTC determines if the current system voltage is below the minimum required voltage for proper ECM operation.	System voltage	≤ 9 volts	Ignition is "ON" Engine Speed	≥ 400 RPM	5 failures out of 6 samples 1 second/sample	Type C, No MIL Not "Special Type C"

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage High	P0563	This DTC determines if the current system voltage is above the maximum allowed voltage for proper ECM operation.	System voltage	≥ 18 volts	Ignition is "ON"		5 failures out of 6 samples 1 second/sample	Type C, No MIL Not "Special Type C"

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Mutil-Function 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	TRUE 1.00	fail continuously for greater than 0.500 seconds	MIL: Type C, No MIL

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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 continuously 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	TRUE 1.00	fail continuously for greater than 90.000 seconds	MIL: Type C, No MIL

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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 continuously 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	TRUE 1.00	fail continuously for greater than 90.000 seconds	MIL: Type C, No MIL

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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	TRUE 1.00	10 / 16 counts	MIL: Type C, No MIL

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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 checksum 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				

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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

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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

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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 >	0.45716 s			When dual store updates occur.	

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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)	

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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 received		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 received			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	

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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_TestEnbl d == 1 Value of KePISD_b_ALU_TestEnbl d 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_ConfigRegTestEnbl d == 1 Value of KePISD_b_ConfigRegTestEnbl d 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_SO H_FltEnbl d == 1 Value of KePISD_b_ConfigRegTestEnbl d 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	

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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_TestEnbl d == 1 Value of KePISD_b_ALU_TestEnbl d 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_ConfigRegTestEnbl == 1 Value of KePISD_b_ConfigRegTestEnbl 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_CnvrtrTestEnbl == 1 Value of KePISD_b_A2D_CnvrtrTestEnbl 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 occurred 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	

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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 occurred 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 RAM variable, depends on length of time to write flash to RAM	
			MAIN processor DMA transfer from Flash to RAM has 1 failure			KePISD_b_DMA_XferTestEnbl == 1 Value of KePISD_b_DMA_XferTestEnbl 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	

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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)	

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Control Circuit Open	P0615	Diagnoses the starter relay high side driver circuit for circuit faults	Voltage high during driver off states (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	Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 50 ms / sample	Type C, No MIL Not "Special Type C"

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Open	P0627	Diagnoses the fuel pump relay control high side driver circuit for circuit faults	Voltage high during driver off state (indicates 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	Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Fuel Injector Control Performance	P062B	This DTC checks the circuit for electrical integrity during operation.	Internal ECU Boost Voltage OR Internal ECU Boost Voltage OR Driver Status OR Driver Status	>= 90 Volts <= 40 Volts = Not Ready = Uninitialized	Battery Voltage	>= 8.00 or >= 11.00 Enabled when a code clear is not active or not exiting device control Engine is not cranking Powertrain Relay Voltage within range	High Voltage - 160 failures out of 200 samples Low Voltage - 160 failures out of 200 samples Driver Status Not Ready- 160 failures out of 200 samples Driver Status Uninitialized - Uninitialized state for >= 100 counts All at 12.5ms per sample	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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	P0650	Diagnoses the malfunction indicator lamp control 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 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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Control (ODM) Open	P0685	Diagnoses the powertrain relay control 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 Open Circuit: ≥ 200 K Ω ohms impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	8 failures out of 10 samples 250 ms / sample	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Relay Feedback Circuit Low	P0689	This DTC is a check to determine if the Powertrain relay is functioning properly.	PT Relay feedback voltage is	≤ 5 volts	Run/Crank Voltage Powertrain relay commanded "ON" No active DTCs:	≥ 11 volts PowertrainRelayStateOn_ FA	5 failures out of 6 samples 1 second/sample	Type C, No MIL Not "Special Type C"

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Relay Control Circuit Low Voltage (ODM)	P0691	Diagnoses the cooling fan 1 relay control 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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 Relay Control Circuit High Voltage (ODM)	P0692	Diagnoses the cooling fan 1 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	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit Low Voltage (ODM)	P0693	Diagnoses cooling fan 2 relay control 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 Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	Run/Crank Voltage	Voltage ≥ 11 volts	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 Relay Control Circuit High Voltage (ODM)	P0694	Diagnoses the cooling fan 2 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	50 failures out of 63 samples 100 ms / sample	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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 Cumulative 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 ≥ 40 mg/cylinder and ≤ 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBTCM is valid	Serial Communication 2's complement message - (\$140 for PPEI2 or \$1C9 for PPEI3, \$1CA/\$1C6 for Hybrid)) OR Serial Communication message (\$140 for PPEI2 or \$1C9 for PPEI3, \$1CA/\$1C6 for Hybrid)) rolling count value OR Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period Torque request greater than torque request diagnostic maximum threshold	Message <> 2's complement of message Message rolling count value <> previous message rolling count value plus one Requested torque intervention type toggles from not increasing request to increasing request > 250 Nm for engine based traction torque system, OR > 4,000 Nm for axle based traction torque system	Serial communication to EBTCM (U0108) Power Mode Engine Running Status of traction in GMLAN message (\$4E9)	No loss of communication = Run = True = Traction Present	Count of 2's complement values not equal >= 20 Performed on every received message 8 rolling count failures out of 10 samples Performed on every received message >= 5 multi-transitions out of 5 samples. Performed every 200 ms >= 4 out of 10 samples Performed on every received message	Type C, No MIL

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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) > 17 grams/sec > 25.0 kPa) > 25.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 575 RPM <= 6,600 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.50 Filtered Throttle Model Error multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow Error multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Est MAP Model 1 Error multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 Error multiplied by MAP2 Residual Weight Factor based on RPM See "Residual Weight Factor" tables. MAP_SensorCircuitFA EGRValvePerformance_FA A MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA	Continuous Calculation are performed every 12.5 msec	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Insufficient Switching Bank 1 Sensor 1	P1133	This DTC determines if the O2 sensor is no longer sufficiently switching.	Fault condition present if Half Cycle L/R or R/L Switches are below the threshold. OR Slope Time L/R Switches OR Slope Time R/L Switches	H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to tables named O2S HC L to R Switches Limit Bank 1 Sensor 1 "Pass/Fail Threshold table" and O2S HC R to L Switches Limit Bank 1 Sensor 1 "Pass/Fail Threshold table" in Supporting tables tab) < 5 < 5	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 AmbientAirDefaultMAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA = P0131, P0132 or P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of Green Sensor Delay Criteria - Airflow and Green Sensor Delay Criteria - Limit for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab.	Sample time is 60 seconds Frequency: Once per trip	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					O2 Heater on for Learned Htr resistance Engine Coolant IAT Engine run Accum Time since any AFM status change Time since Purge On to Off change Time since Purge Off to On change Engine airflow Engine speed Fuel Baro Air Per Cylinder Fuel Control State Closed Loop Active LTM fuel cell Transient Fuel Mass Baro Fuel Control State Fuel State Commanded Proportional Gain ===== All of the above met for Time	≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 68 °C > -40 °C > 120 seconds > 2.0 seconds > 0.0 seconds > 1.5 seconds 14 ≤ gps ≤ 40 1,000 ≤ RPM ≤ 3,500 < 87 % Ethanol > 70 kpa ≥ 200 mgrams = Closed Loop = TRUE = Enabled ≤ 100.0 mgrams = Not Defaulted not = Power Enrichment DFCO not active ≥ 0.0 % ===== > 3.0 seconds		

