Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Intake Camshaft Actuator Solenoid Circuit – Bank 1	P0010	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 32 Volts	20 failures out of 25 samples 250 ms /sample, continuous	Trips 2 B Type
Intake Camshaft System Performance – Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when VVT is activated	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	(Intake cam Bank 1)Cam Position Error > KtPHSD_phi_CamPosErrorLimIc1 Deg (see Supporting Table)	The following DTC's are NOT active: P0010 IntkCMP B1 Circuit P0340, P0341, Intake B1 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	System Voltage > 11 Volts, and System Voltage < 32 Volts Desired cam position cannot vary more than 7.5 Cam Deg for at least KtPHSD_t_StablePositionTimeIc1 seconds (see Supporting Table)	200 failures out of 1000 samples 100 ms /sample	Trips 2 B Type
Exhaust Camshaft Actuator Solenoid Circuit – Bank 1	P0013	Detects a VVT system error by monitoring the circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System supply voltage is within limits Output driver is commanded on, Ignition switch is in crank or run position	> 11 Volts, and < 32 Volts	19 failures out of 30 samples 250 ms /sample, continuous	Trips 2 B Type

Component/ System	Fault Code	Monitor Strategy 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 > KtPHSD_phi_CamPosErrorLimEc1 Deg (see Supporting Table)	The following DTC's are NOT active: P0013 ExhCMP B1 Circuit P0365, P0366, Exh B1 Cam sensors P0335, P0336, Crank sensors P0016, P0017, P0018, P0019 Cam to crank rationality Engine is running VVT is enabled Desired camshaft position > 0 Power Take Off (PTO) not active	System Voltage > 11 Volts, and System Voltage < 32 Volts Desired cam position cannot vary more than 1.0 Cam Deg for at least KtPHSD_t_StablePositionTimeEc1 seconds (see Supporting Table)	100 failures out of 150 samples 100 ms /sample	Trips 2 B Type
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 11 crank degrees before or 11 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized Cam phaser is in "parked" position No Active DTCs: No Pending DTCs:	< 1200 P0335, P0336 P0340, P0341 5VoltReferenceA_FA 5VoltReferenceB_FA P0341	4 failures out of 5 samples if the engine is being assisted by the starter 24 failures out of 30 samples if the engine is running without assistance from the starter One sample per cam rotation	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor 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 8 crank degrees before or 9 crank degrees after nominal position in one cam revolution.		Engine Speed Crankshaft and camshaft position signals are synchronized Cam phaser is in "parked" position No Active DTCs: No Pending DTCs:	< 1200 P0335, P0336 P0365, P0366 5VoltReferenceA_FA 5VoltReferenceB_FA P0366	4 failures out of 5 samples if the engine is being assisted by the starter 24 failures out of 30 samples if the engine is running without assistance from the starter One sample per cam rotation	Type B 2 trips
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Supercharger Bypass Valve Control Circuit	P0033	Electrical Integrity of Supercharger Bypass Valve Control Circuitry	ECM detects that commanded and actual states of output driver do not match		Ignition Voltage Ignition Voltage Engine Speed	>= 11.00 Volts <= 32.00 Volts > 0	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
O2S Heater Control Circuit Bank 2 Sensor 1	P0050	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
HO2S Heater Resistance Bank 1 Sensor 1	P0053	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 2.8 ohms -OR- Calculated Heater Resistance > 9.5 ohms	No Active DTC's Coolant – IAT Coolant Temp Ignition Voltage Engine Soak Time Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 32.0 volts > 28800 seconds < 3.00 seconds	Once per valid cold start	2 trips Type B
HO2S Heater Resistance Bank 1 Sensor 2	P0054	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 4.1 ohms -OR- Calculated Heater Resistance > 10.8 ohms	No Active DTC's Coolant – IAT Coolant Temp Ignition Voltage Engine Soak Time Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 32.0 volts > 28800 seconds < 3.00 seconds	Once per valid cold start	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2S Heater Control Circuit Bank 2 Sensor 2	P0056	This DTC checks the Heater Output Driver circuit for electrical integrity.	Voltage low during driver open state (indicates short-to-ground or open circuit) or voltage high during driver closed state (indicates short to voltage).		Ign Switch position Ignition Voltage Engine Speed	= Crank or Run position 11.0 volts < Ign Voltage < 32.0 volts > 400 RPM	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
HO2S Heater Resistance Bank 2 Sensor 1	P0059	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 2.8 ohms -OR- Calculated Heater Resistance > 9.5 ohms	No Active DTC's Coolant – IAT Coolant Temp Ignition Voltage Engine Soak Time Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 32.0 volts > 28800 seconds < 3.00 seconds	Once per valid cold start	2 trips Type B
HO2S Heater Resistance Bank 2 Sensor 2	P0060	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Learned Heater Resistance.	Calculated Heater Resistance < 4.1 ohms -OR- Calculated Heater Resistance > 10.8 ohms	No Active DTC's Coolant – IAT Coolant Temp Ignition Voltage Engine Soak Time Engine Run Time	ECT_Sensor_FA P2610 IAT_SensorFA < 8.0 ºC -30.0 ºC ≤ Coolant ≤ 45.0 ºC < 32.0 volts > 28800 seconds < 3.00 seconds	Once per valid cold start	2 trips Type B
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP and MAF do not match estimated engine airflow as established by the TPS	1) Difference between measured MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails	Table, f(TPS). See supporting tables	Engine Speed Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	> 800 RPM Continuous in primary processor	Continuously fail MAP and MAF portions of diagnostic for 0.1875 sec	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			2) Absolute difference between MAF and estimated MAF exceed threshold (grams/sec), or P0102 (MAF circuit low), or P0103 (MAF circuit hi) have failed this key cycle, or maximum MAF versus RPM (Table) is greater than or equal to maximum MAF versus battery voltage, then MAF portion of diagnostic fails	Table, f(TPS). See supporting tables Table, f(RPM). See supporting tables Table, f(Volts). See supporting tables				
Barometric Pressure (BARO) - Supercharger Inlet Pressure Correlation	P006D	Compares baro sensor to the calculated baro estimate (part throttle calculation or unthrottled Supercharger Inlet Pressure)	Difference between baro sensor reading and estimated baro when distance since last estimated baro update OR Difference between baro sensor reading and estimated baro when distance since last estimated baro update	> 15.0 kPa <= 0.01 miles > 15.0 kPa > 0.01 miles	No Active DTCs:	AmbientAirPressCktFA ECT_Sensor_Ckt_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressureFA_SC TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Intake Air Temperature Sensor 2 Circuit Performance	P0096	Detects an IAT2 sensor that has stuck in range by comparing to IAT and engine coolant temperature at startup	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up ECT – Power Up IAT2) > ABS(Power Up ECT – Power Up IAT) AND P0116 is passing	> 20 deg C	Time between current ignition cycle and the last time the engine was running No Active DTCs:	 > 28800 seconds ECT_Sensor_FA ECT_Sensor_Ckt_FA IAT_SensorFA IAT2_SensorFA P0116 Test Aborted = FALSE P0116 Test Complete = TRUE	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B 2 trips
Intake Air Temperature Sensor 2 Circuit Low (High Temperature)	P0097	Detects a continuous short to ground in the IAT 2 signal circuit or the IAT 2 sensor	Raw IAT 2 Input	< 45 Ohms (~150 deg C)	Engine Run Time Coolant Temp Vehicle Speed No Active DTCs:	> 0.0 seconds < 150 deg C >= 0.00 MPH ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Intake Air Temperature Sensor 2 Circuit High (Low Temperature)	P0098	Detects a continuous open circuit in the IAT 2 signal circuit or the IAT 2 sensor	Raw IAT 2 Input	> 420000 Ohms (~-60 deg C)	Engine Run Time Coolant Temp Vehicle Speed Engine Air Flow No Active DTCs:	> 0.0 seconds > -40 deg C <= 318.00 MPH >= 512 gm/sec ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError MAF_SensorFA MAF_SensorFP MAF_SensorTFTKO	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	This DTC detects a short to ground in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ 150ºC)	< 55 Ohms	Engine run time Or IAT min	> 0.0 seconds ≤ 150.0 °C	5 failures out of 25 samples 1 sec /sample	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							Continuous	
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT signal circuit or the RCT sensor.	RCT Resistance (@ -60ºC)	> 160500 Ohms	Engine run time Or IAT min	> 10.0 seconds ≥ -7.0 °C	5 failures out of 25 samples 1 sec /sample Continuous	2 trips Type B
Radiator Coolant Temp - Engine Coolant Temp (ECT) Correlation	P00B6	This DTC detects a difference between ECT and RCT after a soak condition.	A failure will be reported if any of the following occur: 1) Absolute difference between ECT at power up & RCT at power up is ≥ an IAT based threshold table lookup value(fast fail). 2) Absolute difference between ECT at power up & RCT at power up is > by 19.3 C and a block heater has not been detected.	See "P00B6: Fail if power up ECT exceeds RCT by these values" in the Supporting tables section	No Active DTC's Engine Off Soak Time Non-volatile memory initization	VehicleSpeedSensor_FA IAT_SensorCircuitFA RCT_Sensor_Ckt_FA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid > 28800 seconds = Not occurred	1 failure 500 msec /sample Once per valid cold start	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			3) ECT at power up > IAT at power up by 19.3 C and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag	= False	Test complete this trip Test aborted this trip IAT LowFuelCondition Diag	= False = False ≥ -7 ºC = False		
					Block Heater detection is enabled when either of the following occurs:			
					1) ECT at power up > IAT at power up by 2) Cranking time	> 19.3 ºC < 10.0 Seconds		
					Block Heater is detected and diagnostic is aborted when 1)or 2) occurs. Diagnostic is aborted when 3) or 4) occurs:			
					1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 1d) IAT drops from power up IAT	> 400 Seconds with > 14.9 MPH and 0.00 times the seconds with vehicle speed below 1b ≥ 3.3 ºC		
					2a) ECT drops from power up ECT 2b) Engine run time	≥ 1 ºC Within ≤ 30 Seconds		
					3) Engine run time with vehicle speed below 1b	> 1800 Seconds		
					4) Minimum IAT during test	> -7.0 ºC		

Component/ System	Fault Code	Monitor Strategy 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	<= 250 kPa*(g/s) > 12 grams/sec > 15.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs:	>= 450 RPM <= 6700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FA IAT_SensorFA IAT_SensorFP CylDeacSystemTFTKO	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Mass Air Flow System Performance (supercharged)	P0101	Determines if the MAF sensor is stuck within the normal operating range	See table "Supercharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.		Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 6200 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C	Continuous Calculation are performed every 12.5 msec	Type B 2 trips
			TPS model fails when			>= 0.00 RPM		
			Filtered Throttle Model Error	> 400 kPa*(g/s)		Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM		
			MAF model fails when					
			ABS(Measured Flow – Modeled Air Flow) Filtered	> 21 grams/sec		Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate		
			MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered	> 22.0 kPa		MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered	> 22.0 kPa		MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered	> 14.0 kPa				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 14.0 kPa		SCIAP Model 1 multiplied by SCIAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost SCIAP Model 2 multiplied by SCIAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA ECT_Sensor_Ckt_FA IAT_SensorFA IAT_SensorFP CylDeacSystemTFTKO IAT2_SensorFA IAT2_SensorCircuitFP SCIAP_SensorCircuitFA SCIAP_SensorCircuitFP AmbientAirDefault_SC		
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	<= 291 Hz (~ 1.02g/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 400 RPM >= 9.0 Volts >= 1.0 seconds	400 failures out of 500 samples 1 sample every cylinder firing event	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy 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	>= 14500 Hz (~ 1037.5 gm/sec)	Engine Run Time Engine Speed Ignition Voltage Above criteria present for a period of time	> 1.0 seconds >= 400 RPM >= 9.0 Volts >= 1.0 seconds	400 failures out of 500 samples 1 sample every cylinder firing event	Type B 2 trips
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	<= 250 kPa*(g/s) > 15.0 kPa > 15.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together) No Active DTCs:	>= 450 RPM <= 6700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA	Continuous Calculations are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
Manifold Absolute Pressure Sensor Performance (supercharged)	P0106	Determines if the MAP sensor is stuck within the normal operating range	See table "Supercharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered	 > 400 kPa*(g/s) > 21 grams/sec > 22.0 kPa > 22.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 6200 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered	> 14.0 kPa				
						SCIAP Model 1 multiplied by SCIAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 14.0 kPa				
						SCIAP Model 2 multiplied by SCIAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
						See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO IAT2_SensorFA IAT2_SensorCircuitFP SCIAP_SensorCircuitFA SCIAP_SensorCircuitFP AmbientAirDefault_SC		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to low or open in either the signal circuit or the MAP sensor.	MAP Voltage	< 3.0 % of 5 Volt Range (0.2 Volts = 3.5 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects an open sensor ground or continuous short to high in either the signal circuit or the MAP sensor.	MAP Voltage	> 90.0 % of 5 Volt Range (4.5 Volts = 115.1 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
Intake Air Temperature Sensor Circuit Performance	P0111	Detects an IAT sensor that has stuck in range by comparing to IAT2 and engine coolant temperature at startup	ABS(Power Up IAT - Power Up IAT2) AND ABS(Power Up ECT – Power Up IAT) > ABS(Power Up ECT – Power Up IAT2) AND P0116 is failing	> 20 deg C	Time between current ignition cycle and the last time the engine was running No Active DTCs:	> 28800 seconds ECTSensor_FA ECT_Sensor_Ckt_FA IAT_SensorCircuitFA IAT2_SensorCircuitFA P0116 Test Aborted = FALSE P0116 Test Complete = TRUE	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B 2 trips
Intake Air Temperature Sensor Circuit Low (High Temperature)	P0112	Detects a continuous short to ground in the IAT signal circuit or the IAT sensor	Raw IAT Input	< 45 Ohms (~150 deg C)	Engine Run Time Coolant Temp Vehicle Speed No Active DTCs:	> 0.0 seconds < 150 deg C >= 0.00 MPH ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Intake Air Temperature Sensor Circuit High (Low Temperature)	P0113	Detects a continuous open circuit in the IAT signal circuit or the IAT sensor	Raw IAT Input	> 163000 Ohms (~-60 deg C)	Engine Run Time Coolant Temp Vehicle Speed Engine Air Flow No Active DTCs:	> 0.0 seconds > -40 deg C <= 318.00 MPH <= 512 gm/sec ECT_Sensor_Ckt_FA ECT_Sensor_Ckt_FP VehicleSpeedSensorError MAF_SensorFA MAF_SensorFP MAF_SensorTFTKO	50 failures out of 63 samples 1 sample every 100 msec	Type B 2 trips
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects ECT temp sensor stuck in mid range.	A failure will be reported if any of the following occur: 1) ECT at power up > IAT at power up by an IAT based table lookup value after a minimum 28800 second soak (fast fail). 2) ECT at power up > IAT at power up by 15.0 C after a minimum 28800 second soak and a block heater has not been detected.	See "P0116: Fail if power up ECT exceeds IAT by these values" in the Supporting tables section.	No Active DTC's Non-volatile memory initization Test complete this trip	VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA IgnitionOffTimeValid TimeSinceEngineRunningValid = Not occurred = False	1 failure 500 msec /sample Once per valid cold start	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			3) ECT at power up > IAT at power up by 15.0 C after a minimum 28800 seconds soak and the time spent cranking the engine without starting is greater than 10.0 seconds with the LowFuelConditionDiag	= False	Test aborted this trip IAT LowFuelCondition Diag	= False ≥ -7 ºC = False		

Block Heater detection is enabled when either of the following occurs:	
1) ECT at power up > IAT at power up by	> 15.0 ºC
2) Cranking time	< 10.0 Seconds

Block Heater is detected and diagnostic is aborted when 1)or 2) occurs. Diagnostic is aborted when 3) or 4) occurs:	
1a) Vehicle drive time 1b) Vehicle speed 1c) Additional Vehicle drive time is provided to 1a when Vehicle speed is below 1b as follows: 1d) IAT drops from power up IAT	> 400 Seconds with > 14.9 MPH 0.00 times the seconds with vehicle speed below 1b ≥ 8.0 ºC
2a) ECT drops from power up ECT 2b) Engine run time	> 256 ºC Within > 0 Seconds
3) Engine run time with vehicle speed below 1b	> 1800 Seconds

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					4) Minimum IAT during test	≤ -7 ºC		
Engine Coolant Temp Sensor Circuit Low	P0117	This DTC detects a short to ground in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ 150ºC)	< 45 Ohms			5 failures out of 6 samples 1 sec /sample Continuous	2 trips Type B
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT signal circuit or the ECT sensor.	ECT Resistance (@ -60ºC)	> 450000 Ohms	Engine run time Or IAT min	> 10.0 seconds ≥ -7.0 °C	5 failures out of 6 samples 1 sec /sample Continuous	2 trips Type B
TPS1 Circuit	P0120	Detects a continuous or intermittent short or open in TPS1 circuit on the secondary processor but sensor is in range on the primary processor	Secondary TPS1 Voltage < or Secondary TPS1 Voltage >	0.325 4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	Trips: 1 Type: A MIL: YES
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	> 250 kPa*(g/s) > 12 grams/sec	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp	>= 450 RPM <= 6700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Minimum total weight factor (all factors multiplied together)	>= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
Throttle Position Sensor Performance (supercharged)	P0121	Determines if the Throttle Position Sensor input is stuck within the normal operating range	See table "Supercharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC.		Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 6200 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			TPS model fails when					
			Filtered Throttle Model Error	> 400 kPa*(g/s)		Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM		
			MAF model fails when					
			ABS(Measured Flow – Modeled Air Flow) Filtered	> 21 grams/sec		Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate		
			MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered	> 22.0 kPa		MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered	> 22.0 kPa		MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered	> 14.0 kPa		SCIAP Model 1 multiplied by SCIAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		
			SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 14.0 kPa		SCIAP Model 2 multiplied by SCIAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO IAT2_SensorFA IAT2_SensorCircuitFP SCIAP_SensorCircuitFA SCIAP_SensorCircuitFP AmbientAirDefault_SC		
TPS1 Circuit Low	P0122	Detects a continuous or intermittent short or open in TPS1 circuit on both processors or just the primary processor	Primary TPS1 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary TPS1 Voltage <	0.325		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
TPS1 Circuit High	P0123	Detects a continuous or intermittent short in TPS1 circuit on both processors or just the primary processor	Primary TPS1 Voltage >	4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the primary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Secondary TPS1 Voltage >	4.75		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault	Actual accumulated airflow is > predicted accumulated airflow before: Range #1 (Primary) ECT reaches 75.0 °C when IAT min is ≤ 54.5°C and ≥ 10.0°C. Range #2 (Alternate) ECT reaches 55.0 °C when IAT min is < 10.0°C and ≥ -7.0°C.	See "**P0128: Maximum Accumulated Airflow for IAT and Start-up ECT conditions**" in the Supporting tables section.	No Active DTC's Engine not run time Engine run time Fuel Condition **Range #1 (Primary) Test** ECT at start run Average Airflow Vehicle speed **Range #2 (Alternate) Test** ECT at start run Average Airflow Vehicle speed	MAP_SensorFA MAF_SensorFA TPS_Performance_FA TPS_FA TPS_ThrottleAuthorityDefaulted IAT_SensorFA ECT_Sensor_Ckt_FA ECT_Sensor_Perf_FA VehicleSpeedSensor_FA ≥ 1800 seconds ≥ 120 seconds Ethanol ≤ 87% ≤ 70.0 °C ≥ 5.0 gps > 5 mph for at least 2.4 miles ≤ 50.0 °C ≥ 5.0 gps > 5 mph for at least 2.4 miles	30 failures to set DTC 1 sec /sample Once per ignition key cycle	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Accumulated Airflow Adjustments 1) Max. airflow amount added when accumulating airflow is 2) Zero Airflow accumulated when airflow is 3) With AFM active Airflow added to acculmulated is multiplyed by 4) With Decel Fuel Cut Off active, acculmulated airflow is reduced by multiplying actual airflow by	50.0 gps < 12.0 gps 0.50% 1.00 times		
Engine Coolant Temperature Below Stat Regulating Temperature (For applications with a two coolant sensors)	P0128	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or Cooling system fault	Engine run time is accumulated when airflow is ≥ 17 grams per sec during Range #1 or #2: Range #1 (Primary) ECT reaches target temperature of 75.0 °C when IAT min is < 54.5°C and ≥ 10.0°C.	See "P0128: Maximum Accumulated Time for IAT and Start-up ECT conditions" in the Supporting tables section.	No Active DTC's Engine not run time Engine run time	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA ≥ 1800 seconds 10 ≤ Eng Run Tme ≤ 1370 seconds	1 failure to set DTC 1 sec /sample Once per ignition key cycle	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Range #2 (Alternate) ECT reaches target temperature of 65.0 °C when IAT min is < 10.0°C and ≥ -7.0°C.		Fuel Condition	Ethanol ≤ 87%		
					Range #1 (Primary) Test			
					ECT at start run Average Airflow	-7.0 ≤ ECT ≤ 70.0 °C ≥ 17.0 gps		
					Range #2 (Alternate) Test			
					ECT at start run Average Airflow	-7.0 ≤ ECT ≤ 60.0 °C ≥ 17.0 gps		
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Performance	P012B	Determines if the Supercharger Inlet Absolute Pressure Sensor input is stuck within the normal operating range	See table "Supercharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when	 > 400 kPa*(g/s) > 21 grams/sec	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 6200 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 22.0 kPa > 22.0 kPa > 14.0 kPa > 14.0 kPa		MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost SCIAP Model 1 multiplied by SCIAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost SCIAP Model 2 multiplied by SCIAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						IAT2_SensorFA IAT2_SensorCircuitFP SCIAP_SensorCircuitFA SCIAP_SensorCircuitFP AmbientAirDefault_SC		
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Circuit Low	P012C	Detects a continuous short to low or open in either the signal circuit or the SCIAP sensor.	SCIAP Voltage	< 3.0 % of 5 Volt Range (0.2 Volts = 3.5 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
Supercharger Inlet Absolute Pressure (SCIAP) Sensor Circuit High	P012D	Detects an open sensor ground or continuous short to high in either the signal circuit or the SCIAP sensor.	SCIAP Voltage	> 90.0 % of 5 Volt Range (4.5 Volts = 115.0 kPa)	Continuous		320 failures out of 400 samples 1 sample every 12.5 msec	Type B 2 trips
O2S Circuit Low Voltage Bank 1 Sensor 1	P0131	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's AIR intrusive test Fuel intrusive test Idle intrusive test	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA = Not active = Not active = Not active	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	3 % <= Throttle <= 70 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 1	P0132	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	0.0 % <= Throttle <= 70.0 %		
					Fuel Control State	= Closed Loop		
					Fuel Control State	not = Power Enrichment		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for			
					Time	> 2 seconds		
O2S Slow Response Bank 1 Sensor 1	P0133	This DTC determines if the O2 sensor response time is degraded.	The average response time is caluclated over the test time, and compared to the threshold. Refer to **"P0133 - O2S Slow Response Bank 1 Sensor 1"** Pass/Fail Threshold table in the Supporting Tables tab.		No Active DTC's	TPS_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	Sample time is 60 seconds Frequency: Once per trip	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						EthanolCompositionSensor_FA EngineMisfireDetected_FA		
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S1)** in Supporting Tables tab.		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 0.0 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 0.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	15 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 5 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 100.0 mgrams		
					Baro	= Not Defaulted		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for			
					Time	> 3.0 seconds		
O2S Circuit Insufficient Activity Bank 1 Sensor 1	P0134	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	350 mvolts < Oxygen Sensor signal < 550 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA 10.0 volts < system voltage< 32.0 volts = All Cylinders active = Complete = Wamed Up > 300 seconds <= 87 % Ethanol	400 failures out of 500 samples. Minimum of 0 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 0.0 % Frequency: Continuous 100msec loop	2 trips Type B
					System Voltage			
					AFM Status			
					Heater Warm-up delay			
					Predicted Exhaust Temp (by location)			
					Engine Run Time			
					Fuel			
O2S Heater Performance Bank 1 Sensor 1	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 3.1 amps	No Active DTC's	ECT_Sensor_FA 10.0 volts < system voltage< 32.0 volts = Complete > zero	8 failures out of 10 samples Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	2 trips Type B
					System Voltage			
					Heater Warm-up delay			
					B1S1 O2S Heater Duty Cycle			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					O2S Heater device control	= Not active		
					All of the above met for			
					Time	> 120 seconds		
O2S Circuit Low Voltage Bank 1 Sensor 2	P0137	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	3 % <= Throttle <= 70 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 1 Sensor 2	P0138	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	3.0 % <= Throttle <= 70.0 %		
					Fuel Control State	= Closed Loop		
					Fuel Control State	not = Power Enrichment		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for			
					Time	> 2 seconds		
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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 8.2 units OR 2) Accumulated air flow during slow rich to lean test > 75 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA
					B1S2 Failed this key cycle	P013B, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			
O2 Sensor Slow Response Lean to Rich Bank 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 is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the lower and upper voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 32.0 units OR 2) Accumulated air flow during slow lean to rich test > 150 grams (lower threshold is 350 mvolts and upper threshold is 650 mvolts)	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA
					B1S2 Failed this key cycle	P013A, P013E, P013F, P2270 or P2271		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					System Voltage	10.0 volts < system voltage< 32.0 volts
					Learned heater resistance	= Valid
					ICAT MAT Burnoff delay	= Not Valid
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.
					Low Fuel Condition Diag	= False
					Post fuel cell	= enabled
					DTC's Passed	= P2270 (and P2272 (if applicable))
					DTC's Passed	= P013E (and P014A (if applicable))
					DTC's Passed	= P013A (and P013C (if applicable))
					DTC's Passed	= P2271 (and P2273 (if applicable))
					DTC's Passed	= P013F (and P014B (if applicable))
					After above conditions are met: Fuel Enrich mode continued.			
O2 Sensor Slow Response Rich to Lean Bank 2 Sensor 2	P013C	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Rich to Lean voltages range during Rich to Lean transition. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Post O2 sensor normalized integral value is greater than the threshold. OR The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds) is greater than the airflow threshold.	1) B1S2 EWMA normalized integral value > 8.2 units OR 2) Accumulated air flow during slow rich to lean test > 75 grams (upper threshold is 450 mvolts and lower threshold is 150 mvolts)	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013D, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			
O2 Sensor Slow Response Lean to Rich Bank 2 Sensor 2	P013D	This DTC determines if the post catalyst O2 sensor has Slow Response in a predefined Lean to Rich voltages range during Lean to Rich transition. The diagnostic is an intrusive test which	The EWMA of the Post O2 sensor normalized integral value is greater than the threshold. OR The Accumulated mass air flow	1) B1S2 EWMA normalized integral value > 32.0 units OR 2) Accumulated air flow during slow lean to rich test > 150 grams (lower	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	mass air flow monitored during the Slow Response Test (between the lower and upper voltage thresholds) is greater than the airflow threshold.	grams (lower threshold is 350 mvolts and upper threshold is 650 mvolts)			NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	
						MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013C, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					DTC's Passed	= P013F (and P014B (if applicable))		
					After above conditions are met: Fuel Enrich mode continued.			

Component/ System	Fault Code	Monitor Strategy 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 cannot go below the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal > 450 mvolts AND 2) Accumulated air flow during stuck rich test > 50 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					B1S2 Failed this key cycle	P013A, P013B, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 and P2272 (if applicable)		
					After above conditions are met: DFCO mode is entered (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2 Sensor Delayed Response Lean to Rich Bank 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 cannot go above the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal < 350 mvolts AND 2) Accumulated air flow during lean to rich test > 380 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	2 trips Type B
					B1S2 Failed this key cycle	P013A, P013B, P013E, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					After above conditions are met: Fuel Enrich mode entered.			
O2S Circuit Insufficient Activity Bank 1 Sensor 2	P0140	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	410 mvolts < Oxygen Sensor signal < 490 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted	590 failures out of 740 samples.	2 trips Type B
						MAF_SensorFA	Minimum of 0 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 0.0 %	
						EthanolCompositionSensor_FA		
					System Voltage	10.0 volts < system voltage < 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete	100msec loop	
					Predicted Exhaust Temp (by location)	= Wamed Up		
					Engine Run Time	> 300 seconds	Frequency: Once per trip for post sensors	
					Fuel	<= 87 % Ethanol		
O2S Heater Performance Bank 1 Sensor 2	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 2.9 amps	No Active DTC's	ECT_Sensor_FA	8 failures out of 10 samples	2 trips Type B
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Heater Warm-up delay	= Complete	Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	
					B1S2 O2S Heater Duty Cycle	> zero		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					O2S Heater device control	= Not active		
					All of the above met for			
					Time	> 120 seconds		
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 2	P014A	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	Post O2 sensor cannot go below the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal > 450 mvolts AND 2) Accumulated air flow during stuck rich test > 50 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					B2S2 Failed this key cycle	P013C, P013D, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 and P2272 (if applicable)		
					After above conditions are met: DFCO mode is entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 2	P014B	This DTC determines if the post catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which increases the delivered A/F ratio to achieve the required rich threshold.	Post O2 sensor cannot go above the threshold voltage. AND The Accumulated mass air flow monitored during the Delayed Response Test is greater than the threshold.	1) Post O2S signal < 350 mvolts AND 2) Accumulated air flow during lean to rich test > 380 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed	2 trips Type B
					B2S2 Failed this key cycle	P013C, P013D, P014A, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Learned heater resistance	= Valid		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Low Fuel Condition Diag	= False		
					Post fuel cell	= enabled		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					DTC's Passed	= P2271 (and P2273 (if applicable))		
					After above conditions are met: Fuel Enrich mode entered.			
O2S Circuit Low Voltage Bank 2 Sensor 1	P0151	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	380 failures out of 475 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	3 % <= Throttle <= 70 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 2.0 seconds		
O2S Circuit High Voltage Bank 2 Sensor 1	P0152	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	0.0 % <= Throttle <= 70.0 %		
					Fuel Control State	= Closed Loop		
					Fuel Control State	not = Power Enrichment		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for			
					Time	> 2 seconds		
O2S Slow Response Bank 2 Sensor 1	P0153	This DTC determines if the O2 sensor response time is degraded.	The average response time is caluclated over the test time, and compared to the threshold. Refer to **"P0153 - O2S Slow Response Bank 2 Sensor 1"** Pass/Fail Threshold table in the Supporting Tables tab.		No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Sample time is 60 seconds Frequency: Once per trip	2 trips Type B
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S1)** in Supporting Tables tab.		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 0.0 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 0.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	15 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 5 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					All of the above met for			
					Time	> 3.0 seconds		
O2S Circuit Insufficient Activity Bank 2 Sensor 1	P0154	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	350 mvolts < Oxygen Sensor signal < 550 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA EthanolCompositionSensor_FA	400 failures out of 500 samples. Minimum of 0 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 0.0 %	2 trips Type B
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete	Frequency: Continuous	
					Predicted Exhaust Temp (by location)	= Wamed Up		
					Engine Run Time	> 300 seconds	100msec loop	
					Fuel	<= 87 % Ethanol		
O2S Heater Performance Bank 2 Sensor 1	P0155	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 3.1 amps	No Active DTC's	ECT_Sensor_FA	8 failures out of 10 samples	2 trips Type B
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					Heater Warm-up delay	= Complete	Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	
					B2S1 O2S Heater Duty Cycle	> zero		
					O2S Heater device control	= Not active		
					All of the above met for			
					Time	> 120 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2S Circuit Low Voltage Bank 2 Sensor 2	P0157	This DTC determines if the O2 sensor circuit is shorted to low.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is < 50 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	430 failures out of 540 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	3 % <= Throttle <= 70 %		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel Condition	Ethanol <= 87%		
					Fuel State	DFCO not active		
					All of the above met for			
					Time	> 2.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2S Circuit High Voltage Bank 2 Sensor 2	P0158	This DTC determines if the O2 sensor circuit is shorted to high.	Measure Oxygen Sensor Signal.	Oxygen Sensor signal is > 1050 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA	100 failures out of 125 samples Frequency: Continuous in 100 milli - second loop	2 trips Type B
					AIR intrusive test	= Not active		
					Fuel intrusive test	= Not active		
					Idle intrusive test	= Not active		
					EGR intrusive test	= Not active		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Equivalence Ratio	0.9922 ≤ equiv. ratio ≤ 1.0137		
					Throttle Position	3.0 % <= Throttle <= 70.0 %		
					Fuel Control State	= Closed Loop		
					Fuel Control State	not = Power Enrichment		
					Closed Loop Active	= TRUE		
					All Fuel Injectors for active Cylinders	Enabled (On)		
					Fuel State	DFCO not active		
					Fuel Condition	Ethanol <= 87%		
					All of the above met for			
					Time	> 2 seconds		

Component/ System	Fault Code	Monitor Strategy 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 above]	> 0.40 EWMA (sec) ≥ 4.00 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 O2 Heater (pre sensor) on for	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 for the following locations: B1S1, B2S1 (if applicable) and B1S2 in Supporting Tables tab. ≥ 40 seconds	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to initially enable test	1050 ≤ RPM ≤ 2600		
					Engine Speed range to keep test enabled (after initially enabled)	1000 ≤ RPM ≤ 2750		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to initially enable test	42.3 ≤ MPH ≤ 80.8		
					Vehicle Speed range to keep test enabled (after initially enabled)	37.3 ≤ MPH ≤ 83.9 mph		
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater (post sensor) on Time	≥ 80.0 sec		
					Predicted Catalyst temp	600 ≤ ºC ≤ 900		
					Fuel State	= DFCO possible		
					All of the above met for at least 0.5 seconds, and then the Force Cat Rich intrusive stage is requested.			
					Pre O2S voltage B1S1 at end of Cat Rich stage	≥ 700 mvolts		
					Fuel State	= DFCO active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Number of fueled cylinders	≤ 7 cylinders		
					After above conditions are met: DFCO Mode entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1	P015B	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is below] OR At end of Cat Rich stage the Pre O2 sensor output is	> 0.40 EWMA (sec) ≥ 4.00 Seconds < 350 mvolts < 700 mvolts	No Active DTC's System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control Low Fuel Condition Diag	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	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 (if applicable) and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 2 cylinders		
					When above conditions are met: Fuel Enrich mode entered (Test begins)			
					During test: Engine Airflow must stay between:	0 ≤ gps ≤ 15		
O2 Sensor Delayed Response Rich to Lean Bank 2 Sensor 1	P015C	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Rich to Lean. The diagnostic is an intrusive test which runs in a DFCO mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized R2L time delay value OR [The Accumulated time monitored during the R2L Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is above]	> 0.40 EWMA (sec) ≥ 4.00 Seconds > 550 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemB1_FA	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						FuelTrimSystemB2_FA EthanolCompositionSensor_FA EngineMisfireDetected_FA P0131 P0132 P0134		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 (if applicable) and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine run Accum	> 120 seconds		
					Engine Speed to initially enable test	1050 ≤ RPM ≤ 2600		
					Engine Speed range to keep test enabled (after initially enabled)	1000 ≤ RPM ≤ 2750		
					Engine Airflow	3 ≤ gps ≤ 20		
					Vehicle Speed to initially enable test	42.3 ≤ MPH ≤ 80.8		
					Vehicle Speed range to keep test enabled (after initially enabled)	37.3 ≤ MPH ≤ 83.9 mph		
					Closed loop integral	0.74 ≤ C/L Int ≤ 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Ethanol Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State	not in estimate mode = enabled = not active = not active ≥ 80.0 sec 600 ≤ °C ≤ 900 = DFCO possible		
					All of the above met for at least 0.5 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	≥ 700 mvolts = DFCO active ≤ 7 cylinders		
					After above conditions are met: DFCO Mode entered (wo driver initiated pedal input).			
O2 Sensor Delayed Response Lean to Rich Bank 2 Sensor 1	P015D	This DTC determines if the pre catalyst O2 sensor has an initial delayed response to an A/F change from Lean to Rich. The diagnostic is an intrusive test which runs in an enriched fuel mode to achieve the required response.	The EWMA of the Pre O2 sensor normalized L2R time delay value OR [The Accumulated time monitored during the L2R Delayed Response Test (Gross failure). AND Pre O2 sensor voltage is below]	> 0.40 EWMA (sec) ≥ 4.00 Seconds < 350 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA	Frequency: Once per trip Note: if NaESPD_b_FastInitRespIsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponseIsActive = TRUE, multiple tests per trip are allowed	1 trips Type A EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			[voltage is below]			FuelTankPressureSnsrCkt_FA		
			OR			FuelInjectorCircuit_FA		
			At end of Cat Rich stage the Pre O2 sensor output is	< 700 mvolts		AIR System FA		
						FuelTrimSystemB1_FA		
						FuelTrimSystemB2_FA		
						EthanolCompositionSensor_FA		
						EngineMisfireDetected_FA		
						P0131		
						P0132		
						P0134		
					System Voltage	10.0 < Volts < 32.0		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of Green Sensor Delay Criteria for the following locations: B1S1, B2S1 (if applicable) and B1S2 in Supporting Tables tab.		
					O2 Heater (pre sensor) on for	≥ 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Fuel State	= DFCO inhibit		
					Number of fueled cylinders	≥ 2 cylinders		
					When above conditions are met: Fuel Enrich mode entered (Test begins)			
					During test: Engine Airflow must stay between:	0 ≤ gps ≤ 15		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2S Circuit Insufficient Activity Bank 2 Sensor 2	P0160	This DTC determines if the O2 sensor circuit is open.	Measure Oxygen Sensor Signal.	410 mvolts < Oxygen Sensor signal < 490 mvolts	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAF_SensorFA	590 failures out of 740 samples.	2 trips Type B
						EthanolCompositionSensor_FA	Minimum of 0 delta TPS changes required to report fail. Delta TPS is incremented when the TPS % change >= 0.0 %	
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					AFM Status	= All Cylinders active		
					Heater Warm-up delay	= Complete	100msec loop	
					Predicted Exhaust Temp (by location)	= Wamed Up	Frequency: Once per trip for post sensors	
					Engine Run Time	> 300 seconds		
					Fuel	<= 87 % Ethanol		
O2S Heater Performance Bank 2 Sensor 2	P0161	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Measured Heater Current.	Measured Heater current < 0.3 amps -OR- Measured Heater current > 2.9 amps	No Active DTC's	ECT_Sensor_FA	8 failures out of 10 samples	2 trips Type B
					System Voltage	10.0 volts < system voltage< 32.0 volts	Frequency: 1 tests per trip 5 seconds delay between tests and 1 second execution rate	
					Heater Warm-up delay	= Complete		
					B2S2 O2S Heater Duty Cycle	> zero		
					O2S Heater device control	= Not active		
					All of the above met for			
					Time	> 120 seconds		