13 OBDG05C Engine Diagnostics

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 high side circuit	P1248	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the fuel injector high side is shorted to low side		Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 high side circuit	P1249	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the fuel injector high side is shorted to low side		Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 high side circuit	P124A	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the fuel injector high side is shorted to low side		Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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 high side circuit	P124B	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the fuel injector high side is shorted to low side		Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Coil Positive Voltage Circuit Group 1 * * SIDI ONLY * *	P135A	This diagnostic checks for voltage supply to the Ignition Coils (applicable only for SIDI applications)	Common Enable Criteria Ignition Module Supply Voltage. Three possible power supply sources for Ignition Coils: Case 1: Battery Case 2: Ignition Run/ Crank Case 3: PT Relay Case Specific Enable Criteria	< 2.5 Volts Ignition Coil Power Source = (see corresponding case specific enable criteria below)	Diagnostic Enabled? PT Relay	Yes Delay starting at Key-On Ignition Run/Crank Voltage PT Relay Voltage	50 Failures out of 63 Samples 6.25 msec rate 5 Engine Revs > 11.0 volts > 11.0 volts	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	<p>Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst)</p> <p>Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst)</p> <p>(EWMA filtered)</p>	<p>< -32.00 KJ/s (high RPM failure mode)</p> <p>> 4.00 KJ/s (low RPM failure mode)</p>	<p>To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following:</p> <p>Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure</p> <p>The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:</p> <p>Catalyst Temperature AND Engine Run Time OR Engine Run Time OR</p> <p>Barometric Pressure</p> <p>Other Enable Criteria:</p>	<p>< 500.00 degC</p> <p>> -10.00 degC</p> <p><= 56.00 degC</p> <p>>= 60.00 KPa</p> <p>>= 1,000.00 degC</p> <p>>= 17.50 seconds</p> <p>></p> <p>CatalystLightOffExtendedEngineRunTimeExit</p> <p>This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.</p> <p>< 60.00 KPa</p>	<p>Runs once per trip when the cold start emission reduction strategy is active</p> <p>Frequency: 100ms Loop</p> <p>Test completes after 10 seconds of accumulated qualified data.</p>	EWMA Based - Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>OBD Manufacturer Enable Counter</p> <p>Vehicle Speed</p> <p>Allow diagnostic to calculate residual in an off-idle state. If the value of the OffIdleEnable is equal to 1 then the "DriverOffAccelPedal" will not be checked. However, if the value of OffIdleEnable is 0 then driver must be off the accel pedal</p> <p>A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. Therefore: When the Pedal Close Delay Timer is : the diagnostic will continue the calculation.</p> <p>For Manual Transmission vehicles:</p>	<p>0</p> <p>< 1.24 MPH</p> <p>0</p> <p>(A value of 1 allows diagnostic to run and calculate the residual while off idle. A value of 0 requires calculation of the residual at idle)</p> <p>> 5.00 seconds</p> <p>Clutch Pedal Top of Travel Achieved and Clutch Pedal Bottom of Travel Achieved. Refer to the "Clutch Pedal Top of Travel Achieved criteria" and "Clutch Pedal Bottom of Travel Achieved criteria" section of the "Supporting Tables" tab criteria</p>		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>The diagnostic will delay calculation of the residual value and potentially weight the residual calculation differently based on engine run time. This is to ensure the diagnostic is operating in idle speed control as well as during the peak catalyst light off period. The time weighting factor must be :</p> <p>General Enable:</p> <p>DTC's Not Set:</p>	<p>> 0 These are scalar values that are a function of engine run time. Refer to ColdStartDiagnosticDelayBasedOnEngineRunTime and the cal axis, ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis in the "Supporting Tables" for details.</p> <p>AcceleratorPedalFailure ECT_Sensor_FA IAT_SensorCircuitFA MnfdTempSensorCktFP CrankSensorFaultActive FuelInjectorCircuit_FA MAF_SensorFA MAP_SensorFA EngineMisfireDetected_FA Clutch Sensor FA IAC_SystemRPM_FA IgnitionOutputDriver_FA TPS_FA VehicleSpeedSensor_FA 5VoltReferenceMAP_OOR_Fit TransmissionEngagedState FA</p>		

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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 Transmission engine speed protection	+ 1 from previous \$19D message (PTEI3) not equal to 2's complement of transmission engine speed request + Transmission alive rolling count	Diagnostic enable bit Engine run time # of Protect Errors # of Alive Rolling Errors No idle diagnostic 506/507 code No Serial communication loss to TCM Engine Running Power mode	1 0.50 sec 10 protect errors out of 10 samples 6 rolling count errors out of 10 samples IAC_SystemRPM_FA (U0101) = TRUE Run Crank Active	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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 inability 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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hybrid Control Torque Request Circuit	P15F2	Determines if torque request from the HCP is valid	<p>1. Serial Communication 2's complement not equal for message \$181 for Strong Hybrid or Mild Hybrid Applications</p> <p>OR</p> <p>2. Serial Communication rolling count value shall be + 1 from previous \$181 message for Strong Hybrid or Mild Hybrid Applications</p>	<p>Message <> 2's complement of Engine Torque Signal</p> <p>and if Mild Hybrid:</p> <p>Message <> 2's complement of Motor Torque Signal</p> <p>OR</p> <p>Message rolling count value <> previous message rolling count value plus one</p>	<p>Secondary High Speed Bus is Present and No Serial communication loss to HCP (U1817)</p> <p>Run Crank Active</p> <p>Low Voltage not Present</p> <p>No Serial communication loss to HCP (U1817)</p> <p>Hybrid Type = Mild or Strong</p> <p>If Mild Hybrid Only: Torque source type = Crankshaft Torque</p>	<p>No loss of communication</p> <p>>= 0.50 Sec</p> <p>> 6.41</p> <p>= Mild</p> <p>= Crankshaft Torque</p>	<p>1. >= 10 Protect errors out of 16 samples</p> <p>OR</p> <p>2. >= 10 Rolling count errors out of 16 samples</p> <p>Pass diagnostic if samples >= 16</p> <p>Performed every received message</p>	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Driver Motor Torque Delivered Circuit	P15F4	Determines if torque archieved from BCP is valid	1. Serial Communication 2's complement not equal for message \$0BF for Mild Hybrid Applications OR 2. Serial Communication rolling count value shall be + 1 from previous \$0BF message for Mild Hybrid Applications	Message <> 2's complement of Motor Torque Signal OR Message rolling count value <> previous message rolling count value plus one	Secondary High Speed Bus is Present and No Serial communication loss to BCP (U1817) Run Crank Active Low Voltage not Present	No loss of Communication >= 0.50 > 6.41	1. >= 10.00 Protect errors out of 16.00 samples OR 2. >= 10.00 Rolling count errors out of 16.00 samples Executes in a 12.5ms loop	yes

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Remote Vehicle Speed Limiting Signal Circuit	P162B	Determines if the speed request from OnStar is valid	Password Protect error - Serial Communication message - (\$3ED) OR Rolling count error - Serial Communication message (\$3ED) rolling count value	Message <> two's complement of message Message <> previous message rolling count value + one	Vehicle Requested Speed Limit	< 135 MPH Can be lower speed if being requested by another non_ECM module No loss of communication	>= 10 Password Protect errors out of 10 samples OR >= 10 Rolling count errors out of 10 samples Performed on every received message	Type C, No MIL

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active and Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -20.0 degC -20 <= Temp degC <= 90		

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS SENT Comm Circuit Low	P16A0	Detects a Low Circuit Fault in the TPS SENT Communication Circuit	Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol	0.5 V		Run/Crank voltage > 6.41	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS SENT Comm Circuit High	P16A1	Detects a High Circuit Fault in the TPS SENT Communication Circuit	Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol	4.1 V		Run/Crank voltage > 6.41	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS SENT Comm Circuit Performance	P16A2	Detects a Message Fault in the TPS SENT Communication Circuit	Message Pulse < Message Pulse > or Message Age Limit >= or Signal CRC fails	0.125977 ms 0.209991 ms 3.125 ms		Run/Crank voltage > 6.41	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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	<p>Detect Processor Calculation faults due to RAM corruptions, ALU failures and ROM failures</p> <p>For all of the following cases: If the individual diagnostic threshold is equal to 2048 ms, this individual case is not applicable. If any of the following cases are X out of Y diagnostics and the fail (x) is greater than the sample (Y), this individual case is also not applicable.</p>	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 multiplier	Type A, 1 Trips
			Equivalence Ratio torque compensation exceeds threshold	-80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Absolute difference between Equivalence Ratio torque compensation and its dual store out of bounds given by threshold	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	152.21 mg	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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	15.14 degrees		Engine speed >0rpm	Up/down timer 145 ms continuous, 0.5 down time multiplier	
			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	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold 0.00 Nm			multiplier	
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 700 rpm	Up/down timer 445 ms continuous, 0.5 down time multiplier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	15.14 degrees	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			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	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multiplier	
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 970.92 Nm Low Threshold -1,456.39 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 970.92 Nm Low Threshold -1,456.39 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multiplier	
			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 multiplier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 7,000.00 or 7,200.00 rpm (hysteresis pair)	Up/down timer 145 ms continuous, 0.5 down time multiplier	
			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	

13 OBDG05C Engine Diagnostics

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 multiplier	
			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 multiplier	
			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 multiplier	
			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	

13 OBDG05C Engine Diagnostics

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 > 2.00s Number of cylinder events since engine run > 24 No fuel injector faults	Up/down timer 145ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	255 / 6 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 multiplier	

13 OBDG05C Engine Diagnostics

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 + 80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	79.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold	79.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	79.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Commanded Hybrid Immediate Crankshaft Request is less than its redundant calculation minus threshold	79.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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 175 ms continuous.	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				877.00 Nm			0.5 down time multiplier	
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	15.14 degrees	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			1. Cylinder Torque Offset exceeds step size threshold OR 2. Sum of Cylinder Torque Offset exceeds sum threshold	1. 80.30 Nm 2. 80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			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 multiplier	

13 OBDG05C Engine Diagnostics

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	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			PTO Torque Request exceeds allowed rate limited PTO Torque Request	10.04 Nm/25ms	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant	N/A		Engine speed greater than 0rpm	Up/down timer 145 ms continuous, 0.5	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			calculation				down time multiplier	
			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 145 ms continuous, 0.5 down time multiplier	
			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) + 80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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) + 80.30	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	970.92 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Driver Immediate Request is less than its redundant calculation minus threshold	970.92 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Commanded Immediate Request is greater than its redundant calculation plus threshold	970.92 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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 multiplier	
			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 multiplier	
			Difference between			Cruise has been engaged	Up/down timer	

13 OBDG05C Engine Diagnostics

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	121.37 Nm		for more than 4.00 seconds	2,048 ms continuous, 0.5 down time multiplier	
			Desired engine torque request greater than redundant calculation plus threshold	79.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Engine min capacity above threshold	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 116 ms continuous, 0.5 down time multiplier	
			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 145 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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 159 ms continuous, 0.5 down time multiplier	
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 145 ms continuous, 0.5 down time multiplier	
			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 multiplier	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Speed Control's Predicted 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 multiplier	
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 373 ms continuous, 0.5 down time multiplier	
			Desired throttle position greater than redundant calculation plus threshold	8.22 percent	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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 multiplier	
			Throttle desired torque above desired torque plus threshold	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Desired filtered throttle torque exceeds the threshold plus the higher of desired throttle torque or modeled throttle torque	80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Torque feedback proportional term is out of	High Threshold	Ignition State	Accessory, run or crank	Up/down timer 475	

13 OBDG05C Engine Diagnostics

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	40.15 Nm Low Threshold -40.15 Nm			ms continuous, 0.5 down time multiplier	
			Torque feedback integral term magnitude or rate of change is out of allowable range or its dual store copy do not match	High Threshold 75.28 Nm Low Threshold -80.30 Nm Rate of change threshold 5.02 Nm/loop	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Difference of Final Torque	High Threshold	Ignition State	Accessory, run or crank	Up/down timer	

13 OBDG05C Engine Diagnostics

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	80.30 Nm Low Threshold - 80.30 Nm			475 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.0001588 Low Threshold - 0.0001588	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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 80.30 Nm Low Threshold - 80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 80.30 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			AC friction torque is	High Threshold	Ignition State	Accessory, run or crank	Up/down timer	

13 OBDG05C Engine Diagnostics

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	25.00 Nm Low Threshold 0.00 Nm			475 ms continuous, 0.5 down time multiplier	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 80.30 Nm Low Threshold -80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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 80.30 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Supercharger friction torque is out of bounds given by threshold range	High Threshold 80.30 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			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 80.30 Nm		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 475 ms continuous, 0.5 down time	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold -80.30 Nm Rate of change threshold 5.02 Nm/loop			multiplier	
			Torque error compensation is out of bounds given by threshold range	High Threshold 80.30 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 5.09 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Low Threshold -2.50 Nm			multiplier	
			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 exceed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	1. 79.30 Nm 2. N/A 3. 79.30 Nm 4. 79.30 Nm	3. & 4.: Ignition State	1. & 2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 80.30 Nm 3. & 4.: Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Engine Vacuum and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							ms continuous, 0.5 down time multiplier	
			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 145 ms continuous, 0.5 down time multiplier	
			Min. Axle Torque Capacity is greater than threshold	-1,409.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Driver Predicted Request is greater than its redundant calculation plus threshold OR Driver Predicted Request	970.92 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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 multiplier	
			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) + 80.30 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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.	

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							0.5 down time multiplier	
			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 175 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	15.14 degrees	Ignition State	Accessory, run or crank	Up/down timer 145 ms continuous, 0.5 down time multiplier	

13 OBDG05C Engine Diagnostics

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	15.14 degrees		Engine speed >0rpm	Up/down timer 145 ms continuous, 0.5 down time multiplier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	80.30 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	80.30 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Difference of desired spark advance for	15.14 degrees		Torque reserve (condition when spark control	Up/down timer 445	

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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) > 80.30 Nm	ms continuous, 0.5 down time multiplier	
			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	80.30 Nm		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multiplier	

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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 > 700 rpm	Up/down timer 445 ms continuous, 0.5 down time multiplier	
			Rate limited cruise axle torque request and its dual store do not match within a threshold	121.37 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time multiplier	
			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 multiplier	

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal</p> <p>OR</p> <p>3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal</p>					
			<p>Commanded axle torque is greater than its redundant calculation by threshold</p>	<p>970.92 Nm</p>	<p>Ignition State</p>	<p>Accessory, run or crank</p>	<p>Up/down timer 475 ms continuous, 0.5 down time multiplier</p>	

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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	-728.20 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			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 multiplier	
			AC friction torque is greater than commanded by AC control software	25.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Engine Speed Lores	N/A		Engine speed >0rpm	Up/down timer	