Component/ System	Fault Code	Monitor Strategy 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 fuel trim.	The filtered long-term fuel trim metric	>= **Long Term Trim Lean** Table	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level	375 <rpm< 7000 > 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty	Frequency: 100 ms Continuous Loop Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during 97**%** % of the H2778EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	2 Trip(s) Type B
					Long Term Fuel Trim data accumulation:	> 25.0 seconds of data must accumulate on each trip, with at least 15.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		
					fuel trim diagnosed during decels? No			
					Long-Term Fuel Trim Cell Usage			
					Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control or diagnosis. **Please see "Supporting Tables" Tab for a list of cells utilized for diagnosis.**			
					Fuel Control Status			
					Closed Loop Long Term FT	Enabled Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Fuel Consumed	> 0.3 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only)		
					EGR Flow Diag. Intrusive Test Not Active Catalyst Monitor Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					No active DTCs: IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA O2S_Bank_1_Sensor_1_FA			
Fuel System Too Rich Bank 1	P0172	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two methods to determine a Rich fault. They are Passive and Intrusive. The Intrusive test is described below:	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric (a Passive Test decision cannot be made when Purge is enabled)	<= **Non Purge Rich Limit** Table		Secondary Parameters and Enable Conditions are identical to those for P0171, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during **97** % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual	2 Trip(s) Type B
			Intrusive Test: The filtered Purge Long Term Fuel Trim metric	<= **Purge Rich Limit** Table				
			AND					
			The filtered Non-Purge Long Term Fuel Trim metric	<= **Non Purge Rich Limit** Table for 3 out of 5 intrusive segments				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							conditions present during the drive cycle.	
		Intrusive Test: When the filtered Purge Long Term fuel trim metric is <= **Purge Rich Limit** Table, purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge-on Long Term fuel trim > **Purge Rich Limit** Table the test passes without checking the filtered Non-Purge Long Term fuel trim metric. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	Segment Def'n: Segments can last up to 30 seconds and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 16 grams of vapor. A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge-on Long Term fuel trim > Purge Rich Limit Table for at least 200 seconds, indicating that the canister has been purged.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Fuel System Too Lean Bank 2	P0174	Determines if the fuel control system is in a lean condition, based on the filtered long-term fuel trim.	The filtered long-term fuel trim metric	>= **Long Term Trim Lean** Table	Engine speed BARO Coolant Temp MAP Inlet Air Temp MAF Fuel Level	375 <rpm< 7000 > 70 kPa -40 <°C< 150 10 <kPa< 255 -20 <°C< 150 1.0 <g/s< 510.0 > 10 % or if fuel sender is faulty	Frequency: 100 ms Continuous Loop Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during **97** % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual conditions present during the drive cycle.	2 Trip(s) Type B
					Long Term Fuel Trim data accumulation:	> 25.0 seconds of data must accumulate on each trip, with at least 15.0 seconds of data in the current fuel trim cell before a pass or fail decision can be made.		
					fuel trim diagnosed during decels? No			
					Long-Term Fuel Trim Cell Usage			
					Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control or diagnosis. **Please see "Supporting Tables" Tab for a list of cells utilized for diagnosis.**			
					Fuel Control Status			
					Closed Loop Long Term FT	Enabled Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Fuel Consumed	> 0.3 liters of fuel consumed after a fuel fill event ("Virtual Flex Fuel Sensor applications only)		
					EGR Flow Diag. Intrusive Test Not Active Catalyst Monitor Intrusive Test Not Active Post O2 Diag. Intrusive Test Not Active Device Control Not Active EVAP Diag. “tank pull down” Not Active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					No active DTCs: IAC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSensorCircuit_FA Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStatus AmbientAirDefault_NA O2S_Bank_2_Sensor_1_FA			
Fuel System Too Rich Bank 2	P0175	Determines if the fuel control system is in a rich condition, based on the filtered long-term fuel trim metric. There are two methods to determine a Rich fault. They are Passive and Intrusive. The Intrusive test is described below:	**Passive Test:** The filtered Non-Purge Long Term Fuel Trim metric (a Passive Test decision cannot be made when Purge is enabled) **Intrusive Test:** The filtered Purge Long Term Fuel Trim metric AND The filtered Non-Purge Long Term Fuel Trim metric	 <= **Non Purge Rich Limit** Table <= **Purge Rich Limit** Table <= **Non Purge Rich Limit** Table for 3 out of 5 intrusive segments		Secondary Parameters and Enable Conditions are identical to those for P0174, with the exception that fuel level is not considered.	Frequency: 100 ms Continuous Loop Development data indicates that the Fuel Adjustment System Diagnostic (FASD) is typically enabled during **97** % of the EPAIII drive cycle. This is also typical of real-world driving, however values will vary (higher or lower) based on the actual	2 Trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							conditions present during the drive cycle.	
		Intrusive Test: When the filtered Purge Long Term fuel trim metric is <= **Purge Rich Limit** Table, purge is ramped off to determine if excess purge vapor is the cause of the rich condition. If the filtered Purge-on Long Term fuel trim > **Purge Rich Limit** Table the test passes without checking the filtered Non-Purge Long Term fuel trim metric. Performing intrusive tests too frequently may also affect EVAP and EPAIII emissions, and the execution frequency of other diagnostics.	Segment Def'n: Segments can last up to 30 seconds and are separated by the lesser of 20 seconds of purge-on time or enough time to purge 16 grams of vapor. A maximum of 5 completed segments or 20 attempts are allowed for each intrusive test. After an intrusive test report is completed, another intrusive test cannot occur for 300 seconds to allow sufficient time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge-on Long Term fuel trim > Purge Rich Limit Table for at least 200 seconds, indicating that the canister has been purged.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Fuel Composition Sensor Circuit Low	P0178	Detects Out of Range Low Frequency Signal	Flex Fuel Sensor Output Frequency	< 45 Hertz	Powertrain Relay	> 11.0 Volts < 32.0 Volts	50 failures out of 63 samples 100 ms loop Continuous	2 trip(s) Type B
Fuel Composition Sensor Circuit High	P0179	Detects Out of Range High Frequency Signal	Flex Fuel Sensor Output Frequency	> 155 Hertz <= 185 Hertz	Powertrain Relay	> 11.0 Volts < 32.0 Volts	50 failures out of 63 samples 100 ms loop Continuous	2 trip(s) Type B
Injector 1	P0201	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 2	P0202	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 3	P0203	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 4	P0204	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Injector 5	P0205	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 6	P0206	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 7	P0207	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
Injector 8	P0208	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control ciruit do not match		Powertrain Relay Voltage within range and stable according to Enable Conditions Engine Running	11 volts ≤ Voltage ≤ 32 volts greater than 5 seconds	20 failures out of 25 samples 250 ms /sample Continuous	2 trips Type B
TPS2 Circuit	P0220	Detects a continuous or intermittent short or open in TPS2 circuit on the secondary processor but sensor is in range on the primary processor	Secondary TPS2 Voltage < or Secondary TPS2 Voltage >	0.25 4.59		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short or open in TPS2 circuit on both processors or just the primary processor	Primary TPS2 Voltage <	0.25		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary TPS2 Voltage <	0.25		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
TPS2 Circuit High	P0223	Detects a continuous or intermittent short in TPS1 circuit on both processors or just the primary processor	Primary TPS2 Voltage >	4.59		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79 / 159 counts; 57 counts continuous; 3.125 ms /count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary TPS2 Voltage >	4.59		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
Fuel Pump Primary Circuit (ODM)	P0230	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 0 RPM	8 failures out of 10 samples 250 ms /sample	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							Continuous	
Supercharger Intercooler Coolant Pump Control Circuit	P023A	Electrical Integrity of Supercharger Intercooler Coolant Pump Control Circuitry	ECM detects that commanded and actual states of output driver do not match		Ignition Voltage Ignition Voltage Engine Speed	>= 11.00 Volts <= 32.00 Volts > 0	20 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips
Random Misfire Detected Cylinder 1 Misfire Detected Cylinder 2 Misfire Detected Cylinder 3 Misfire Detected Cylinder 4 Misfire Detected Cylinder 5 Misfire Detected Cylinder 6 Misfire Detected Cylinder 7 Misfire Detected Cylinder 8 Misfire Detected	P0300 P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring crankshaft velocity	Deceleration index vs. Engine Speed Vs Engine load Deceleration index calculation is tailored to specific veh. Tables used are 1st tables encountered that are not max of range. Undetectable region at a given speed/load point is where all tables are max of range point. see Algorithm Description Document for additional details. Misfire Percent Emission Failure Threshold	**(>**Idle SCD AND > Idle SCD ddt Tables) **OR** (>SCD Delta AND > SCD Delta ddt Tables) **OR** (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables) **OR** (>Cyl Mode AND > Cyl Mode ddt Tables) **OR** (>Rev Mode Table) **OR** (> AFM Table in Cyl Deact mode) ≥ 1.05 % P0300 ≥ 1.05 % emission	Engine Run Time ECT If ECT at startup ECT System Voltage + Throttle delta - Throttle delta	> 2 crankshaft revolutions -7 ºC < ECT < 125 ºC < -7 ºC 21 ºC < ECT < 125 ºC 9.00 <volts< 32.00 < 40.00 % per 25 ms < 40.00 % 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. 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.	2 Trips Type B (Mil Flashes with Catalyst Damaging Misfire)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Misfire Percent Catalyst Damage	>"Catalyst Damaging Misfire Percentage" Table whenever secondary conditions are met.	Engine Speed Engine Load Misfire counts (at low speed/loads, one cylinder may not cause cat damage)	> 800 rpm AND > 25 % load AND < 180 counts on one cylinder		
			When engine speed and load are less than the FTP cals (3) catalyst damage exceedences are allowed.	≤ 0 FTP rpm AND ≤ 0 FTP % load			Continuous	
					Engine Speed	500 < rpm < (Engine Speed Limit) - 400 Engine speed limit is a function of inputs like Gear and temperature typical Engine Speed Limit = xxxx rpm	4 cycle delay	
				disable conditions:	No active DTCs:	TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensorTestFailedTKO CrankSensorFaultActive CrankIntakeCamCorrelationFA CrankExhaustCamCorrelationFA CrankCamCorrelationTFTKO	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						AnyCamPhaser_FA AnyCamPhaser_TFTKO		
						If Monitor Rough Road=1 and RoughRoadSource="TOSS"		
						Trans_Gear_Defaulted(TCM) (Auto Trans only)		
						Clutch Sensor FA (Manual Trans only)		
						Trans_Gear_Defaulted(TCM) (Auto Trans only)		
					P0315 & engine speed	> 1000 rpm		
					Fuel Level Low	LowFuelConditionDiagnostic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode	4 cycle delay	
					Fuel System Status	≠ Fuel Cut	4 cycle delay	
					Active Fuel Management	Transition in progress	7 cycle delay	
					Undetectable engine speed and engine load region	invalid speed load range in **decel index** tables	4 cycle delay	
					Abusive Engine Over Speed	> 7600 rpm	1250 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	<" Zero torque engine load" in Supporting Tables tab	4 cycle delay	
					Below zero torque: TPS (area) Veh Speed	 ≤ 0 % > 30 mph	4 cycle delay	
					EGR Intrusive test	Active	0 cycle delay	
					Manual Trans	Clutch shift	4 cycle delay	
					Throttle Position AND Automatic transmission shift	> 95.00 %	0 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Driveline Ring Filter active After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early. Filter Driveline ring: Stop filter early: Abnormal engine speed oscillations: (Rough road etc) Off Idle, number of consecutive decelerating cylinders after accelerating,: (Number of decels can vary with misfire detection equation) TPS Engine Speed Veh Speed SCD Cyl Mode Rev Mode Rough Road Section: Monitor Rough Road RoughRoadSource	 7 engine cycles after misfire 3 Engine cycles after misfire > 3 % > 1000 rpm > 3 mph = 4 consecutive cyls = 4 consecutive cyls = 4 consecutive cyls 1 (1=Yes) FromABS		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					IF Rough Road is monitored, then ONE of the following Rough Road Sources will be used: Rough Road Source = "TOSS" Rough Road Rough Road Source = "WheelSpeedInECM" ABS/TCS system RoughRoad VSES Rough Road Source = "FromABS" ABS/TCS system RoughRoad VSES	 detected active detected active active detected active		
Crankshaft Position System Variation Not Learned	P0315	Monitor for valid crankshaft error compensation factors	Sum of Compensation factors	≥ 4.0040 OR ≤ 3.9960	OBD Manufacturer Enable Counter	0	0.50 seconds Frequency Continuous 100 msec	1 Trips Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Knock Sensor (KS) Module Performance E38 & E67 controllers	P0324	This diagnostic will detect a failed internal ECM component associated with knock control	Any Cylinder's Avg Gain Signal **or** All Cylinder's Raw Signals	> 4.50 Volts ≤ 0.20 Volts	Engine Speed Cylinder Air Mass No Active DTC's Engine Speed Cylinder Air Mass	≥ 400 RPM > 50 milligrams KS_Ckt_Perf_B1B2_FA ≥ 400 RPM > 50 milligrams	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Bank 1 E38 & E67 controllers	P0325	This diagnostic checks for an open in the knock sensor circuit	Gated Low Pass Filter Voltage	> 4.0 Volts or < 1.24 Volts	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Enginer Run Time Power Take Off	= 1 ≥ 400 RPM ≥ -40 deg. C ≥ 2 seconds = Not Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Bank 1 E37 controllers	P0325	This diagnostic checks for an open in the knock sensor circuit	Gated FFT Output	< **OpenCircuit Thresh** See Supporting Tables for **OpenCircuit Thresh**	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Engine Run Time No Active DTC's Power Take-Off	= 1 ≥ 1800 RPM ≥ -40 deg. C ≥ 1 seconds KS_Ckt_Perf_B1B2_FA = Not Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Performance Bank 1 E38 & E67 controllers	P0326	This diagnostic checks for an overactive knock sensor caused by excessive knock or noisy engine components	Knock Fast Retard (spark degrees)	> (FastRtdMax + 4.0) degrees spark See Supporting Tables for FastRtdMax	Diagnostic Enabled (1 = Enabled) Knock Detection Enabled	= 1 > 0 Knock Detection Enabled is calculated by multiplying the	31 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						following three factors: FastAttackRate FastAttackCoolGain FastAttackBaroGain (see Supporting Tables)		
					Engine Speed MAP	≥ 400 RPM ≥ 10 kPa		
					Power Take Off	= Not Active		
Knock Sensor (KS) Performance Bank 1 E37 controllers	P0326	This diagnostic checks for an overactive knock sensor caused by excessive knock or noisy engine components	Knock Fast Retard (spark degrees)	> (FastRtdMax + 5.0 degrees spark See Supporting Tables for FastRtdMax	Diagnostic Enabled (1 = Enabled) Knock Detection Enabled	= 1 > 0	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
						Knock Detection Enabled is calculated by multiplying the following three factors: FastAttackRate FastAttackCoolGain FastAttackBaroGain (see Supporting Tables)		
					Engine Speed MAP No Active DTC's Power Take-Off	≥ 400 RPM ≥ 10 kPa GetTPSR_ThrotAuth Default = Not Active		
Knock Sensor (KS) Circuit Low Bank 1 E38 & E67 controllers	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> 2.86 Volts < 1.48 Volts	ECT Engine Run Time	≥ -40 deg. C ≥ 2 seconds	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
					Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp	= 0 < 256 deg. C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					and ValidOilTemp Model or No OilTemp Sensor DTC's <u>If No:</u> No Eng Oil Temp enable criteria	EngOilModeledTemp Valid EngOilTempSensor CircuitFA		
Knock Sensor (KS) Circuit Low Bank 1 E37 controllers	P0327	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< **ShortLow ThreshSig** (Volts) < **ShortLow ThreshRet** (Volts) See Supporting Tables for **ShortLow ThreshSig** and **ShortLow ThreshRet**	ECT Enginer Run Time Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's <u>If No:</u> No Eng Oil Temp enable criteria	≥ -40 deg. C ≥ 1 seconds = 1 < 150 deg. C EngOilModeledTemp Valid EngOilTempSensorCircuitFA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit High Bank 1 E38 & E67 controllers	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< 2.02 Volts > 3.76 Volts	ECT Enginer Run Time Valid Oil Temp Required? (1= Yes, 0 = No)	≥ -40 deg. C ≥ 2 seconds = 0	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					If Yes: Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's If No: No Eng Oil Temp enable criteria	< 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA		
Knock Sensor (KS) Circuit High Bank 1 E37 controllers	P0328	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> **ShortHi ThreshSig** (Volts) > **ShortHi ThreshRet** (Volts) See Supporting Tables for **ShortHi ThreshSig** and **ShortHi ThreshRet**	ECT Engine Run Time Valid Oil Temp Required? (1= Yes, 0 = No) If Yes: Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's If No: No Eng Oil Temp enable criteria	≥ -40 deg. C ≥ 1 seconds = 1 < 150 deg. C EngOilModeledTemp Valid EngOilTempSensorCircuitFA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Knock Sensor (KS) Circuit Bank 2 E38 & E67 controllers	P0330	This diagnostic checks for an open in the knock sensor circuit	Gated Low Pass Filter Voltage	> 4.0 Volts or < 1.24 Volts	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Enginer Run Time Power Take Off	= 1 ≥ 400 RPM ≥ -40 deg. C ≥ 2 seconds = Not Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Bank 2 E37 controllers	P0330	This diagnostic checks for an open in the knock sensor circuit	Gated FFT Output	< **OpenCircuit Thresh** See Supporting Tables for **OpenCircuit Thresh**	Diagnostic Enabled (1 = Enabled) Engine Speed ECT Engine Run Time No Active DTC's Power Take-Off	= 1 ≥ 1800 RPM ≥ -40 deg. C ≥ 1 seconds KS_Ckt_Perf_B1B2_FA = Not Active	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit Low Bank 2 E38 & E67 controllers	P0332	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> 2.86 Volts < 1.48 Volts	ECT Enginer Run Time Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's <u>If No:</u> No Eng Oil Temp enable criteria	≥ -40 deg. C ≥ 2 seconds = 0 < 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Knock Sensor (KS) Circuit Low Bank 2 E37 controllers	P0332	This diagnostic checks for an out of range low knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< **ShortLow ThreshSig** (Volts) < **ShortLow ThreshRet** (Volts) See Supporting Tables for **ShortLow ThreshSig** and **ShortLow ThreshRet**	ECT Engine Run Time Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's <u>If No:</u> No Eng Oil Temp enable criteria	≥ -40 deg. C ≥ 1 seconds = 1 < 150 deg. C EngOilModeledTemp Valid EngOilTempSensorCircuitFA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Knock Sensor (KS) Circuit High Bank 2 E38 & E67 controllers	P0333	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	< 2.02 Volts > 3.76 Volts	ECT Engine Run Time Valid Oil Temp Required? (1= Yes, 0 = No) <u>If Yes:</u> Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's	≥ -40 deg. C ≥ 2 seconds = 0 < 256 deg. C EngOilModeledTemp Valid EngOilTempSensor CircuitFA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					If No: No Eng Oil Temp enable criteria			
Knock Sensor (KS) Circuit High Bank 2 E37 controllers	P0333	This diagnostic checks for an out of range high knock sensor signal	Sensor Input Signal Line **or** Sensor Return Signal Line	> **ShortHi ThreshSig** (Volts) > **ShortHi ThreshRet** (Volts) See Supporting Tables for **ShortHi ThreshSig** and **ShortHi ThreshRet**	ECT Engine Run Time Valid Oil Temp Required? (1= Yes, 0 = No) If Yes: Engine Oil Temp and ValidOilTemp Model or No OilTempSensor DTC's If No: No Eng Oil Temp enable criteria	≥ -40 deg. C ≥ 1 seconds = 1 < 150 deg. C EngOilModeledTemp Valid EngOilTempSensorCircuitFA	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Crankshaft Position (CKP) Sensor A Circuit	P0335	Determines if a fault exists with the crank position sensor signal	Engine-Cranking Crankshaft Test: Time since last crankshaft position sensor pulse received	>= 4.0 seconds	Engine-Cranking Crankshaft Test: Starter engaged AND (cam pulses being received OR (DTC P0101	= FALSE	Engine-Cranking Crankshaft Test: Continuous every 100 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE > 3.0 grams/second))		
			Time-Based Crankshaft Test: No crankshaft pulses received	>= 0.3 seconds	Time-Based Crankshaft Test: Engine is Running Starter is not engaged No DTC Active:	 5VoltReferenceB_FA	Time-Based Crankshaft Test: Continuous every 12.5 msec	
			Event-Based Crankshaft Test: No crankshaft pulses received		Event-Based Crankshaft Test: Engine is Running OR Starter is engaged No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	Event-Based Crankshaft Test: 2 failures out of 10 samples One sample per engine revolution	
Crankshaft Position (CKP) Sensor A Performance	P0336	Determines if a performance fault exists with the crank position sensor signal	Crank Re-synchronization Test: Time in which 25 or more crank re-synchronizations occur Time-Based Crankshaft Test:	< 20.0 seconds	Crank Re-synchronization Test: Engine Air Flow Cam-based engine speed No DTC Active: Time-Based Crankshaft Test:	 >= 3.0 grams/second > 450 RPM 5VoltReferenceB_FA P0335	Crank Re-synchronization Test: Continuous every 250 msec Time-Based Crankshaft Test:	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			No crankshaft synchronization gap found	>= 0.4 seconds	Engine is Running Starter is not engaged		Continuous every 12.5 msec	
					No DTC Active:	5VoltReferenceB_FA		
			Engine Start Test during Crank:		Engine Start Test during Crank:		Engine Start Test during Crank:	
			Time since starter engaged without detecting crankshaft synchronization gap	>= 1.5 seconds	Starter engaged AND (cam pulses being received		Continuous every 100 msec	
					OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second))		
			Event-Based Crankshaft Test:		Event-Based Crankshaft Test:		Event-Based Crankshaft Test:	
			Crank Pulses received in one engine revolution OR Crank Pulses received in one engine revolution	< 51 seconds > 65 seconds	Engine is Running OR Starter is engaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA P0340 P0341	8 failures out of 10 samples One sample per engine revolution	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						CrankSensor_FA		
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles	= 0	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	Determines if a performance fault exists with the cam position bank 1 sensor A signal	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 24 MEDRES events is less than 2 or greater than 8 (There are 24 MEDRES events per engine cycle)		Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Fast Event-Based Camshaft Test: Continuous every MEDRES event	Type B 2 trips
			Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles OR	< 398 > 402	Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
IGNITION CONTROL #1 CIRCUIT	P0351	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 1 (Cylinders 1 and 4 for V6 with waste spark)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #2 CIRCUIT	P0352	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 2 (Cylinders 2 and 5 for V6 with waste spark)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #3 CIRCUIT	P0353	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 3 (Cylinders 3 and 6 for V6 with waste spark)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #4 CIRCUIT	P0354	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 4 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
IGNITION CONTROL #5 CIRCUIT	P0355	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 5 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #6 CIRCUIT	P0356	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 6 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #7 CIRCUIT	P0357	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 7 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
IGNITION CONTROL #8 CIRCUIT	P0358	This diagnostic checks the circuit for electrical integrity during operation. Monitors EST for Cylinder 8 (if applicable)	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Engine running Ignition Voltage	 > 5.00 Volts	50 Failures out of 63 Samples 100 msec rate	Type: B MIL: YES Trips: 2
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Determines if a fault exists with the cam position bank 1 sensor B signal	<u>Engine Cranking Camshaft Test:</u> Time since last camshaft position sensor pulse received OR	 >= 5.5 seconds	<u>Engine Cranking Camshaft Test:</u> Starter engaged AND (cam pulses being received		<u>Engine Cranking Camshaft Test:</u> Continuous every 100 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Time that starter has been engaged without a camshaft sensor pulse	>= 4.0 seconds	OR (DTC P0101 AND DTC P0102 AND DTC P0103 AND Engine Air Flow	= FALSE = FALSE = FALSE > 3.0 grams/second))		
			<u>Time-Based Camshaft Test:</u> Fewer than 4 camshaft pulses received in a time	> 3.0 seconds	<u>Time-Based Camshaft Test:</u> Engine is Running Starter is not engaged No DTC Active:	5VoltReferenceA_FA	<u>Time-Based Camshaft Test:</u> Continuous every 100 msec	
			<u>Fast Event-Based Camshaft Test:</u> No camshaft pulses received during first 10 MEDRES events (There are 10 MEDRES events per engine cycle)		<u>Fast Event-Based Camshaft Test:</u> Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	<u>Fast Event-Based Camshaft Test:</u> Continuous every MEDRES event	
			<u>Slow Event-Based Camshaft Test:</u> The number of camshaft pulses received during 100 engine cycles	= 0	<u>Slow Event-Based Camshaft Test:</u> Crankshaft is synchronized No DTC Active:	5VoltReferenceA_FA 5VoltReferenceB_FA	<u>Slow Event-Based Camshaft Test:</u> 8 failures out of 10 samples	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						CrankSensor_FA	Continuous every engine cycle	
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Determines if a performance fault exists with the cam position bank 1 sensor B signal	Fast Event-Based Camshaft Test: The number of camshaft pulses received during first 10 MEDRES events is less than 3 or greater than 11 (There are 10 MEDRES events per engine cycle) Slow Event-Based Camshaft Test: The number of camshaft pulses received during 100 engine cycles OR	 < 398 > 402	Fast Event-Based Camshaft Test: Crankshaft is synchronized Starter must be engaged to enable the diagnostic, but the diagnostic will not disable when the starter is disengaged No DTC Active: Slow Event-Based Camshaft Test: Crankshaft is synchronized No DTC Active:	 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA 5VoltReferenceA_FA 5VoltReferenceB_FA CrankSensor_FA	Fast Event-Based Camshaft Test: Continuous every MEDRES event Slow Event-Based Camshaft Test: 8 failures out of 10 samples Continuous every engine cycle	Type B 2 trips
Secondary AIR Incorrect Airflow Single Valve Systems	P0411	Detects an insufficient flow condition. This test is run during Phase 1 (AIR pump commanded On, Valve commanded Open).	System Pressure Error (vs. predicted System Pressure) OR **OR the following String Length (SL) Test:** System Pressure Error	 > 5.0 kPa < -5.0 kPa > 5.0 kPa	BARO Inlet Air Temp Coolant Temp Engine off time System Voltage MAP not Engine Speed MAF not SL Stability time	> 60 kPa > 5.0 deg C. > 5.0 deg C. < 60.0 deg C. > 3600.0 seconds > 10.0 OR < 32.0 Volts < 20 kPa for 2.0 sec. > 5000 RPM > 50 gm/s for 3.0 sec. > 3.0 seconds Bank 1	Phase 1 Conditional test weight > 4.0 seconds Total 'String Length' accumulation time:	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Leaks downstream of the valve are detected via an evaluation of both pressure error and average pressure "String Length"(SL) – a term that represents the absolute pressure delta accumulated every 6.25ms, then averaged over the duration of the test. Low SL values are indicative of downstream leaks or blockages.			SL RPM range	rpm < 5600 or > 6400	> 10 sec Bank1	
			OR	< -2.0 kPa	**Conditional test weight is calculated by multiplying the following Factors:**			
			AND the Average String Length	**< SL Threshold Bank 1 Table**	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		Frequency: Once per trip when AIR pump commanded On	
					(see Supporting Tables)			
					No active DTCs:	AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
Secondary AIR Solenoid Control Circuit	P0412	This DTC checks the AIR solenoid circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System Voltage	> 10.0 Volts < 32.0 Volts	50 failures out of 63 samples 250 ms loop Continuous	2 trip(s) Type B
Secondary AIR Pump Control Circuit	P0418	This DTC checks the AIR Pump circuit for electrical integrity	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		System Voltage	> 10.0 Volts < 32.0 Volts	50 failures out of 63 samples 250 ms loop Continuous	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Catalyst System Low Efficiency Bank 1	P0420	Oxygen Storage	Normalized Ratio OSC Value (EWMA filtered)	< 0.335	***Valid Idle Period Criteria***		1 test attempted per valid idle period	Type A 1 Trip(s)
		The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Lean and Rich A/F excursions. Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.			Throttle Position	< 1.00 %	Minimum of 1 test per trip Maximum of 8 tests per trip Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 1000ms	
					Vehicle Speed	< 1.24 MPH		
					Engine speed	> 1100 RPM for a minimum of 5 seconds since end of last idle period.		
					Engine run time	≥ MinimumEngineRunTime, **This is a function of Coolant Temperature, please see Supporting Tables**		
					Tests attempted this trip	< 255		
					The catalyst diagnostic has not yet completed for the current trip.			
					Catalyst Idle Conditions Met Criteria			
					General Enable met and the Valid Idle Period Criteria met			
					Green Converter Delay	Not Active		
					Induction Air	*-20 < ° C < 250*		
					Intrusive test(s): Fueltrim Post O2 EVAP EGR	Not Active		
					RunCrank Voltage	> 10.90 Volts		
					Ethanol Estimation	NOT in Progress		
		The Catalyst Monitoring Test is done during idle. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document.			ECT	*45 < ° C < 140*		
					Barometric Pressure	> 70 KPA		
					Idle Time before going intrusive is	< 50 Seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Idle time is incremented if Vehicle speed	< 1.24 MPH and the throttle position < 1.00 % as identified in the Valid Idle Period Criteria section.		
					Short Term Fuel Trim	*0.90 < ST FT < 1.10*		
					Predicted catalyst temp > MinCatTemp table (degC) (refer to "Supporting Tables" tab) AND Engine Airflow > MinAirflowToWarmCatalyst table (g/s) (refer to "Supporting Tables" tab) (Based on engine coolant at the time the WarmedUpEvents counter resets to 0.) for at least 15 seconds with a closed throttle time < 90 seconds consecutively (closed throttle consideration involves having the TPS < the value as stated in the Valid Idle Period Criteria Section) . Also, in order to increment the WarmedUpEvents counter (counter must exceed 15 cal value), either the vehicle speed must exceed the vehicle speed cal or the TPS must exceed the TPS cal as stated in the Valid Idle Period Criteria section above.			
					Closed loop fueling Enabled **Please see "Closed Loop Enable Criteria" section of the "Supporting Tables" tab for details.**			
					PRNDL is in Drive Range on an Auto Transmission vehicle.			
					Idle Stable Criteria :: Must hold true from after Catalyst Idle Conditions Met to the end of test			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					MAF	*5.00 < g/s < 15.00*		
					Predicted catalyst temperature	< 710 degC		
					Engine Fueling Criteria at Beginning of Idle Period			
					The following fueling related must also be met from between 4 and 7 seconds after the Catalyst Idle Conditions Met Criteria has been met for at least 4 seconds prior to allowing intrusive control			
					Number of pre-O2 switches	>= 2 grams/second		
					Short Term Fuel Trim Avg	*0.960 < ST FT Avg < 1.040*		
					Rapid Step Response (RSR) feature will initiate multiple tests:			
					If the difference between current EWMA value and the current OSC Normalized Ratio value is > 0.550 and the current OSC Normalized Ratio value is < 0.260			
					Maximum of 24 RSR tests to detect failure when RSR is enabled.			
					Green Converter Delay Criteria			
					This is part of the check for the Catalyst Idle Conditions Met Criteria section			
					The diagnostic will not be enabled until the following has been met:			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Predicted catalyst temperature > 0 ° C for 0 seconds non-continuously. Note: this feature is only enabled when the vehicle is new and cannot be enabled in service			
					PTO Not Active			
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					AmbPresDfltdStatus			
					IAT_SensorCircuitFA			
					ECT_Sensor_FA			
					O2S_Bank_1_Sensor_1_FA			
					O2S_Bank_1_Sensor_2_FA			
					O2S_Bank_2_Sensor_1_FA			
					O2S_Bank_2_Sensor_2_FA			
					FuelTrimSystemB1_FA			
					FuelTrimSystemB2_FA			
					EngineMisfireDetected_FA			
					EvapPurgeSolenoidCircuit_FA			
					IAC_SystemRPM_FA			
					EGRValvePerformance_FA			
					EGRValveCircuit_FA			
					CamSensor_FA			
					CrankSensorFaultActive			
					TPS_Performance_FA			
					EnginePowerLimited			
					VehicleSpeedSensor_FA			
Catalyst System Low Efficiency Bank 2		Oxygen Storage	Normalized Ratio OSC Value (EWMA filtered)	< 0.335	***Valid Idle Period Criteria***		1 test attempted per valid idle period Minimum of 1 test per trip Maximum of 8 tests per trip	Type A 1 Trip(s)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							Frequency: Fueling Related : 12.5 ms OSC Measurements: 100 ms Temp Prediction: 1000ms	
		The catalyst washcoat contains Cerium Oxide. Cerium Oxide reacts with NO and O2 during lean A/F excursions to store the excess oxygen (I.e. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H2 to release this stored oxygen (I.e. Cerium Reduction). This is referred to as the Oxygen Storage Capacity, or OSC. CatMon's strategy is to "measure" the OSC of the catalyst through forced Lean and Rich A/F excursions Normalized Ratio OSC Value Calculation Information and Definitions = 1. Raw OSC Calculation = (post cat O2 Resp time - pre cat O2 Resp time) 2. BestFailing OSC value from a calibration table (based on temp and exhaust gas flow) 3. WorstPassing OSC value (based on temp and exhaust gas flow) Normalized Ratio Calculation = (1-2) / (3-2) A Normalized Ratio of 1 essentially represents a good part and a ratio of 0 essentially represents a very bad part.		Throttle Position	< 1.00 %		
					Vehicle Speed	*< 1.24 MPH*		
					Engine speed	> 1100 RPM for a minimum of 5 seconds since end of last idle period.		
					Engine run time	≥ MinimumEngineRunTime, **This is a function of Coolant Temperture, please see Supporting Tables**		
					Tests attempted this trip	< 255		
					The catalyst diagnostic has not yet completed for the current trip.			
					Catalyst Idle Conditions Met Criteria			
					General Enable met and the Valid Idle Period Criteria met			
					Green Converter Delay	Not Active		
					Induction Air	*-20 < ° C < 250*		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		The Catalyst Monitoring Test is done during idle. Several conditions must be meet in order to execute this test. These conditions and their related values are listed in the secondary parameters area of this document.			Intrusive test(s): Fueltrim Post O2 EVAP EGR	=Not Active		
					RunCrank Voltage	> 10.90 Volts		
					Ethanol Estimation	NOT in Progress		
					ECT	*45 < ° C < 140*		
					Barometric Pressure	> 70 KPA		
					Idle Time before going intrusive is	< 50 Seconds		
					Idle time is incremented if Vehicle speed	< 1.24 MPH and the throttle position < 1.00 % as identified in the Valid Idle Period Criteria section.		
					Short Term Fuel Trim	*0.90 < ST FT < 1.10*		
					Predicted catalyst temp > MinCatTemp table (degC) (refer to "Supporting Tables" tab) AND Engine Airflow > MinAirflowToWarmCatalyst table (g/s) (refer to "Supporting Tables" tab) (Based on engine coolant at the time the WarmedUpEvents counter resets to 0.) for at least 15 seconds with a closed throttle time < 90 seconds consecutively (closed throttle consideration involves having the TPS < the value as stated in the Valid Idle Period Criteria Section) . Also, in order to increment the WarmedUpEvents counter (counter must exceed 15 cal value), either the vehicle speed must exceed the vehicle speed cal or the TPS must exceed the TPS cal as stated in the Valid Idle Period Criteria section above.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Closed loop fueling Enabled **Please see "Closed Loop Enable Criteria" section of the "Supporting Tables" tab for details.**			
					PRNDL is in Drive Range on an Auto Transmission vehicle.			
					Idle Stable Criteria :: Must hold true from after Catalyst Idle Conditions Met to the end of test			
					MAF	*5.00 < g/s < 15.00*		
					Predicted catalyst temperature	< 710 degC		
					Engine Fueling Criteria at Beginning of Idle Period			
					The following fueling related must also be met from between 4 and 7 seconds after the Catalyst Idle Conditions Met Criteria has been met for at least 4 seconds prior to allowing intrusive control			
					Number of pre-O2 switches	>= 2		
					Short Term Fuel Trim Avg	*0.96 < ST FT Avg < 1.04*		
					Rapid Step Response (RSR) feature will initiate multiple tests:			
					If the difference between current EWMA value and the current OSC Normalized Ratio value is > 0.550 and the current OSC Normalized Ratio value is < 0.290			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Maximum of 24 RSR tests to detect failure when RSR is enabled.			
					Green Converter Delay Criteria			
					This is part of the check for the Catalyst Idle Conditions Met Criteria section			
					The diagnostic will not be enabled until the following has been met:			
					Predicted catalyst temperature > 0 ° C for 0 seconds non-continuously. Note: this feature is only enabled when the vehicle is new and cannot be enabled in service			
					PTO Not Active			
					General Enable			
					DTC's Not Set			
					MAF_SensorFA			
					AmbPresDfltdStatus			
					IAT_SensorCircuitFA			
					ECT_Sensor_FA			
					O2S_Bank_1_Sensor_1_FA			
					O2S_Bank_1_Sensor_2_FA			
					O2S_Bank_2_Sensor_1_FA			
					O2S_Bank_2_Sensor_2_FA			
					FuelTrimSystemB1_FA			
					FuelTrimSystemB2_FA			
					EngineMisfireDetected_FA			
					EvapPurgeSolenoidCircuit_FA			
					IAC_SystemRPM_FA			
					EGRValvePerformance_FA			
					EGRValveCircuit_FA			
					CamSensor_FA			
					CrankSensorFaultActive			
					TPS_Performance_FA			
					EnginePowerLimited			
					VehicleSpeedSensor_FA			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Evaporative Emission (EVAP) System Small Leak Detected	P0442	This DTC will detect a small leak (≥ 0.020") in the EVAP system between the fuel fill cap and the purge solenoid. The engine off natural vacuum method (EONV) is used. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric.	The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (See P0442: EONV Pressure Threshold Table on Supporting Tables Tab). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail).		Fuel Level Drive Time Drive length ECT Baro Odometer	10 % ≤ Percent ≤ 90 % ≥ 600 seconds ≥ 5.0 miles ≥ 70 °C ≥ 70 kPa ≥ 10.0 miles	Once per trip, during hot soak (up to 2400 sec.). No more than 2 unsuccessful attempts between completed tests.	1 trip Type A EWMA Average run length is 6 under normal conditions Run length is 3 to 6 trips after code clear or non-volatile reset
					Time since last complete test if normalized result and EWMA is passing	≥ 17 hours		
					OR Time since last complete test if normalized result or EWMA is failing	≥ 10 hours		
					Estimated ambient temperature at end of drive	0 °C ≤ Temperature ≤ 34 °C		
					Estimate of Ambient Air Temperature Valid			
			When EWMA is , the DTC light is	> 0.62 (EWMA Fail Threshold)	**Conditions for Estimate of Ambient Air Temperature to be valid:**			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			illuminated.					
		After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When the pressure drops (-62.27) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62.27 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort.	The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 2 additional consecutive trips.	≤ 0.35 (EWMA Re-Pass Threshold)	**1. Cold Start** Startup delta deg C (ECT-IAT) OR **2. Short Soak and Previous EAT Valid** Previous time since engine off OR **3. Not a Cold Start and Previous EAT Valid and between Short and Long Soak** Previous time since engine off AND Must expire Estimate of Ambient Temperature Valid Conditioning Time. **"P0442: Estimate of Ambient Temperature Valid Conditioning Time" in Supporting Tables Tab.**	≤ 8 °C ≤ 7200 seconds 7200 seconds < Time < 25200 seconds Vehicle Speed ≥ 29.2 mph AND Mass Air Flow ≥ 0 g/sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					OR **4. Not a Cold Start and Previous EAT Not Valid and less than Long Soak**			
					Previous time since engine off	< 25200 seconds		
					AND Must expire maximum value in Estimate of Ambient Temperature Valid Conditioning Time. **Please see "P0442: Estimate of Ambient Temperature Valid Conditioning Time" in Supporting Tables Tab.**	Vehicle Speed ≥ 29.2 mph AND Mass Air Flow ≥ 0 g/sec		
					OR **5. Long Soak**			
					Previous time since engine off	≥ 25200 seconds		
				Abort Conditions:	**1. High Fuel Volatility**			
					During the volatility phase, pressure in the fuel tank is integrated vs. time. If the integrated pressure is	< -5		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					then test aborts and unsuccessful attempts is incremented. OR **2. Vacuum Refueling Detected** See P0454 Fault Code for information on vacuum refueling algorithm. OR **3. Fuel Level Refueling Detected** See P0464 Fault Code for information on fuel level refueling. OR **4. Vacuum Out of Range and No Refueling** See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					OR **5. Vacuum Out of Range and Refueling Detected** See P0451 Fault Code for information on vacuum sensor out of range and P0464 Fault Code for information on fuel level refueling. OR **6. Vent Valve Override Failed** Device control using an off-board tool to control the vent solenoid, cannot exceed during the EONV test	0.50 seconds		
					OR **7. Key up during EONV test** No active DTCs:	FuelLevelDataFault MAF_SensorFA ECT_Sensor_FA IAT_SensorFA VehicleSpeedSensor_FA IgnitionOffTimeValid AmbientAirDefault P0443		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						P0446 P0449 P0452 P0453 P0455 P0496		
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM)	P0443	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		PT Relay Voltage	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms / sample Continuous with solenoid operation	2 trips Type B
Evaporative Emission (EVAP) Vent System Performance	P0446	This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister. This test runs with normal purge and vent valve is open.	Vent Restriction Prep Test: Vented Vacuum OR Vented Vacuum for 60 seconds Vent Restriction Test: Tank Vacuum for 5 seconds BEFORE Purge Volume 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 > 1245 Pa > 2989 Pa ≥ 6 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_SensorCircuitFA 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 1000 seconds	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Evaporative Emission (EVAP) Vent Solenoid Control Circuit (ODM)	P0449	This DTC checks the circuit for electrical integrity during operation. If the P0449 is active, an intrusive test is performed with the vent solenoid commanded closed for 15 seconds.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms / sample Continuous with solenoid operation	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit Performance	P0451	The DTC will be set if the fuel tank vacuum sensor is out of range when it tries to re-zero prior to the phase-1 or phase-2 portions of the engine-off natural vacuum small leak test.	The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts) Upper voltage threshold (voltage addition above the nominal voltage) Lower voltage threshold (voltage subtraction below the nominal voltage) The difference between tank vacuum sensor voltage and the nominal offset voltage is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then	0.2 volts 0.2 volts	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The number of times that it executes can range from zero to two per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	1 trip Type A EWMA Average run length: 6 Run length is 2 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			filtered with a EWMA (with 0= perfect pass and 1=perfect fail). When EWMA is , the DTC light is illuminated. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 2 additional consecutive trips.	 > 0.73 (EWMA Fail Threshold) ≤ 0.40 (EWMA Re-Pass Threshold)				
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	P0452	This DTC will detect a fuel tank pressure sensor signal that is too low out of range.	Fuel tank pressure sensor signal The normal operating range of the fuel tank pressure sensor is 0.5 volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).	< 0.15 volts (3 % of Vref or ~ 1681 Pa)	Time delay after sensor power up for sensor warm-up ECM State ≠ crank Stops 6.0 seconds after key-off	is 0.10 seconds	80 failures out of 100 samples 100 ms / sample Continuous	2 trips Type B
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	P0453	This DTC will detect a fuel tank pressure sensor signal that is too high out of range.	Fuel tank pressure sensor signal The normal operating range of the fuel tank pressure sensor is 0.5	> 4.85 volts (97% of Vref or ~ -4172 Pa)	Time delay after sensor power up for sensor warm-up ECM State ≠ crank	is 0.10 seconds	80 failures out of 100 samples 100 ms / sample	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			volts (~1245 Pa) to 4.5 volts (~ -3736 Pa).		Stops 6.0 seconds after key-off		Continuous	
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent	P0454	This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem.		This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period.	1 trips Type A
							The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	
			An abrupt change is defined as a change in vacuum:	> 112 Pa			The test will report a failure if 2 out of 3 samples are failures.	
			in the span of 1.0 seconds. But	< 249 Pa				
			in 12.5 msec.				12.5 ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			A refueling event is confirmed if the fuel level has a persistent change for 30 seconds.	of 10 %			Continuous when vent solenoid is closed.	
Evaporative Emission (EVAP) System Large Leak Detected	P0455	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system. Purge valve is controlled (to allow purge flow) and vent valve is commanded closed.	Purge volume 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. <u>Weak Vacuum Follow-up Test</u> (fuel cap replacement test) Weak Vacuum Test Passes if tank vacuum Note: Weak Vacuum Follow-up Test can only report a pass.	> 11 liters ≤ 2740 Pa ≥ 2740 Pa	Fuel Level System Voltage BARO No active DTCs: <u>Cold Start Test</u> If ECT > IAT, Startup temperature delta (ECT-IAT): Cold Test Timer Startup IAT Startup ECT <u>Weak Vacuum Follow-up Test</u> This test can run following	10 % ≤ Percent ≤ 90 % 11 volts ≤ Voltage ≤ 32 volts ≥ 70 kPa MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited P0443 P0449 P0452 P0453 P0454 ≤ 8 °C ≤ 1000 seconds 4 °C ≤ Temperature ≤ 30 °C ≤ 35 °C	Once per cold start Time is dependent on driving conditions Maximum time before test abort is 1000 seconds <u>Weak Vacuum Follow-up Test</u> With large leak detected, the follow-up test is limited to 1300 seconds. Once the MIL is on, the follow-up test runs indefinitely.	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					a weak vacuum failure or on a hot restart.			
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 148 miles.	< 3 liters	Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample Continuous	2 trips Type B
Fuel Level Sensor 1 Performance (For use on vehicles with mechanical transfer pump dual fuel tanks)	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.			Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample Continuous	2 trips Type B
			Fuel Level in Primary Tank Remains in an Unreadable Range too Long					
			If fuel volume in primary tank is AND Fuel volume in secondary tank and remains in this condition for OR	>= 28.5 liters < 6.0 liters 124 miles.				
			After Refuel Event					
			If the secondary fuel volume changes by 10.0 liters from engine “off” to engine “on” the primary volume should change by 3.0 liters. OR		The shutdown primary tank volume + 3.0 liters must be	< 28.5 liters		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Distance Traveled without a Primary Fuel Level Change					
			Delta Fuel Volume change over an accumulated 50 miles.	< 3 liters				
Fuel Level Sensor 1 Performance (For use on vehicles with electric transfer pump dual fuel tanks)	P0461	This DTC will detect a fuel sender stuck in range in the primary fuel tank.			Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample Continuous	2 trips Type B
			Fuel Level in Primary and Secondary Tanks Remains in an Unreadable Range too Long					
			If fuel volume in primary tank is AND Fuel volume in secondary tank and remains in this condition for OR	>= 99.0 liters < 0.0 liters 200 miles.				
			During Fuel Transfer					
			During fuel transfer, when the enable conditions are met, at least 3.0 liters of fuel will be transferred from the secondary tank and 3.0 liters of fuel will be transfered into the primary tank within 180 seconds. There is a short delay of 20 seconds to allow fuel slosh to settle		Transfer Pump is commanded on No device control for the transfer pump Fuel Volume in Secondary Tank Vehicle Speed	< 43 liters < 0 mph		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			before the fail timer begins. If the secondary tank volume does decrease by the cal amount but the primary volume does not increase by the cal amount after the fail timer has expired, then P0461 sets. OR					
			Distance Traveled without a Primary Fuel Level Change					
			Delta Fuel Volume change over an accumulated 98 miles.	< 3 liters				
Fuel Level Sensor 1 Circuit Low Voltage	P0462	This DTC will detect a fuel sender stuck out of range low in the primary fuel tank.	Fuel level Sender % of 5V range	< 10 %	Run/Crank Voltage Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	100 failures out of 125 samples 100 ms / sample Continuous	2 trips Type B
Fuel Level Sensor 1 Circuit High Voltage	P0463	This DTC will detect a fuel sender stuck out ofrange high in the primary fuel tank.	Fuel level Sender % of 5V range	> 60 %	Run/Crank Voltage Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	100 failures out of 125 samples 100 ms / sample	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
							Continuous	
Fuel Level Sensor 1 Circuit Intermittent	P0464	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If a change in fuel level is detected, the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that an actual refueling event occurred. If a refueling event is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem.		This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		This test is executed during an engine-off natural vacuum small leak test. The test can only execute up to once per engine-off period. The length of the test is determined by the refueling rationality test, which can take up to 600 seconds to complete.	1 trips Type A
			An intermintant change in fuel level is defined as:				The test will report a failure if 2 out of 3 samples are failures.	
			The fuel level changes	by 10 %				
			and does not remain	> 10 %				
			for 30 seconds during a 600 second refueling rationality test.				100 ms / sample	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Cooling Fan 1 Relay Control Circuit (ODM)	P0480	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous with fan operation	2 trips Type B Not used on systems with Mechanical Fan)
Cooling Fan 2 Relay Control Circuit (ODM)	P0481	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 32 volts ≥ 400 RPM	20 failures out of 25 samples 250 ms / sample Continuous with fan operation	2 trips Type B Not used on systems with Mechanical Fan)
Evaporative Emission (EVAP) System Flow During Non-Purge	P0496	This DTC will determine if the purge solenoid is leaking to engine manifold vacuum. This test will run with the purge valve closed and the vent valve closed.	Tank Vacuum for 5 seconds BEFORE Test time	> 2491 Pa ≥ refer to "P0496: Purge Valve Leak Test Engine Vacuum Test Time (Cold Start) as a Function of Fuel Level table" in Supporting Tables Tab.	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 ≥ 28800.0 seconds MAP_SensorFA TPS_FA VehicleSpeedSensor_FA IAT_SensorCircuitFA ECT_Sensor_FA AmbientAirDefault EnginePowerLimited	Once per cold start Cold start: max time is 1000 seconds	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						P0443 P0449 P0452 P0453 P0454		
Transmission Output Speed Sensor (TOSS)	P0502	No activity in the TOSS circuit	TOSS Raw Speed	<= 60 RPM	Maximum Engine Torque	<= 8191.9 N-m	>= 4.50 sec	Type B 2 trips
					Minimum Engine Torque	>= 68.0 N-m		
					Maximum Engine Torque in Park or Neutral	<= 8191.9 N-m		
					Minimum Engine Torque in Park or Neutral	>= 90.0 N-m		
					Minimum Throttle opening	>= 3.5 %		
					Minimum Engine Speed when there is a Brake DTC: P0572, P0573, P0703. **Cald Out by matched threshold with below. **	>= 1500 RPM		
					Minimum Engine Speed when there is no Brake DTC :P0572, P0573, P0703. **Cald Out by	>= 1500 RPM		
					Maximum Engine Speed	<= 6500 RPM		
					Minimum Transmission Fluid Temperature	>= -40.0 º C.		
					Disable P0502 if PTO Active	Enabled		
					Engine Speed	<= 7500 RPM >= 200 RPM for >= 5.0 sec		
					Vehicle Speed	<= 318 MPH		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						for >= 5.0 sec		
					Ignition Voltage	<= 32.0 volts		
					Ignition Voltage	>= 11.0 volts		
					No Active DTCs:	EngineTorqureInaccurate AcceleratorEffectivePstnValid P0503 Active this Key On		
Transmission Output Speed Sensor (TOSS)	P0503	TOSS Signal Intermittent	Loop-to-Loop change in TOSS	>= 350 RPM	Disable P0502 if PTO Active	Enabled	>= 3.25 sec	Type B 2 trips
					Engine Speed	<= 7500 RPM >= 200 RPM for >= 5.0 sec		
					Vehicle Speed	<= 318 MPH for >= 5.0 sec		
					Ignition Voltage	<= 32.0 volts		
					Ignition Voltage	>= 11.0 volts		
					Time since Selected Gear Range Change	>= 6 sec		
					Time since 4WD Range change	>= 6 sec		
					Loop-to-Loop Input Speed Change	<= 500 RPM For >= 2 Sec.		
					Raw Output Speed	> 300 RPM for >= 2 Sec.		
					Output Speed change	<= 150 RPM for >= 2 Sec.		
					Disabled For Following DTCS:	ShiftSolenoidFaults (TCM)		
Low Engine Speed Idle System	P0506	This DTC will determine if a low idle exists	Filtered Engine Speed Error	< 91.00 rpm	Baro	> 70 kPa	Diagnostic runs in	2 trips Type B
			filter coefficient	0.003	Coolant Temp	> 60 °C and < 123 °C	every 12.5 ms loop	
					Engine run time	≥ 60 sec	Diagnostic reports	
					Ignition voltage	32 ≥ volts ≥ 11	pass or fail in	
					Time since gear change	≥ 3 sec	10 sec	
					Time since a TCC mode change	> 3 sec	once all enable	
					IAT	> -20 °C	conditions are met	
					Vehicle speed	≤ 1.24 mph		
					Commanded RPM delta	≤ 25 rpm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					For manual transmissions: Clutch Pedal TOT Threshold or Clutch Pedal BOT Threshold	> 88.00 pct < 16.00 pct		
						PTO not active		
						Transfer Case not in 4WD LowState		
						Off-vehicle device control (service bay control) must not be active.		
					No active DTCs	AmbientAirDefault		
						ECT_Sensor_FA		
						EGRValveCircuit_FA		
						EGRValvePerformance_FA		
						IAT_SensorCircuitFA		
						EvapFlowDuringNonPurge_FA		
						FuelTrimSystemB1_FA		
						FuelTrimSystemB2_FA		
						FuelInjectorCircuit_FA		
						MAF_SensorFA		
						EngineMisfireDetected_FA		
						IgnitionOutputDriver_FA		
						EnginePowerLimited		
						TPS_FA		
						TPS_Performance_FA		
						VehicleSpeedSensor_FA		
						FuelLevelDataFault		
						LowFuelConditionDiagnostic		
						Clutch Sensor FA		
					All of the above met for Idle time	> 10 sec		
High Engine Speed Idle System	P0507	This DTC will determine if a high idle exists	Filtered Engine Speed Error	> -182.00 rpm	Baro	> 70 kPa	Diagnostic runs in	2 trips Type B
			filter coefficient	0.003	Coolant Temp	> 60 °C and < 123 °C	every 12.5 ms loop	
					Engine run time	≥ 60 sec	Diagnostic reports	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Ignition voltage	32 ≥ volts ≥ 11	pass or fail in	
					Time since gear change	≥ 3 sec	10 sec	
					Time since a TCC mode change	> 3 sec	once all enable	
					IAT	> -20 °C	conditions are met	
					Vehicle speed	≤ 1.24 mph		
					Commanded RPM delta	≤ 25 rpm		
					For manual transmissions: Clutch Pedal TOT Threshold or Clutch Pedal BOT Threshold	> 88.00 pct < 16.00 pct		
						PTO not active		
						Transfer Case not in 4WD LowState		
						Off-vehicle device control (service bay control) must not be active.		
					No active DTCs	AmbientAirDefault		
						ECT_Sensor_FA		
						EGRValveCircuit_FA		
						EGRValvePerformance_FA		
						IAT_SensorCircuitFA		
						EvapFlowDuringNonPurge_FA		
						FuelTrimSystemB1_FA		
						FuelTrimSystemB2_FA		
						FuelInjectorCircuit_FA		
						MAF_SensorFA		
						EngineMisfireDetected_FA		
						IgnitionOutputDriver_FA		
						EnginePowerLimited		
						TPS_FA		
						TPS_Performance_FA		
						VehicleSpeedSensor_FA		
						FuelLevelDataFault		
						LowFuelConditionDiagnostic		
						Clutch Sensor FA		
					All of the above met for Idle time	> 10 sec		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Engine Oil Pressure (EOP) Sensor Performance	P0521	Determines if the Engine Oil Pressure (EOP) Sensor is stuck or biased in range	**To fail a currently passing test:** The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.):	< -50.0 kPa OR > 47.0 kPa	Diagnostic enabled/disabled	Enabled	Performed every 100 msec	2 trip(s) Type B
					Oil Pressure Sensor In Use	Present		
					Filtered engine oil pressure test weighting (function of engine speed, engine oil temperature, predicted oil pressure, and engine load stability). Details on Supporting Tables Tab (P0521 Section)	>= 0.30 weighting		
			To pass a currently failing test: The filtered, weighted difference between measured EOP and predicted EOP (a function of engine speed and engine oil temp.):	> -47.0 kPa AND < 44.0 kPa	No active DTC's	Fault bundles: CrankSensorFA ECT_Sensor_FA MAF_SensorFA IAT_SensorFA EOPCircuit_FA		
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low	(Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts	< 5 percent	Engine Running Ignition Voltage Sensor Present Diagnostic enabled/ disabled	= True <= 32.0 V and >= 11.0 V Yes Enabled	50 failures out of 63samples Performed every 100 msec	2 trip(s) Type B
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high	(Engine Oil Pressure Sensor Circuit Voltage) / 5 Volts	> 85 percent	Engine Running Ignition Voltage Sensor Present Diagnostic enabled/ disabled	= True <= 32.0 V and >= 11.0 V Yes Enabled	220 failures out of 255 samples Performed every 100 msec	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Booster Pressure Sensor Performance	P0556	Determines if the Brake Booster Vacuum Sensor is stuck or skewed within the normal operating range by comparing the engine vacuum to the brake booster vacuum when the engine is producing a large amount of vacuum	Engine vs brake booster vacuum sensor values are compared when % throttle < value for a time period. When throttle once again > calibrated value, min and max vacuum sensor values are normalized and subtracted from a 1st order lag filter value of 1. A properly operating vacuum sensor would have a normalized result of 1 or greater. If the normalized result is greater than 1 it is considered 1. The 1st order lag filter value would be 0 in a passing system. 1st order lag fail threshold 1st order lag re-pass threshold	> 0.5 < 0.6	Throttle Area (with idle included) for time period of Ignition Voltage BrkBoostVacDiff For time period of AND Vacuum Delta Diagnostic enabled/ disabled No active DTC's	<= 1 Percent for > 3 seconds <= 32.0 V and >= 11.0 V > 0.3 kPa >= 0.2 Seconds >= 6.0 kPa Enabled Fault bundles: MAP_SensorFA TPS_FA	Pass counter incremented when enable conditions are met, pass achieved when counter >= 8 Performed every 100 msec	2 trip(s) Type B
Brake Booster Pressure Sensor Circuit Low Voltage	P0557	Determines if the Brake Booster Pressure Sensor circuit voltage is too low	(Brake Booster Pressure Sensor Voltage) / 5 Volts	< 2.0 percent	Brake booster diagnostic enabled/ disabled Brake booster pressure sensor present	Enabled Yes	320 failures out of 400samples Performed every 12.5 msec	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Booster Pressure Sensor Circuit High Voltage	P0558	Determines if the Brake Booster Pressure Sensor circuit voltage is too high	(Brake Booster Pressure Sensor Voltage) / 5 Volts	> 87.0 percent	Brake booster diagnostic enabled/ disabled Brake booster pressure sensor present	Enabled Yes	2000 failures out of 2400 samples Performed every 12.5 msec	2 trip(s) Type B
Cruise Control Mutil-Functon Switch Circuit	P0564	Detect when cruise control multi-function switch circuit (analog) voltage is in an illegal range	Cruise Control analog circuit voltage must be in an "illegal range" for greater than a calibratable period of time for cruise switch states that are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE -1	fail continuously for greater than 0.500 seconds	Type: C MIL: NO Trips: 1
Cruise Control Resume Circuit	P0567	Detects a failure of the cruise resume switch in a continously applied state	Cruise Control Resume switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE -1	fail continuously for greater than 90.000 seconds	Type: C MIL: NO Trips: 1