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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 multiplier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant calculation is greater than a threshold	15.14 degrees		Engine speed >0rpm	Up/down timer 145 ms continuous, 0.5 down time multiplier	
			Transmission Torque Request calculations do not equal their dual stores	N/A		Run or Crank = TRUE > 0.50 s	16 / 32 counts; 25.0msec/count	
			Absolute difference of the predicted motor torque ACS and its redundant calculation is greater than a threshold	0.01 Nm			Up/down timer 475 ms continuous, 0.5 down time multiplier	

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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 <= 14 % for >= 5.0 seconds.	>= 80 counts per 100 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 <= 200 >= -20 deg. C Not Active Not Active Not Present AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorFA CamSensorAnyLocationFA EvapEmissionSystem_FA	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

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						EvapFlowDuringNonPurge_FA FuelTankPressureSnrCkt_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	> 0.0 seconds 0 0 0 0 0		
					Fail counter will increment if sample counter increments AND Post oxygen sensor control integral offset (in			

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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	<= N/A (control min.= 0) N/A (control min.= 0) -500 (control min.= -500) -500 (control min.= -500) -500 (control min.= -500) > 800 mV 800 mV 800 mV 800 mV 800 mV		

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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 <= 14 % for >= 5.0 seconds.	>= 80 counts per 100 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	>= N/A (control max.= 0) N/A (control max.= 0) 700 (control max.= 700) 700 (control max.= 700) 700 (control max.= 700) < 690 mV 690 mV 690 mV 690 mV 690 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

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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 >	8.22 percent	TPS minimum learn is not active and Throttle is being Controlled and (Engine Running or Ignition Voltage > Ignition Voltage >)	Run/Crank voltage > 6.41 Ignition voltage failure is false (P1682) TPS minimum learn is not active and Throttle is being Controlled AND ((Engine Running AND Ignition Voltage > 5.50) OR Ignition Voltage > 11.00)	15 counts; 12.5 ms/count in the primary processor	Type A, 1 Trips
			OR					
			Difference between modeled throttle position and measured throttle position >	8.22 percent	Ignition voltage failure is false (P1682)			
			Throttle Position >	38.38 percent		Powertrain Relay voltage > 6.41 TPS minimum learn is active	11 counts; 12.5 ms/count in the primary processor	
			Throttle Position >	37.38 percent		Powertrain Relay voltage > 6.41 Reduced Power is True	11 counts; 12.5 ms/count in the primary processor	

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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 Normalizd TPS2 Voltage > On the main processor)	1.7700		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
			OR					
			(Normalized TPS1 Voltage < AND Normalizd TPS2 Voltage < On the main processor)	1.3900				
				1.3640				
			(Normalized TPS1 Voltage > AND Normalizd TPS2 Voltage > On the main processor)	1.7700 1.7960		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	
			OR	1.3900				
			(Normalized TPS1 Voltage < AND Normalizd TPS2 Voltage < On the main processor)	1.3640				

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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

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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

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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

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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

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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 >	6.775 % offset at min. throttle position with a linear threshold to 9.705 % 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	

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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 faultst 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 faultst for # 3 & # 4 5V reference circuits (P06A3, P0697)	19 / 39 counts intermittent or 15 counts continuous, 12.5 ms/count in the main processor	

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 high side circuit shorted to ground	P2147	This DTC checks the circuit for electrical integrity during operation.	Voltage low during driver on state indicates short to ground	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 high side circuit shorted to power	P2148	This DTC checks the circuit for electrical integrity during operation.	Voltage 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	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 high side circuit shorted to ground	P2150	This DTC checks the circuit for electrical integrity during operation.	Voltage low during driver on state indicates short to ground	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 high side circuit shorted to power	P2151	This DTC checks the circuit for electrical integrity during operation.	Voltage 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	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 high side circuit shorted to ground	P2153	This DTC checks the circuit for electrical integrity during operation.	Voltage low during driver on state indicates short to ground	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 3 high side circuit shorted to power	P2154	This DTC checks the circuit for electrical integrity during operation.	Voltage 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	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 high side circuit shorted to ground	P2156	This DTC checks the circuit for electrical integrity during operation.	Voltage low during driver on state indicates short to ground	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 high side circuit shorted to power	P2157	This DTC checks the circuit for electrical integrity during operation.	Voltage 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	Battery Voltage Engine Run Time	>= 11 Volts >= 5 Sec P062B not FA or TFTK	10 failures out of 20 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Minimum Throttle Position Not Learned	P2176	TP sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS Voltage > AND Number of learn attempts >	0.6170 10 counts		Run/Crank voltage > 6.41 TPS minimum learn is active	2.0 secs	Type A, 1 Trips

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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.	<p>Filtered Ratio ></p> <p>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.</p> <p>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.</p> <p>The Ratio metric is calculated by selecting a 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 (Supporting Table</p>	0.60	<p>System Voltage</p> <p>Fuel Level</p> <p>Engine Coolant Temperature</p> <p>Cumulative engine run time</p> <p>Diagnostic enabled at Idle (regardless of other operating conditions)</p> <p>Engine speed range</p> <p>Engine speed delta during a short term sample period</p> <p>Mass Airflow (MAF) range</p> <p>Cumulative delta MAF during a short term sample period</p> <p>Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF = 0.050</p> <p>Air Per Cylinder (APC)</p> <p>APC delta during short term sample period</p> <p>Filtered APC delta between samples</p>	<p>no lower than 11.0 Volts for more than 0.2 seconds</p> <p>> 10.0 percent AND no fuel level sensor fault</p> <p>> -20 degrees C</p> <p>> 30.0 seconds</p> <p>No</p> <p>900 to 3,700 RPM</p> <p>< 150 RPM</p> <p>7 to 100 g/s</p> <p>< 2 g/s</p> <p>< 0.25 g/s</p> <p>100 to 600 mg/cylinder</p> <p>< 40 mg/cylinder</p> <p>< 0.30 percent</p>	<p>Minimum of 1 test per trip, up to 5 tests per trip during RSR or FIR.</p> <p>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, 4.50 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</p>	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>"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.</p> <p>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.</p> <p>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.</p>		<p>Note: first order lag filter coefficient applied to APC = 0.100</p> <p>Spark Advance</p> <p>Throttle Area (percent of max)</p> <p>Intake Cam Phaser Angle</p> <p>Exhaust Cam Phaser Angle</p> <p>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.</p> <p>Fuel Control Status Closed Loop and Long Term FT Enabled for:</p> <p>AIR pump not on CASE learn not active EGR - no device control, no intrusive diagnostics EVAP - no device control, no intrusive diagnostics Engine OverSpeed</p>	<p>5 to 55 degrees</p> <p>7 to 200 percent</p> <p>0 to 25 degrees</p> <p>0 to 25 degrees</p> <p>>= 0.99</p> <p>>= 1.2 seconds (Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables)</p>	<p>made within 5 minutes of operation.</p> <p>For RSR or FIR, 15 tests must complete before the diagnostic can report.</p>	

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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:	>= 0.60 >= 0.74 0.00 0.00 EngineMisfireDetected_F A MAP_SensorFA MAF_SensorFA ECT_Sensor_FA TPS_ThrottleAuthorityDef aulted FuelInjectorCircuit_FA AIR System FA EvapExcessPurgePsbl_F A CamSensorAnyLocationF A		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 1.0 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: 0.96 ≤ Fuel EQR ≤ 1.01	37.3 ≤ MPH ≤ 82.0 0.85 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode = enabled = not active = not active ≥ 180.0 sec 600 ≤ °C ≤ 900 = DFCE possible =====		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold.	Post O2 sensor signal AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test	> 100 mvolts > 33 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 Power Take Off EGR Intrusive diagnostic	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 Green Sensor Delay Criteria - Airflow and Green Sensor Delay Criteria - Limit for the following locations: B1S2, B2S2 (if applicable) in Supporting Tables tab. = False 1,250 ≤ RPM ≤ 2,300 2 ≤ gps ≤ 12 41.6 ≤ MPH ≤ 74.6 0.85 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode = enabled = not active = not active	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

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 ≥ 180.0 sec 600 ≤ °C ≤ 900 DFCO possible = P2270 (and P2272 if applicable) = P013E (and P014A if applicable) = P013A (and P013C if applicable) =====		

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump	P228C	Detects measured fuel rail pressure bias too low from desired fuel pressure.	Desired Pressure - Measure Pressure	>= 3.00 Mpa	Battery Voltage Low Side Fuel Pressure Engine Run Time Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and	>= 11 Volts > 0.275 MPa >= KtFHPD_t_PumpCntrlEng RunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking	Pressure Error - 750 failures out of 938 samples	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -20.0 degC -20 <= Temp degC <= 90		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump	P228D	Detects measured fuel rail pressure bias too high from desired fuel pressure	Desired Pressure - Measure Pressure	<= -3.00 Mpa	Battery Voltage Low Side Fuel Pressure Engine Run Time Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement	>= 11 Volts > 0.275 MPa >= KtFHPD_t_PumpCntrlEngRunThrsh(see supporting tables) Enabled when a code clear is not active or not exiting device control Engine is not cranking	Pressure Error - 750 failures out of 938 samples	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -20.0 DegC -20 <= Temp degC <= 90		

13 OBDG05C Engine Diagnostics

Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Bank 1	P2430	This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on.	Average Pressure Error AND Signal Variation	< 0.50 kPa < 0.15 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Stuck in range cumulative time > 5.0 seconds Frequency: Once per trip when SAI pump is commanded On	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Performance Bank 1	P2431	This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison.	Difference between AIR pressure sensor and BARO (Pump Commanded Off) or OR Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 18.0 kPa < -10.0 kPa > 50.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Transfer Case not in 4WD Low Run/crank active No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA MAF_SensorFA EngineMisfireDetected_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Skewed sensor cumulative test weight > 15.0 seconds Continuous 6.25ms loop Skewed sensor cumulative test weight is based on distance from the last Baro update. See Baro Skewed Sensor Weight Factor table.	Type B, 2 Trips

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

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Bank 2	P2435	This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on.	Average Pressure Error AND Signal Variation	< 0.50 kPa < 0.15 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Stuck in range cumulative time > 5.0 seconds Frequency: Once per trip when SAI pump is commanded On	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Performance Bank 2	P2436	This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison.	Difference between AIR pressure sensor and BARO (Pump Commanded Off) or OR Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 18.0 kPa < -10.0 kPa > 50.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Transfer Case not in 4WD Low Run/crank active No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 OR < 32.0 Volts < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA MAF_SensorFA EngineMisfireDetected_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	Skewed sensor cumulative test weight > 15.0 seconds Continuous 6.25ms loop Skewed sensor cumulative test weight is based on distance from the last Baro update. See Baro Skewed Sensor Weight Factor table.	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 2	P2437	This DTC detects an out of range low AIR pressure sensor signal	AIR Pressure Sensor signal	< 6 % of 5Vref for 800 failures out of 1,000 samples	No active DTCs:	ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA	1,000 samples (6.25 ms per sample) Continuous	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pressure Sensor Circuit Hi Voltage Bank 2	P2438	This DTC detects an out of range high AIR pressure sensor signal	AIR Pressure Sensor signal	> 94 % of 5Vref for 800 failures out of 1,000 samples	No active DTCs:	ControllerProcessorPerf_ FA 5VoltReferenceA_FA 5VoltReferenceB_FA	1,000 samples (6.25 ms per sample) Continuous	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Shut-off Valve Stuck Open	P2440	This DTC detects if one or both of the AIR system control valves is stuck open. This test is run during Phase 2 (Pump commanded On, valve commanded closed)	Average Pressure Error or or	< Bank 1 Valve Pressure Error table < Bank 2 Valve Pressure Error table > 32 kPa for either Bank	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Stability Time AIR diagnostic Phase 1 passed No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for 2.0 sec < 5,000 RPM > 50 gm/s for 3.0 sec > 0.5 seconds AIRSystemPressureSens or FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 2 Conditional test weight > 1.5 sec Frequency: Once per trip when AIR pump commanded On Conditional test weight is calculated by multiplying the following Factors: Phase 2 Baro Test Weight Factor, Phase 2 MAF Test Weight Factor, Phase 2 System Volt Test Weight Factor, Phase 2 Ambient Temp Test Weight Factor (see Supporting Tables)	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Secondary AIR System Pump Stuck On	P2444	This DTC detects if the SAI pump is stuck On. This test is run during Phase 3 (Pump commanded Off, valve commanded closed)	Average Pressure Error or or	> Bank 1 Pump Pressure Error table > Bank 2 Pump Pressure Error table < -32 kPa for either bank	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not Stability Time AIR diagnostic Phase 1 passed AIR diagnostic Phase 2 passed No active DTCs:	> 60 kPa > -11.0 deg C > -11.0 deg C < 56.0 > 1,800.0 seconds > 10.0 Volts < 32.0 < 20 kPa for > 2.0 sec < 5,000 RPM > 50 gm/s for > 3.0 sec > 4.0 seconds Phase 3 cumulative test weight is based on the distance from the last Baro update. See Baro Skewed Sensor Weight Factor table. AIRSystemPressureSensorFA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA	Phase 3 Cumulative test weight > 2.0 sec. Frequency: Once per trip when AIR pump is commanded On	Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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) OR Rolling count error - Serial Communication message (\$199 - PPEI3) rolling count value OR Range Error - Serial Communication message - (\$199 - PTEI3) TCM Requested Torque Increase OR Multi-transition error - Trans torque intervention type request change	Message <> two's complement of message Message <> previous message rolling count value + one > 250 Nm Requested torque intervention type toggles from not increasing request to increasing request	Diagnostic enabled/ disabled Power Mode Engine Running Run/Crank Active No Serial communication loss to TCM (U0101)	Enabled = Run = True > 0.50 Sec No loss of communication	>= 10 Protect errors during key cycle. Performed on every received message >= 6 Rolling count errors out of 10 samples. Performed on every received message >= 6 range errors out of 10 samples. Performed on every received message >= 3 multi-transitions out of 5 samples. Performed every 200 msec	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM/PCM Internal Engine Off Timer Performance 11.12.41 and beyond	P2610	<p>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).</p> <p>Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment.</p> <p>Range Test (RaTe): When the run/crank is not active both the hardware and mirror timers are started. The timers are compared when ECM shutdown is initiated or run/crank becomes active.</p>	<p>Count Up Test: Time difference between the current read and the previous read of the timer</p> <p>Range Test: The variation of the HWIO timer and mirror timer is</p>	<p>> 1.50 seconds</p> <p>> 25%.</p>			<p>Count Up Test: 8 failures out of 40 samples</p> <p>1 sec / sample</p> <p>Continuous while run/crank is not active and until controller shutdown is initiated.</p> <p>Range Test: Once per trip when controller shutdown is initiated or run/crank becomes active.</p>	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2Sensor Circuit Range / Performance Bank 1 Sensor 1	P2A00	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	===== Closed Loop O2S ready flag A) O2S signal must be To set Closed Loop ready flag ===== Closed Loop O2S ready flag B) Once set to ready O2S cannot be for Then set Closed Loop ready flag ===== =====	===== = False < 1,250 mvolts = True ===== = True > 1,250 mvolts > 5.0 seconds = False ===== =====	No Active DTC's System Voltage Engine Speed Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp ActiveFuel State AFM Status Predicted Exhaust Temp (B1S1) Engine run time Fuel Enrichment All of the above met for	TPS_ThrottleAuthorityDefaulted MAP_SensorFA ECT_Sensor_FA FuelInjectorCircuit_FAP0131, P0151P0132, P0152 10.0 < Volts < 32.0 500 ≤ RPM ≤ 3,400 3.2 ≤ gps ≤ 30.0 ≥ 68.0 °C = False = False DFCO not active = All Cylinders active ≥ 0.0 °C > 100 seconds = Not Active > 5 seconds	200 failures out of 250 samples. Frequency: Continuous 100 msec loop	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communicati on Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures out of these samples	≥ 4 counts ≥ 5 counts	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 or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds	Not Active on Current Key Cycle Enabled Not Active Not Active ≥= 11.00 or ≥= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips Trip(s) Type Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					CAN hardware is bus OFF for	> 0.1125 seconds		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communicati on Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures out of these samples	≥ 4 counts ≥ 5 counts	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds	Not Active on Current Key Cycle Enabled Not Active Not Active ≥= 11.00 or ≥= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips Trip(s) Type Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					CAN hardware is bus OFF for	> 0.1125 seconds		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With TCM	U0101	This DTC monitors for a loss of communication with the transmission control module	Message is not received from controller for Message \$0C7 or Message \$0F9 or Message \$199 or Message \$1F5	 ≥ 10.0 seconds ≥ 10.0 seconds ≥ 10.0 seconds ≥ 0.5 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 or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in	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 Trip(s) Type Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					accessory or run or crank and High Voltage Virtual Network Management is not active for U0101 TCM	> 0.4000 seconds Not Active on Current Key Cycle is present on the bus		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Fuel Pump Control Module	U0109	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for	≥ 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 or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds Power Mode is in	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 Trip(s) Type Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Anti- Lock Brake System (ABS) Control Module	U0121	This DTC monitors for a loss of communication with the Anti-Lock Brake System Control Module	Message is not received from controller for	≥ 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 or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds	Not Active on Current Key Cycle Enabled Not Active Not Active ≥ 11.00 or ≥ 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type C, No MIL Trip(s) Type Type C, No MIL