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Cruise Control Set Circuit	P0568	Detects a failure of the cruise set switch in a continously applied state	Cruise Control Set switch remains applied for greater than a calibratable period of time for architecture where cruise switch states are received over serial data		CAN cruise switch diagnostic enable in ECM	TRUE -1	fail continuously for greater than 90.000 seconds	Type: C MIL: NO
							fail continuously for greater than 90.000 seconds	Trips: 1
Cruise Control Input Circuit	P0575	Detects rolling count or protection value errors in Cruise Control Switch Status serial data signal	If x of y rolling count / protection value faults occur, disable cruise for duration of fault		Cruise Control Switch Serial Data Error Diagnostic Enable	TRUE -1	10 / 16 counts	Type: C MIL: NO Trips: 1
Brake Pedal Position Sensor Circuit Low	P057C	Detects low circuit failure when brake pedal position is below calibratable value	If x of y faults occur, default brake pedal position to zero for duration of fault	0.25	Brake Pedal Position Diagnostic Enable	TRUE -1	20 / 32 counts	Type: B MIL: YES Trips: 2

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Pedal Position Sensor Circuit High	P057D	Detects high circuit failure when brake pedal position is above calibratable value	If x of y faults occur, default brake pedal position to zero for duration of fault	4.75	Brake Pedal Position Diagnostic Enable	TRUE -1	20 / 32 counts	Type: B MIL: YES Trips: 2
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration check sum is incorrect	Output state invalid		PCM State	= crank or run	Diagnostic runs continuously in the background	Type A 1 trips
							Diagnostic reports a fault if 1 failure occurs on the first pass.	
							Diagnostic reports a fault if 5 failures occur after the first pass is complete.	
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	Diagnostic runs at powerup	Type A 1 trips
						PCM is identified through calibration as a Service PCM		
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	Type A 1 trips
							Diagnostic reports a fault if 1 failure occurs	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
ECM RAM Failure	P0604	Indicates that the ECM is unable to correctly read data from or write data to RAM	Primary processor data pattern written doesn't match the pattern read for a count >	1 count if found on first memory scan. 5 counts if found on subsequent scans.			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously	Trips: 1 Type: A MIL: YES
			Secondary processor battery backed RAM failed checksum twice for original values at power up and the defaulted values				Completion at intilization, <500 ms	
			Secondary processor copy of calibration area to RAM failed for a count >	2 counts			Completion at intilization, <500 ms	
			Secondary Processor data pattern written doesn't match the pattern read consecutive times				Will finish within 30 seconds at all engine conditions.	
			Secondary Processor TPS or APPS minimum learned values fail compliment check continuously				0.0625 sec continuous	
ECM Processor	P0606	Indicates that the ECM has detected an internal processor integrity fault	When drag is active Secondary processor detects Primary's calculated throttle position is greater > than Secondary Processor calculated Throttle Position by	46.98 %.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1875 sec in the secondary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Secondary processor detects Primary's calculated throttle position is greater > than Secondary's calculated Throttle Position when driver is commanding the throttle from APP by	5.82 %.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions		
			Secondary processor detects Primary's calculated throttle position is greater > than Secondary's calculated Throttle Position when reduce engine power is active by	39.26 %.		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions		
			Software tasks on the Primary Processor in the 12.5 ms loop were not executed or were not executed in the correct order.	0.0625 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.0625 sec continuous	
			Software tasks on the Primary Processor in the 25 ms loop were not executed or were not executed in the correct order.	0.1250 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1250 sec continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Software tasks on the Primary Processor in the 50 ms loop were not executed or were not executed in the correct order.	0.5000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.5000 sec continuous	
			Software tasks on the Primary Processor in the 100 ms loop were not executed or were not executed in the correct order.	1.0000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	1.0000 sec continuous	
			Software tasks on the Primary Processor in the 250 ms loop were not executed or were not executed in the correct order.	2.5000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2.5000 sec continuous	
			The first completion of the RAM diagnostic on the Primary Processor was completed > the amount of time	360.0000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	360.0000 sec continuous	
			The first completion of the ROM diagnostic on the Primary Processor was completed > the amount of time	360.0000 sec continuous		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	360.0000 sec continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Software tasks on the Secondary Processor were not executed or were not executed in the correct order.	Two Consecutive Loops (12.5ms * 2) 25ms		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	25 ms	
			Loss or invalid message of SPI communication from the Secondary Processor at initialization detected by the Primary Processor or loss or invalid message of SPI communication from the Secondary Processor after a valid message was recieved by the Primary Processor			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	In the primary processor, 159 / 400 counts intermittent or 15 counts continuous; 39 counts continuous @ initialization	
			Loss or invalid message of SPI communication from the Primary Processor at initialization detected by the Secondary Processor or loss or invalid message of SPI communication from the Primary Processor after a valid message was recieved by the Secondary Processor			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	In the secondary processor 0.4750 sec at initialization, 0.1750 sec continuous or 20 / 200 intermittent.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Primary processor check of the secondary processor by verifing the hardware line toggle between the two processors toggles within the threshold values	9.3750 ms and 15.6250 ms		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	9 counts continuous at initialization or 9 counts continuous; 12.5 ms /count in the primary processor	
			Primary Processor TPS or APP minimum learned values fail compliment check			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1000 sec continuous	
			The ocillator failed for the Primary processor where the clock is outside the threshold	27.85 kHz and 37.68 kHz		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	100 ms continuous	
			The secondary check of the ALU failed to compute the expected result			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5 ms continuous	
			Secondary processor failed configuration check of the registers.			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5 ms continuous	
			Secondary processor checks stack beginning and end point for pattern written at initialization.			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Secondary processor check that the Primary processor hasen't set a select combination of internal processor faults			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
			The primary processor check of the ALU failed to compute the expected result	Two Consecutive Times		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
			Primary processor failed configuration check of the registers.			Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	12.5ms continuous	
Main & MHC state of health fault	P0607		Primary state of health (SOH) discrete line is not toggling between the two processors for a time >	0.4875 sec		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4875 sec continuous	Trips: 1 Type: C MIL: NO
Vehicle Speed Output Circuit 2 (128kPPM)	P0609	Determines if the Vehicle Speed Output Circuit 2 (128kPPM) is faulted	ECM detects that commanded and actual states of the output driver do not match because the output has either an open circuit, short to ground, or short to power.	100 failures out of 120 samples	Vehicle speed output (128kPPM) circuit diagnostic enabled	Enabled	100 failures out of 120 samples	2 Trip(s) Type B
					Run/crank voltage is in range	<= 32.0 V and >= 11.0 V	Performed every 250 msec	
Control Module Accelerator Pedal Position (APP) System Performance	P060D	Verify that the indicated accelerator pedal position calculation is correct	PPS sensor switch fault - When the APP sensor 2 is shorted to ground, the sensor value is >	41		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	Consecutive checks within 200ms or 2 / 2 counts; 175 ms/count	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						Engine Running TPS minimum learn is not active No Pedal related errors or diagnostic faults. Diagnostic is enabled (Only applicable for Legacy accelerator pedals)		
			Difference between primary processor indicated accelerator pedal position and secondary indicated accelerator pedal position is >	5		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions Primary processor Pedal Sync Error is FALSE	44 / 40 counts or 39 counts continuous; 12.5 ms/count in the secondary processor	
Control Module EEPROM Error	P062F	Indicates that the NVM Error flag has not been cleared	Last EEPROM write did not complete		Ignition State	= unlock/accesory, run, or crank	1 test failure Diagnostic runs once at powerup	Type A 1 trips
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on th 5 volt reference circuit #1	Primary Processor Vref1 < or Primary Processor Vref1 > or the difference between Primary filtered Vref1 and Primary Vref1 >	4.875 5.125 0.049		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 0.1875 continuous; 12.5 ms/count in primary processor	Trips: 1 Type: A MIL: YES
			Secondary Processor Vref1 < or Secondary Processor Vref1 >	4.875 5.125			19 / 39 counts or 15 counts continuous; 12.5 ms/count in secondary processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Malfunction Indicator Lamp (MIL) Control Circuit (ODM)	P0650	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Remote Vehicle Start is not active	11 volts ≤ Voltage ≤ 32 volts	20 failures out of 25 samples 250 ms / sample Continuous	2 trip Type B NO MIL
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on th 5 volt reference circuit #2	Primary Processor Vref2 < or Primary Processor Vref2 > or the difference between Primary filtered Vref2 and Primary Vref2 >	4.875 5.125 0.049		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 0.1875 sec continuous; 12.5 ms/count in primary processor	Trips: 1 Type: A MIL: YES
			Secondary Processor Vref2 < or Secondary Processor Vref2 >	4.875 5.125			19 / 39 counts or 15 counts continuous; 12.5 ms/count in secondary processor	
Powertrain Relay Control (ODM)	P0685	This DTC checks the circuit for electrical integrity during operation.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	8 failures out of 10 samples 250 ms / sample Continuous	2 trips Type B
Powertrain Relay Feedback Circuit High	P0690	This DTC is a check to determine if the Powertrain relay is functioning properly.	PT Relay feedback voltage is Stuck Test: PT Relay feedback voltage is	≥ 18 volts > 2.5 volts	Powertrain relay commanded “ON” No active DTCs:	PowertrainRelayStateOn_FA	5 failures out of 6 samples 1 second / sample Stuck Test: 100 ms/ sample	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			when commanded 'OFF'				Continous failures ≥ 4 seconds	
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	1 trips Type A (No MIL)
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 Control Module Emissions-Related DTC set			Time since power-up > 3 seconds	Continuous	1 trips Type A (No MIL)
Clutch Pedal Position Sensor Circuit Range / Performance	P0806	Detects if Clutch Pedal Position Sensor is Stuck in a range indicative of a vehicle NOT in gear, when the vehicle is determined to be in gear. Gear determination is made by verifying that engine RPM/ Vehicle Speed (N/V) ratio represents a valid gear.	Filtered Clutch Pedal Position Error when the vehicle is determined to be in gear	> 1 %	N/V Ratio Transfer Case vehicle speed Engine Torque Clutch Pedal Position **OR** Clutch Pedal Position **No Active DTCs:** ClutchPositionSensorCktLo FA ClutchPositionSensorCktHi FA CrankSensorFA VehicleSpeedSensor_FA	Must match actual gear (i.e. vehicle in gear) Not in 4WD Low range > 0.0 MPH > **EngTorqueThreshold** Table < **ResidualErrEnableLow** Table > ***ResidualErrEnableHigh*** *Table*	25 ms loop Continuous	1 Trip(s) Type A
Clutch Pedal Position Sensor Circuit Low	P0807	Detects Continuous Circuit Short to Low or Open	Clutch Position Sensor Circuit for	< 4 % of Vref 200 counts out of 250 samples	Engine Not Cranking System Voltage	> 9.0 Volts	25 ms loop Continuous	1 Trip(s) Type A