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U0121 Anti-Lock Brake System Control Module	> 0.4000 seconds Not Active on Current Key Cycle is present on the bus		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on 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	≥ 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 or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000 seconds	Not Active on Current Key Cycle Enabled Not Active Not Active ≥ 11.00 or ≥ 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type C, No MIL Trip(s) Type Type C, No MIL

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U0140 Body Control Module	> 0.4000 seconds Not Active on Current Key Cycle is present on the bus		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Hybrid Powertrain Control Module	U0293	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module.	Message is not received from controller for	≥ 0.5 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 or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000	Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips Trip(s) Type Type A, 1 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					seconds Power Mode is in accessory or run or crank and High Voltage Virtual Network Management is not active for U0293 Hybrid Powertrain Control Module	> 0.4000 seconds Not Active on Current Key Cycle is present on the bus		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Hybrid Powertrain Control Module on Bus B	U1817	This DTC monitors for a loss of communication with the Hybrid Powertrain Control Module on Bus B	Message is not received from controller for	≥ 0.5 seconds	General Enable Criteria: U0074 Normal CAN transmission on Bus B Device Control High Voltage Virtual Network Management Ignition Voltage Criteria: Ignition voltage Power Mode Off Cycle Enable Criteria: KeCAND_b_OffKeyCycle DiagEnbl Ignition Accessory Line or Battery Voltage General Enable Criteria and either Ignition Voltage Criteria or Off Cycle Enable Criteria met for > 3.0000	Not Active on Current Key Cycle Enabled Not Active Not Active >= 11.00 or >= 6.41 = run = 0 (1 indicates enabled) = Active > 11.00	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips Trip(s) Type Type A, 1 Trips

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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: $\leq 0.5 \Omega$ 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

13 OBDG05C Engine Diagnostics

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 low during driver on state (indicates short to power).	Short to power: $\leq 0.5 \Omega$ 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

13 OBDG05C Engine Diagnostics

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: $\leq 0.5 \Omega$ 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

13 OBDG05C Engine Diagnostics

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 low during driver on state (indicates short to power).	Short to power: $\leq 0.5 \Omega$ 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

13 OBDG05C Engine Diagnostics

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	> 0.7 EWMA (sec) ≥ 1.5 Seconds > 550 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag Green O2S Condition	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131, P0132, P0134 10.0 < Volts < 32.0 = Not active = Not active = Not active = Not active = False = Not Valid, See definition of Green Sensor Delay Criteria - Airflow and Green Sensor Delay Criteria - Limit for the following locations: B1S1, B2S1 (if applicable) in	Frequency: Once per trip Note: if NaESPD_b_Fast InitResplsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponsesActive = TRUE, multiple tests per trip are allowed	Type A, 1 Trips EWMA

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					O2 Heater (pre sensor) on for Learned Htr resistance Engine Coolant IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State =====	Supporting Tables tab. ≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 68 °C > -40 °C > 120 seconds 1,250 ≤ RPM ≤ 2,300 1,100 ≤ RPM ≤ 2,450 2 ≤ gps ≤ 12 41.6 ≤ MPH ≤ 74.6 37.3 ≤ MPH ≤ 82.0 0.85 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode = enabled = not active = not active ≥ 180.0 sec 600 ≤ °C ≤ 900 = DFCO possible =====		

13 OBDG05C Engine Diagnostics

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 1.0 seconds, and then the Force Cat Rich intrusive stage is requested. ===== Pre O2S voltage B1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders ===== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).	===== ≥ 690 mvolts = DFCO active ≤ 3 cylinders =====		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					O2 Heater (pre sensor) on for Learned Htr resistance Engine Coolant IAT Engine run Accum Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled) Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled) Closed loop integral Closed Loop Active Evap Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State Number of fueled	Supporting Tables tab. ≥ 40 seconds = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's") > 68 °C > -40 °C > 120 seconds 1,250 ≤ RPM ≤ 2,300 1,100 ≤ RPM ≤ 2,450 2 ≤ gps ≤ 12 41.6 ≤ MPH ≤ 74.6 37.3 ≤ MPH ≤ 82.0 0.85 ≤ C/L Int ≤ 1.07 = TRUE not in control of purge not in estimate mode = enabled = not active = not active ≥ 180.0 sec 600 ≤ °C ≤ 900 = DFCO inhibit		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					cylinders ===== When above conditions are met: Fuel Enrich mode is entered.	≥ 0 cylinders =====		

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Control Circuit Low Voltage	P0616	Diagnoses the starter relay 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 50 ms / sample	Type C, No MIL Not "Special Type C"