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Clutch Pedal Position Sensor Circuit High	P0808	Detects Continuous Circuit Short to High	Clutch Position Sensor Circuit	> 96 % of Vref	Engine Not Cranking System Voltage	> 9.0 Volts	25 ms loop Continuous	1 Trip(s) Type A
			for	200 counts out of 250 samples				
Clutch Pedal Position Not Learned	P080A	Monitor for Valid Clutch Pedal Fully Applied Learn Position values	Fully Applied Learn Position	< 9.0 %	OBD Manufacturer Enable Counter	= 0	250 ms loop Continuous	1 Trip(s) Type A
			OR					
			Fully Applied Learn Position	> 36.0 %				
Skip Shift Solenoid Control Circuit Low (Manual Transmission Only)	P080C	This DTC checks for an open and shorted low circuit while the device is commanded off.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 32 volts > 250 RPM	5 failures out of 6 samples 250 ms / sample Continuous with device off	2 trips Type B
Skip Shift Solenoid Control Circuit High (Manual Transmission Only)	P080D	This DTC checks for a shorted high circuit while the device is commanded on.	The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.		Run/Crank Voltage Engine Speed	11 volts ≤ Voltage ≤ 32 volts > 250 RPM	5 failures out of 6 samples 250 ms / sample Continuous with device on	2 trips Type B
Traction Control Torque Request Circuit	P0856	Determines if torque request from the EBTCM is valid	**With GMLAN:** Serial Communication 2's complement message - ($140 for PPEI2 or $1C7/$1C9 for PPEI3 engine torque or $1CA/$1C6 for axle torque)	Message <> 2's complement of message	**With GMLAN:** Serial communication to EBTCM (U0108) Power Mode Engine Running	No loss of communication = Run = True	**With GMLAN:** Count of 2's complement values not equal >= 10 Performed every 25 msec.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			OR		Status of traction in GMLAN message ($380 for PPEI2 or $4E9 for PPEI3)	= Traction Present	**OR** 6 rolling count failures out of 10 samples Performed every 25 msec.	1 trip(s)
			Serial Communication message ($140 for PPEI2 or $1C7/$1C9 for PPEI3 engine torque or $1CA/$1C6 for axle torque) rolling count value	Message rolling count value <> previous message rolling count value plus one				
			OR					
			Too many minimum limit torque request transitions occur from TRUE to FALSE to TRUE within a time period	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples. Performed every 200 msec.	Special Type C
			Torque request greater than allowed	> 650 Nm for engine based traction torque system			>= 10 out of 10 samples above 650 Nm Performed every 25 msec.	
			With PWM:		**With PWM:**		**With PWM:**	
			PWM Duty cycle	< 4 Pct	Traction Status for PWM ($2B3C Class2 message)		3 failures out of 30 samples	
			OR					
			PWM Duty cycle	> 96 Pct		= Traction Present		
					Engine Run Time	> 2 Seconds	Performed every 50 msec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Inlet Airflow System Performance (naturally aspirated applications)	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	Filtered Throttle Model Error	<= 250 kPa*(g/s)	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp	>= 450 RPM <= 6700 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C	Continuous Calculation are performed every 12.5 msec	Type B 2 trips
			AND (ABS(Measured Flow – Modeled Air Flow) Filtered	> 12 grams/sec	Minimum total weight factor (all factors multiplied together)			
			OR ABS(Measured MAP – MAP Model 1) Filtered	> 15.0 kPa)		>= 0.00		
			AND ABS(Measured MAP – MAP Model 2) Filtered	> 15.0 kPa		Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM See table "IFRD Residual Weighting Factors".		
					No Active DTCs:	MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO		
Inlet Airflow System Performance (supercharged)	P1101	Determines if there are multiple air induction problems affecting airflow and/or manifold pressure.	See table "Supercharger Intake Flow Rationality Diagnostic Failure Matrix" for combinations of model failures that can set this DTC. TPS model fails when Filtered Throttle Model Error MAF model fails when ABS(Measured Flow – Modeled Air Flow) Filtered MAP1 model fails when ABS(Measured MAP – MAP Model 1) Filtered MAP2 model fails when ABS(Measured MAP – MAP Model 2) Filtered SCIAP1 model fails when ABS(Measured SCIAP – SCIAP Model 1) Filtered	 > 400 kPa*(g/s) > 21 grams/sec > 22.0 kPa > 22.0 kPa > 14.0 kPa	Engine Speed Engine Speed Coolant Temp Coolant Temp Intake Air Temp Intake Air Temp Minimum total weight factor (all factors multiplied together)	>= 450 RPM <= 6200 RPM > -7 Deg C < 125 Deg C > -20 Deg C < 125 Deg C >= 0.00 RPM Filtered Throttle Model multiplied by TPS Residual Weight Factor based on RPM Modeled Air Flow multiplied by MAF Residual Weight Factor based on RPM and MAF Residual Weight Factor Based on MAF Estimate MAP Model 1 multiplied by MAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost	Continuous Calculation are performed every 12.5 msec	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			SCIAP2 model fails when ABS(Measured SCIAP – SCIAP Model 2) Filtered	> 14.0 kPa		SCIAP Model 1 multiplied by SCIAP1 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost SCIAP Model 2 multiplied by SCIAP2 Residual Weight Factor based on RPM and Boost Residual Weight Factor based on % of Boost See table "IFRD Residual Weighting Factors". MAP_SensorCircuitFA EGRValve_FP EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensorFA ECT_sensor_FA ECT_Sensor_FP IAT_SensorFA IAT_SensorCircuitFP CylDeacSystemTFTKO IAT2_SensorFA IAT2_SensorCircuitFP SCIAP_SensorCircuitFA SCIAP_SensorCircuitFP AmbientAirDefault_SC		
					No Active DTCs:			
O2S Insufficient Switching Bank 1 Sensor 1	P1133	This DTC determines if the O2 sensor is no longer sufficiently switching.	Fault condition present if Half Cycle L/R or R/L Switches are below the threshold. OR If Slope Time L/R or R/L Switches are below the threshold.	H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to table named "P1133 - O2S HC L to R Switches Limit Bank 1 Sensor 1" Pass/Fail Threshold table & "P1133 - O2S HC R to L Switches	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA	Sample time is 60 seconds Frequency: Once per trip	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				Limit Bank 1 Sensor 1" Pass/Fail Threshold table in Supporting tables tab) OR S/T L/R switches < 3, or S/T R/L switches < 3		EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA		
					Bank 1 Sensor 1 DTC's not active	= P0131, P0132 or P0134		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S1)** in Supporting Tables tab.		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 0.0 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 0.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	15 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 5 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for			
					Time	> 3.0 seconds		
O2S Insufficient Switching Bank 2 Sensor 1	P1153	This DTC determines if the O2 sensor is no longer sufficiently switching.	Fault condition present if Half Cycle L/R or R/L Switches are below the threshold. OR If Slope Time L/R or R/L Switches are below the threshold.	H/C L/R switches < Threshold, or H/C R/L switches < Threshold, (refer to table named "P1153 - O2S HC L to R Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table & "P1153 - O2S HC R to L Switches Limit Bank 2 Sensor 1" Pass/Fail Threshold table in Supporting tables tab) OR S/T L/R switches < 3, or S/T R/L switches < 3	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnsrCkt_FA FuelInjectorCircuit_FA AIR System FA EthanolCompositionSensor_FA EngineMisfireDetected_FA	Sample time is 60 seconds Frequency: Once per trip	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Bank 2 Sensor 1 DTC's not active	= P0151, P0152 or P0154		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					EGR Device Control	= Not active		
					Idle Device Control	= Not active		
					Fuel Device Control	= Not active		
					AIR Device Control	= Not active		
					Low Fuel Condition Diag	= False		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S1)** in Supporting Tables tab.		
					O2 Heater on for	>= 40 seconds		
					Learned Htr resistance	= Valid		
					Engine Coolant	> 55 ºC		
					IAT	> -40 ºC		
					Engine Run Time	> 120 seconds		
					Time since any AFM status change	> 0.0 seconds		
					Time since Purge On to Off change	> 0.0 seconds		
					Time since Purge Off to On change	> 0.0 seconds		
					Purge duty cycle	>= 0 % duty cycle		
					Engine airflow	15 gps <= engine airflow <= 55 gps		
					Engine speed	1000 <= RPM <= 3000		
					Fuel	< 87 % Ethanol		
					Baro	> 70 kpa		
					Throttle Position	>= 5 %		
					Low Fuel Condition Diag	= False		
					Fuel Control State	= Closed Loop		
					Closed Loop Active	= TRUE		
					LTM fuel cell	= Enabled		
					Transient Fuel Mass	<= 100.0 mgrams		
					Baro	= Not Defaulted		
					Fuel Control State	not = Power Enrichment		
					Fuel State	DFCO not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Commanded Proportional Gain	>= 0.0 %		
					All of the above met for			
					Time	> 3.0 seconds		
EngineMetal OvertempActive	P1258	The objective of the algorithm is to protect the engine in the event of engine metal overtemperature, mainly due to loss of coolant	Engine Coolant For	≥ 132 °C ≥ 10 seconds	Engine Run Time If feature was active and it set the coolant sensor fault then feature will be enabled on coolant sensor fault pending on the next trip.	≥ 10 Seconds	Fault present for ≥ 0 seconds	1 trips Type A
ABS Rough Road malfunction	P1380	This diagnostic detects if the ABS controller is indicating a fault, and misfire is present. When this occurs, misfire will continue to run.	GMLan Message: "Wheel Sensor Rough Road Magnitude Validity"	= FALSE	Vehicle Speed Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 5 mph rpm < 8192 load < 60 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	1 Trips Type C "Special Type C"
ABS System Rough Road Detection Communication Fault	P1381	This diagnostic detects if the rough road information is no longer being received from the ABS controller, and misfire is present. When this occurs, misfire will continue to run.	Loss of GMLan Message: "Wheel Sensor Rough Road Magnitude"	= FALSE	Vehicle Speed Engine Speed Engine Load RunCrankActive Active DTC	VSS ≥ 5 mph rpm < 8192 load < 60 = TRUE P0300, MIL Request	40 failures out of 80 samples 250 ms /sample Continuous	1 Trips Type C "Special Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	Average desired accumulated exhaust power - Average estimated accumulated exhaust power OR Average desired accumulated exhaust power - Average estimated accumulated exhaust power (EWMA filtered)	< -32.00 KJ/s (high RPM failure mode) > 1.01 KJ/s (low RPM failure mode)	Cold Start Emission Reduction Strategy Is Active. The strategy is considered active if either the Spark cat light off or Idle cat light off strategies are considered active. Spark CLO is considered active when the CatLightOffDesiredSparkRetard (function of idle RPM and air per cylinder and scaled based on coolant and engine run time) <= 11.50 degrees of Spark Idle CLO is considered active if the desired RPM exceeds a base RPM value (function of coolant) plus an RPM offset. The amount of RPM offset to be considered catalyst light off is also a function of coolant temperature and gear state. Refer to "Supporting Tables" for details.		Runs once per trip when the cold start emission reduction strategy is active Frequency: 100ms Loop Test completes after 10 seconds of accumulated qualified data.	Type A 1 Trip(s)
					Vehicle Speed	< 1.24 MPH		
					OBD Manufacturer Enable Counter	0		
					Throttle Position	< 0.50 percent		
					A change in throttle position (tip-in/tip-out) will initiate a delay in the calculation of the average qualified residual value. When the delay timer > 5.00 seconds the diagnostic will continue the calculation.			
					For Manual Transmission vehicles, the clutch must be fully engaged. Clutch Pedal Position < 16.00 OR The clutch must be fully disengaged. Clutch Pedal Position > 88.00			
					General Enable			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					DTC's Not Set			
					MAF_SensorFA			
					MAP_SensorFA			
					IAT_SensorCircuitFA			
					IAT2_SensorCircuitFA			
					ECT_Sensor_FA			
					CrankSensorFaultActive			
					IAC_SystemRPM_FA			
					TPS_FA			
					VehicleSpeedSensor_FA			
					EngineMisfireDetected_FA			
					IgnitionOutputDriver_FA			
					ControllerProcessorPerf_FA			
					5VoltReferenceA_FA			
					5VoltReferenceB_FA			
					FuelInjectorCircuit_FA			
					TransmissionEngagedState_FA			
					Clutch Sensor FA			
					P050A (ColdStrt_IAC_SysPerf)			
					P050B (ColdStrtIgnTmngPerf)			
Replicated Transmission Output Speed (RTOS) Sensor	P150A	No activity in the RTOS Signal circuit	RTOS Sensor Raw Speed	<= 60 RPM	Transmission output Speed Angular Velocity	>= 1000 RPM	>= 4.50 Fail Time (Sec)	Type B 2 trips
					Engine Speed	<= 7500 RPM >= 200 RPM for >= 5.0 sec		
					Vehicle Speed	<= 124 MPH for >= 5.0 sec		
					Ignition Voltage Ignition Voltage Disabled For Following DTCS:	<= 32.0 volts >= 9.0 volts VehicleSpeedSensor_FA P150B		
Replicated Transmission Output Speed (RTOS) Sensor	P150B	RTOS Signal Circuit Intermittent	RTOS Sensor Loop-to-Loop speed change	>= 350 RPM	Raw Transmission Output Speed Output Speed change	> 300 RPM for >= 2 sec. <= 150 RPM for >= 2 sec.	>= 3.25 Fail Time (Sec)	Type B 2 trips
					Engine Speed	<= 7500 RPM >= 200 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						for >= 5.0 sec		
					Vehicle Speed	<= 124 MPH for >= 5.0 sec		
					Ignition Voltage Ignition Voltage Disabled For Following DTCS:	<= 32.0 volts >= 9.0 volts VehicleSpeedSensor_FA		
Transmission Engine Speed Request Circuit	P150C	Determines if engine speed request from the TCM is valid	Serial Communication rolling count value	+ 1 from previous $19D message (PTEI3)	Diagnostic enable bit	1	Diagnostic runs in 12.5 ms loop	2 trips Type B
			Transmission engine speed protection	not equal to 2's complement of transmission engine speed request + Transmission alive rolling count	Engine run time	0.50 sec		
					# of Protect Errors	10 protect errors out of 10 samples		
					# of Alive Rolling Errors	6 rolling count errors out of 10 samples		
					No idle diagnostic 506/507 code	IAC_SystemRPM_FA		
					No Serial communication loss to TCM	(U0101)		
					Engine Running	= TRUE		
					Power mode	Run Crank Active		
Throttle Actuator Control - Position Performance	P1516	Detect a throttle positioning error	The throttle model and actual Throttle position differ by > or The actual Throttle position and throttle model differ by >	5.824 %. 5.824 %.	 Engine Running or Ignition Voltage >	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions 11	0.1875 sec in the secondary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					and Ignition Voltage >	5.4		
					and Throttle is being Controlled			
					and Communication Fault (SPI is not set)			
					and TPS minimum learn is not active			
					Ignition voltage failure is false (P1682)			
		Detect throttle control is driving the throttle in the incorrect direction	Thottle Position >	39.761 %.	(Throttle is being Controlled and	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.1375 sec continuous	
					TPS minimum learn is active) or			
					Reduce Engine Power is Active			
		Degraded Motor	Desired throttle position is stable within 0.25 for 4.0000 sec and the delta between Indicated throttle position and desired throttle position in greater than 2.00 %		Engine Running or Ignition Voltage >	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	0.4875 sec continuous on secondary processor	
					and Ignition Voltage >	11		
					and Throttle is being Controlled	5.4		
					and Communication Fault (SPI is not set)			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					and TPS minimum learn is not active Ignition voltage failure is false (P1682)			
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 > or PT Relay Ignition voltage > and Run/crank voltage >	Table, f(IAT). See supporting tables 5.5 5.5	14 / 14 counts or 0.1750 sec continuous; 12.5 msec/count in main processor	Trips: 1 Type: A MIL: YES
Fuel Level Sensor 2 Performance (For use on vehicles with electric transfer pump dual fuel tanks)	P2066	This DTC will detect a fuel sender stuck in range in the secondary fuel tank.			Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample Continuous	2 trips Type B
			Fuel Level in Primary and Secondary Tanks Remains in an Unreadable Range too Long					
			If fuel volume in primary tank is AND Fuel volume in secondary tank	>= 99.0 liters < 0.0 liters				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			and remains in this condition for	200 miles				
			OR					
			During fuel tranfer					
			When the enable conditions are met, 3.0 liters of fuel will be transferred from the secondary tank and 3.0 liters of fuel will be transfered into the primary tank within 180 seconds. There is a short delay of 20 seconds to allow fuel slosh to settle before the fail timer begins. If the secondary tank volume does not decrease by the cal amount but the primary volume does increase by the cal amount after the fail timer has expired, then P2066 sets.		Transfer Pump is commanded on No device control for the transfer pump Fuel Volume in Secondary Tank Vehicle Speed	 < 43 liters < 0 mph		
			OR					
			After a Refuel Event					
			If the primary fuel volume changes by 45 liters from engine “off” to engine “on” the secondary volume should change by 3 liters. Otherwise, P2066 will set.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			OR					
			Distance Traveled without a Secondary Fuel Level Change					
			If the vehicle is driven a distance of 100 miles without the secondary fuel level changing by 3 liters, then the sender must be stuck. OR The secondary fuel sender is stuck in the deadband AND If the vehicle is driven a distance of 100 miles without the secondary fuel level changing by 3 liters, then the sender must be stuck.	> 43 liters.	Volume in Secondary Tank and Volume in Secondary Tank Secondary Full Transfer Pump On Time	>= 3 liters < 43 liters >= 600 seconds		
Fuel Level Sensor 2 Performance (For use on vehicles with mechanical transfer pump dual fuel tanks)	P2066	This DTC will detect a fuel sender stuck in range in the secondary fuel tank.			Engine Running No active DTCs:	VehicleSpeedSensor_FA	250 ms / sample Continuous	2 trips Type B
			Fuel Level in Secondary Tank Remains in an Unreadable Range too Long					
			If fuel volume in primary tank is AND Fuel volume in secondary tank	>= 28.5 liters < 6.0 liters				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			and remains in this condition for OR	124 miles				
			Fuel Level is in a Readable Range for both Primary and Secondary Tanks too Long					
			Volume in Primary Tank AND Volume in Secondary Tank and remains in this condition for OR	< 28 liters > 6 liters 1800 seconds				
			Distance Traveled without a Secondary Fuel Level Change					
			If the vehicle is driven a distance of 62 miles without the secondary fuel level changing by 3 liters, then the sender must be stuck.		Volume in Secondary Tank	>= 6.0 liters		
Fuel Level Sensor 2 Circuit Low Voltage (For use on vehicles with dual fuel tanks)	P2067	This DTC will detect a fuel sender stuck out of range low in the secondary fuel tank.	Fuel level Sender % of 5V range	< 10 %	Run/Crank Voltage Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	100 failures out of 125 samples 100 ms / sample Continuous	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Fuel Level Sensor 2 Circuit High Voltage (For use on vehicles with dual fuel tanks)	P2068	This DTC will detect a fuel sender stuck out of range low in the secondary fuel tank.	Fuel level Sender % of 5V range	> 60 %	Run/Crank Voltage Run/Crank voltage goes to 0 volts at key off	11 volts ≤ Voltage ≤ 32 volts	100 failures out of 125 samples 100 ms / sample Continuous	2 trips Type B
Post Catalyst Fuel Trim System Low Limit Bank 1 (Too Rich)	P2096	Determines if the post catalyst O2 sensor based fuel control system has been unable to adapt to a rich exhaust gas condition that results in an emissions correlated failure.	Rich Fail Counts: Note: 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.	> 100 out of 2000 samples	The following must be true for:	> 3.0 seconds	Frequency: Continuous Monitoring in 100ms loop	2 Trip(s) Type B
					PTO:	NOT active		
					Intrusive diagnostic fuel control:	FALSE (i.e. catalyst monitor diagnostic)		
					Long Term Secondary Fuel Trim Enabled	Please see "**Long Term Secondary Fuel Trim Enable Criteria**" in Supporting Tables		
					Ambient air pressure	>= 70 kPa		
					Engine air flow	>= 0 g/s and <= 10000 g/s		
					Intake manifold air pressure	>= 0 kPa and <= 200 kPa		
					Induction air temperature	>= -20 °C and <= 200 °C		
					Start up coolant temperature	> -20 °C		
					NO ACTIVE DTCs:			
					AmbientAirDefault_NA AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_FA IAT_Sensor_FA CamSnsrLctnAny_FA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSensorCircuit_FA EvapPurgeSolenoidCircuit_FA			

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

Additional notes, strategy and enable requirements:

If the post catalyst O2 voltage is outside a control window, the integral offset is adjusted in an attempt to move the voltage back inside the control window. The offset value is used to adjust the front O2 sensor control to bias the bulk average exhaust air/fuel ratio either lean or rich. The integral offset value is retained between trips.

The above specified Sample Counter will increment if:	
The current post O2 airflow mode is a selected cell:	See supporting tables: **Selected Cells**
AND	
Accumulated Cell Count is greater than (counts spent in the given cell while enabled)	See supporting tables: **Cell Accum Min**
The above specified Fail Counter will increment if the Sample Counter increments AND:	
Filtered post O2 voltage is beyond the fail threshold:	See supporting tables: > **O2 Rich Thresh**
for more than this many counts:	See supporting tables: **Out of Window Count**
AND	
The post catalyst O2 integral offset is:	See supporting tables: <= **Integral Offset Min**
Note - the Post O2 filter coefficient is:	See supporting tables: **Post O2 Filt Coefficient**

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Re-Pass Feature						
		If a fault is active from a prior trip and the above fail threshold is not met on the current trip, a Re-Pass sample counter must exceed a threshold in order for a pass to be reported.	Re-Pass sample counter is This counter will increment if neither the filtered post O2 voltage nor the integral offset are in failing regions (see fail conditions specified above)	>= 1000 counts	If neither a pass nor a fail can be reported before the sample counter reaches its threshold, no report is made (indeterminate state).			
		High Vapor (HV) Delay Feature						
		The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions that impact the fuel control system are present. This HV condition is indicated when the criteria to the right are met. In this situation, the diagnostic will temporarily stop evaluation. When the HV condition subsides, evaluation will resume.	Canister purging is active and Long term fuel correction for	<= 0.82 >= 5.0 seconds	Filtered post O2 voltage is outside the window defined by:	See supporting tables: **HV Post Low** and **HV Post High**	When these conditions are met, HV is detected and the diagnostic will temporarily stop evaluation.	
					Integral offset is outside the window defined by:	See supporting tables: **HV Integral Offset Low** and **HV Integral Offset High**		
			If HV has caused the diagnostic to stop evaluation, evaluation will resume when long term fuel correction is for	> 0.85 >= 20.0 seconds		Note: When either the filtered post O2 voltage or the integral offset returns to the above defined windows, the diagnostic will immediately resume evaluation.		
			If HV has caused the diagnostic to stop evaluation, evaluation will resume when the purge valve closes for	>= 20.0 seconds				

Component/ System	Fault Code	Monitor Strategy 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 been unable to adapt to a lean exhaust gas condition that results in an emissions correlated failure.	Lean Fail Counts: Note: 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.	> 100 out of 2000 samples	Same enable conditions for P2096, P2097, P2098, P2099 (see P2096 enable conditions)		Frequency: Continuous Monitoring in 100ms loop	2 Trip(s) Type B

Additional notes, strategy and enable requirements:

If the post catalyst O2 voltage is outside a control window, the integral offset is adjusted in an attempt to move the voltage back inside the control window. The offset value is used to adjust the front O2 sensor control to bias the bulk average exhaust air/fuel ratio either lean or rich. The integral offset value is retained between trips.

The above specified Sample Counter will increment if:	
The current post O2 airflow mode is a selected cell:	See supporting tables: **Selected Cells**
AND	
Accumulated Cell Count is greater than	See supporting tables: **Cell Accum Min**
(counts spent in the given cell while enabled)	
The above specified Fail Counter will increment if the Sample Counter increments AND:	
Filtered post O2 voltage is beyond the fail threshold:	See supporting tables: **< O2 LeanThresh**
for more than this many counts:	See supporting tables: **Out of Window Count**
AND	
The post catalyst O2 integral offset is:	See supporting tables: **>= Integral Offset Max**
Note - the Post O2 filter coefficient is:	See supporting tables: **Post O2 Filt Coefficient**

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Re-Pass Feature: same for P2096, P2097, P2098, P2099 (see P2096 for details)						
		High Vapor (HV) Delay Feature: same as rich fault for bank 1 (see P2096)						
Post Catalyst Fuel Trim System Low Limit Bank 2 (Too Rich)	P2098	Same as bank 1 rich fault (see P2096)	Rich Fail Counts: Note: Same as bank 1 rich fault (see P2096)	> 100 out of 2000 samples	Same enable conditions for P2096, P2097, P2098, P2099 (see P2096 enable conditions) NOTE: The Bank1 faults listed in the P2096 section are replaced by: A/F Imbalance Bank2 O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA		Frequency: Continuous Monitoring in 100ms loop	2 Trip(s) Type B
		Additional notes, strategy and enable requirements: same as bank 1 rich fault (see P2096)						
		Re-Pass Feature: same for P2096, P2097, P2098, P2099 (see P2096 for details)						
		High Vapor (HV) Delay Feature						
		The diagnostic is at risk of reporting a false fail when excessively High Vapor (HV) conditions that impact the fuel control system are present. This HV condition is indicated when the criteria to the right are met. In this situation, the diagnostic will temporarily stop evaluation. When the HV condition subsides, evaluation will resume.	Canister purging is active and Long term fuel correction is for	<= 0.82 >= 5.0 seconds	Filtered post O2 voltage is outside the window defined by:	See supporting tables: **HV Post Low** and **HV Post High**	When these conditions are met, HV is detected and the diagnostic will temporarily stop evaluation.	
					Integral offset is outside the window defined by:	See supporting tables: **HV Integral Offset Low** and **HV Integral Offset High**		
			If HV has caused the diagnostic to stop evaluation, evaluation will resume when long term fuel correction is for	> 0.85 >= 20.0 seconds				
						Note: When either the filtered post O2 voltage or the integral offset returns to the above defined windows, the diagnostic will immediately resume evaluation.		
			If HV has caused the diagnostic to stop evaluation, evaluation will resume when the purge valve closes for	>= 20.0 seconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Post Catalyst Fuel Trim System High Limit Bank 2 (Too Lean)	P2099	Same as bank 1 lean fault (see P2097)	Lean Fail Counts: Note: Same as bank 1 lean fault (see P2097)	> 100 out of 2000 samples	Same enable conditions for P2096, P2097, P2098, P2099 (see P2096 enable conditions) NOTE: The Bank1 faults listed in the P2096 section are replaced by: A/F Imbalance Bank2 O2S_Bank_2_Sensor_1_FA O2S_Bank_2_Sensor_2_FA		Frequency: Continuous Monitoring in 100ms loop	2 Trip(s) Type B
		Additional notes, strategy and enable requirements: same as bank 1 lean fault (see P2097)						
		Re-Pass Feature: same for P2096, P2097, P2098, P2099 (see P2096 for details)						
		High Vapor (HV) Delay Feature: same as rich fault for bank 2 (see P2098)						
Throttle Actuator Control - Position Performance	P2101	Detect a throttle positioning error	The throttle model and actual Throttle position differ by > or The actual Throttle position and throttle model differ by >	5.824 %. 5.824 %.	Engine Running or Ignition Voltage > and Ignition Voltage > and Throttle is being Controlled and Communication Fault (SPI is not set) and TPS minimum learn is not active Ignition voltage failure is false (P1682)	Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions 11 5.5	15 / 15 counts; 12.5 msec/count in the primary processor	Trips: 1 Type: A MIL: YES
		Detect throttle control is driving the throttle in	Thottle Position >	39.26 %.	TPS minimum learn is active		11 counts; 12.5 msec/count in the	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		the incorrect direction or exceed the reduced power limit				Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	primary processor	
			Thottle Position >	39.06 %.	Reduce Engine Power is Active			
Throttle return to default	P2119	Throttle unable to return to default throttle position after de-energizing ETC motor.	TPS1 Voltage >	1.689	Throttle de-energized	No 5V reference error or fault for # 2 5V reference circuit (P0651)	0.4969 sec continuous	Trips: 1
			AND TPS2 Voltage > On the main processor	1.789	No TPS circuit faults			Type: C
			Or		PT Relay Voltage > 5.500			MIL: NO
			TPS1 Voltage > AND TPS2 Voltage > On the secondary processor	1.689 1.789				
APP1 Circuit	P2120	Detects a continuous or intermittent short or open in APP1 circuit on the secondary processor but sensor is in range on the primary processor	Secondary APP1 Voltage <	0.463		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 14 counts continuous; 12.5 msec/count in the secondary processor	Trips: 1
			or Secondary APP1 Voltage >	4.75				Type: A
						No 5 V reference #2 error		MIL: YES
						No 5 V reference #2 DTC (P0651)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
APP1 Circuit Low	P2122	Detects a continuous or intermittent short or open in APP1 circuit on both processors or just the primary processor	Primary APP1 Voltage <	0.463		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP1 Voltage <	0.463		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
APP1 Circuit High	P2123	Detects a continuous or intermittent short in APP1 circuit on both processors or just the primary processor	Primary APP1 Voltage >	4.75		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP1 Voltage >	4.75		No 5 V reference #2 error No 5 V reference #2 DTC (P0651)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
APP2 Circuit	P2125	Detects a continuous or intermittent short or open in APP2 circuit on the secondary processor but sensor is in range on the primary processor	Secondary APP2 Voltage < or Secondary APP2 Voltage >	0.325 2.6		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 14 counts continuous; 12.5 msec/count in the secondary processor	Trips: 1 Type: A MIL: YES

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						No 5 V reference #1 error No 5 V reference #1 DTC (P0641)		
APP2 Circuit Low	P2127	Detects a continuous or intermittent short or open in APP2 circuit on both processors or just the primary processor	Primary APP2 Voltage <	0.325		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP2 Voltage <	0.325		No 5 V reference #1 error No 5 V reference #1 DTC (P0641)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	
APP2 Circuit Low	P2128	Detects a continuous or intermittent short in APP2 circuit on both processors or just the primary processor	Primary APP2 Voltage >	2.6		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Secondary APP2 Voltage >	2.6		No 5 V reference #1 error No 5 V reference #1 DTC (P0641)	19 / 39 counts or 14 counts continuous; 12.5 ms/count in the secondary processor	

Component/ System	Fault Code	Monitor Strategy 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 primary or secondary processor	Difference between TPS1 displaced and TPS2 displaced >	6.998 % offset at min. throttle position with a linear threshold to 9.698 % at max. throttle position		Run/Crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	79 / 159 counts or 60 counts continuous; 3.125 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Difference between (normalized min TPS1) and (normalized min TPS2) >	4.999 % Vref		No TPS sensor faults (P0120, P0122, P0123, P0220, P0222, P0223) No 5V reference error or fault for # 2 5V reference circuit (P0651)		
			Difference between TPS1 displaced and TPS2 displaced >	6.998 % offset at min. throttle position with a linear threshold to 9.698 % at max. throttle position		Run/Crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 15 counts continuous; 12.5 ms/count in the secondary processor	
			Difference between (normalized min TPS1) and (normalized min TPS2) >	5.000 % Vref		No TPS sensor faults (P0120, P0122, P0123, P0220, P0222, P0223) No 5V reference error or fault for # 2 5V reference circuit (P0651)		
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	Detects a continuous or intermittent correlation fault between APP sensors #1 and #2 on primary or secondary processor	Difference between APP1 displaced and APP2 displaced >	10.001 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position		Run/Crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 15 counts continuous; 12.5 ms/count in the primary processor	Trips: 1 Type: A MIL: YES
			Difference between (normalized min					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			APP1) and (normalized min APP2) >	5.000 % Vref		No APP sensor faults (P2120, P2122, P2123, P2125, P2127, P2128) No 5V reference error or fault for #1 or # 2 5V reference circuits (P0641, P0651)		
			Difference between APP1 displaced and APP2 displaced >	10.001 % offset at min. pedal position with a linear threshold to 10.001 % at max. pedal position		Run/Crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	19 / 39 counts or 15 counts continuous; 12.5 ms/count in the secondary processor	
			Difference between (normalized min APP1) and (normalized min APP2) >	5.000 % Vref		No APP sensor faults (P2120, P2122, P2123, P2125, P2127, P2128) No 5V reference error or fault for #1 or # 2 5V reference circuits (P0641, P0651)		
Transfer Case Speed Sensor Output (TCSS)	P2160	No activity in the TCSS Signal circuit	TCSS Raw Speed	<= 50 RPM	Engine Torque Engine Torque Transmission Input speed Transmission Input speed Throttle Position Throttle Position Disabled For Following DTCS:	<= 8192 N-m >= 60 N-m <= 7500 RPM >= 1000 RPM <= 99.0 % >= 8.0 % TPS_FA EngineTorqureInaccurate TransTurbineSpeedValid(TCM)	>= 5.00 Fail Time (Sec)	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Transfer Case Speed Sensor Output (TCSS)	P2161	TCSS Circuit Signal Intermittent	Increasing TCSS Loop-to-Loop change	>= 225 RPM	Engine Torque	<= 8192 N-m	>= 4.00 Fail Time (Sec)	Type B 2 trips
			Decreasing TCSS Loop-to-Loop change	>= 475 RPM	Engine Torque	>= 60 N-m		
					Transmission Input speed	<= 7500 RPM		
					Transmission Input speed	>= 1000 RPM		
					Throttle Position	<= 99.0 %		
					Throttle Position	>= 8.0 %		
					Engine Speed	>= 1000 RPM		
					Number of Software Loops with TCSS =0	< 10 counts		
					Disabled For Following DTCS:	TPS_FA EngineTorqureInaccurate TransTurbineSpeedValid(TCM) P2160 Fault active CrankSensorFA		
Minimum Throttle Position Not Learned	P2176	TP sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Primary processor, TPS Voltage >	0.935		Run/crank voltage or Powertrain relay voltage > 6.00 and reduced power is false, else the failure will be reported for all conditions	2.0 secs continuous	Trips: 1 Type: A MIL: YES
			or					
			During TPS min learn on the Secondary processor, TPS Voltage >	0.935	No TPS circuit errors No TPS circuit faults P1682 is not active Minimum TPS learn active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			and Number of learn attempts > AND TPS2 Voltage > On the Primary processor OR TPS1 Voltage > AND TPS2 Voltage > On the Secondary processor	 10 counts 1.789 1.689 1.789	 Throttle de-energized No TPS circuit faults PT Relay Voltage >	 5.5		
Cooling System Performance	P2181	This DTC detects thermostat malfunction (i.e. stuck open)	Engine Coolant Temp (ECT) is ≤ target temperature of 75 Deg C and normalized ratio is ≤ than 2. When above is present for more than 5 seconds, fail counts start. Engine total airgrams is accumulated when 17 ≤ AirFlow ≤ 450 grams per second. **Ratio Definition:** Current temp difference between ECT and RCT minus PwrUp difference divided by total airgrams. Note: Minimum total airgrams is 500.0 grams.		No Active DTC's Engine not run time Engine run time	MAF_SensorFA IAT_SensorFA THMR_RCT_Sensor_Ckt_FA THMR_ECT_Sensor_Ckt_FA ≥ 1800 seconds 90 ≤ Time ≤ 1370 seconds	30 failures out of 90 samples 1 sec /sample Once per ignition key cycle	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Fuel Condition ECT at Power Up IAT min Airflow	Ethanol ≤ 87% -7.0 ≤ ECT ≤ 70.0 °C -7°C ≤ IAT ≤ 55°C. 17.0 ≤ Airflow ≤ 450.0 GPS		
Air Fuel Imbalance Bank 1	P219A (P1174 on some applications)	Determines if the air-fuel delivery system is imbalanced by monitoring the pre and post catalyst O2 sensor voltage characteristics. To improve S/N, pre-catalyst O2 voltages between 1000 and 0 millivolts are ignored. This feature is enabled at Air Per Cylinder values <= 0 mg/cylinder. Note: If the first voltage value is >= the second voltage value, AND/OR the Air Per Cylinder value is equal to zero, the feature is not used on this application and the full pre-catalyst O2 voltage range is utilized.	Bank 1 Filtered Length Ratio variable	> 0.23	System Voltage	*10 <= V <= 32 for >= 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop The AFIM Filtered Length Ratio variable is updated after every 2.50 seconds of valid data. The first report is delayed for 45 seconds to allow time for the AFIM Filtered Length Ratio variable to saturate. This minimizes the possibility of reporting a pass before a potential failure could be detected.	2 Trip(s) Type B
					ECT	> -20 oC		
					Engine Run Time	>= 100 seconds		
					Engine speed	*425 <= rpm <= 3500*		
			OR		Mass Airflow	*15.0 <= g/s <= 510.0*		
			Bank 1 AFM (DoD) Filtered Length Ratio variable (AFM applications only)	> 8192.00	Air Per Cylinder	*260 <= mg/cylinder <= 2000*		
					% Ethanol	<= 87 %		
					Positive (rising) Delta O2 voltage during previous 12.5ms is OR Negative (falling) Delta	> 0.0 millivolts		
			AND					
			Bank 1 Filtered Post catalyst O2 voltage is NOT between Note: If the first voltage value is >= the second voltage value, this is an indication that the post catalyst O2 data is not used for diagnosis on this application.	1000 and 0 millivolts	**OR**			
					Negative (falling) Delta O2 voltage during previous 12.5ms is	< 0.0 millivolts		
					For AFM (Cylinder Deactivation) vehicles only	No AFM state change during current 2.50 second sample period.		
					O2 sensor switches	>= 1times during current 2.50 second sample period		
					Quality Factor	>= 0.70 in the current operating region		
					No EngineMisfireDetected_FA			
					No MAP_SensorFA			
					No MAF_SensorFA			
					No ECT_Sensor_FA			
					No Ethanol Composition Sensor FA			
					No TPS_ThrottleAuthorityDefaulted			
					No FuelInjectorCircuit_FA			
					No AIR System FA			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					No O2S_Bank_1_Sensor_1_FA			
					No O2S_Bank_2_Sensor_1_FA			
					No EvapPurgeSolenoidCircuit_FA			
		Monitor Strategy Notes: The AFIM Filtered Length Ratio is derived from the pre-O2 sensor voltage metric known as String Length. String Length is simply the curve length of the O2 sensor voltage over a fixed time period of 2.50 seconds. The reason we use String Length is because it comprehends both O2 signal frequency and amplitude in one metric. The busier the O2 voltage (an indication of imbalance), the longer the String Length will be.	The AFIM Filtered Length Ratio is the difference between the measured String Length and a 17x17 table lookup value,divided by the same lookup value, and finally multiplied by a Quality Factor (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The reason we use a ratio of the String Lengths is so that we can normalize the failure metric over various engine speed and load regions since engine speed and load directly impact pre-O2 String Length, especially when AFIM failures are present. In order to filter out signal noise (to avoid false failures), the Length Ratio is filtered using a common first-order lag filter. The result is the AFIM Filtered Length Ratio.	The Quality Factor (QF) calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Tables). A QF of "1" is an indication that we were able to achieve at least 4sigma/2sigma robustness in that speed/load region. 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 String Length data. QF values less than 0.70 identify regions where diagnosis is not possible.	No EvapFlowDuringNonPurge_FA			
					No EvapVentSolenoidCircuit_FA			
					No EvapSmallLeak_FA			
					No EvapEmissionSystem_FA			
					No FuelTankPressureSensorCircuit_FA			
					Device Control Not Active			
					Intrusive Diagnostics Not Active			
					Engine OverSpeed Protection Not Active			
					Reduced Power Mode (ETC DTC) Not Active			
					PTO Not Active			
					Traction Control Not Active			
					Fuel Control Status			
					Closed Loop Long Term FT	Enabled Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Cumulative (absolute) delta MAF during the current 2.50 second sample period is Note: This protects	*< 150 g/s* *Note: This protects against false diagnosis during severe transient maneuvers.*		
					Data collection is suspended under the following circumstances:	- for 1.0 seconds after AFM transitions - for 1.0 seconds after Closed Loop transitions from Off to On - for 1.0 seconds after purge transitions from Off to On or On to Off - for 2.0 seconds after the AFIM diagnostic transitions from Disabled to Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Air Fuel Imbalance Bank 2	P219B	Determines if the air-fuel delivery system is imbalanced by monitoring the pre and post catalyst O2 sensor voltage characteristics. To improve S/N, pre-catalyst O2 voltages between 1000 and 0 millivolts are ignored. This feature is enabled at Air Per Cylinder values <= 0 mg/cylinder. Note: If the first voltage value is >= the second voltage value, AND/OR the Air Per Cylinder value is equal to zero, the feature is not used on this application and the full pre-catalyst O2 voltage range is utilized.	Bank 2 Filtered Length Ratio variable	> 0.50	System Voltage	*10 <= V <= 32 for >= 4 seconds*	Frequency: Continuous Monitoring of O2 voltage signal in 12.5ms loop The AFIM Filtered Length Ratio variable is updated after every 2.50 seconds of valid data. The first report is delayed for 45 seconds to allow time for the AFIM Filtered Length Ratio variable to saturate. This minimizes the possibility of reporting a pass before a potential failure could be detected.	2 Trip(s) Type B
					ECT	> -20 oC		
					Engine Run Time	>= 100 seconds		
					Engine speed	*425 <= rpm <= 3500*		
			OR		Mass Airflow	*15.0 <= g/s <= 510.0*		
			Bank 2 AFM (DoD) Filtered Length Ratio variable (AFM applications only)	> 8192.00	Air Per Cylinder	*260 <= mg/cylinder <= 2000*		
					% Ethanol	<= 87 %		
			AND		Positive (rising) Delta O2 voltage during previous 12.5ms is OR Negative (falling) Delta	> 0.0 millivolts		
			Bank 2 Filtered Post catalyst O2 voltage is NOT between Note: If the first voltage value is >= the second voltage value, this is an indication that the post catalyst O2 data is not used for diagnosis on this application.	1000 and 0 millivolts	**OR**			
					Negative (falling) Delta O2 voltage during previous 12.5ms is	< 0.0 millivolts		
					For AFM (Cylinder Deactivation) vehicles only	No AFM state change during current 2.50 second sample period.		
					O2 sensor switches	>= 1 times during current 2.50 second sample period		
					Quality Factor	>= 0.70 in the current operating region		
					No EngineMisfireDetected_FA			
					No MAP_SensorFA			
					No MAF_SensorFA			
					No ECT_Sensor_FA			
					No Ethanol Composition Sensor FA			
					No TPS_ThrottleAuthorityDefaulted			
					No FuelInjectorCircuit_FA			
					No AIR System FA			
					No O2S_Bank_1_Sensor_1_FA			
					No O2S_Bank_2_Sensor_1_FA			
					No EvapPurgeSolenoidCircuit_FA			
		Monitor Strategy Notes: The AFIM	The AFIM Filtered Length Ratio is the	The Quality Factor (QF) calibrations are	No EvapFlowDuringNonPurge_FA			
					No EvapVentSolenoidCircuit_FA			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		Filtered Length Ratio is derived from the pre-O2 sensor voltage metric known as String Length. String Length is simply the curve length of the O2 sensor voltage over a fixed time period of 2.50 seconds. The reason we use String Length is because it comprehends both O2 signal frequency and amplitude in one metric. The busier the O2 voltage (an indication of imbalance), the longer the String Length will be.	difference between the measured String Length and a 17x17 table lookup value,divided by the same lookup value, and finally multiplied by a Quality Factor (the latter ranges between 0 and 1, based on robustness to false diagnosis in the current operating region). The reason we use a ratio of the String Lengths is so that we can normalize the failure metric over various engine speed and load regions since engine speed and load directly impact pre-O2 String Length, especially when AFIM failures are present. In order to filter out signal noise (to avoid false failures), the Length Ratio is filtered using a common first-order lag filter. The result is the AFIM Filtered Length Ratio.	located in a 17x17 lookup table versus engine speed and load (see Supporting Tables). A QF of "1" is an indication that we were able to achieve at least 4sigma/2sigma robustness in that speed/load region. 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 String Length data. QF values less than 0.70 identify regions where diagnosis is not possible.	No EvapSmallLeak_FA			
					No EvapEmissionSystem_FA			
					No FuelTankPressureSensorCircuit_FA			
					Device Control Not Active			
					Intrusive Diagnostics Not Active			
					Engine OverSpeed Protection Not Active			
					Reduced Power Mode (ETC DTC) Not Active			
					PTO Not Active			
					Traction Control Not Active			
					Fuel Control Status			
					Closed Loop Long Term FT	Enabled Enabled **Please see "Closed Loop Enable Criteria" and "Long Term FT Enable Criteria" in Supporting Tables.**		
					Cumulative (absolute) delta MAF during the current 2.50 second sample period is Note: This protects against false diagnosis during severe transient maneuvers.	*< 150 g/s* *Note: This protects against false diagnosis during severe transient maneuvers.*		
					Data collection is suspended under the following circumstances:	- for 1.0 seconds after AFM transitions - for 1.0 seconds after Closed Loop transitions from Off to On - for 1.0 seconds after purge transitions from Off to On or On to Off - for 2.0 seconds after the AFIM diagnostic transitions from Disabled to Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Barometric Pressure (BARO) Sensor Performance	P2227	Detects a noisy or erratic barometric pressure input	Difference between the current Baro sensor reading and the previous Baro sensor reading	> 10.0 kPa	Ignition has been on Vehicle Speed No Active DTCs:	 > 10.0 seconds < 62 MPH AmbientAirPressCktFA ECT_Sensor_FA IAT_SensorFA MAF_SensorFA AfterThrottlePressure_NA or AfterThrottlePressure_SC TPS_FA TPS_Performance_FA VehicleSpeedSensorError	5 failures out of 25 samples 1 sample every 250 msec	Type B 2 trips
Barometric Pressure(BARO) Sensor Circuit Low	P2228	Detects a continuous short to low or open in either the signal circuit or the BARO sensor.	BARO Voltage	< 40.0 % of 5 Volt Range (2.0 Volts = 50.9 kPa)	Continuous		20 failures out of 25 samples 1 sample every 12.5 msec	Type B 2 trips
Barometric Pressure(BARO) Sensor Circuit High	P2229	Detects an open sensor ground or continuous short to high in either the signal circuit or the BARO sensor.	BARO Voltage	> 90.0 % of 5 Volt Range (4.5 Volts = 115.0 kPa)	Continuous		20 failures out of 25 samples 1 sample every 12.5 msec	Type B 2 trips
Fuel Conductivity Out Of Range (water in fuel)	P2269	Detects Sensor Frequency Signal	Flex Fuel Sensor Output Frequency	> 185 Hertz	Powertrain Relay	> 11.0 Volts < 32.0 Volts	50 failures out of 63 samples 100 ms loop Continuous	2 trip(s) Type B
O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	This DTC determines if the post catalyst O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an	Post O2 sensor cannot achieve the rich threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Lean Voltage	1) Post O2S signal < 700 mvolts AND 2) Accumulated air flow during stuck lean test > 200 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank OR	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		intrusive test (during coast) which increases the delivered fuel to achieve the required rich threshold.	Test is greater than the threshold before the above voltage threshold is met.				NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	
						MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA		
					B1S2 Failed this key cycle	P013A, P013B, P013E, P013F, P2270 or P2271		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Engine Speed to initially enable test	900 <= RPM <= 2300		
					Engine Speed range to keep test enabled (after initially enabled)	850 <= RPM <= 2400		
					Engine Airflow	3 gps <= Airflow <= 20 gps		
					Vehicle Speed to initially enable test	39.8 mph <= Veh Speed <= 80.8 mph		
					Vehicle Speed range to keep test enabled (after initially enabled)	35.4 mph <= Veh Speed <= 85.7 mph		
					Closed loop integral	0.80 <= C/L Int <= 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 sec		
					Predicted Catalyst temp	500 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
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 cannot achieve the lean threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal > 100 mvolts AND 2) Accumulated air flow during stuck rich test > 80 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted	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.	2 trips Type B
						ECT_Sensor_FA IAT_SensorFA		
						MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA		
					B1S2 Failed this key cycle	P013A, P013B, P013E, P013F or P2270		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					ICAT MAT Burnoff delay	= Not Valid		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						= Not Valid, See definition of **Green Sensor Delay Criteria (B1S2)** in Supporting Tables tab.		
					Green O2S Condition			
					Low Fuel Condition Diag	= False		
					Engine Speed	900 <= RPM <= 2300		
					Engine Airflow	3 gps <= Airflow <= 20 gps		
					Vehicle Speed	39.8 mph <= Veh Speed <= 80.8 mph		
					Closed loop integral	0.80 <= C/L Int <= 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 sec		
					Predicted Catalyst temp	500 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
O2 Sensor Signal Stuck Lean Bank 2 Sensor 2	P2272	This DTC determines if the post catalyst O2 sensor is stuck in a normal lean voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test (during coast) which increases the delivered fuel to achieve the required rich threshold.	Post O2 sensor cannot achieve the rich threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Lean Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal < 700 mvolts AND 2) Accumulated air flow during stuck lean test > 200 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted	Frequency: Once per trip Note: if NaPOPD_b_ResetFastRespFunc= FALSE for the given Fuel Bank	2 trips Type B
						ECT_Sensor_FA IAT_SensorFA	OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.	
						MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA EngineMisfireDetected_FA EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013C, P013D, P014A, P014B, P2272 or P2273		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Engine Speed to initially enable test	900 <= RPM <= 2300		
					Engine Speed range to keep test enabled (after initially enabled)	850 <= RPM <= 2400		
					Engine Airflow	3 gps <= Airflow <= 20 gps		
					Vehicle Speed to initially enable test	39.8 mph <= Veh Speed <= 80.8 mph		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Vehicle Speed range to keep test enabled (after initially enabled)	35.4 mph <= Veh Speed <= 85.7 mph		
					Closed loop integral	0.80 <= C/L Int <= 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 sec		
					Predicted Catalyst temp	500 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					All of the above met for at least 1.0 seconds, and then the Force Cat Rich intrusive stage is requested.			
O2 Sensor Signal Stuck Rich Bank 2 Sensor 2	P2273	This DTC determines if the post catalyst O2 sensor is stuck in a normal rich voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic is an intrusive test which requests the DFCO mode to achieve the required lean threshold.	Post O2 sensor cannot achieve the lean threshold voltage. AND The Accumulated mass air flow monitored during the Stuck Rich Voltage Test is greater than the threshold before the above voltage threshold is met.	1) Post O2S signal > 100 mvolts AND 2) Accumulated air flow during stuck rich test > 80 grams.	No Active DTC's	TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA	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.	2 trips Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						EngineMisfireDetected_FA		
						EthanolCompositionSensor_FA		
					B2S2 Failed this key cycle	P013C, P013D, P014A, P014B or P2272		
					System Voltage	10.0 volts < system voltage< 32.0 volts		
					ICAT MAT Burnoff delay	= Not Valid		
					Green O2S Condition	= Not Valid, See definition of **Green Sensor Delay Criteria (B2S2)** in Supporting Tables tab.		
					Low Fuel Condition Diag	= False		
					Engine Speed	900 <= RPM <= 2300		
					Engine Airflow	3 gps <= Airflow <= 20 gps		
					Vehicle Speed	39.8 mph <= Veh Speed <= 80.8 mph		
					Closed loop integral	0.80 <= C/L Int <= 1.08		
					Closed Loop Active	= TRUE		
					Evap	not in control of purge		
					Ethanol	not in estimate mode		
					Post fuel cell	= enabled		
					Power Take Off	= not active		
					EGR Intrusive diagnostic	= not active		
					All post sensor heater delays	= not active		
					O2S Heater on Time	>= 80.0 sec		
					Predicted Catalyst temp	500 ºC <= Cat Temp <= 900 ºC		
					Fuel State	= DFCO possible		
					DTC's Passed	= P2270 (and P2272 (if applicable))		
					DTC's Passed	= P013E (and P014A (if applicable))		
					DTC's Passed	= P013A (and P013C (if applicable))		
					After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Secondary AIR System Pressure Sensor Circuit Bank 1	P2430	This DTC detects a stuck in range pressure sensor signal when the AIR pump is commanded on.	Average Pressure Error	< 0.50 kPa	BARO	> 60 kPa	Stuck in range cumulative time > 5.0 seconds	2 trip(s) Type B
					Inlet Air Temp	> 5.0 deg C.		
			AND		Coolant Temp	> 5.0 deg C. < 60.0 deg C.		
			Signal Variation	< 1.00 kPa	Engine off time	> 3600.0 seconds		
					System Voltage	> 10.0 OR < 32.0 Volts		
					MAP not	< 20 kPa for 2.0 sec.	Frequency: Once per trip when SAI pump commanded On	
					Engine Speed	> 5000 RPM		
					MAF not	> 50 gm/s for 3.0 sec.		
					No active DTCs:	AIRValveControlCircuit FA AIRPumpControlCircuit FA AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		
Secondary AIR System Pressure Sensor Performance Bank 1	P2431	This DTC detects a skewed pressure sensor signal via a comparison of the AIR pressure sensor signal and estimated BARO, as well as an evaluation of the quality of the comparison.	Difference between AIR pressure sensor and BARO (Pump Commanded Off)	> 20.0 kPa < -20.0 kPa	BARO	> 60 kPa	Skewed sensor cumulative test weight > 5.0 seconds	2 trip(s) Type B
					Inlet Air Temp	> 5.0 deg C.		
					Coolant Temp	> 5.0 deg C. < 60.0 deg C.		
					Engine off time	> 3600.0 seconds		
			OR		System Voltage	> 10.0 OR < 32.0 Volts		
			Difference between AIR pressure sensor and BARO (Pump Commanded On)	> 50.0 kPa	MAP not	< 20 kPa for 2.0 sec.	Continuous 6.25ms loop	
					Engine Speed	> 5000 RPM		
					MAF not	> 50 gm/s for 3.0 sec.		
					Transfer Case not in 4WD Low			
					Run/crank active			
						Skewed sensor cumulatative test weight is based on distance from the last Baro update. See Baro Skewed Sensor Weight Factor table.		
					No active DTCs:	AIRValveControlCircuit FA AIRPumpControlCircuit FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						AIRSysPressSnsrB1CktLoFA AIRSysPressSnsrB1CktHiFA MAF_SensorFA EngineMisfireDetected_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA		
Secondary AIR System Pressure Sensor Circuit Low Voltage Bank 1	P2432	This DTC detects an out of range low AIR pressure sensor signal	AIR Pressure Sensor signal	< 5 % of 5Vref	No active DTCs:	ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	800 failures out of 1000 samples 6.25 ms loop Continuous	2 trip(s) Type B
Secondary AIR System 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	No active DTCs:	ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA	800 failures out of 1000 samples 6.25 ms loop Continuous	2 trip(s) Type B
Secondary AIR System Shut-off Valve Stuck Open (Single Valve System)	P2440	This DTC detects if the AIR system control valve is stuck open This test is run during Phase 2 (Pump commanded On, valve commanded closed)	AIR pressure error	< Bank 1 Valve Pressure Error table or > 32 kPa for either Bank	BARO: > 60 kPa Inlet Air Temp: > 5.0 deg C. Coolant Temp: > 5.0 deg C. < 60.0 deg C. Engine off time: > 3600.0 seconds System Voltage: > 10.0 OR < 32.0 Volts MAP not: < 20 kPa for 2.0 sec. Engine Speed: > 5000 RPM MAF not: > 50 gm/s for 3.0 sec. Stability Time: > 0.5 seconds AIR diagnostic Phase 1 passed 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)		Phase 2 Conditional test weight > 2.0 seconds Frequency: Once per trip when AIR pump commanded On	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					No active DTCs:	AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
Secondary AIR System Pump Stuck On (Single Valve Systems)	P2444	This DTC detects if the SAI pump is stuck On This test is run during Phase 3 (Pump commanded Off, valve commanded closed)	AIR pressure error	> Bank 1 Pump Pressure Error table or < -32 kPa either Bank	BARO	> 60 kPa	Phase 3 Cumlatative test weight > 3.0 seconds Frequency: Once per trip when AIR pump commanded On	1 trip(s) Type A
					Inlet Air Temp	> 5.0 deg C.		
					Coolant Temp	> 5.0 deg C. < 60.0 deg C.		
					Engine off time	> 3600.0 seconds		
					System Voltage	> 10.0 OR < 32.0 Volts		
					MAP not	< 20 kPa for 2.0 sec.		
					Engine Speed	> 5000 RPM		
					MAF not	> 50 gm/s for 3.0 sec.		
					Stability Time	> 6.0 seconds		
					AIR diagnostic Phase 1 passed			
					AIR diagnostic Phase 2 passed			
						Phase 3 cumulatative test weight is based on the distance from the last Baro update. See Baro Skewed Sensor Weight Factor table.		
					No active DTCs:	AIRSystemPressureSensor FA AIRValveControlCircuit FA AIRPumpControlCircuit FA MAF_SensorFA AmbientAirDefault_NA IAT_SensorFA ECT_Sensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						EngineMisfireDetected_FA CatalystSysEfficiencyLoB1_FA CatalystSysEfficiencyLoB2_FA ControllerProcessorPerf_FA 5VoltReferenceA_FA 5VoltReferenceB_FA IgnitionOutputDriver_FA FuelInjectorCircuit_FA		
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	**Protect error** - Serial Communication message - ($199 - PTEI3)	Message <> two's complement of message	Diagnostic enabled/ disabled	Enabled	>= 16 Protect errors during key cycle. Performed every 25msec.	2 trip(s)
			OR					
			Rolling count error - Serial Communication message ($199 - PTEI3) rolling count value	Message <> previous message rolling count value + one	Power Mode Engine Running Run/Crank Active	= Run = True > 0.50 Sec	>= 6 Rolling count errors out of ten samples. Performed every 25msec.	Type B
			OR					
			RAM Error - Internal ECU fault	Transmission torque request value or request type dual store not equal			>= 3 RAM errors during key cycle. Performed every 25msec.	
			OR					
			Range Error - Serial Communication message - ($199 - PTEI3) TCM Requested Torque Increase	> 600 Nm			>= 3 out of 10 samples. Performed every 25 msec.	
			OR					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Multi-transition error - Trans torque intervention type request change	Requested torque intervention type toggles from not increasing request to increasing request			>= 3 multi-transitions out of 5 samples. Performed every 200msec.	
Torque Management Request Input Signal B	P2548	Determines if the performance launch torque request is valid	**Protect error** - Serial Communication message - ($1C8 Message)	Message <> two's complement of message	Diagnostic enabled/ disabled Run/Crank Active	Enabled > 0.50 Sec	>= 10 Protect errors out of 10 samples	2 trip(s) Type B
			OR					
			Rolling count error - Serial Communication message ($1C8) rolling count value	Message <> previous message rolling count value + one			>= 3 Rolling count errors out of 10 samples	
					No active DTC's	Fault bundles: IAC_SystemRPM_FA	Each test Performed every 12.5 msec	
ECM/PCM Internal Engine Off Timer Performance	P2610	This DTC determines if the engine off timer does not initialize or count properly. Clock rate test: Checks the accuracy of the 1 second timer by comparing it with the 12.5 ms timer	Initial value test: Initial ignition off timer value	< 0 seconds	ECM is powered down IAT Temperature	 -40 °C ≤ Temperature ≤ 125 °C	Initial value test: 3 failures 1.375 sec / sample	2 trips Type B DTC sets on next key cycle if failure detected
			OR Initial ignition off timer value	> 10 seconds				
			Clock rate test: Time between ignition off timer increments	< 0.8 seconds			Clock rate test: 8 failures out of 10 samples	
			Time between ignition off timer increments	> 1.2 seconds			1 second / sample	
			Time since last ignition off timer increment	≥ 1.375 seconds			test runs once each key-off	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			Current ignition off time < old ignition off time Current ignition off timer minus old ignition off timer	 ≠ 1				
Four Wheel Drive Low Switch Circuit	P2771	Detects Fail Case 1: Couninuous Open (Stuck Off) Fail Case 2: Ground (Stuck On) in the Four Wheel Drive	Fail Case 1: Measured Transfer Case Ratio Fail Case 2: Measured Transfer Case Ratio	<= 3.00 ratio >= 2.40 ratio <= 1.85 ratio >= 0.65 ratio	Engine Torque Engine Speed Ignition Voltage Throttle Position Transmission Temperature Engine Run time Vehicle Speed Automatic Transmission Gear State Manual Transmission Disabled For Following DTCS:	<= 8192 N-m >= 30 N-m <= 5500 RPM >= 1000 RPM <= 32 V >= 11 V <= 99.0 % >= 5.0 % <= 130 º C. >= -20 º C. > 10 Sec >= 3 MPH Not in Park, Neutral, or Reverse Clutch Not engaged TCM: TransTurbineSpeedValid(TCM) Trans_Gear_Defaulted(TCM) ECM: VehicleSpeedSensorError P150A, P150B, P2160, P2161 CrankSensorFaultActive TPS_FA TOSS_Fault EngineTorqureInaccurate	Fail Case 1: >= 2.0 Consecutive Seconds for 1 Times Fail Case 2: >= 7.0 Consecutive Seconds for 1 Times	Type B 2 trips

Component/ System	Fault Code	Monitor Strategy 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	= False	No Active DTC's	TPS_ThrottleAuthorityDefaulted MAP_SensorFA ECT_Sensor_FA FuelInjectorCircuit_FA P0131, P0151 P0132, P0152	200 failures out of 250 samples. Frequency: Continuous	2 trips Type B
			A) O2S signal must be 1) O2S signal OR 2) O2S signal To set Closed Loop ready flag	 > 550 mvolts < 350 mvolts = True	System Voltage	10.0 volts < system voltage< 32.0 volts	100msec loop	
			Closed Loop O2S ready flag	= True	Engine Speed	1000 RPM <= Engine speed <= 3400 RPM		
			B) Once set to ready O2S cannot be 1) O2S signal AND 2) O2S signal for time Then set Closed Loop ready flag	 > 350 mvolts < 550 mvolts > 5.0 seconds = False	Engine Airflow Engine Coolant Engine Metal Overtemp Active Converter Overtemp Active Fuel State AFM Status Predicted Exhaust Temp (B1S1) Engine run time Fuel Enrichment	10.0 gps <= Engine Airflow<= 50.0 gps >= 70.0 ºC = False = False DFCO not active = All Cylinders active >= 0.0 ºC > 100 seconds = Not Active		
					All of the above met for			
					Time	> 5 seconds		
Deactivation System Performance	P3400	Detects a “failed to deactivate” condition when Deactivation Mode allowed:	ABS(Measured MAP – MAP Model 2) **AND** ((Measured MAP – MAP Model 2) filtered) (*stored from previous all-Cylinder mode*	< -10.0 kPa	**DIAGNOSTIC ENABLE CONDITIONS**			
					Total filtered residual weight factors ECT IAT Engine RPM	>= 0.0 factor > -7 and < 125 Deg C > -20 and < 125 Deg C > 450 and < 5800 RPM	100 cylinder deactivation lag residual failures out of 200 samples	2 trip(s) Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			event) - ((Measured MAP – MAP Model 2) filtered) (*current*)	> 10.0 kPa		MAP Model 2 multiplied by MAP2 Residual Weight Factor based on RPM. See table IFRD Residual Weighting Factors	Performed once every 100 msec	

CYLINDER DEACTIVATION ENABLE CONDITIONS
(Conditions below must be met for >= 0 seconds before cylinder deactivation will begin)

Engine running	> 30.0 seconds
Engine RPM	> **EngSpeedLwrLimitEnableTable** AND < **EngSpeedUprLimitEnableTable** - Details on Supporting Tables Tab (P3400 Section)
Engine coolant	>= 44.0 and <= 128.0 Deg C
Ignition voltage	>= 11.0 and <= 32.0 Volts
Pedal Commanded Throttle Area	< 5 Percent
Brake booster vacuum	>= 45.0 kPa
Engine oil temp	>= 20 and <= 128 Deg C
Transmission gear	HalfCylDisabledTransGr and HalfCylDisabledTransGrDeviceControl (when in device control) - See details on Supporting Tables Tab (P3400 Section)
Vehicle speed	>= 11 MPH
FCO not active for	>= 3.0 Seconds
Time since last cylinder deac mode event	>= 3.0 Seconds
Gear shift	Not currently in progress

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					AC Clutch transition	Not currently in progress		
					Tip In Bump	Not active		
					Accelerator pedel delta	<= 50.0 Percent in 12.5 ms		
					Engine oil pressure	>= 187 and <= 455 kPa		
					Filtered engine vacuum	> AllCylToHalfCylVacuum or EcoAllCylToHalfCylVacuum (in Eco mode) - See details on Supporting Tables Tab (P3400 Section) for 0.0 sec.		
					PRNDL state	HalfCylDisabledPRNDL and HalfCylDisabledPRNDLDevicControl tables (when in device control) - See details on Supporting Tables Tab (P3400 Section)		
					Oil aeration present	Aeration enabled by engine RPM > 3100 for 10 seconds, disabled by engine RPM < 3000 for 50 seconds		
					After exiting deac mode, must be in all cylinder mode for	>= 60 seconds		
					DFCO mode	Not currently in DFCO		
					Fuel shut off mode other than DFCO	Not currently in fuel shut-off		
					ETC Power management mode	Not active		
					Heater performance	Not in Heater Performance Mode		
					POSD Intrusive	POSD diagnostic not active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					POPD Intrusive	POPD diagnostic not active		
					Low range 4WD	Not in Low Range 4WD		
					AFM is disabled at high percent ethanol	Ethanol concentration > 95 % disables AFM. Once disabled, ethanol concentration must be < 85 % to re-enable		
					If feature is enabled, AFM is allowed only when percent ethanol learn is not in progress	Feature is Disabled		
					IF DEACTIVATED, ANY OF THE CONDITIONS BELOW WILL FORCE CYLINDER REACTIVATION			
					If deactivation mode is active for	>= 480 seconds		
					then reactivation will occur if:			
					Deac mode active	>= 600 seconds		
						OR		
					Delta vacuum	> 5 or < -5 kPa		
					Engine RPM	> **EngSpeedLwrLimitDisableTable** AND < **EngSpeedUprLimitDisableTable** - Details on Supporting Tables Tab (P3400 Section)		
					Engine power limited mode	Active		
					Pedal Commanded Throttle Area	> 6 Percent		
					Piston protection	Active		
					Engine oil temperature	< 18 or > 130 Deg C		
					Engine oil pressure	< 172 or > 470 kPa		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					Oil aeration present	Aeration enabled by engine RPM > 3100 for 10 seconds, disabled by engine RPM < 3000 for 50 seconds		
					Engine metal overtemp protection	Active		
					Accelerator pedel delta	<= 50.0 percent in 12.5 ms		
					In device control only, if PNDRL in Park or Neutral, vehicle speed	<= 5.0 MPH		
					Transmission gear	HalfCylDisabledTransGr and HalfCylDisabledTransGrDevic eControl (when in device control) - See details on Supporting Tables Tab (P3400 Section)		
					PRNDL state	HalfCylDisabledPRNDL and HalfCylDisabledPRNDLDevic eControl tables (when in device control) - See details on Supporting Tables Tab (P3400 Section)		
					Ignition voltage	< 11.0 or > 32.0 Volts		
					Engine coolant	< 40.0 or > 132.0 Deg C		
					Vehicle speed	< 9.3 MPH		
					Brake booster vacuum	< 41.0 kPa		
					Filtered engine vacuum	> HalfCylToAllCylVacuum or EcoHalfCylToAllCylVacuum (in Eco mode) - See details on Supporting Tables Tab (P3400 Section) for 0 sec.		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					ETC Power management mode	Active		
					Converter overtemp protect	Active		
					Hot coolant mode	Active		
					Engine running	= False		
					Engine overspeed protection	Active		
					Engine metal overtemp protect	Active		
					Cat. temp low	Active		
					POSD Intrusive	Active		
					FWD	In low range		
					Engine misfire	Detected		
					Heater performance	Active		
					POPD Intrusive	Active		
					No active DTC's	Fault bundles: Map_SensorFA VehicleSpeedSensorError ECT_Sensor_FA EOP_Sensor_FA PowertrainRelayFault BrakeBoosterSensorFA CrankSensorFA CamSensorFA IAT_SensorFA CylnderDeacDriverTFTKO FourWheelDriveLowStateValid EngineTorqueEstInaccurate TransmissionGearDefaulted EnginePowerLimited		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Cylinder 1 Deactivation Solenoid Control Circuit	P3401	Checks the Solenoid Control Circuit electrical integrity for cylinder #1	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage Diagnostic enabled/ disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
Cylinder 4 Deactivation Solenoid Control Circuit	P3425	Checks the Solenoid Control Circuit electrical integrity for cylinder #4	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage Diagnostic enabled/ disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
Cylinder 6 Deactivation Solenoid Control Circuit	P3441	Checks the Solenoid Control Circuit electrical integrity for cylinder #6	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage Diagnostic enabled/ disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
Cylinder 7 Deactivation Solenoid Control Circuit	P3449	Checks the Solenoid Control Circuit electrical integrity for cylinder #7	The ECM detects that commanded state of driver and actual state of the control circuit do not match. (Short to ground, short to voltage, open circuit)		Engine RPM Ignition Voltage Diagnostic enabled/ disabled	>= 400.0 RPM <= 32.0 and >= 11.0 Volts Enabled	20 failures out of 25 samples Performed every 250 msec	2 trip(s) Type B
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures	≥ 5 counts	CAN hardware is bus OFF for	> 0.1125 seconds	Diagnostic runs in 12.5 ms loop	2 Trip(s)
			out of these samples	≥ 5 counts	Diagnostic enable timer	> 3.0000 seconds		Type B

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Lost Communication With TCM	U0101	This DTC monitors for a loss of communication with the transmission control module	Message is not received from controller for this many counts	12 counts	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
			out of these samples	12 counts	Power mode is RUN			Type B
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to monitor.			
Lost Communication with Transfer Case Control Module	U0102	This DTC monitors for a loss of communication with the transfer case control module	Message is not received from controller for this many counts	12 counts	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
			out of these samples	12 counts	Power mode is RUN			Type B
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to monitor.			
Lost Communication With Fuel Pump Control Module	U0109	This DTC monitors for a loss of communication with the fuel pump control module	Message is not received from controller for this many counts	12 counts	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	2 Trip(s)
			out of these samples	12 counts	Power mode is RUN			Type B
					Communication bus is not OFF			
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to monitor.			
Lost Communication With Anti-Lock Brake System (ABS) Control Module	U0121	This DTC monitors for a loss of communication with the ABS control module.	Message is not received from controller for this many counts	12 counts	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	1 Trip(s)
			out of these samples	12 counts	Power mode is RUN			Type C
					Communication bus is not OFF			**Special Type C**

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to monitor.			
Lost Communication With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	Message is not received from controller for this many counts	12 counts	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	The fail diagnostic runs in the 6.25 ms loop with pass conditions reported to the DFIR in the 1000ms loop.	1 Trip(s)
			out of these samples	12 counts	Power mode is RUN			Type C
					Communication bus is not OFF			**Special Type C**
					or is typed as a C code			
					Normal Communication is enabled			
					Normal Transmit capability is TRUE			
					The diagnostic system is not disabled			
					The bus has been on for	> 3.0000 seconds		
					A message has been selected to monitor.			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Lost Communication with Brake/Traction Controller - Device $28 (Only used for ClassII Onboard Communication based Vehicles)	U1040	This DTC monitors for a loss of communication over the Class2 bus with the Brake/Traction (Device $28) Control Module.	Class2 message not received from module for	>= 10 seconds	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	Diagnostic runs in 1000 ms loop	1 Trip(s)
					Power mode is RUN			Type C
					The diagnostic system is not disabled			**Special Type C**
					The bus has been on for	> 3.0000 seconds		
Lost Communication with Brake/Traction Controller - Device $29(Only used for ClassII Onboard Communication based Vehicles)	U1041	This DTC monitors for a loss of communication over the Class2 bus with the Brake/Traction (Device $29) Control Module.	Class2 message not received from module for	>= 10 seconds	Run/Crank Voltage	11 volts ≤ Voltage ≤ 32 volts	Diagnostic runs in 1000 ms loop	1 Trip(s)
					Power mode is RUN			Type C
					The diagnostic system is not disabled			**Special Type C**
					The bus has been on for	> 3.0000 seconds		

ECM Supporting Tables

P2096 P2097 P2098 P2099 FAPD

Cell Accum Min

Post O2 Air Flow Mode	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
Cell Accum Min Count (10 counts = 1 sec.)	300	300	300	300	300	300	300	300	300	300

Integral Offset Max

Post O2 Air Flow Mode	Decel	Idle	Cruise	Light Accel	Heavy Accel
Post O2 Integral Offset Max [mV]	0	0	0	0	0

Integral Offset Min

Post O2 Air Flow Mode	Decel	Idle	Cruise	Light Accel	Heavy Accel
Post O2 Integral Offset Min [mV]	0	0	0	0	0

O2 Lean Thresh

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
O2 Lean Threshold [mV]	600	600	600	600	600	600	600	600	600	600

O2 Rich Thresh

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
O2 Rich Threshold [mV]	800	800	800	800	750	750	810	810	810	810

Out Of Window Count

Post O2 Airflow Mode Cell	Decel	Idle	Cruise	Light Accel	Heavy Accel
Out of Window Count (10 counts = 1 sec.)	0	0	0	0	0

Selected Cells

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
Post O2 Airflow Mode Selected Cell 0 if not selected, 1 if selected	0	0	0	0	1	1	1	1	1	1

HV Post Low

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
KaFAPD_U_HV_PO2_FiltLoThresh	625	625	625	625	625	625	625	625	625	625

HV Post High

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
KaFAPD_U_HV_PO2_FiltHiThresh	775	775	775	775	725	725	785	785	785	785

HV Integral Offset Low

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
KaFAPD_U_HV_PO2_IntOffLoThresh	-115	-115	-115	-115	-365	-365	-365	-365	-365	-365

HV Integral Offset High

Post O2 Airflow Mode Cell	Bank1 Decel	Bank2 Decel	Bank1 Idle	Bank2 Idle	Bank1 Cruise	Bank2 Cruise	Bank1 Light Accel	Bank2 Light Accel	Bank1 Heavy Accel	Bank2 Heavy Accel
KaFAPD_U_HV_PO2_IntOffHiThresh	105	105	105	105	355	355	355	355	355	355

Post O2 Filt Coefficient

Bank and Index	Bank 1 Index 0	Bank 2 Index 0	Bank 1 Index 1	Bank 2 Index 1	Bank 1 Index 2	Bank 2 Index 2	Bank 1 Index 3	Bank 2 Index 3	Bank 1 Index 4	Bank 2 Index 4
Filter Coefficient	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Current Filtered Post O2 Voltage	0	0	500	500	600	600	700	700	800	800

ECM Supporting Tables

P0068: MAP / MAF / TPS Correleation

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

X-axis	5.0003	10.0006	14.9994	19.9997	25.0000	30.0003	35.0006	39.9994	99.9985
Data	26.3984	23.3359	20.2734	19.1484	18.0234	13.7813	100.0000	100.0000	100.0000

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

X-axis	5.0003	10.0006	14.9994	19.9997	25.0000	30.0003	35.0006	39.9994	99.9985
Data	17.6250	20.6016	23.5781	24.0938	34.6406	40.6641	255.0000	255.0000	255.0000

X axis is Engine Speed (RPM)
Data is max MAF vs RPM (grams/sec)

X-axis	600.00	1400.00	2200.00	3000.00	3800.00	4600.00	5400.00	6200.00	7000.00
Data	25.0000	60.0000	100.0000	140.0000	180.0000	220.0000	250.0000	280.0000	300.0000

X axis is Battery Voltage (V)
Data is max MAF vs Voltage (grams/sec)

X-axis	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
Data	0.0000	18.0000	40.0000	75.0000	135.0000	250.0000	500.0000	500.0000	500.0000

P1682: Ignition Voltage Correleation

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

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

P0325/P0330 OpenCircuitThresh

Engine Speed (RPM):	500	1000	1500	2000	2500	3000	3500	4000
OpenCircuitThresh:	9	15	25	33	48	85	85	85

Engine Speed (RPM):	4500	5000	5500	6000	6500	7000	7500	8000
OpenCircuitThresh:	85	85	85	85	85	85	85	85

P0326 Knock Detection Enabled Factors:

FastRtdMax:

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

	0	**512**	**1024**	**1536**	**2048**	**2560**	**3072**	**3584**	**4096**	**4608**	**5120**	**5632**	**6144**	**6656**	**7168**	**7680**	**8192**
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
60	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
70	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
80	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
90	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
100	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
110	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
120	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
130	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
140	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
150	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
160	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
170	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
180	0.0	6.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