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Starter Relay Control Circuit High Voltage	P0617	Diagnoses the starter relay high side driver circuit for circuit faults	Voltage high during driver off states (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	Run/Crank Voltage Engine Speed	Voltage ≥ 11 volts ≥ 0 RPM	8 failures out of 10 samples 50 ms / sample	Type C, No MIL Not "Special Type C"

13 OBDG05C Engine Diagnostics

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

13 OBDG05C Engine Diagnostics

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 samples 250 ms / sample, continuous	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit Low – Bank 1	P2090	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.	Short to ground: ≤ 0.5 Ω to a voltage source within the Vehicle Ground Voltage Range relative to PWRGND	System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples 250 ms / sample, continuous	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

Component/ System	Fault Code	Monitor Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit High – Bank 1	P2091	Diagnoses the VVT system high side driver circuit for circuit faults.	The ECM detects that voltage is high during driver off state (indicates short to power or open circuit)	Short to power: ≤ 0.5 Ω impedance between signal and controller power Open Circuit: ≥ 200 K Ω impedance between signal and controller ground	System supply voltage is within limits. Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts	20 failures out of 25 samples 250 ms / sample, continuous	Type B, 2 Trips

13 OBDG05C Engine Diagnostics

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 or open circuit)	Short to ground: ≤ 0.5 Ω impedance between signal and controller ground 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

Closed_Loop_Enable_Clarification

Engine run time greater than
KtFSTA_t_ClosedLoopAutostart (HYBRID ONLY)
 AutoStart CoolantX1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11
 Close Loop Enable TimeY1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11
and
KtFSTA_t_ClosedLoopTime
 Start-Up CoolantX1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11
 Close Loop Enable TimeY1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11
and pre converter O2 sensor voltage less
than
KfFULC_U_O2_SensorReadyThresh
Lo
 Voltage < XXXXmilliVolts
for
KcFULC_O2_SensorReadyEvents
 Time (events * 12.5 milliseconds) > XXXXevents
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

Closed Loop Enable and
Coolant greater than
KfFCLL_T_AdaptiveLoCoolant

Coolant > XXXXCelcius

or less than
KfFCLL_T_AdaptiveHiCoolant

Coolant < XXXXCelcius

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 < XXXXmilliVolts

for
KcFCLP_Cnt_O2RdyCyclesThrsh

Time (events * 12.5 milliseconds) > XXXXevents

Long Term Secondary Fuel Trim
Enable Criteria

KtFCLP_t_PostIntglDisableTime

Closed_Loop_Enable_Clarification

	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	<u>< XXXXCelcius</u>											
and												
KeFCLP_T_IntegrationCatalystMin												
Modeled Catalyst Temperature	<u>> XXXXCelcius</u>											
and												
PO2S_Bank_1_Snsr_2_FA and												
PO2S_Bank_2_Snsr_2_FA = False												

Bundle Name: 5VoltReferenceA_FA
P0641
Bundle Name: 5VoltReferenceB_FA
P0651
Bundle Name: 5VoltReferenceMAP_OOR_Fit
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: ACThrmIRefrgSpdVld
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.

**13 OBDG05C Engine Diagnostics
Fault Bundle Definitions**

Supporting Information

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: AmbPresDfltStatus
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

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

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

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: CyInderDeacDriverTFTKO
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

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, P0606, P16F3, P1104, P2100, P2101, P2102, P2103, P160E, P160D, P0191, P0192, P0193, P00C8, P00C9, P16A0, P16A1, P16A2
Bundle Name: EngineTorqueEstInaccurate
EngineMisfireDetected_FA, FuelInjedorCircuit_FA, FuelInjedorCircuit_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: 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
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
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
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.
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: PowertrainRelayFault
P1682
Bundle Name: PowertrainRelayStateOn_Error
P0685
Bundle Name: PowertrainRelayStateOn_FA
P0685
Bundle Name: PPS1_OutOfRange
P2122, P2123
Bundle Name: PPS1_OutOfRange_Composite
P2122, P2123, P06A3
Bundle Name: PPS2_OutOfRange
P2127, P2128
Bundle Name: PPS2_OutOfRange_Composite
P2127, P2128, P0697
Bundle Name: SCIAP_SensorCircuitFA
P012C, P012D
Bundle Name: SCIAP_SensorCircuitFP

P012C, P012D
Bundle Name: SCIAP_SensorFA
P012B, P012C, P012D
Bundle Name: SCIAP_SensorPerfFA
P012B
Bundle Name: SCIAP_SensorPerfTFTKO
P012B
Bundle Name: SCIAP_SensorTFTKO
P012B, P012C, P012D
Bundle Name: SuperchargerBypassValveFA
P2261
Bundle Name: SystemVoltageHigh_FA
P0563
Bundle Name: SystemVoltageLow_FA
P0562
Bundle Name: TC_BoostPresSnsrCktFA
P0237, P0238
Bundle Name: TC_BoostPresSnsrFA
P0236, P0237, P0238
Bundle Name: TCM_EngSpdReqCkt
P150C
Bundle Name: THMR_AHV_FA
P2681, P26A3, P26A6, P26A7, P26A9
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

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
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

13 OBDG05C Engine Diagnostics
LD OBD Component System Table

Supporting Information

STATE OF CALIFORNIA
California Environmental Protection Agency
AIR RESOURCES BOARD
MSCD/ESB-113 (NEW 1/11)

OBD II Gasoline Monitoring Requirements Checklist

Component/System	MONITORING REQUIREMENTS: List the DTC of the monitor that detects the following failure mode:									
Catalyst	(e)(1.2.2) Conversion Efficiency									
	P0420	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heated Catalyst	(e)(2.2) Heating Performance									
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Misfire	(e)(3.2.1) Catalyst Damage Misfire	(e)(3.2.2) FTP Level Misfire: First 1000-revs	(e)(3.2.2) FTP Level Misfire: 4 x 1000-revs							
	P0300	P0300	P0300	NA	NA	NA	NA	NA	NA	NA
Evaporative System	(e)(4.2.2)(A) Purge Flow	(e)(4.2.2)(B) 0.040" Leak Check	(e)(4.2.2)(C) 0.020" Leak Check	(e)(4.2.5) 0.090" Leak Check in Lieu of 0.040"						
	P0455	P0442	P0442	NA	NA	NA	NA	NA	NA	NA
Secondary Air	(e)(5.2.3) Insufficient Flow Emission Threshold	(e)(5.2.4) Functional Monitor In Lieu of Emission Threshold								
	P0411	P0411, P2440, P2444	NA	NA	NA	NA	NA	NA	NA	NA
Fuel System	(e)(6.2.1)(A) Emission Threshold	(e)(6.2.1)(B) Secondary Fuel Trim Emission Threshold	(e)(6.2.1)(C) Air-fuel Ratio Cylinder Imbalance	(e)(6.2.2) Adaptive Limits Reached	(e)(6.2.3) Secondary Fuel Trim Adaptive Limits Reached	(e)(6.2.4) Fails to Enter Closed Loop				
	P0171, P0172	P2096, P2097	P219A, P0300	P0171, P0172	P2096, P2097	NA	NA	NA	NA	NA
Upstream Exhaust Gas Sensor	(e)(7.2.1)(A) Emission Threshold	(e)(7.2.1)(B) Open Circuit	(e)(7.2.1)(B) Out-of-Range High	(e)(7.2.1)(B) Out-of-Range Low	(e)(7.2.1)(C) Feedback: Slow/ fails to Enter, Default OL	(e)(7.2.1)(D) Sufficient for Other Diagnostics	(e)(7.2.3)(A) Heater Performance	(e)(7.2.3)(B) Heater Circuit Continuity		
	P0133, P0133, P015A, P015B	P0134, P2A00	P0132	P0131	P2A00	P0131, P0132, P0134, P0133, P015A, P015B	P0053, P0135	P0030	NA	NA
Downstream Exhaust Gas Sensor	(e)(7.2.2)(A) Emissions Threshold	(e)(7.2.2)(B) Open Circuit	(e)(7.2.2)(D) Out-of-Range High	(e)(7.2.2)(D) Out-of-Range Low	(d)(2.2.3) & (e)(6.2.4) Feedback: Slow/ fails to Enter, Default OL	(e)(7.2.2)(C) Sufficient for Other Diagnostics	(e)(7.2.3)(A) Heater Performance	(e)(7.2.3)(B) Heater Circuit Continuity		
	P013A, P013B, P013E, P013F	P0140	P0138, P2271	P0137, P2270	P0054, P0137, P0138, P0140, P0141, P013A, P013B, P013E, P013F, P2270, P2271	P013A, P013B, P013E, P013F, P2270, P2271	P0054, P0141	P0036	NA	NA
	(e)(8.2.1)	(e)(8.2.1)	(e)(8.2.2)							