12 OBDG07 Engine Diagnostics

ECM Supporting Tables

Knock Detection Enabled Factors:

Knock Detection Enabled = FastAttackRate * FastAttackCoolGain * FastAttackBaroGain

RPM:	0	512	1024	1536	2048	2560	3072	3584	4096
FastAttackRate:	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

RPM:	4608	5120	5632	6144	6656	7168	7680	8192
FastAttackRate:	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

ECT (deg. C):	-40	-30	-20	-10	0	10	20	30	40
FastAttack CoolGain:	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.50	0.75

ECT (deg. C):	50	60	70	80	90	100	110	120
FastAttack CoolGain:	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.20

Baro:	55.00	61.25	67.50	73.75	80.00	86.25	92.50	98.75	105.00
FastAttack BaroGain:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

P0327/P0332 ShortLowThresh

Engine Oil Temp (deg C):	90	95	100	105	110	115	120	125
ShortLowThreshSig	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
ShortLowThreshRet	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69

Engine Oil Temp (deg C):	130	135	140	145	150	155	160
ShortLowThreshSig	2.59	2.44	2.29	2.14	1.98	1.83	1.68
ShortLowThreshRet	2.69	2.38	2.08	1.77	1.47	1.16	0.86

P0328P0333 ShortHiThresh

Engine Oil Temperature (deg C):

Engine Oil Temp (deg C):	90	95	100	105	110	115	120	125
ShortHiThreshSig	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58
ShortHiThreshRet	6.66	6.66	6.66	6.66	6.66	6.66	6.66	6.66

Engine Oil Temp (deg C):	130	135	140	145	150	155	160
ShortHiThreshSig	4.58	4.58	4.58	4.58	4.58	4.58	4.58
ShortHiThreshRet	6.66	6.66	6.66	6.66	6.66	6.66	6.66

Tables supporting P219A and P219B Diagnostics:

KtOXYD_cmp_AFIM_LngthThrsh1

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
80	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
125	90000	90000	90000	90000	90000	90000	90000	90000	90000	6000	6000	6000	90000	90000	90000	90000	90000
160	90000	90000	90000	90000	90000	90000	90000	90000	90000	6000	6000	6000	90000	90000	90000	90000	90000
200	90000	90000	90000	90000	90000	90000	90000	90000	90000	6000	6000	12208	12208	90000	90000	90000	90000
240	90000	4496	4496	4496	90000	90000	90000	90000	11776	11776	12208	12208	12208	90000	90000	90000	90000
280	90000	4496	4496	4496	11632	11632	90000	90000	11776	11776	13040	12224	12224	90000	90000	90000	90000
320	90000	4784	4784	8208	11632	11280	12528	14320	90000	13456	15136	13216	13216	90000	90000	90000	90000
360	90000	4784	4784	11840	12448	10944	12528	14320	14320	13056	11920	10704	10704	90000	90000	90000	90000
400	90000	90000	11216	11216	13376	12928	15648	14992	13056	13056	9936	8384	8384	90000	90000	90000	90000
440	90000	10160	10112	10064	12128	11776	13056	90000	14400	13040	9008	9456	9456	90000	90000	90000	90000
480	90000	10160	10160	9168	11168	11184	11744	15376	15776	13488	9584	9040	9040	90000	90000	90000	90000
520	90000	10608	10608	12176	11840	10256	13760	18576	9264	9136	11440	10512	10512	90000	90000	90000	90000
560	90000	10624	10624	13408	12528	9808	11184	8912	8608	9392	17680	10240	10240	90000	90000	90000	90000
640	90000	9552	9552	11616	11856	10240	11632	8752	10896	11808	18032	9024	9024	90000	90000	90000	90000
720	90000	9552	9552	10704	11856	10240	11632	8752	10896	11808	18032	9024	9024	90000	90000	90000	90000
800	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000

ECM Supporting Tables

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
80	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
125	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
160	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
200	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
240	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
280	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
320	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
360	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
400	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
440	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
480	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
520	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
560	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
640	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
720	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
800	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000

KtOXYD_cmp_AFIM_LngthThrsh2

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	90000	90000	90000	90000	90000	90000	90000	20288	20288	20288	90000	90000	90000	90000	90000	90000	90000
80	90000	90000	90000	90000	90000	90000	90000	20288	20288	20288	90000	90000	90000	90000	90000	90000	90000
125	90000	90000	90000	90000	90000	90000	90000	15744	15744	11872	6752	6752	90000	90000	90000	90000	90000
160	90000	90000	90000	11664	11664	9760	9584	11920	11184	11872	6752	6752	90000	90000	90000	90000	90000
200	90000	7280	7280	11888	11664	9760	9584	12656	14176	15200	20304	19024	17728	90000	90000	90000	90000
240	90000	7280	7280	12128	13440	11568	12544	14560	17664	14160	16656	17728	17728	90000	90000	90000	90000
280	90000	4672	4672	14112	12720	13776	13856	16768	15744	14784	16608	16464	16464	90000	90000	90000	90000
320	90000	4384	4384	11888	13552	16352	15696	18736	18112	13856	16096	15280	15280	90000	90000	90000	90000
360	90000	10400	10400	13536	13280	13440	14096	15584	13360	13488	22144	13600	13600	90000	90000	90000	90000
400	90000	13344	13344	13024	17360	16864	22448	14832	22944	16672	11504	10704	10704	90000	90000	90000	90000
440	90000	9888	9888	17696	18528	13264	19184	19376	20080	12240	13072	12176	12176	90000	90000	90000	90000
480	90000	11008	11008	10192	12176	14080	15680	16288	15904	15472	12272	12736	12736	90000	90000	90000	90000
520	90000	9952	9952	11888	13456	12080	17648	19536	9328	11952	12640	12256	12256	90000	90000	90000	90000
560	90000	11456	11456	15008	13792	12064	12608	10160	10560	13056	13440	14160	14160	90000	90000	90000	90000
640	90000	11792	11792	15536	15472	12816	12464	11184	13104	13168	16160	15168	15168	90000	90000	90000	90000
720	90000	11792	11792	15536	15472	12816	12464	11184	13104	13168	16160	15168	15168	90000	90000	90000	90000
800	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000

ECM Supporting Tables

KtOXYD_cmp_AFIM_LngthThrsh2_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
80	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
125	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
160	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
200	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
240	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
280	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
320	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
360	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
400	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
440	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
480	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
520	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
560	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
640	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
720	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
800	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000

KtOXYD_K_AFIM_QualFactor1

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.00	0.80	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.80	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.75	0.80	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	0.75	0.75	0.75	0.75	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.75	0.75	0.00	0.75	0.00	0.00	0.75	0.85	0.75	0.00	0.00	0.00	0.00	0.00
440	0.00	0.00	0.00	0.80	0.75	0.75	0.00	0.00	0.00	0.80	0.85	0.85	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.75	0.80	0.85	0.80	0.75	0.00	0.80	0.80	0.85	0.85	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.75	0.75	0.85	0.85	0.80	0.75	0.90	0.85	0.85	0.85	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.80	0.75	0.80	0.90	0.85	0.90	0.90	0.85	0.75	0.85	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.80	0.00	0.75	0.85	0.85	0.90	0.85	0.85	0.75	0.90	0.00	0.00	0.00	0.00	0.00
720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ECM Supporting Tables

KtOXYD_K_AFIM_QualFactor1_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

KtOXYD_K_AFIM_QualFactor2

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.80	0.90	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.75	0.85	0.80	0.75	0.00	0.80	0.75	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.80	0.80	0.80	0.85	0.85	0.80	0.80	0.80	0.80	0.75	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	1.00	0.75	0.75	0.75	0.75	0.80	0.80	0.85	0.85	0.80	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.90	0.80	0.85	0.80	0.80	0.75	0.85	0.85	0.85	0.85	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.85	0.80	0.90	0.85	0.85	0.85	0.90	0.85	0.80	0.75	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.75	0.80	0.85	0.75	0.80	0.90	0.85	0.85	0.95	0.95	0.00	0.00	0.00	0.00	0.00
440	0.00	0.00	0.75	0.80	0.85	0.90	0.85	0.75	0.85	0.95	0.95	0.95	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95	0.95	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.90	0.75	0.95	0.90	0.90	0.75	1.00	0.95	0.95	0.95	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.90	0.85	0.75	0.75	0.90	1.00	1.00	0.90	0.95	0.95	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.90	0.90	0.85	0.85	0.75	0.95	0.95	0.95	0.90	0.95	0.00	0.00	0.00	0.00	0.00
720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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ECM Supporting Tables

KtOXYD_K_AFIM_QualFactor2_DoD (AFM applications only)

AvgFlow / AvgRPM	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	6000
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tables supporting Clutch Diagnostics:

P0806

EngTorqueThreshold Table — **axis is Percent Clutch Pedal Position, 0 = bottom of travel**

Axis	**0**	**6.2485**	**12.497**	**18.7455**	**24.994**	**31.2425**	**37.491**	**43.7395**	**49.988**	**56.2365**
Curve	10.0	10.5	14.0	18.5	27.0	35.0	40.0	51.5	80.0	87.0

Axis	**62.485**	**68.7335**	**74.982**	**81.2305**	**87.479**	**93.7275**	**99.976**
Curve	-8192.0	-8192.0	-8192.0	-8192.0	-8192.0	-8192.0	-8192.0

P0806

ResidualErrorEnableLow Table — **axis is Gear**

Axis	1st	2nd	3rd	4th	5th	6th	rev	neutral
Curve	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

P0806

ResidualErrorEnableHigh Table — **axis is Gear**

Axis	1st	2nd	3rd	4th	5th	6th	rev	neutral
Curve	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Tables supporting Clutch Pedal Position Status (analog Clutch Pedal Position Sensor applications only):

Clutch Pedal Top of Travel Achieved criteria

The clutch pedal Top of Travel state will transition from FALSE to TRUE when the following occurs:

Clutch Pedal Position	<= 88 %	
for	> 3 counts	each count is equal to 12.5ms

Clutch Disengaged criteria

The clutch state will transition from engaged to disengaged when the following occurs:

Clutch Pedal Position	<= 50 %	
for	> 3 counts	each count is equal to 12.5ms

Clutch Pedal Bottom of Travel Achieved criteria

The clutch pedal Bottom of Travel state will transition from FALSE to TRUE when the following occurs:

Clutch Pedal Position	< 16 %	
for	> 3 counts	each count is equal to 12.5ms

The following tables define the Lean and Rich failure thresholds for FASD

P0171 & P0174 (LONG TERM ONLY)	**Long Term Trim Lean (Lean Fail threshold)**									
% Ethanol	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25
Long Term Fuel Trim Lean Threshold	1.245	1.245	1.245	1.245	1.245	1.245	1.245	1.245	1.245	1.245
% Ethanol	62.50	68.75	75.00	81.25	87.50	93.75	100.00			
Long Term Fuel Trim Lean Threshold	1.245	1.245	1.245	1.245	1.245	1.245	1.245			

P0172 & P0175 (LONG TERM ONLY)	**Non Purge Rich Limit (Rich Fail threshold)**									
% Ethanol	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25
Long Term Fuel Non-Purge Rich Threshold	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755
% Ethanol	62.50	68.75	75.00	81.25	87.50	93.75	100.00			
Long Term Fuel Non-Purge Rich Threshold	0.755	0.755	0.755	0.755	0.755	0.755	0.755			

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ECM Supporting Tables

P0172 & P0175 (LONG TERM ONLY) **Purge Rich Limit (Triggers Rich Intrusive test)**

% Ethanol	0.00	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25
Long Term Fuel Purge Rich Threshold	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
% Ethanol	62.50	68.75	75.00	81.25	87.50	93.75	100.00			
Long Term Fuel Purge Rich Threshold	0.760	0.760	0.760	0.760	0.760	0.760	0.760			

The following table defines the Long Fuel Trim cells utilized for FASD diagnosis (cells identified with a "Yes" are enabled, and with a "NO" are disabled)

Long-Term Fuel Trim Cell Usage

Cell I.D.	CeFADR_e_ Cell00_Purg OnAirMode5	CeFADR_e_ Cell01_Purg OnAirMode4	CeFADR_e_ Cell02_Purg OnAirMode3	CeFADR_e_ Cell03_Purg OnAirMode2	CeFADR_e_ Cell04_Purg OnAirMode1	CeFADR_e_ Cell05_Purg OnAirMode0	CeFADR_e_ Cell06_Purg OnIdle	CeFADR_e_ Cell07_Purg OnDecel	CeFADR_e_ Cell08_Purg OffAirMode5	CeFADR_e_ Cell09_Purg OffAirMode4	CeFADR_e_ Cell10_Purg OffAirMode3	CeFADR_e_ Cell11_Purg OffAirMode2	CeFADR_e_ Cell12_Purg OffAirMode1	CeFADR_e_ Cell13_Purg OffAirMode0	CeFADR_e_ Cell14_Purg OffIdle	CeFADR_e_ Cell15_Purg OffDecel
FASD Cell Usage	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ SelectedPurgeCell	CeFADD_e_ NonSelectedCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ SelectedNonPurgeCell	CeFADD_e_ NonSelectedCell
FASD Enabled In Cell?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NO

P0411

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

Axis	**0.0**	**3.0**	**6.0**	**9.0**	**12.0**	**15.0**	**18.0**	**21.0**	**24.0**	**27.0**
Curve	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0

Axis	**30.0**	**33.0**	**36.0**	**39.0**	**42.0**	**45.0**	**48.0**
Curve	25.0	25.0	25.0	25.0	25.0	25.0	25.0

P0411

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

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

P0411

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

Axis	**0.0**	**3.0**	**6.0**	**9.0**	**12.0**	**15.0**	**18.0**	**21.0**	**24.0**	**27.0**
Curve	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Axis	**30.0**	**33.0**	**36.0**	**39.0**	**42.0**	**45.0**	**48.0**
Curve	1.0	0.5	0.0	0.0	0.0	0.0	0.0

P0411

Phase 1 System Volt Test Weight Factor **axis is system volts**

Axis	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**	**13.0**	**14.0**
Curve	0.0	0.0	0.0	0.0	0.0	0.5	0.8	1.0	1.0	1.0

15.0	**16.0**	**17.0**	**18.0**	**19.0**	**20.0**	**21.0**
1.0	1.0	0.8	0.5	0.5	0.5	0.5

P0411

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

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

P2431

Baro Skewed Sensor Weight Factor **axis is distance traveled from last Baro update in Km**

Axis	**0.0**	**2.0**	**4.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**18.0**
Curve	1.0	0.8	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0

20.0	**22.0**	**24.0**	**26.0**	**28.0**	**30.0**	**32.0**
0.0	0.0	0.0	0.0	0.0	0.0	0.0

P2440

Bank 1 Valve Pressure Error **axis is weighted time in seconds**

Axis	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Curve	-6.0	-6.0	-5.0	-4.0	-3.0	-3.0	-3.0	-3.0	-3.0

P2440

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

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

ECM Supporting Tables

P2440

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

Axis	0.0	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0
Curve	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Axis	30.0	33.0	36.0	39.0	42.0	45.0	48.0
Curve	1.0	1.0	1.0	1.0	0.5	0.0	0.0

P2440

Phase 2 System Volt Test Weight Factor — **axis is system volts**

Axis	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
Curve	0.0	0.0	0.0	0.0	0.0	0.5	0.8	1.0	1.0	1.0

Axis	15.0	16.0	17.0	18.0	19.0	20.0	21.0
Curve	1.0	1.0	0.8	0.5	0.5	0.5	0.5

P2440

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

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

P2444

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

Axis	0	1	2	3	4	5	6	7	8
Curve	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2

P1400 Detail

KnlDLC_T_ECT_Axis

Coolant Temperature	-11	-10	1	2	16	17	38	39	100

KalDLC_n_CLO_ThrshOfst[CilDLR_DR]

RPM Offset to be considered Cat Light Off	1000	125	125	125	125	125	125	1000	1000

KalDLC_n_CLO_ThrshOfst[CilDLR_PN]

RPM Offset to be considered Cat Light Off	1000	125	125	125	125	125	125	1000	1000

KalDLC_n_EngDsrdBase[CilDLR_PN]

Coolant Temperature	-40	-28	-16	-4	8	20	32	44	56	68
Base RPM	800	800	800	800	800	750	725	710	695	680

Coolant Temperature	80	92	104	116	128	140	152
Base RPM	665	650	650	650	725	725	725

KalDLC_n_EngDsrdBase[CilDLR_DR]

Coolant Temperature	-40	-28	-16	-4	8	20	32	44	56	68
Base RPM	800	800	800	800	800	750	725	710	695	680

Coolant Temperature	80	92	104	116	128	140	152
Base RPM	665	650	650	650	725	725	725

P0420 / P0430 Detail

MinimumEngineRunTime

Coolant Temp	40	50	60	70	80
Engine Run Time	100	100	100	100	100

MinCatTemp		X_AXIS_PTS
CATD_ExhaustWarmMin_Loc_0	575	0
CATD_ExhaustWarmMin_Loc_1	575	1
CATD_ExhaustWarmMin_Loc_2	575	2
CATD_ExhaustWarmMin_Loc_3	575	3
CATD_ExhaustWarmMin_Loc_4	575	4
CATD_ExhaustWarmMin_Loc_5	575	5
CATD_ExhaustWarmMin_Loc_6	575	6
CATD_ExhaustWarmMin_Loc_7	575	7

MinAirflowToWarmCatalyst

Engine Coolant	0	45	90
MinAirFlowToWrmCat	18	10	6

ECM Supporting Tables

P0101, P0106, P0121, P012B, P1101: IFRD Residual Weighting Factors (Naturally Aspirated Applications)

TPS Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.722	0.686	0.673	0.472	0.467	0.343	0.279	0.284	1.000	1.000

MAF Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.608	0.594	0.502	0.388	0.386	0.349	0.352	0.343	1.000	1.000

MAF Residual Weight Factor Based on MAF Estimate

gm/sec	0.0	50.0	70.0	73.0	76.0	79.0	82.0	85.0	89.0	95.0	100.0	110.0	120.0	150.0	200.0	280.0	350.0
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

MAP1 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	0.828	0.921	0.972	1.000	1.000	0.708	0.723	0.660	0.491	0.477	0.439	0.427	0.401	1.000	1.000

MAP2 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.656	0.903	0.850	0.449	0.436	0.401	0.390	0.364	1.000	1.000

SCIAP1 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

SCIAP2 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Boost Residual Weight Factor based on % of Boost

% Boost	0.00	0.06	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

P0101, P0106, P0121, P012B, P1101: IFRD Residual Weighting Factors (Super Charged Applications only)

TPS Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.833	0.714	0.625	0.556	0.500	0.500	0.500	0.500

MAF Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	1.000	1.000	1.000	0.833	0.833	0.733	0.696	0.500	0.400	0.300	0.300	0.300	0.200	0.200	0.200	0.714	0.714

MAF Residual Weight Factor Based on MAF Estimate

gm/sec	0.0	40.0	47.0	56.0	67.0	79.0	93.0	111.0	131.0	156.0	184.0	218.0	259.0	307.0	363.0	431.0	510.0
	1.000	1.000	0.909	0.836	0.773	0.719	0.660	0.584	0.501	0.408	0.336	0.294	0.268	0.243	0.219	0.191	0.159

MAP1 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.714	0.625	0.556	0.500	0.455	0.417	0.385	0.357	0.333	0.313

MAP2 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	0.556	0.556	0.556	0.556	0.556	0.556	0.556	0.500	0.455	0.455	0.455	0.417	0.417	0.385	0.385	0.385	0.385

SCIAP1 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	0.625	0.625	0.625	0.625	1.000	1.000	1.000	0.556	0.556	0.556	0.556	0.556	0.556	0.556	0.556	0.556	0.556

SCIAP2 Residual Weight Factor based on RPM

RPM	0	250	750	1250	1750	2250	2750	3250	3750	4250	4750	5250	5750	6250	6750	7250	9000
	0.556	0.556	0.556	0.556	1.000	1.000	1.000	0.625	0.625	0.625	0.625	0.625	0.625	0.600	0.600	0.600	0.600

Boost Residual Weight Factor based on % of Boost

% Boost	0.00	0.06	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

ECM Supporting Tables

Supercharger Intake Flow Rationality Diagnostic Failure Matrix						
DTC Set	TPS Model Failure	MAF Model Failure	MAP 1 Model Failure	MAP 2 Model Failure	SCIAP 1 Model Failure	SCIAP 2 Model Failure
No DTC	F	F	F	F	F	F
No DTC	F	F	F	F	F	T
No DTC	F	F	F	F	T	F
P012B	F	F	F	F	T	T
No DTC	F	F	F	T	F	F
P1101	F	F	F	T	F	T
P1101	F	F	F	T	T	F
P1101	F	F	F	T	T	T
No DTC	F	F	T	F	F	F
P1101	F	F	T	F	F	T
P1101	F	F	T	F	T	F
P1101	F	F	T	F	T	T
P0106	F	F	T	T	F	F
P1101	F	F	T	T	F	T
P1101	F	F	T	T	T	F
P1101	F	F	T	T	T	T
No DTC	F	T	F	F	F	F
P0101	F	T	F	F	F	T
No DTC	F	T	F	F	T	F
P0101, P012B	F	T	F	F	T	T
P1101	F	T	F	T	F	F
P0101	F	T	F	T	F	T
P1101	F	T	F	T	T	F
P0101, P012B	F	T	F	T	T	T
P1101	F	T	T	F	F	F
P1101	F	T	T	F	F	T
P1101	F	T	T	F	T	F
P1101	F	T	T	F	T	T
P1101	F	T	T	T	F	F
P1101	F	T	T	T	F	T
P1101	F	T	T	T	T	F
P1101	F	T	T	T	T	T
P0121	T	F	F	F	F	F
No DTC	T	F	F	F	F	T
P0121	T	F	F	F	T	F
P1101	T	F	F	F	T	T
P1101	T	F	F	T	F	F
P1101	T	F	F	T	F	T
P1101	T	F	F	T	T	F
P1101	T	F	F	T	T	T
P0121	T	F	T	F	F	F
P1101	T	F	T	F	F	T
P0121	T	F	T	F	T	F
P1101	T	F	T	F	T	T
P1101	T	F	T	T	F	F
P1101	T	F	T	T	F	T
P1101	T	F	T	T	T	F
P0121	T	T	F	F	F	F
P1101	T	T	F	F	F	T
P0121	T	T	F	F	T	F
P1101	T	T	F	F	T	T
P1101	T	T	F	T	F	F
P1101	T	T	F	T	F	T
P1101	T	T	F	T	T	F
P1101	T	T	F	T	T	T
P0121	T	T	T	F	F	F
P1101	T	T	T	F	F	T
P0121	T	T	T	F	T	F
P1101	T	T	T	F	T	T

P012D: MAP/SCIAP Cold Run Time Threshold

	X axis is Engine Coolant Temperature in Deg C				
Temp	-30	-15	0	15	30
	242.0	188.0	134.0	80.0	0.0

ECM Supporting Tables

P00B6: Fail if power up ECT exceeds RCT by these values

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

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

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

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

-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
80	80	80	70	60	45	35	25	25	25	15	15	15	15	15	15	15

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

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

IAT Range	Low	Hi	-40	-28	-16	-4	8	20	32	44	56	68	80
Primary	10.0 ° C	54.5 ° C	13185	13185	13185	13185	13185	11804	10422	9041	7660	6279	4898
Alternate	-7.0 ° C	10.0 ° C	13418	13418	13418	12217	11015	9814	8612	7410	6209	6209	6209

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

Z axis is the accumulated time failure threshold (seconds)
X axis is ECT Temperature at Power up (° C)
Y axis is IAT min during test (° C)

IAT Range	Low	Hi	-40	-28	-16	-4	8	20	32	44	56	68	80
Primary	10.0 ° C	54.5 ° C	1100	1015	930	845	760	675	590	505	420	335	250
Alternate	-7.0 ° C	10.0 ° C	1020	935	850	765	680	595	510	425	340	255	170

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

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

	0.000	0.060	0.077	0.094	0.111	0.128	0.145	0.162	0.179	0.196	0.213	0.230	0.247	0.264	0.281	0.298	63.999
0.000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.070	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.087	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.104	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.121	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.138	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.155	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.172	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.189	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.206	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.223	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
0.240	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
0.257	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0
0.274	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
0.291	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
0.308	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
63.999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ECM Supporting Tables

P0153 - O2S Slow Response Bank 2 Sensor 1" Pass/Fail Threshold table

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

	0.000	0.060	0.077	0.094	0.111	0.128	0.145	0.162	0.179	0.196	0.213	0.230	0.247	0.264	0.281	0.298	63.999
0.000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.070	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.087	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
0.104	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0.121	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.138	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.155	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.172	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0.189	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0
0.206	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
0.223	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
0.240	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
0.257	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0
0.274	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
0.291	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
0.308	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
63.999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

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

	0.0	10.0	20.0	50.0	80.0
0.0	28	28	28	28	28
6.3	28	28	28	28	28
12.5	28	28	28	28	28
18.8	28	28	28	28	28
25.0	28	28	28	28	28
31.3	28	28	28	28	28
37.5	28	28	28	28	28
43.8	28	28	28	28	28
50.0	28	28	28	28	28
56.3	28	28	28	28	28
62.5	28	28	28	28	28
68.8	28	28	28	28	28
75.0	28	28	28	28	28
81.3	28	28	28	28	28
87.5	28	28	28	28	28
93.8	28	28	28	28	28
100.0	28	28	28	28	28

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

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

	0.0	10.0	20.0	50.0	80.0
0.0	28	28	28	28	28
6.3	28	28	28	28	28
12.5	28	28	28	28	28
18.8	28	28	28	28	28
25.0	28	28	28	28	28
31.3	28	28	28	28	28
37.5	28	28	28	28	28
43.8	28	28	28	28	28
50.0	28	28	28	28	28
56.3	28	28	28	28	28
62.5	28	28	28	28	28
68.8	28	28	28	28	28
75.0	28	28	28	28	28
81.3	28	28	28	28	28
87.5	28	28	28	28	28
93.8	28	28	28	28	28
100.0	28	28	28	28	28

ECM Supporting Tables

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

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

	0.0	10.0	20.0	50.0	80.0
0.0	28	28	28	28	28
6.3	28	28	28	28	28
12.5	28	28	28	28	28
18.8	28	28	28	28	28
25.0	28	28	28	28	28
31.3	28	28	28	28	28
37.5	28	28	28	28	28
43.8	28	28	28	28	28
50.0	28	28	28	28	28
56.3	28	28	28	28	28
62.5	28	28	28	28	28
68.8	28	28	28	28	28
75.0	28	28	28	28	28
81.3	28	28	28	28	28
87.5	28	28	28	28	28
93.8	28	28	28	28	28
100.0	28	28	28	28	28

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

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

	0.0	10.0	20.0	50.0	80.0
0.0	28	28	28	28	28
6.3	28	28	28	28	28
12.5	28	28	28	28	28
18.8	28	28	28	28	28
25.0	28	28	28	28	28
31.3	28	28	28	28	28
37.5	28	28	28	28	28
43.8	28	28	28	28	28
50.0	28	28	28	28	28
56.3	28	28	28	28	28
62.5	28	28	28	28	28
68.8	28	28	28	28	28
75.0	28	28	28	28	28
81.3	28	28	28	28	28
87.5	28	28	28	28	28
93.8	28	28	28	28	28
100.0	28	28	28	28	28

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

	0.0	500.0	1000.0	1500.0	2000.0
0.0	1.1201	1.1201	1.1201	1.1201	1.1201
25.0	1.1201	1.1201	1.1201	1.1201	1.1201
50.0	1.1299	1.1299	1.1299	1.1299	1.1299
75.0	1.1401	1.1401	1.1401	1.1401	1.1401
100.0	1.1499	1.1499	1.1499	1.1499	1.1499

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

ECM Supporting Tables

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

	0.0	500.0	1000.0	1500.0	2000.0
0.0	0.8999	0.8999	0.8999	0.8999	0.8999
25.0	0.8999	0.8999	0.8999	0.8999	0.8999
50.0	0.8999	0.8999	0.8999	0.8999	0.8999
75.0	0.8999	0.8999	0.8999	0.8999	0.8999
100.0	0.8999	0.8999	0.8999	0.8999	0.8999

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

Green Sensor Delay Criteria:

The specific diagnostic (from summary table) will not be enabled until the next ignition cycle after the airflow criteria below (by sensor location) has been met:

* B1S1 Airflow greater than 22 gps for 120,000 grams of accumulated flow non-continuously.
* B1S2 Airflow greater than 22 gps for 720,000 grams of accumulated flow non-continuously.
* B2S1 Airflow greater than 22 gps for 120,000 grams of accumulated flow non-continuously.
* B2S2 Airflow greater than 22 gps for 720,000 grams of accumulated flow non-continuously.

Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle.
Note: This feature is only enabled when the vehicle is new and cannot be enabled in service

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P0300-P0308: Idle SCD (decel index (> Idle SCD AND > Idle SCD ddt Tables))

load / Load	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	300	251	188	135	100	87	56	28	24	32767	32767	32767	32767
9	180	175	150	125	80	55	40	32	25	32767	32767	32767	32767
11	190	180	175	150	80	60	45	37	30	32767	32767	32767	32767
12	200	180	175	150	90	70	40	33	25	32767	32767	32767	32767
13	236	178	170	170	83	51	48	35	27	32767	32767	32767	32767
14	290	214	180	180	88	51	45	40	28	32767	32767	32767	32767
15	343	252	201	170	79	54	47	32	29	32767	32767	32767	32767
16	374	238	194	155	101	62	49	37	30	32767	32767	32767	32767
17	406	300	232	170	107	70	53	41	26	32767	32767	32767	32767
18	465	375	295	155	118	73	62	37	29	32767	32767	32767	32767
19	524	450	350	155	120	76	65	48	32	32767	32767	32767	32767
21	577	488	388	150	120	79	62	50	25	32767	32767	32767	32767
22	629	525	433	140	115	82	76	60	25	32767	32767	32767	32767
24	657	563	467	150	135	85	80	90	80	32767	32767	32767	32767
25	684	600	500	160	150	100	95	100	90	32767	32767	32767	32767
27	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Idle SCD ddt

load	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	170	140	114	88	70	55	32	30	30	32767	32767	32767	32767
9	160	125	113	100	75	60	42	35	4	32767	32767	32767	32767
11	201	157	175	150	100	70	50	11	11	32767	32767	32767	32767
12	270	200	160	150	111	25	21	13	15	32767	32767	32767	32767
13	330	186	164	180	67	39	21	16	15	32767	32767	32767	32767
14	420	170	190	190	72	43	25	22	19	32767	32767	32767	32767
15	512	164	165	134	85	50	36	27	20	32767	32767	32767	32767
16	541	154	151	137	90	60	45	33	25	32767	32767	32767	32767
17	572	272	175	140	95	72	56	34	25	32767	32767	32767	32767
18	617	253	185	140	100	81	58	42	27	32767	32767	32767	32767
19	663	500	195	140	105	81	68	49	22	32767	32767	32767	32767
21	767	615	205	140	110	81	65	50	24	32767	32767	32767	32767
22	870	730	210	180	115	85	66	52	26	32767	32767	32767	32767
24	900	765	400	250	200	150	70	53	28	32767	32767	32767	32767
25	930	800	650	500	375	250	75	60	30	32767	32767	32767	32767
27	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

ECM Supporting Tables

P0300-P0308: SCD Delta

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

load
Load

	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	276	251	188	125	100	87	56	36	28	22	32767	32767	32767
9	158	158	129	100	80	55	40	32	25	18	32767	32767	32767
11	154	154	122	90	80	60	60	60	48	18	32767	32767	32767
12	159	159	130	100	90	77	72	62	48	24	32767	32767	32767
13	238	178	159	140	125	90	77	64	50	25	32767	32767	32767
15	341	250	225	200	150	110	88	65	50	30	32767	32767	32767
17	406	300	233	165	170	120	95	70	55	35	32767	32767	32767
19	524	450	375	300	200	135	105	85	60	40	32767	32767	32767
22	629	525	433	340	250	160	135	110	70	45	32767	32767	32767
25	684	600	500	400	275	190	150	125	90	60	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: SCD Delta ddt

load

	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	165	130	116	104	79	64	59	54	34	17	32767	32767	32767
9	160	125	113	100	75	60	55	50	30	18	32767	32767	32767
11	201	158	141	123	100	70	65	60	55	23	32767	32767	32767
12	270	202	174	145	111	88	77	60	57	20	32767	32767	32767
13	337	253	217	180	150	115	82	65	59	25	32767	32767	32767
15	511	378	282	185	210	140	110	85	60	35	32767	32767	32767
17	572	423	312	200	240	160	120	90	60	45	32767	32767	32767
19	663	500	450	400	275	180	150	115	80	50	32767	32767	32767
22	872	730	595	460	325	220	175	135	100	55	32767	32767	32767
25	928	800	650	500	375	250	200	170	120	70	32767	32767	32767
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

P0300-P0308: Idle Cyl Mode

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

load
Load

	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	550	500	425	350	275	185	145	95	85	66	50	30	22
9	523	475	400	325	250	180	140	90	80	65	47	28	20
11	501	455	390	325	260	180	140	95	85	65	45	30	20
12	539	490	420	350	280	200	145	100	90	65	43	30	20
13	660	600	500	400	300	220	160	120	100	70	45	32	24
14	729	663	550	438	325	235	174	135	105	75	48	33	26
15	798	725	600	475	350	250	187	150	110	80	50	34	28
16	867	788	650	513	375	275	206	155	75	50	55	37	31
17	935	850	700	550	190	200	130	110	90	60	60	40	34
18	1073	975	800	625	200	160	130	110	90	76	65	45	37
19	1210	1100	900	700	220	150	130	110	90	70	70	50	40
21	1293	1175	963	750	240	140	119	100	90	113	78	55	43
22	1375	1250	1025	800	260	140	130	115	90	120	85	60	45
24	1403	1275	1063	850	280	155	150	120	200	130	95	68	50
25	1430	1300	1100	900	300	220	210	140	220	140	105	75	55
27	1623	1475	1238	1000	763	513	400	325	235	160	115	83	63
29	1815	1650	1375	1100	825	575	450	350	250	180	125	90	70

ECM Supporting Tables

P0300-P0308: Idle Cyl Mode ddt

load	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	165	150	185	220	255	185	101	100	95	67	50	30	20
9	523	475	400	325	250	180	140	120	90	65	47	28	20
11	501	455	390	325	260	180	140	120	100	66	45	30	20
12	539	490	420	350	280	200	135	125	110	70	45	30	20
13	660	600	500	400	300	250	160	130	125	75	45	30	25
14	537	488	450	413	375	275	186	140	133	83	50	32	30
15	413	375	400	425	450	300	211	150	140	90	55	34	35
16	647	588	550	513	475	338	243	175	75	50	65	42	38
17	880	800	700	600	500	220	125	110	90	26	24	50	40
18	1210	1100	925	750	200	190	125	110	90	28	26	55	43
19	1540	1400	1150	900	220	175	125	110	90	60	90	60	45
21	1650	1500	1225	950	250	150	125	105	90	139	98	65	50
22	1760	1600	1300	1000	255	140	120	100	90	150	105	70	55
24	1760	1600	1325	1050	260	140	125	105	100	163	115	78	60
25	1760	1600	1350	1100	280	220	210	140	140	175	125	85	65
27	2255	2050	1675	1300	925	700	500	413	295	198	140	93	73
29	2750	2500	2000	1500	1000	800	550	450	325	220	155	100	80

P0300-P0308: Cyl Mode

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

load	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	500	425	388	350	275	185	145	95	90	63	45	30	22
9	475	400	363	325	250	180	140	90	88	60	37	28	20
11	455	390	358	325	260	180	140	95	106	80	35	30	20
12	490	420	385	350	280	200	145	100	107	60	43	30	20
13	600	500	450	400	300	220	160	120	109	75	50	32	24
15	725	600	538	475	350	250	187	150	110	87	58	34	28
17	850	700	625	550	400	300	225	160	130	90	60	40	34
19	1100	900	800	700	500	325	260	175	150	105	70	50	40
22	1250	1025	913	800	575	400	331	250	180	120	85	60	45
25	1300	1100	1000	900	700	450	350	300	220	140	105	75	55
29	1650	1375	1238	1100	825	575	450	350	250	180	125	90	70
33	1975	1650	1488	1325	1000	775	525	400	325	200	145	105	75
38	2350	1950	1750	1550	1150	1000	638	475	388	250	170	120	90
42	2900	2400	2150	1900	1400	1250	750	550	450	300	190	130	105
48	3450	2850	2550	2250	1650	1500	983	802	513	350	210	140	120
54	4000	3300	2950	2600	1900	1750	1215	1053	575	400	230	150	135
61	4550	3750	3350	2950	2150	2000	1448	1305	638	450	250	160	150

load	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	17	12	11	10	8	3	3	4	4	3	2	3	3
9	15	11	10	9	7	3	3	3	4	3	3	3	3
11	15	12	10	9	7	4	3	3	4	4	3	3	3
12	16	15	10	9	7	4	3	4	3	4	3	3	3
13	18	15	11	9	7	3	3	4	4	3	3	3	3
15	22	16	13	10	8	4	3	4	4	3	3	3	3
17	24	20	15	12	9	5	4	4	4	4	4	4	4
19	30	27	18	14	11	7	5	3	4	4	4	4	4
22	35	28	22	17	14	8	4	4	4	4	4	4	4
25	40	33	26	20	16	8	5	4	4	4	4	4	4
29	50	40	30	24	18	8	6	3	4	4	4	4	4
33	58	45	35	28	22	9	7	5	4	4	4	4	4
38	67	53	41	33	26	10	7	5	4	4	4	4	4
42	75	60	47	38	30	11	8	5	4	4	4	4	4
48	84	68	53	43	34	12	9	5	4	4	4	4	4
54	92	75	59	48	38	13	10	5	4	4	4	4	4
61	101	83	65	53	42	14	11	5	4	4	4	4	4

ECM Supporting Tables

P0300-P0308: Cyl Mode ddt

load	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
8	150	185	203	220	255	185	101	100	98	67	50	30	20
9	475	400	363	325	250	180	140	120	95	75	34	28	20
11	455	390	358	325	260	180	140	120	105	85	48	30	20
12	490	420	385	350	280	200	135	125	113	74	47	30	20
13	600	500	450	400	300	250	160	130	125	75	45	30	25
15	375	400	413	425	450	300	211	150	140	90	55	34	35
17	800	700	650	600	500	375	275	200	155	110	75	50	40
19	1400	1150	1025	900	650	425	325	250	185	127	90	60	45
22	1600	1300	1150	1000	700	500	400	300	220	150	105	70	55
25	1600	1350	1225	1100	850	600	450	375	265	175	125	85	65
29	2500	2000	1750	1500	1000	800	550	450	325	220	155	100	80
33	2700	2200	1950	1700	1200	900	700	500	400	250	175	100	85
38	3350	2700	2375	2050	1400	950	800	600	462	300	200	140	103
42	4000	3200	2800	2400	1600	1000	900	700	525	350	240	150	120
48	4650	3700	3225	2750	1800	1050	858	723	575	400	280	160	138
54	5300	4200	3650	3100	2000	1100	815	745	625	450	320	170	155
61	5950	4700	4075	3450	2200	1150	773	768	675	500	360	180	173

load	2200	2400	2600	2800	3000	3500	4000	4500	5000	5500	6000	6500	7000
8	15	11	10	9	8	0	0	0	0	0	0	0	0
9	15	11	10	9	8	0	0	0	0	0	0	0	0
11	15	12	10	9	8	0	0	0	0	0	0	0	0
12	16	15	10	9	8	0	0	0	0	0	0	0	0
13	17	16	11	10	8	0	0	0	0	0	0	0	0
15	25	20	14	11	9	0	0	0	0	0	0	0	0
17	30	25	17	15	11	0	0	0	0	0	0	0	0
19	35	22	21	16	15	0	0	0	0	0	0	0	0
22	42	35	25	21	16	0	0	0	0	0	0	0	0
25	50	40	30	22	19	0	0	0	0	0	0	0	0
29	60	50	35	26	22	0	0	0	0	0	0	0	0
33	70	55	40	30	26	0	0	0	0	0	0	0	0
38	80	63	48	36	31	0	0	0	0	0	0	0	0
42	90	70	55	42	35	0	0	0	0	0	0	0	0
48	100	78	63	48	40	0	0	0	0	0	0	0	0
54	110	85	70	54	44	0	0	0	0	0	0	0	0
61	120	93	78	60	49	0	0	0	0	0	0	0	0

P0300-P0308: Rev Mode Table

OR (decel index > Rev Mode Table)

load	1100	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3500	4000
8	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	66	49	33
9	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	59	46	33
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	72	54	38
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	88	66	47
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	103	78	54
15	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	113	86	61
17	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	135	103	73
19	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	160	123	87
22	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	188	143	101
25	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	217	165	118
29	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	242	186	134
33	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	297	227	161
38	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	331	254	182
42	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	380	291	209
48	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	433	332	239
54	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	491	377	271
61	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	549	421	303

ECM Supporting Tables

P0300-P0308: Rev Mode Table (Con't)

OR (decel index > Rev Mode Table)

load	4500	5000	5500	6000	6500	7000
8	23	16	11	7	5	4
9	24	18	13	10	7	5
11	27	19	13	10	7	5
12	33	23	16	11	8	6
13	38	26	19	13	9	6
15	43	31	22	15	11	8
17	52	37	27	19	14	10
19	63	45	32	23	16	12
22	72	51	36	26	18	13
25	84	60	43	31	22	16
29	96	69	50	36	26	19
33	115	82	59	42	30	21
38	131	94	68	49	35	25
42	150	108	75	56	40	29
48	160	120	85	64	46	33
54	170	127	93	72	52	38
61	190	157	113	81	58	42

P0300-P0308: AFM Mode Table

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

load
Load

	500	600	650	700	800	900	1000	1100	1200	1400	1600	1800	2000
11	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
14	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
16	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
18	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
21	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
23	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
27	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
30	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
35	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
40	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
45	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
51	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
58	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
65	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767
74	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767	32767

	2200	2400	2600	2800	3000	3500
11	32767	32767	32767	32767	32767	32767
12	32767	32767	32767	32767	32767	32767
13	32767	32767	32767	32767	32767	32767
14	32767	32767	32767	32767	32767	32767
16	32767	32767	32767	32767	32767	32767
18	32767	32767	32767	32767	32767	32767
21	32767	32767	32767	32767	32767	32767
23	32767	32767	32767	32767	32767	32767
27	32767	32767	32767	32767	32767	32767
30	32767	32767	32767	32767	32767	32767
35	32767	32767	32767	32767	32767	32767
40	32767	32767	32767	32767	32767	32767
45	32767	32767	32767	32767	32767	32767
51	32767	32767	32767	32767	32767	32767
58	32767	32767	32767	32767	32767	32767
65	32767	32767	32767	32767	32767	32767
74	32767	32767	32767	32767	32767	32767

ECM Supporting Tables

P0300-P0308: Zero torque engine load

Zero Torque: All Cylinders active

RPM	Pct load
500	12.00
600	11.37
650	10.00
700	10.50
800	11.00
900	10.25
1000	9.75
1100	9.25
1200	8.75
1400	8.50
1600	8.40
1800	8.30
2000	8.20
2200	8.20
2400	8.30
2600	8.30
2800	8.30
3000	8.30
3500	9.76
4000	11.22
4500	12.68
5000	14.14
5500	15.60
6000	17.06
6500	18.52
7000	19.98

Baro KPa	Multiplier
65	0.82
70	0.85
75	0.88
80	0.90
85	0.93
90	0.95
95	0.97
100	1.00
105	1.03

Zero Torque: Active Fuel Management (AFM)

RPM	Pct load
500	15.00
600	15.00
650	15.00
700	15.00
800	13.50
900	12.20
1000	11.40
1100	11.00
1200	11.00
1400	11.00
1600	11.00
1800	11.00
2000	11.00
2200	11.00
2400	11.00
2600	11.00
2800	11.00
3000	11.00
3500	14.00
4000	17.00
4500	19.99
5000	22.99
5500	25.99
6000	28.98
6500	31.98
7000	34.98

Note: Zero torque is adjusted for Baro. Misfire thresholds are relative to (maximum air density PID $1188 SAE xxx) and do not shift appreciably with altitude compared to (current density as defined PID $04 SAE1979)

Catalyst Damaging Misfire Percentage

load
Load

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

RoughRoadSource = CeRRDR_e_WheelSpeedInECM or CeRRDR_e_SerialDataFromABS
Rough Road Threshold

Kph	0	12	24	36	48	60	72	84	96	108	120	132	144	158	170	181	194
Accel	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.34	0.39	0.49	0.55	0.58	0.58	0.59	0.59	0.60

ECM Supporting Tables

P0442: EONV Pressure Threshold Table (in Pascals)

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

	0.0000	6.2499	12.4998	18.7497	24.9996	31.2495	37.4994	43.7493	49.9992	56.2491	62.4990	68.7490	74.9989	81.2488	87.4987	93.7486	99.9985
-10.0000	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
-4.3750	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
1.2500	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
6.8750	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
12.5000	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
18.1250	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
23.7500	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
29.3750	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
35.0000	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
40.6250	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
46.2500	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
51.8750	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
57.5000	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
63.1250	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
68.7500	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
74.3750	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322
80.0000	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322	-635.1322

P0442: Estimate of Ambient Temperature Valid Conditioning Time

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

Axis	Curve
0	300
600	400
1200	500
1800	600
2400	600
3000	600
3600	600
4200	600
4800	600
5400	600
6000	578
6600	556
7200	533
7800	511
8400	489
9000	467
9600	444
10200	422
10800	400
11700	388
12600	375
13500	363
14400	350
15300	338
16200	325
17100	313
18000	300
19200	283
20400	267
21600	250
22800	233
24000	217
25200	200

ECM Supporting Tables

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

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

Axis	Curve
0	40
6	40
12	40
19	40
25	40
31	40
37	40
44	40
50	40
56	40
62	40
69	40
75	40
81	40
87	40
94	40
100	40

P0461, P2066, P2636: Transfer Pump Enable

TransferPumpOnTimeLimit (in seconds)
Axis is Fuel Level in %

Axis	Curve
0	0
3	220
6	220
9	220
13	220
16	275
19	330
22	385
25	440
28	495
31	550
34	605
38	660
41	715
44	771
47	826
50	881
53	936
56	991
59	1046
63	1101
66	1156
69	1211
72	1266
75	1321
78	1376
81	1431
84	1486
88	1541
91	1596
94	1651
97	1706
100	1761

KtEGRD_p_StepDelta

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
3.1953	3.1953	3.1953	3.1953	3.1953	3.1953	3.1953	3.1953	3.1953

ECM Supporting Tables

KtEGRD_p_StepMAP_DIFF

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391	-0.0391

KtEGRD_Cnt_StepSamplesPerTrip

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

KtEGRD_Cnt_SamplesAfterStep

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000

KtEGRD_Cnt_SamplesAfterReset

X axis is Kpa BARO

65	70	75	80	85	90	95	100	105
10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000

KtPHSD_phi_CamPosErrorLimIc1

X axis is Deg C
Y axis is RPM

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

KtPHSD_phi_CamPosErrorLimEc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
5200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
5600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000

ECM Supporting Tables

KtPHSD_phi_CamPosErrorLimIc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
5200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
5600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000

KtPHSD_phi_CamPosErrorLimEc2

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
2800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
4800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
5200	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
5600	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6400	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
6800	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000

KtPHSD_t_StablePositionTimeIc1

X axis is Deg C
Y axis is RPM

	-40.0000	-28.0000	-16.0000	-4.0000	8.0000	20.0000	32.0000	44.0000	56.0000	68.0000	80.0000	92.0000	104.0000	116.0000	128.0000	140.0000	152.0000
400	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
800	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
1200	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
1600	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
2000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
2400	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
2800	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
3200	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
3600	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
4000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
4400	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
4800	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
5200	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
5600	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
6000	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
6400	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350
6800	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350	3.350

ECM Supporting Tables

KtPHSD_t_StablePositionTimeEc1

X axis is Deg C
Y axis is RPM

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

KtPHSD_t_StablePositionTimeIc2

X axis is Deg C
Y axis is RPM

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

KtPHSD_t_StablePositionTimeEc2

X axis is Deg C
Y axis is RPM

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

ECM Supporting Tables

Closed Loop Enable Criteria

Coolant greater than
KtFSTA_T_ClosedLoopTemp

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Coolant	85.0	80.0	75.0	55.0	45.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0

and engine run time greater than
KtFSTA_t_ClosedLoopTime

Start-Up Coolant	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Close Loop Enable Time	120.0	90.0	65.0	45.0	25.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	70.0	70.0	70.0	70.0

and pre converter 02 sensor voltage greater than
KfFULC_U_O2_SensorReadyThrshHi

Voltage *> 550 milliVolts*

or less than
KfFULC_U_O2_SensorReadyThrshLo

Voltage *< 350 milliVolts*

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
All cylinders whose valves are active also have their injectors enabled
and
O2S_Bank_ 1_TFTKO, O2S_Bank_ 2_TFTKO, FuelInjectorCircuit_FA and CylnderDeacDriverTFTKO = False

Long Term FT Enable Criteria

Closed Loop Enable and
Coolant greater than
KfFCLL_T_AdaptiveLoCoolant

Coolant *> 35 Celcius*

or less than
KfFCLL_T_AdaptiveHiCoolant

Coolant *< 140 Celcius*

and MAP less than
KtFCLL_p_AdaptiveLowMAP_Limit

Barometric Pressure	65	70	75	80	85	90	95	100	105
Manifold Air Pressure	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

and
TPS_ThrottleAuthorityDefaulted = False
and
Flex Fuel Estimate Algorithm is not active
and
Catalyst or EVAP large leak test not intrusive

Secondary Fuel Trim Enable Criteria

Closed Loop Enable and
KfFCLP_U_O2ReadyThrshLo

Voltage *< 350 milliVolts*

for
KcFCLP_Cnt_O2RdyCyclesThrsh

Time (events * 12.5 milliseconds) *> 10 events*

Long Term Secondary Fuel Trim Enable Criteria

KtFCLP_t_PostIntglDisableTime

Start-Up Coolant	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
Post Integral Enable Time	185.0	185.0	185.0	185.0	110.0	60.0	60.0	60.0	60.0	30.0	30.0	30.0	40.0	40.0	40.0	60.0	60.0

Plus
KtFCLP_t_PostIntglRamplnTime

Start-Up Coolant	-40	-29	-18	-6	5	16	28	39	50	61	73	84	95	106	118	129	140
Post Integral Ramp In Time	60.0	60.0	60.0	60.0	60.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

and

ECM Supporting Tables

KeFCLP_T_IntegrationCatalystMax

Modeled Catalyst Temperature < 900 Celcius
and
KeFCLP_T_IntegrationCatalystMin

Modeled Catalyst Temperature > 500 Celcius
and
KfFCLP_T_CoolantThrsh

Coolant > 80 Celcius
and
PO2S_Bank_1_Snsr_2_FA and PO2S_Bank_2_Snsr_2_FA = False

Tables supporting Engine Oil Temperature Sensor

P0196

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

Axis	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
Curve	79.5	79.5	79.5	60.0	60.0	39.8	39.8	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

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

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

Tables supporting Deactivation System Performance

P3400

EngSpeedLwrLimitEnableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	Neutral	Reverse	Park
Curve	950	950	950	950	950	950	950	950	950

EngSpeedUprLimitEnableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	Neutral	Reverse	Park
Curve	2800	2800	2800	2800	2800	2800	2800	2800	2800

EngSpeedLwrLimitDisableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	Neutral	Reverse	Park
Curve	675	675	675	675	675	675	675	675	675

EngSpeedUprLimitDisableTable — **AXIS is Gear State, Curve is Engine Speed**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	Neutral	Reverse	Park
Curve	3000	3000	3000	3000	3000	3000	3000	3000	3000

ECM Supporting Tables

HalfCylToAllCylVacuum **Horizontal AXIS is Gear State, Vertical axis is Engine RPM**

RPM	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear	6th Gear	Neutral	Park	Reverse
0.0	6	6	31	31	30	20	6	6	6
100.0	5	5	31	31	30	20	5	5	5
200.0	4	4	31	31	30	20	4	4	4
300.0	4	4	31	31	30	20	4	4	4
400.0	4	4	31	31	30	20	4	4	4
500.0	4	4	31	31	30	20	4	4	4
600.0	4	4	31	31	30	20	4	4	4
700.0	4	4	31	31	30	20	4	4	4
800.0	4	4	30	31	30	20	4	4	4
900.0	4	4	28	29	29	20	4	4	4
1000.0	4	4	26	29	28	19	4	4	4
1100.0	4	4	25	27	28	17	4	4	4
1200.0	4	4	24	24	25	16	4	4	4
1300.0	4	4	17	17	21	14	4	4	4
1400.0	4	4	10	11	17	11	4	4	4
1500.0	4	4	6	7	13	8	4	4	4
1600.0	4	4	4	5	10	7	4	4	4
1700.0	4	4	4	4	8	6	4	4	4
1800.0	4	4	4	4	4	5	4	4	4
1900.0	4	4	4	4	4	4	4	4	4
2000.0	4	4	4	4	4	4	4	4	4
2100.0	4	4	4	4	4	4	4	4	4
2200.0	4	4	4	4	4	4	4	4	4
2300.0	4	4	4	4	4	4	4	4	4
2400.0	4	4	4	4	4	4	4	4	4
2500.0	4	4	4	4	4	4	4	4	4
2600.0	4	4	4	4	4	4	4	4	4
2700.0	4	4	4	4	4	4	4	4	4
2800.0	4	4	4	4	4	4	4	4	4
2900.0	4	4	4	4	4	4	4	4	4
3000.0	4	4	4	4	4	4	4	4	4
3100.0	4	4	4	4	4	4	4	4	4
3200.0	4	4	4	4	4	4	4	4	4

EcoHalfCylToAllCylVacuum **Horizontal AXIS is Gear State, Vertical axis is Engine RPM**

RPM	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear	6th Gear	Neutral	Park	Reverse
0.0	4	4	4	4	4	4	4	4	4
100.0	4	4	4	4	4	4	4	4	4
200.0	4	4	4	4	4	4	4	4	4
300.0	4	4	4	4	4	4	4	4	4
400.0	4	4	4	4	4	4	4	4	4
500.0	4	4	4	4	4	4	4	4	4
600.0	4	4	4	4	4	4	4	4	4
700.0	4	4	4	4	4	4	4	4	4
800.0	4	4	4	4	4	4	4	4	4
900.0	4	4	4	4	4	4	4	4	4
1000.0	4	4	4	4	4	4	4	4	4
1100.0	4	4	4	4	4	4	4	4	4
1200.0	4	4	4	4	4	4	4	4	4
1300.0	4	4	4	4	4	4	4	4	4
1400.0	4	4	4	4	4	4	4	4	4
1500.0	4	4	4	4	4	4	4	4	4
1600.0	4	4	4	4	4	4	4	4	4
1700.0	4	4	4	4	4	4	4	4	4
1800.0	4	4	4	4	4	4	4	4	4
1900.0	4	4	4	4	4	4	4	4	4
2000.0	4	4	4	4	4	4	4	4	4
2100.0	4	4	4	4	4	4	4	4	4
2200.0	4	4	4	4	4	4	4	4	4
2300.0	4	4	4	4	4	4	4	4	4
2400.0	4	4	4	4	4	4	4	4	4
2500.0	4	4	4	4	4	4	4	4	4
2600.0	4	4	4	4	4	4	4	4	4
2700.0	4	4	4	4	4	4	4	4	4
2800.0	4	4	4	4	4	4	4	4	4
2900.0	4	4	4	4	4	4	4	4	4
3000.0	4	4	4	4	4	4	4	4	4
3100.0	4	4	4	4	4	4	4	4	4
3200.0	4	4	4	4	4	4	4	4	4

ECM Supporting Tables

HalfCylDisabledPRNDL

PRNDL Drive 1	1
PRNDL Drive 2	1
PRNDL Drive 3	0
PRNDL Drive 4	0
PRNDL Drive 5	0
PRNDL Drive 6	0
PRNDL Neutral	1
PRNDL Reverse	1
PRNDL Park	1
PRNDL Transitional 1	1
PRNDL Transitional 2	1
PRNDL Transitional 4	1
PRNDL Transitional 7	1
PRNDL Transitional 8	1
PRNDL Transitional 11	1
PRNDL Transitional 13	1
PRNDL Transitional Illegal	1
PRNDL Transitional Between State	1

HalfCylDisabledPRNDLDeviceControl

PRNDL Drive 1	1
PRNDL Drive 2	1
PRNDL Drive 3	0
PRNDL Drive 4	0
PRNDL Drive 5	0
PRNDL Drive 6	0
PRNDL Neutral	0
PRNDL Reverse	1
PRNDL Park	0
PRNDL Transitional 1	1
PRNDL Transitional 2	1
PRNDL Transitional 4	1
PRNDL Transitional 7	1
PRNDL Transitional 8	1
PRNDL Transitional 11	1
PRNDL Transitional 13	1
PRNDL Transitional Illegal	1
PRNDL Transitional Between State	1

HalfCylDisabledTransGr — **AXIS is Gear State**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	Neutral	Reverse	Park
Curve	1	1	0	0	0	0	1	1	1

HalfCylDisabledTransGrDeviceControl — **AXIS is Gear State**

Axis	1st Gear	2nd Gear	3rd Gear	4th Gear	5thGear	6th Gear	Neutral	Reverse	Park
Curve	1	1	0	0	0	0	0	1	0

AllCylToHalfCylVacuum — **Horizontal AXIS is Gear State, Vertical axis is Engine RPM**

RPM	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear	6th Gear	Neutral	Park	Reverse
0.0	40	40	56	58	56	56	40	40	40
100.0	40	40	56	58	56	56	40	40	40
200.0	40	40	56	58	56	56	40	40	40
300.0	40	40	56	58	56	56	40	40	40
400.0	40	40	56	58	56	56	40	40	40
500.0	40	40	56	58	56	56	40	40	40
600.0	40	40	56	58	56	55	40	40	40
700.0	40	40	55	58	56	55	40	40	40
800.0	40	40	55	58	56	54	40	40	40
900.0	40	40	54	58	56	54	40	40	40
1000.0	40	40	54	58	56	53	40	40	40
1100.0	40	40	53	57	56	52	40	40	40
1200.0	40	40	53	56	56	52	40	40	40
1300.0	40	40	52	55	55	52	40	40	40
1400.0	40	40	52	55	55	52	40	40	40
1500.0	40	40	51	53	53	52	40	40	40
1600.0	40	40	51	50	51	52	40	40	40
1700.0	40	40	51	50	51	52	40	40	40
1800.0	40	40	51	50	51	52	40	40	40
1900.0	40	40	51	50	51	52	40	40	40
2000.0	40	40	51	50	51	52	40	40	40
2100.0	40	40	51	50	51	52	40	40	40
2200.0	40	40	51	50	51	52	40	40	40
2300.0	40	40	51	50	51	52	40	40	40
2400.0	40	40	51	50	51	52	40	40	40
2500.0	40	40	51	50	51	52	40	40	40
2600.0	40	40	51	50	51	52	40	40	40
2700.0	40	40	51	50	51	52	40	40	40
2800.0	40	40	52	50	51	53	40	40	40
2900.0	40	40	54	54	54	54	40	40	40
3000.0	40	40	55	55	55	55	40	40	40
3100.0	40	40	55	55	55	55	40	40	40
3200.0	40	40	55	55	55	55	40	40	40

ECM Supporting Tables

EcoAllCylToHalfCylVacuum — **Horizontal AXIS is Gear State, Vertical axis is Engine RPM**

RPM	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear	6th Gear	Neutral	Park	Reverse
0.0	48	48	48	48	48	48	48	48	48
100.0	48	48	48	48	48	48	48	48	48
200.0	48	48	48	48	48	48	48	48	48
300.0	48	48	48	48	48	48	48	48	48
400.0	48	48	48	48	48	48	48	48	48
500.0	48	48	48	48	48	48	48	48	48
600.0	48	48	48	48	48	48	48	48	48
700.0	48	48	48	48	48	48	48	48	48
800.0	48	48	48	48	48	48	48	48	48
900.0	48	48	48	48	48	48	48	48	48
1000.0	48	48	48	48	48	48	48	48	48
1100.0	48	48	48	48	48	48	48	48	48
1200.0	48	48	48	48	48	48	48	48	48
1300.0	48	48	48	48	48	48	48	48	48
1400.0	48	48	48	48	48	48	48	48	48
1500.0	48	48	48	48	48	48	48	48	48
1600.0	48	48	48	48	48	48	48	48	48
1700.0	48	48	48	48	48	48	48	48	48
1800.0	48	48	48	48	48	48	48	48	48
1900.0	48	48	48	48	48	48	48	48	48
2000.0	48	48	48	48	48	48	48	48	48
2100.0	48	48	48	48	48	48	48	48	48
2200.0	48	48	48	48	48	48	48	48	48
2300.0	48	48	48	48	48	48	48	48	48
2400.0	48	48	48	48	48	48	48	48	48
2500.0	48	48	48	48	48	48	48	48	48
2600.0	48	48	48	48	48	48	48	48	48
2700.0	48	48	48	48	48	48	48	48	48
2800.0	48	48	48	48	48	48	48	48	48
2900.0	48	48	48	48	48	48	48	48	48
3000.0	48	48	48	48	48	48	48	48	48
3100.0	48	48	48	48	48	48	48	48	48
3200.0	48	48	48	48	48	48	48	48	48

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EngSpeedWeightFactorTable — **AXIS is Engine RPM, Curve is Weight Factor**

Axis	0	500	900	1100	1500	1750	2000	3500	4000
Curve	0.00	0.00	0.00	0.45	0.45	0.45	0.45	0.45	0.00

EngOilTempWeightFactorTable — **AXIS is Engine Oil Temp Deg C, Curve is Weight Factor**

Axis	-10	-5	60	80	90	100	120	130	140
Curve	0.00	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.00

EngLoadStabilityWeightFactorTable — **AXIS is Delta APC, Curve is Weight Factor**

Axis	0	5	10	20	30	50	100	200	399
Curve	1.00	1.00	1.00	0.30	0.00	0.00	0.00	0.00	0.00

EngOilPredictionWeightFactorTable — **AXIS is Predicted Engine Oil Pressure, Curve is Engine Oil Prediction Weight Factor**

Axis	160	170	225	275	360	375	400	500	600
Curve	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

ECM Fault Bundles Tables

Cert Doc Bundle Name	Pcodes							
IAC_SystemRPM_FA	P0506	P0507						
TCM_EngSpdReqCkt	P150C							
A/F Imbalance Bank1	P219A							
A/F Imbalance Bank2	P219B							
Clutch Sensor FA	P0806	P0807	P0808					
ClutchPositionSensorCircuitLo FA	P0807							
ClutchPositionSensorCircuitHi FA	P0808							
FuelTrimSystemB1_FA	P0171	P0172						
FuelTrimSystemB2_FA	P0174	P0175						
FuelTrimSystemB1_TFTKO	P0171	P0172						
FuelTrimSystemB2_TFTKO	P0174	P0175						
EngineMetalOvertempActive	P1258							
FuelInjectorCircuit_FA	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208
FuelInjectorCircuit_TFTKO	P0201	P0202	P0203	P0204	P0205	P0206	P0207	P0208
AIRSystemPressureSensor FA	P2430	P2431	P2432	P2433	P2435	P2436	P2437	P2438
AIR System FA	P0411	P2440	P2444					
AIRValveControlCircuit FA	P0412							
AIRPumpControlCircuit FA	P0418							
CatalystSysEfficiencyLoB1_FA	P0420							
CatalystSysEfficiencyLoB2_FA	P0430							
AmbientAirPressCktFA	P2228	P2229						
AmbientAirPressCktFA_NoSnsr	P0106	P0107	P0108					
	For Naturally Aspirated							
AmbientAirDefault	Engines:	P0106	P0107	P0108	P2227	P2228	P2229	
	For Super Charged							
	Engines:	P012B	P012C	P012D	P2227	P2228	P2229	
	For Engines with no Baro							
	Sensor:	P0106	P0107	P0108				
IAT_SensorCircuitTFTKO	P0112	P0113						
IAT_SensorCircuitFA	P0112	P0113						
IAT_SensorCircuitFP	P0112	P0113						
IAT_SensorTFTKO	P0111	P0112	P0113					
IAT_SensorFA	P0111	P0112	P0113					
IAT2_SensorCktTFTKO	P0097	P0098						
IAT2_SensorCktTFTKO_NoSnsr	P0112	P0113						
IAT2_SensorCircuitFA	P0097	P0098						
IAT2_SensorCircuitFA_NoSnsr	P0112	P0113						
IAT2_SensorcircuitFP	P0097	P0098						
IAT2_SensorcircuitFP_NoSnsr	P0112	P0113						
IAT2_SensorTFTKO	P0096	P0097	P0098					
IAT2_SensorTFTKO_NoSnsr	P0111	P0112	P0113					
IAT2_SensorFA	P0096	P0097	P0098					
IAT2_SensorFA_NoSnsr	P0111	P0112	P0113					
SuperchargerBypassValveFA	P2261							
CylDeacSystemTFTKO	P3400							
MAF_SensorPerfFA	P0101							
MAF_SensorPerfTFTKO	P0101							
MAP_SensorPerfFA	P0106							
MAP_SensorPerfTFTKO	P0106							
SCIAP_SensorPerfFA	P012B							
SCIAP_SensorPerfTFTKO	P012B							
ThrottlePositionSnsrPerfFA	P0121							

ECM Fault Bundles Tables

Cert Doc Bundle Name	Pcodes											
ThrottlePositionSnsrPerfTFTKO	P0121											
MAF_SensorFA	P0101	P0102	P0103									
MAF_SensorTFTKO	P0101	P0102	P0103									
MAF_SensorFP	P0102	P0103										
MAF_SensorCircuitFA	P0102	P0103										
MAF_SensorCircuitTFTKO	P0102	P0103										
MAP_SensorTFTKO	P0106	P0107	P0108									
MAP_SensorFA	P0106	P0107	P0108									
SCIAP_SensorFA	P012B	P012C	P012D									
SCIAP_SensorTFTKO	P012B	P012C	P012D									
SCIAP_SensorCircuitFP	P012C	P012D										
AfterThrottlePressureFA_NA	P0106	P0107	P0108									
AfterThrottlePressureFA_SC	P012B	P012C	P012D									
AfterThrottleVacuumTFTKO_NA	P0106	P0107	P0108									
AfterThrottleVacuumTFTKO_SC	P012B	P012C	P012D									
SCIAP_SensorCircuitFA	P012C	P012D										
AfterThrottlePressTFTKO_NA	P0106	P0107	P0108									
AfterThrottlePressTFTKO_SC	P012B	P012C	P012D									
MAP_SensorCircuitFA	P0107	P0108										
MAP_EngineVacuumStatus	MAP_SensorFA OR P0107, P0108 Pending											
ECT_Sensor_Ckt_FA	P0117	P0118										
ECT_Sensor_Ckt_TPTKO	P0117	P0118										
ECT_Sensor_Ckt_TFTKO	P0117	P0118										
ECT_Sensor_DefaultDetected	P0117	P0118	P0116									
ECT_Sensor_FA	P0117	P0118	P0116									
ECT_Sensor_TFTKO	P0117	P0118	P0116	P0128								
ECT_Sensor_Perf_FA	P0116											
ECT_Sensor_Ckt_FP	P0117	P0118										
ECT_Sensor_Ckt_High_FP	P0118											
ECT_Sensor_Ckt_Low_FP	P0117											
THMR_Insuff_Flow_FA	P00B7											
THMR_Therm_Control_FA	P0597	P0598	P0599									
THMR_RCT_Sensor_Ckt_FA	P00B3	P00B4										
THMR_ECT_Sensor_Ckt_FA	P0117	P0118	P0116	P0125	P00B6							
O2S_Bank_ 1_TFTKO	P0131	P0132	P0134	P2A00								
O2S_Bank_ 2_TFTKO	P0151	P0152	P0154	P2A03								
O2S_Bank_1_Sensor_1_FA	P2A00	P0131	P0132	P0133	P0134	P0135	P0053	P1133	P015A	P015B	P0030	
O2S_Bank_1_Sensor_2_FA	P013A	P013B	P013E	P013F	P2270	P2271	P0137	P0138	P0140	P0141	P0054	P0036
O2S_Bank_2_Sensor_1_FA	P2A03	P0151	P0152	P0153	P0154	P0155	P0059	P1153	P015C	P015D	P0050	
O2S_Bank_2_Sensor_2_FA	P013C	P013D	P014A	P014B	P2272	P2273	P0157	P0158	P0160	P0161	P0060	P0056
PO2S_Bank_1_Snsr_2_FA	P0137	P0138	P0140	P0036	P0054	P0141	P2270	P2271				
PO2S_Bank_2_Snsr_2_FA	P0157	P0158	P0160	P0056	P0060	P0161	P2272	P2273				
EngineMisfireDetected_TFTKO	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
EngineMisfireDetected_FA	P0300	P0301	P0302	P0303	P0304	P0305	P0306	P0307	P0308			
CrankCamCorrelationTFTKO	P0016	P0017	P0018	P0019								
CrankSensorFA	P0335	P0336										
CrankSensorTFTKO	P0335	P0336										
CamSensorFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensorTFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CrankIntakeCamCorrelationFA	P0016	P0018										
CrankExhaustCamCorrelationFA	P0017	P0019										
IntakeCamSensorTFTKO	P0016	P0018	P0340	P0341	P0345	P0346						
IntakeCamSensorFA	P0016	P0018	P0340	P0341	P0345	P0346						

ECM Fault Bundles Tables

Cert Doc Bundle Name	Pcodes											
ExhaustCamSensorTFTKO	P0017	P0019	P0365	P0366	P0390	P0391						
ExhaustCamSensorFA	P0017	P0019	P0365	P0366	P0390	P0391						
IntakeCamSensor_FA	P0016	P0018	P0340	P0341	P0345	P0346						
IntakeCamSensor_TFTKO	P0016	P0018	P0340	P0341	P0345	P0346						
ExhaustCamSensor_FA	P0017	P0019	P0365	P0366	P0390	P0391						
ExhaustCamSensor_TFTKO	P0017	P0019	P0365	P0366	P0390	P0391						
CrankIntakeCamCorrFA	P0016	P0018										
CrankExhaustCamCorrFA	P0017	P0019										
CrankSensorFaultActive	P0335	P0336										
CrankSensor_FA	P0335	P0336										
CrankSensorTestFailedTKO	P0335	P0336										
CrankSensor_TFTKO	P0335	P0336										
CamSensor_FA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensorAnyLocationFA	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
CamSensor_TFTKO	P0016	P0017	P0018	P0019	P0340	P0341	P0345	P0346	P0365	P0366	P0390	P0391
EvapPurgeSolenoidCircuit_FA	P0443											
EvapFlowDuringNonPurge_FA	P0496											
EvapVentSolenoidCircuit_FA	P0449											
EvapSmallLeak_FA	P0442											
EvapEmissionSystem_FA	P0455	P0446										
FuelTankPressureSnsrCkt_FA	P0452	P0453										
CoolingFanSpeedTooHigh_FA	P0495											
FanOutputDriver_FA	P0480	P0481	P0482									
FuelLevelDataFault	P0461	P0462	P0463	P2066	P2067	P2068						
PowertrainRelayFault	P1682											
PowertrainRelayStateOn_FA	P0685											
PowertrainRelayStateOn_Error	P0685											
IgnitionOffTimer_FA	P2610											
IgnitionOffTimeValid	P2610											
EngineModeNotRunTimerError	P2610											
EngineModeNotRunTimer_FA	P2610											
VehicleSpeedSensor_FA	P0502	P0503	P0722	P0723								
VehicleSpeedSensorError	P0502	P0503	P0722	P0723								

LowFuelConditionDiagnostic	Flag set to TRUE if the fuel level < 10 % AND No Active DTCs: FuelLevelDataFault, P0462, P0463 for at least 30 seconds.
Transfer Pump is Commanded On	Fuel Volume in Primary Fuel Tank < 0.0 liters AND Fuel Volume in Secondary Fuel Tank ≥ 100.0 liters AND Transfer Pump on Time < **TransferPumpOnTimeLimit** Table AND Transfer Pump had been Off for at least 0.0 seconds AND Evap Diagnostic (Purge Valve Leak Test, Large Leak Test, and Waiting for Purge) is not running AND Engine Running