LD OBD Component System Table

EGR	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
Crankcase Ventilation	(e)(9.2.2) Disconnection									
	P0106, P0171, P0300	NA	NA	NA	NA	NA	NA	NA	NA	NA
Engine Cooling System	(e)(10.2.1) Time to Reach Threshold Temp	(e)(10.2.2)(A) ECT Open Circuit	(e)(10.2.2)(A) ECT Out-of-Range High	(e)(10.2.2)(A) ECT Out-of-Range Low	(e)(10.2.2)(B) Time to Reach Closed Loop	(e)(10.2.2)(C) ECT Stuck Below Highest Minimum Enable Temp	(e)(10.2.2)(D) ECT Stuck Above Lowest Maximum Enable Temp			
	P0128	P0118, P0119	P0118	P0117	NA	P0128	P0116	NA	NA	NA
Cold Start Strategy	(e)(11.2.1)(A) Emission Threshold	(e)(11.2.1)(B) Functional Monitor In Lieu of Emission Threshold	(e)(11.2.2)(A) Phase-in Single Element Functional Monitor	(e)(11.2.2)(B) Phase-in Emission Threshold						
	P1400	P1400	P0300, P050D, P1400	P1400	NA	NA	NA	NA	NA	NA
VVT System	(e)(13.2.1) Target Error Emission Threshold	(e)(13.2.3) Target Error Functional Monitor in Lieu of Emission Threshold	(e)(13.2.2) Slow Response Emission Threshold	(e)(13.2.3) Slow Response Functional Monitor in Lieu of Emission Threshold						
	P0011, P0014	P0011, P0014	P0011, P0014	P0011, P0014	NA	NA	NA	NA	NA	NA
Direct Ozone Reduction (DOR) System	(e)(14.2.1) Functional Monitor for <50% Std Credit	(e)(14.2.2) Emission Threshold Monitor for >50% Std Credit								
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**13 OBDG05C Engine Diagnostics
LD OBD Monitor System Table**

STATE OF CALIFORNIA
California Environmental Protection Agency
AIR RESOURCES BOARD
MSCD/ESB-113 (NEW 1/11)

OBD II Gasoline Monitoring Requirements Checklist

List the DTC of 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
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	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	P0533	P0532	P0532	NA	NA	NA	NA	NA	NA	NA
AIR Pressure Sensor Bank 1	P2433	P2432	P2432	P2431	P2431	P2430	NA	NA	NA	NA
AIR Pressure Sensor Bank 2	P2438	P2437	P2437	P2436	P2436	P2435	NA	NA	NA	NA
AIR Pump Command Bank 1	NA	NA	NA	NA	NA	NA	NA	P0418	P0418	P0418
AIR Pump Solenoid Relay	NA	NA	NA	NA	NA	NA	NA	P0412	P0412	P0412
Barometric Pressure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Brake Booster Pressure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CAM Phase Control Bank 1 Exhaust	NA	NA	NA	NA	NA	NA	P0014	P2091	P2090	P0013
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	P0365	P0365	P0365	P0366	P0366	P0017	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	P0449	P0449	P0449
Clutch Pedal Position	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Control Canister Purge Solenoid	NA	NA	NA	NA	NA	NA	P0496	P0443	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
ELCP Pressure Sensor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ELCP Switching Valve	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ELCP Vacuum Pump	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Engine Metal Over Temperature Active	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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, P2176	NA	NA	NA
Fan Control #1	NA	NA	NA	NA	NA	NA	NA	P0692	P0691	P0480
Fan Control #2	NA	NA	NA	NA	NA	NA	NA	P0694	P0693	P0481

13 OBDG05C Engine Diagnostics
LD OBD Monitor System Table

Supporting Information

Fan Control #3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Feul Economy Mode Switch Circuit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Composition	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Injector A	NA	NA	NA	NA	NA	NA	P1248	P0262, P2148	P0261, P2147	P0201
Fuel Injector B	NA	NA	NA	NA	NA	NA	P1249	P0265, P2151	P0264, P2150	P0202
Fuel Injector C	NA	NA	NA	NA	NA	NA	P124A	P0268, P2154	P0267, P2153	P0203
Fuel Injector D	NA	NA	NA	NA	NA	NA	P124B	P0271, P2157	P0270, P2156	P0204
Fuel Injector E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Injector F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Injector G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Injector H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	P0627
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
Ignition Off Timer	NA	NA	NA	NA	NA	P2610	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 2	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
Malfunction Indicator Lamp	NA	NA	NA	NA	NA	NA	NA	NA	P263A	P0650
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 Control	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
Powertrain Relay Control	NA	NA	NA	NA	NA	NA	NA	NA	NA	P0685
Powertrain Relay Feedback	NA	NA	NA	P0689	P0690	NA	NA	NA	NA	NA
Reverse Inhibit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SENT Communication A Circuit (Throttle)	P16A0	P16A1	P16A1	P16A2	P16A2	NA	NA	NA	NA	NA
SIDI High Pressure Pump	NA	NA	NA	NA	NA	NA	P0089, P163A, P228C, P228D	P0092, P00CA	P0091, P00C9	P0090, P00C8
SIDI High Pressure Sensor	P0193	P0192	P0192	P0191	P0191	P0191	NA	NA	NA	NA
SIDI High Pressure Start	NA	NA	NA	NA	NA	NA	P00C6	NA	NA	NA
SIDI Injector Driver Circuit	NA	NA	NA	NA	NA	NA	P062B	P062B	P062B	P062B
Skip Shift Solenoid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Starter Relay Control	NA	NA	NA	NA	NA	NA	NA	P0617	P0616	P0615
Supercharger Inlet Pressure	NA	NA	NA	NA	NA	P1101	NA	NA	NA	NA
System Voltage	NA	NA	NA	P0562	P0563	NA	NA	NA	NA	NA
Throttle Position 1	P0123	P0122	P0122	P2135	P2135	P0068, P0121, P2119	NA	NA	NA	NA

LD OBD Monitor System Table

Throttle Position 2	P0223	P0222	P0223	P2135	P2135	P0068, P0121, P2119	NA	NA	NA	NA
Turbocharger Boost Pressure	NA	NA	NA	NA	NA	P1101	NA	NA	NA	NA