ECM Fault Bundles Tables

Cert Doc Bundle Name	Pcodes										
AnyCamPhaser_FA	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024			
AnyCamPhaser_TFTKO	P0010	P0011	P0013	P0014	P0020	P0021	P0023	P0024			
IntkCamPhaser_FA	P0010	P0011	P0020	P0021							
EGRValvePerformance_FA	P0401	P042E									
EGRValveCircuit_FA	P0403	P0404	P0405	P0406							
EGRValve_FP	P0405	P0406	P042E								
EGRValveCircuit_TFTKO	P0403	P0404	P0405	P0406							
EGRValvePerformance_TFTKO	P0401	P042E									
EngOilTempSensorCircuitFA	P0197	P0198									
EngOilModeledTempValid	ECT_Sensor_FA	IAT_SensorCircuitFA									
EngOilPressureSensorCktFA	P0522	P0523									
EngOilPressureSensorFA	P0521	P0522	P0523								
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449				
BrakeBoosterSensorFA	P0556	P0557	P0558								
BrakeBoosterVacuumValid	P0556	P0557	P0558								
BrakeBoosterVacuumValid	VehicleSpeedSensor_FA	MAP_SensorFA									
CylnderDeacDriverTFTKO	P3401	P3409	P3417	P3425	P3433	P3441	P3449				
EngineTorqueEstInaccurate	EngineMisfireDetected_FA	FuelInjedtorCircuit_FA	FuelInjedtorCircuit_	FuelTrimSystemB	FuelTrim	MAF_Se	MAP_Se	EGRValuePerforamnce_FA			
PPS1_OutOfRange_Composite	P2122	P2123	P0651								
PPS2_OutOfRange_Composite	P2127	P2128	P0641								
PPS1_OutOfRange_Composite	P2122	P2123	P0651								
PPS2_OutOfRange_Composite	P2127	P2128	P0641								
PPS1_OutOfRange	P2122	P2123									
PPS2_OutOfRange	P2127	P2128									
PPS1_OutOfRange	P2122	P2123									
PPS2_OutOfRange	P2127	P2128									
AcceleratorPedalFailure	P2122	P2123	P2127	P2128	P2138	P0641	P0651				
ControllerRAM_Error_FA	P0604										
ControllerProcessorPerf_FA	P0606										
TPS1_OutOfRange_Composite	P0122	P0123	P0651								
TPS2_OutOfRange_Composite	P0222	P0223	P0652								
TPS_FA	P0120	P0122	P0123	P0220	P0222	P0223	P2135				
TPS_TFTKO	P0120	P0122	P0123	P0220	P0222	P0223	P2135				
TPS_Performance_FA	P0068	P0121	P1516	P2101							
TPS_Performance_TFTKO	P0068	P0121	P1516	P2101							
TPS_FaultPending	P0120	P0122	P0123	P0220	P0222	P0223	P2135				
TPS_ThrottleAuthorityDefaulted	P0068	P0120	P0122	P0123	P0220	P0222	P0223	P1516	P2135	P2176	
EnginePowerLimited	P0068	P0606	P0120	P0122	P0123	P0220	P0222	P0223	P0641	P0651	
	P1516	P2101	P2120	P2122	P2123	P2125	P2127	P2128	P2135	P2138	P2176
5VoltReferenceA_FA	P0641										
5VoltReferenceB_FA	P0651										
TOSS_Fault	ECM:	P0502	P0503								
	TCM:	P0722	P0723								
ShiftSolenoidFaults (TCM)	M30/M70:	P0751	P0752	P0756	P0757						
	MYC/MYD:	P0751	P0752	P0756	P0757	P0973	P0974	P0976	P0977		

ECM Fault Bundles Tables

Cert Doc Bundle Name	Pcodes																	
TransTurbineSpeedValid(TCM)	M30/M70:	P0716	P0717															
	MYC/MYD:	P0716	P0717	P07BF	P07C0													
Trans_Gear_Defaulted(TCM)	M30/M70:	P0705	P1810	P1815	P1816	P1817	P1818	P1915	P1820	P182A	P1822	P182C	P1823	P182D	P1825	P182E	P1826	P182F
KS_CktPerfB1B2_FA	P0324	P0325	P0326	P0327	P0328	P0330	P0332	P0333										
EST_DriverFltActive	P0351	P0352	P0353	P0354	P0355	P0356	P0357	P0358										

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Brake Pedal	C0161.71	BLS GMLAN signal monitoring	BLS CAN monitoring	BLS GMLAN signal is invalid "Brake Pedal Initial Travel Achieved Validity" = 1	-	Continuous	500ms.	Special Type C NO MIL
Brake Pedal	C0161.00	Signal monitoring	1. Brake light switch permanently high	1. If the BLS-signals is high for 60 s, while the gas pedal is stepped, with vehicle speed > 3 m/s, offset-compensated pVor < 5 bar and no control is active, a fault is set.	-	1. Vehicle speed > 3 m/s and offset-compensated < 5 bar	1. 60 s	Special Type C
			2. Bls vs. Pressure sensor plausibility	2. If the Pre-pressure has climbed to pPre > 10 bar after braking and Brake light switch signal is set in software without the actual Brake light switch signal being set and the Pump motor being actuated. A fault is set if the Fault detection time is exceeded. OR If the Pre-pressure pPre > 80 bar and no Brake light switch signal is set. A fault is set if the Fault detection time is exceeded.		2. No Rfp is running no active pressure increase For pPre > 80bar continuous	2. 1 s	NO MIL
LF, RF, LR, RR Wheel Speed Sensor Circuit	C0035.00 C0040.00 C0045.00	Startup WSS test (Wheel speed sensor test) for active WSS	Failure criteria's: · Open circuit in the WSS line · Short circuit to UZ in the WSS line	Wheel speed sensor test starts immediate after power. Especially shorts between WSS lines and shorts to UZ can be detected by switching single WSS channels in sequence. After end of test only the channels with no fault are switched on.	-	Once after power up	1 s	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
	C0050.00		· Short circuit to GND in the WSS line · Short circuit between WSSlines · Loose contact in WSS connector · Input amplifier in ECU faulty					
LF, RF, LR, RR Wheel Speed Sensor Circuit	C0035.00	WSS line monitoring	Failure criteria's:	The sensor circuitry has two current levels I = 7mA and I= 14mA. These current levels are monitored by the input amplifier located on the ECU. If the sensor line is broken, shorted to ground or shorted to supply voltage a faulty current level will be detected.	-	WSS line faults are detected, if the fault condition exists uninterrupted for t >= 200ms.	> 200 ms	Special Type C
	C0040.00		· Open circuit in the WSS line	Mutual shorts between sensor lines are detected after power up in a self test which turns on single channels in sequence.				NO MIL
	C0045.00		· Short circuit to UZ in the WSS line	Defective sensor channels are turned of to prevent damage due to overheat. Single and multiple faults are detected and the fault locations are given.				
	C0050.00		· Short circuit to GND in the WSS line · Loose contact in WSS connector · Input amplifier in ECU faulty					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
LF, RF, LR, RR Wheel Speed Sensor Circuit	C0035.00 C0040.00 C0045.00 C0050.00	WSS Status monitoring	Failure criteria: · Input amplifier in ECU faulty	Power supply of the wheel speed sensor input amplifier is continuous monitored. WSS low voltage is also continuous monitored (only necessary for active sensors) In case of WSS low voltage WSS line monitoring is not active. Backward current that flows in the WSS input amplifier is also continuous monitored. Filter time is 200 ms. The pulse width (t(high) > 2 ms) of DF11s WSS sensors is continuous monitored but only if vehicle speed is > 0km/h and < 20 km/h. This ensures that the correct active sensor is mounted (DF11i switched with DF11s) and that the sensor is not corrupted. Filter time is 3.5 s.	-	Continuous	200 ms	Special Type C NO MIL
LF, RF, LR, RR wheel speed sensor, plausibility	C0035.5A	Lambda monitoring	Failure Criteria's:	There are two monitors for static wheel slip:	-	Testing is activated when monitoring conditions are met and no under voltage is detected	main monitor (I5):	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
	C0040.5A		· Permanently bad signal	The main monitor (λ5) needs additional information of the ESP-sensors and is active for a velocity > 20 km/h and no under voltage is detected. The backup monitor (λ6) manages with the wheel speeds alone. If the following fault conditions are fulfilled, the fault counter tLam is increased. After 5s, a suspicious flag is set, so that the corresponding wheel is not longer used for the reference speed calculation and no control			20s for 1 defective WSS	NO MIL
	C0045.5A		· Tooth wheel missing, WSS not installed, too great airgap	is active anymore. After that, a fault is detected, if the fault counter exceeds its limit, which depends on the current system state and the driving situation.			40s for 2 defective WSS	
	C0050.5A		· Worn or missing teeth	Main Monitor (λ5):				
			· Noise	If the maximum difference of wheel speeds related to maximum wheel speed exceeds 5% (free rolling wheel speeds transformed to the center of			backup monitor (l6):	
			· Open circuit, Short circuit to Uconst	rear axle) a wheel specific wheel speed sensor fault is set, if the faulty wheel is always the same, otherwise a generic wheel speed sensor fault is set.			normally 20s	
			· Interference between lines	detection filter time			With a spinning wheel 80s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				- the above conditions apply for 20s for 1 defective WSS. - the above conditions apply for 40s for 2 defective WSS. Backup Monitor (λ6): If the velocity is higher than 50 km/h, the deviation between the fastest and the slowest wheel must exceeds 6% related to the fastest wheel. If the velocity is below 50 km/h, the deviation must exceed an absolute value of 3km/h. In case of a detected curve, the threshold is increased with an additional value of 4 km/h. detection filter time : normally 20s With a spinning wheel 80s				
LF, RF, LR, RR wheel speed sensor, plausibility	C0035.5A C0040.5A C0045.5A C0050.5A	Startup monitoring	Failure Criteria's: · Permanently bad signal · Tooth wheel missing, WSS not installed, too great airgap	Fast monitoring: A test is performed at the time the vehicle is accelerated to 12km/h. a) once after energizing the system b) if the vehicle was stationary for approx. 2s.	–	Testing is activated any time the conditions above are met and no under voltage is detected	Usually 20 s	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				The test detects a failure if one (or two) wheel are at vmin and the other wheels are above 12 km/h for longer than 1s. The monitoring could detect double faults, but only at the driven axle. A fault could also be set during driving. If one wheel speed gets to vmin at a vehicle velocity vFzRef = v1, a fault is detected if the vehicle has accelerated to a velocity of v1+18 km/h and the wheel speed at the faulty wheel remains at vMin. This monitoring could only detect singular faults. Slow monitoring: The slow start-up monitoring does not depend on the driving situation or on the vehicle velocity. Therefore it is always performed. However, failures are detected much slowly. The failure detection time is usually about 20 seconds. The monitoring function detects a failure if both non driven wheels are under 3 km/h and the driven wheels have a velocity above 12 km/h over a period of time longer than the defined failure detection time.				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				For 2WD systems, in case of double failure at the non driven wheels, this fault will not be set. This monitoring function can detect double failures.				
LF, RF, LR, RR wheel speed sensor, plausibility	C0035.5A C0040.5A C0045.5A C0050.5A	Missing Teeth Detection	Failure Criteria: · Worn or missing teeth	Every time, if a gap in the wheel speed sensor signal occurs cyclically with one wheel rotation, a fault counter is increased by one. If the fault counter exceeds its limit of 6, a wheel specific fault is stored in the EEPROM.	-	The monitoring is active from 10 km/h to 80km/h and if no ABS-control is active at a front wheel AND a rear wheel.	10 wheel rotations	Special Type C NO MI
LF, RF, LR, RR wheel speed sensor, plausibility	C0035.5A C0040.5A C0045.5A C0050.5A	LF, RF, LR, RR WSS - Dynamic Monitoring	Failure Criteria's: · Open circuit, Short circuit to Uconst · Loose contact in WSS connector	A monitoring is provided for wss signal dropout. If there is a loss of wss signal and the vehicle speed is greater than 43 kph, a fault counter becomes active.	-	Vehicle speed is greater than 43 kph	60 ms	E Special Type C NO MIL
LF, RF, LR, RR wheel speed sensor, plausibility	C0035.5A C0040.5A C0045.5A	WSS Long-term Signal Disturbance Monitoring	Failure Criteria's: · Permanently bad signal · Worn or missing teeth	Interference and signal disturbance like: • non-plausible high frequency received, • non-plausible high wheel acceleration,	-	Continuous	10s	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
	C0050.5A		· Noise · Loose contact in WSS connector · Interference between lines	• non-plausible high wheel jerk and • non-plausible deltaT and Edges at low speed. In case of Active WSS set of failure is done after 10s. During this time an Einst-bit is set. It monitors up to four faults				
Generic Wheel speed sensor, slipping or wrong toothed	C0245.00	Mismatch speed between wheels	1. ABS continuous control monitoring	1. The monitoring reports a failure if the ABS target slip is exceeded for a time period >= 10 s at one or more wheels. If the driver brakes or the velocity is lower than 50 km/h the detection time is enlarged to 60s.	-	1. Continuous	1. 10 s If the driver brakes or the velocity is lower than 50 km/h the detection time is enlarged to 60s.	Special Type C
			2. Wss suspected failure monitoring	2. A suspected Wss (wheel speed sensor) failure is detected using the following information: • Wss electromagnetic noise detection • 50/60Hz interference (passive Wss only) • suspected dynamic failure • suspected flat tire • suspected absent signal • suspected permanent slip		2. Continuous	2. 0.5 s in control. 2s or 5 s outside control	NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
LF Outlet valve LF Inlet valve RF Outlet RF Inlet valve LR Outlet valve LR Inlet valve RR Outlet valve RR Inlet valve Shutoff Valve 1 (HSV1/ASV1) Switching Valve 1 (USV1) Shutoff Valve 2 (HSV2/ASV2) Switching Valve 2 (USV2)	C0550.00	Valve monitor	Fault criteria's · Interruption of valve · Short to GND · Short to UBVR · VR (Valve Relay) defect · Fly back diode · Short/ Interruption in Actuation/ Feedback lines	The electrical feedback signal does not match the actuation signal for the corresponding valve: Actuation Signal != Feedback Signal Fault filter time is t = 30ms (for current controlled valves and under voltage conditions: t =80ms)	-	Continuous	30 ms	Special Type C NO MIL
LF Outlet valve LF Inlet valve RF Outlet	C0550.00	Cyclic Valve and Relay Test (CVRT)	Fault criteria's · Interruption of valve · Short to GND	Malfunctions of electrical valve actuation and valve relay are detected. First the valve relay (VR) is switched off. Then the voltage value of UVR (voltage at the valve relay) is measured. A Fault is found if UVR is not within 0.1*UZ < UVR < 0.8*UZ. After that all valves are switched on sequential, UVR and valve feedback is measured.	-	CVRT is executed immediately after power on and then periodic every t = 20s. The Test is canceled if any control/valve actuation takes place or if the Vehicle is in motion and the BLS is on.	Up to 20 s	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
RF Inlet valve LR Outlet valve LR Inlet valve RR Outlet valve RR Inlet valve Shutoff Valve 1 (HSV1/ASV1) Switching Valve 1 (USV1) Shutoff Valve 2 (HSV2/ASV2) Switching Valve 2 (USV2)			· Short to UBVR · VR (Valve Relay) defect · Short/ Interruption in Actuation/ Feedback lines	A Fault is found if UVR is not 0.2*UZ < UVR < 0.8*UZ and the Valve Feedback is not act. Valve == FALSE and not act. Valve == TRUE. At least VR is switched on again.				
LF Outlet valve LF Inlet valve RF Outlet RF Inlet valve LR Outlet valve LR Inlet valve RR Outlet valve	C0550.00	Valve and pump motor test (VPMT)	Fault criteria's · Interruption of valve · Short to GND · Short to UBVR · Short between valves · VR (Valve Relay) defect · Fly back diode	The valve and pump motor test detects electrical actuation malfunction of ABS valves. The test actuates all valves in series (to detect short cuts or shunts between the valve lines). Faults are detected by monitoring the valve response signals. At the same time the pump motor is actuated. The monitor functions for the pump motor are described separately.	-	The Valve and Pump motor Test is performed once after ignition on if vehicle speed is >= 15 km/h.	Immediately	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
RR Inlet valve Shutoff Valve 1 (HSV1/ASV1) Switching Valve 1 (USV1) Shutoff Valve 2 (HSV2/ASV2) Switching Valve 2 (USV2)			· Short/ Interruption in Actuation/ Feedback lines					
LF Outlet valve LF Inlet valve RF Outlet RF Inlet valve LR Outlet valve LR Inlet valve RR Outlet valve RR Inlet valve Shutoff Valve 1 (HSV1/ASV1) Switching Valve 1 (USV1) Shutoff Valve 2 (HSV2/ASV2) Switching Valve 2 (USV2)	C0550.00	ASV/USV Valve Test	Fault criteria's · Interruption of valve · Short to GND · Short to UBVR · Short between valves · VR (Valve Relay) defect · Fly back diode · Short/ Interruption in Actuation/ Feedback lines	The valve and pump motor test detects electrical actuation malfunction of USV and ASV/HSV valves. The test actuates all valves in series (to detect shorts or shunts between the valve lines). Faults are detected by monitoring the valve response signals.	-	The ASVUSV Test is performed once after ignition on at standstill if the BLS is off and at vehicle speed is v >= 15 km/h if the BLS is on.	Immediately	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
LF Outlet valve LF Inlet valve RF Outlet RF Inlet valve LR Outlet valve LR Inlet valve RR Outlet valve RR Inlet valve Shutoff Valve 1 (HSV1/ASV1) Switching Valve 1 (USV1) Shutoff Valve 2 (HSV2/ASV2) Switching Valve 2 (USV2)	C0550.00	Valve Drift Test (current controlled valves)	Fault criteria's · Interruption of valve · Short to GND · Short to UBVR · VR (Valve Relay) defect · Fly back diode · Current control	The drift test is executed only once during an ignition Cycle. It detects partly shorted valve coils, almost defective coils or malfunction of the valve driver. The test requires identical temperature of the tested valves. At first the power stages are set in test mode. Then a test pattern with different current is applied to current controlled valves. After that the test mode is also checked with a different test pattern. Then the power stages are reset to normal mode. The valve feedback is evaluated. In case of a deviation the test is repeated two times until a failure is set.	-	The drift test executes only once during an ignition Cycle The test is triggered if the following conditions are fulfilled: t = 10min after power up or end of control, no BLS is applied, brake pressure is < 10bar, vehicle speed >15km/h, vehicle acceleration > 0.5m/s2 and supply voltage > 11 volts.	10min	Special Type C NO MIL
Device Power	C0899.00	Supply voltage monitoring	Supply voltage too low	Low-voltage during operation. The monitored supply voltage is filtered and limited to a rise time of 4 volts per second. UZ is monitored for a level of: filtered UZ < 9.3V outside control, or a level of: filtered UZ < 9.2V during control.	-	Continuous Power mode != Crank	20 ms	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
				If the Voltage is lower than this threshold, the DTC will be detected.				
Device Power	C0900.00	Supply voltage monitoring	Supply voltage too high	High-voltage during operation. The monitored supply voltage is filtered and limited to a rise time of 4 volts per second. High voltage problem will be monitored if filtered UZ is > 16.8V. If the Voltage is higher than this threshold, a DTC Supply voltage too high will be detected.	-	Continuous Power mode != Crank	20 ms	Special Type C NO MIL
Pump motor	C0110.00	Pump stop monitor	Fault criteria's · Open circuit in UM line · Short circuit to UZ in UM line · Motor relay faulty - sticks · Motor faulty (Open circuit) · Faulty input stage in control unit · Faulty output stage in control unit	Stop monitor detects short to Ubatt, GND loss and FET continuous on. A failure is detected if the voltage UM > 2.0V for a time t >= 1s	-	Stop monitor is active if the pump is off i.e. not actuation and no slowdown.	> 1 s	Special Type C NO MIL
Pump motor	C0110.00	Pump run monitor	Fault criteria's · Open circuit in UBMR line · Short circuit to GND in UM line	The monitor detects pump supply faults, FET continuous off, UBMR interruptions (fuse blown) and high resistance of FET and supply line. A failure is detected if the voltage UM < (UZ - 4.0V) for a time t >= 100ms.	-	The monitor is active if the pump is switched on (FET on) Remark: the run monitor is idle during pump PWM actuation (i.e. pump control) in the off-phase	> 100 ms	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			· Motor relay faulty fails to energize · Faulty input stage in control unit · Faulty output stage in control unit					
Pump motor	C0110.00	Pump slowdown monitor	Fault criteria's	After the end of the actuation of the motor relay has, the pump motor is still in motion and is generating a Voltage during it's slowdown. The generated UM is monitored for a certain time on high level. The time depends on the supply voltage and is in the range of t = 30ms to t = 125ms.	-	Monitor is always active in the transition	Normally > 4 s	Special Type C
			· Short circuit to GND in UM line	If the slow down condition isn't met, the pump is activated again (see actuation times below) and the slowdown time is measured again. This is repeated for maximum n = 3 times. If, after the last pump activation, the pump motor slowdown time is still to short, a failure is detected.		"pump on -> pump off".		NO MIL
			· Mechanical pump fault · Motor faulty (Short circuit or Open circuit) · Faulty output stage in control unit	Actuation times: 1st actuation: 200 ms 2nd actuation: 1000 ms 3rd actuation: 3000 ms				
Valve relay	C0121.00	FSA Test (Fail Save Circuit Test)	Fault criteria's	Watchdog and VR function is tested during startup.	-	Once during startup.	Immediately	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			· Open circuit in VR line · Short circuit to UZ in VR line · Short circuit to GND in VR line · Open circuit in UBVR line · Short circuit to UZ in UVR line · Short circuit to GND in UVR line · Valve relay faulty (Fails to energize; Drops out; Sticks) · Faulty output stage in control unit (Short or open circuit)	FSA test detects if the VR/Enable remains in off position when it is turned on and vice versa. Reason could be short to GND or UZ, interrupted lines or a defective output stage etc.				NO MIL
Valve relay	C0121.00	UVR Monitor	Fault criteria's · Open circuit in VR line · Open circuit in UBVR line · Valve relay faulty (Fails to energize; Drops out) · Faulty output stage in control unit (Open circuit)	A Fault is detected if UVR < 0.8 * UZ for a time t > 500ms.	-	Continuous	500 ms	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Valve relay	C0121.00	CVRT (Cyclic Valve and Relay Test) for VR monitoring	Fault criteria's · Short circuit to UZ in VR line · Short circuit to GND in VR line · Short circuit to UZ in UVR line · Short circuit to GND in UVR line · Valve relay faulty (Sticks) · Faulty output stage in control unit (Short or open circuit)	This test evaluates the function of the VR (vale relay) periodically. The VR is switched off and back on. VR malfunction and UVR short to UZ or UBVR and medium or high ohmic short of UVR (or a valve) to UZ, UBVR or GND are detected.	-	Continuous	Immediately	Special Type C NO MIL
Pressure Sensor failure, circuit	C0131.00	Pressure sensor Supply monitoring	Failure criteria: · Sensor supply out of range	Sensor Supply Voltage > 5. V OR Sensor Supply Voltage < 4.5V	-	Continuous	60ms	Special Type C NO MIL
Pressure Sensor failure, circuit	C0131.00	Pressure signal line monitoring	Failure criteria: · Pressure signal out of range	Pressure Signal Voltage > 3.29V OR Pressure Signal Voltage < 0.129V	-	Continuous	100ms	Special Type C NO MIL
Pressure Sensor failure, circuit	C0131.00	Pressure signal offset monitoring	Failure criteria: · Pressure sensor offset exceeds range.	The DS-offset value must be in the range of ±15 bar.	-	After DS-initialization, no under voltage, no pumps are running and no BLS-signal is set	0	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Lateral Accelerometer Circuit	C0186.00	Sensor signal failure	1. Lateral acceleration out of range.	1. The AY-signal is limited to an electrical stop of 1.8g. If |Ay| > 1.5g for more than 500ms fault is detected.	-	1. Continuous after initialization.	1. > 500 ms	Special Type C
			2. Lateral acceleration value during standstill is too large.	2. At standstill the plausible range of |Ay| < 0.7g. If the filtered value of Ay > 0.7g than fault is set.		2. Monitoring during standstill	2. > 400 ms	NO MIL
			3. AYS offset out of range.	3. Under normal driving conditions the long time filtered driving direction is straight ahead. The long time filtered Ay-value is called Offset. If the Offset value is higher than 2.25 m/s2 an Ay-fault is determined. Failure detection time depends on the driving distance, vehicle speed and on the amount of failed Ay-signal.		3. Monitoring during straight driving	3. Immediately when offset exceeds limit	
			4. AY gradient monitoring.	4. A signal gradient higher 55g/sec sets a fault. The AY-signal is filtered by a peak-filter.		4. After init and no ABS active	4. Depends on driving condition.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Lateral Accelerometer Circuit	C0186.5A	Sensor plausibility failure	Lateral acceleration plausibility fault during model validity.	If during stabile vehicle behavior an Ay-Failure larger then 2.5 m/s2 is occurring, the VDC controller will disregard the Ay sensor information so that a false VDC intervention is prevented. Failure is detectable if this condition applies for t > 2s and stable driving conditions are given.	-	After initialization, no under voltage, sensor offsets calculated, VDC not temporary passive, FZREF > 5 m/s recognized forward driving direction and no banking curve	> 2 s	Special Type C NO MIL
Yaw Rate Circuit	C0196.00	Monitoring of Yaw rate status reported in CAN message.	If the CAN received signals indicate internal DRS sensor failure the fault will be set after predefined filtering.	-	-	Continuous.	Typical 100ms	Special Type C NO MIL
Yaw Rate Circuit	C0196.00	Yaw Rate signal monitoring	1. Yaw rate sensor offset exceeds limit. 2. Yaw rate sensitivity monitoring.	1. If offset value is outside the plausible range ± 5.25 °/s at start of driving a DRS-Offset fault is set. 2. DRS-sensitivity is estimated by comparison of the reference yaw rate (build by model based sensor monitoring) and measured yaw rate during cornering. The fault criteria is approx. 25% sensitivity failure	-	1. After initialization, no under voltage, no control active, reference yaw rate less than 55 °/s and no internal LWS-failure. 2. After initialization, no undervoltage, DRS-Offset calibration finished, no control active, DRS-reference yaw rate less than 55°/s and higher than 5°/s, |Ay| < 7 m/s2 , slip at driven axle less than 3%, recognized forward driving direction, no LWS-failure and no banking curve	1. Imediately. 2. Depends on driving situation.	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			3. Yaw rate sensor gradient fault.	3. If the yaw rate is greater than 10 – 23 degrees/s / 40ms (depending on driving conditions) a suspected fault is detected after t > 280ms and fault detection occurs after t > 10s.		3. Continuous after initialization. No undervoltage.	3. 800 ms and forward driving is recognized	
Yaw Rate Circuit	C0196.5A	Yaw Rate plausibility monitoring	A failure is set if the offset corrected DRS signal deviates sufficiently from the reference yaw rate and from the yaw rate calculated via a model based upon LWS signal and vehicle speed.	The comparisons include static and dynamic thresholds which vary dependent upon current vehicle maneuver and circumstances.	-	Continuous and no undervoltage.	Depends on driving situation.	Special Type C NO MIL
Yaw rate sensor	U2142	Lost communication with yaw rate sensor.	1. If a DRS CAN message is not received by EBCM fault is set. The receive CAN message from YAW sensor are: 0x130, 0x131 and 0x140.	1. –	-	1. Continuous.	1. 300ms	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			2. If transmitted message was not transmitted a fault is set.	2. –		2. Continuous	2. 600ms	NO MIL
			3. Monitoring includes line short to ground, line short to supply voltage and mutual line short. Line interruptions are detected by CAN message monitor. After detecting a BUSOFF failure the transmission is reinitialized. A BUSOFF fault is established if re-initialization is tried for 15 times in sequence without success.	3. – 15 re-init tries.		4. Continuous	3. 300ms	
			4. Monitoring whether the initialization software has write access to the configuration registers of the CAN-controller module. Faults are detected immediate	4. -		4. During sensor CAN controller initialization.	4. Imediately.	
Steering Position Signal	C0710.00	Steering angle sensor circuit	1. SAS-A and/or SAS-B not changing	1. If one or both of the SAS-A and SAS-B signals is not changing (due to short to ground, etc.) while the SAS is being turned, a fault will be set once the SAS-Analog signal has changed by at least 30degrees	-	1. Continuous during driving. However, this fault can only be detected when the SAS-Analog signal is changing – that is when the angle is between +/- 225 degrees.	1. 40ms	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			2. SAS-A and SAS-B Shorted together	2. If the SAS-A and SAS-B signals are shorted together, they will change state at exactly the same time. Every time this happens a count will be incremented by 1. Every 20ms, this count will be decremented by 1. If the count ever reaches 2, this fault will be set.		2. Continuous while driving	2. 2 counts	NO MIL
			3. SAS-Index Signal Not Changing	3. If the SAS-Index stays high and the SAS-A and SAS-B signals change by more than 25 degrees, or the SAS-Index stays low and the SAS-A and SAS-B signals change by more than 345 degrees.		3. Continuous while driving	3. 40ms	
			4. SAS-Index Signal Coming Too often monitoring	4. If there are two different SAS-Indexes and the SAS-Analog angle changes by less than 5 degrees, a fault will be set.		4. Continuous while driving	4. 40ms	
			5. SAS-Analog Signal Changing Too Fast monitoring	5. If the SAS-Analog signal rises from its lowest value to its highest value (or vice versa) in less than 250 degrees in one direction (based on the SAS-A and SAS-B signals), a fault will be set.		5. Continuous while driving	5. 40ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			6. SAS-A and SAS-B Swapped monitoring	6. If the steering angle based on the SAS-A and SAS-B signals changes in the opposite direction of the analog angle, a fault will be set once the SASAnalog signal has changed by at least 30 degrees if it lasts 40ms.		6. Continuous during driving. However, this fault can only be detected whenthe SAS-Analog signal is changing that is when the angle is between +/- 225 degrees.	6. 40ms	
			7. SAS Turning Too Fast monitoring	7. If the SAS-A and SAS-B signals change significantly faster than the specified maximum turning rate of the Steering Angle Sensor, a fault will be set. This is done to protect the operating system from crashing due to excessive interrupt handling. The number of SAS-A and SAS-B edges each 20ms is counted. If this count exceeds the limit at the end of the 20ms, the fault will be set.		7. Continuous.	7. 50 counts	
Steering Position Signal	C0710.00	Steering angle sensor circuit	8. SAS-Analog Not Changing monitoring	8 If the angle changes by more than 530 degrees based on the SAS-A and SAS-B signals, and the SAS-Analog angle changes by less than 5 degrees, a fault will be set if it lasts 40ms.	-	8. Continuous while driving	8. 40ms	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
		(Cont.)	9. SAS- 5 Volt supply fault	9 If the SAS 5V supply is greater than 5.3V or less than 4.5V for more than 60ms, the fault will be set.		9. Continuous.	9. 60ms	NO MIL
Steering Position Signal	C0710.00	Steering angle sensor signal monitoring.	1. SAS Offset monitoring	1. If the SAS offset value exceeds a threshold of approximately 15 deg a SAS-fault is determined. Failure detection time depends on the driving distance, vehicle speed and on the amount of failed SAS-signal. Within 30 km of symmetrical driving the calculated offset corresponds to the sensor offset.		1. Continuous during driving. The maximum admissible range for SAS offset compensation is when |steering angle|<30 deg or straight ahead driving can be detected from WSS.	1. Immediately.	Special Type C
			2. SAS Gradient monitoring	2. Rapid changes of the SAS-Signal cannot occur under normal conditions. A SAS-gradient-failure is set, if :			2. Immediately	NO MIL
			3. SAS range monitoring	- signal gradient (steering angle velocity) from one 20 ms-cycle to another is higher than 40° or		2. After SAS-initialization and FZREF > 1.4 m/s; no under voltage and at least one SAS-message was sent in the current 20ms-cycle	3. 600ms	
			4. SAS constant signal	- change of this gradient (steering angle acceleration) is higher than 15			4. Depends on driving conditions.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			5. SAS Wrong Sign Monitoring	and no signal peak is recognized by a peak-filter		3. After initialization and no under voltage detected	5. Depends on driving conditions .	
				3. Range of SAS-Signal is limited by mechanical stop of steering mechanism. If value is higher than possible range for more than 300ms a fault is determined.				
				4. At a minimum change of e.g. 5° in the signal, the monitoring is reset. If there is no change in the signal, but a right AND left cornering has been recognized which would have required a change in SAS signal larger than 5 deg (lateral acceleration > 2 m/s² in combination with a yaw rate > 6 °/s in both directions), a fault is determined.		4. Initialization once in every ignition cycle. The monitoring is active until a reset by a change in the SAS signal or until a right and left cornering can be recognized		
				5. This monitoring detects a wrong built in steering angle sensor. The model yaw rates, calculated from the WSS and SAS are compared. During driving these signals must have the same sign. If the signal signs are different, a fault is determined.				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
						5. Once in every ignition cycle. Stable driving with a minimum yaw rate of 3 deg/s is necessary.		
Steering Position Signal	C0710.5A	Steering angle sensor plausibility monitoring.	The steering angle is compared to a steering angle calculated from yaw based on a vehicle model a reference. The difference between measured SAS-signal and SAS signal calculated from YRS-signal is evaluated for fault detection.	Threshold depends on driving conditions.		Continuous during driving when the stability criteria of the monitoring is met.	Depends on driving conditions.	Special Type C NO MIL
Steering Position Signal	C0455.00	Steering angle sensor circuit monitoring.	SAS. Steering Angle Sensor Analog signal	If the SAS-Analog signal is outside of its working range compared to the 5volt supply voltage – less than 9% or greater than 90 of 5V supply - a fault will be set.		Continuous during driving.	120ms	Special Type C NO MIL
Vacuum sensor	C1100.00	Vacuum sensor circuit monitoring	1. Vacuum Sensor Supply monitoring	1. Sensor supply voltage is continuously monitored (except power on). A sensor supply failure is detected if Sensor Supply Voltage > 5.25V OR Sensor Supply Voltage < 4.75V for t >= 200ms		1. Continuous	1. 200ms	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			2. Vacuum Sensor line monitoring	2. Vacuum sensor line is continuous monitored (except power on). Line faults like open, short to GND or short to UZ are detected. A Fault is set if the vacuum sensor signal is U VAC > 3.15V OR U VAC < 0.3V for a time t >= 200ms		2. Continuous	2. 200ms	NO MIL
Vacuum sensor	C1100.00	Vacuum sensor signal monitoring	Vacuum Sensor Plausibility	Vacuum signal remains constant during a brake apply greater than 20 bar/sec starting from 0 bar.		Continuous	1s	Special Type C NO MIL
Brake Fluid	C0267.00	Brake Fluid low	When the brake fluid signal in GMLAN message 0x12A (LS_Device_Information) from BCM indicates the low brake fluid is true, the fault is set.	-	-	Continuous	Immediately	Special Type C NO MIL
Stability System Active Too Long	C0252.00	Implausible Control	1. Implausible FZR-interventions or wrong signal.	1. The monitoring reports a failure if continuous ESC control occurs for a time period >= 10 s. A continuous ESC control for longer than 10s is not possible under normal conditions	-	1. Continuous at vehicle reference speed greater than 6m/s, no detectedunder voltage and a fault is not already detected	1. 10s	Special Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			2. Implausible controller intervention.	2. A fault is set if all 4 wheel inlet valves are continuously maintaining pressure or releasing pressure during the ABS control.		2. Ignition on. Then 'Power on self-test (POS)'. Continuous monitoring. Active ABS control.	2. 2s	NO MIL
Electronic Control Unit Hardware	C0550.00	Monitoring of internal ECU hardware.	Internal control unit failures of the µC's and peripheral integrated circuits will be continuous monitored for proper function.	-	-	Continuous.	Immediately.	Special Type C NO MIL
Electronic Control Unit Software	C0569.00	Calibration not programmed.	If the re-program flag in EEPROM indicates the ECU is not reprogrammed, the fault is set. The re-program flag is set to not reprogrammed when the ECU is built with default calibration block. The reprogram flag will be reset to reprogrammed once the ECU is reprogrammed successfully.	-	-	Wrong configuration can be realized and detected after ignition on.	Immediately	Special Type C NO MIL
CAN System fail	U2100.00	CAN system monitoring	Failure criteria: · CAN controller fails to initialize.	-	-	Monitored whenever CAN chip initializes.	Immediately	Special Type C NO MIL
Lost Comms with ECM	U0100.00	ECM Lost Communication	Following messages are missing from the bus: 0x1C3/0x1C1 PPEI_Engine_Torque_Status 2	N/A	-	Continuous	2.5*period or 250 ms (whichever is greater)	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			0x0C9 PPEI_Engine_General_Status1 0x2C3/0x2C5 PPEI_Engine_Torque_Status_3					
Lost Comms with TCM	U0101.00	TCM Lost Communication	Following messages are missing from the bus: 0x1F5 PPEI_Trans_General_Status_2 0x0F9 PPEI_Trans_General_Status_1 0x2D1 (NR3) PPEI_Transfer_Case_Status	N/A	-	Continuous	2.5*period or 250 ms (whichever is greater)	Special Type C NO MIL
Lost Comms With BCM	U0140.00	BCM Lost Communication	Following messages are missing from the bus: 0x0F1PPEI_Brake_Apply_Status 0x1F1 PPEI_Platform_General_Status 0x12A LS_Device_Information	N/A	-	Continuous	2.5*period or 250 ms (whichever is greater)	Special Type C NO MIL
Lost Comms With TCCM (NQH/NQG variants)	U0102.00	BCM Lost Communication	Following messages are missing from the bus: 0x2D1 PPEI_Transfer_Case_Status	N/A	-	Continuous	2.5*period or 250 ms (whichever is greater)	Special Type C NO MIL

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
			0x1CB PPEI_TC_Coupling_Status					
Invalid GMLAN data	C0561.71 C0561.72 C0561.74	GMLAN signals validity monitoring.	Failure criteria: · GMLAN signal is invalid	-	-	Continuous after 5 sec from power up.	500ms	Special Type C NO MIL
Engine torque	C0242.00	Torque signal monitor.	Engine Torque Inhibit	When the GMLAN signal EngTrqRdFlrSt in 0x1C1/0x1C3 from ECM is not “Torque Reduction OK” or “Torque Reduction Limited”, the fault is set after 500ms. The fault is reset after the signal EngTrqRdFlrSt is “Torque Reduction OK” or Torque Reduction Limited” for 500ms.	-	Continuous.	500ms	Special Type C NO MIL