07_GRP01_All Engines.xls

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
P00XX Fuel and Air Metering and Auxiliary Emission Controls								
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation	P0016	Calculation of crank position by CKP sensor and CMP sensor disagree by < 6deg crank angle. Detects implausible camshaft/crankshaft sensor correlation by comparing the differences between calculated camshaft and crankshaft positions.	PATH 1) Difference between CKP position as calculated by CKP sensor and CMP sensor is >= 6 degrees crank angle. OR PATH 2) Difference between CKP position as calculated by CKP sensor and CMP sensor is < 6 degrees crank angle, but the CMP position tolerance is > 12 degrees (cam). CMP position tolerance is the error between TDC and first edge of cam detection. Prevents	P0642,P0643, P0335, P0336 DTCs not set Ignition ON Engine Speed ≥ 50 rpm	PATH 1) 255 crankshaft increments (60 increments/revolution) PATH 2) 5 cam phases (4 phases/cam revolution)	Cam sensor (CMP sensor) and Crank sensor (CKP sensor)	A	
Turbocharger Boost Control Position Not Learned	P003A	Position of the vanes opened during a learn : vane position > 5.54%, OR vane position < 36.94% Position of the vanes closed during a learn : vane position >69.92%, OR vane position < 95.60%. Detects in range vane position errors during a vane sweep to lea	Position of the vanes opened during a learn : vane position < 5.54%, OR vane position > 36.94% Position of the vanes closed during a learn : vane position <69.92%, OR vane position > 95.60%	P117,P118,P2563, P2564,P2565,P2228,P2229 DTCs are not set. ECM is commanding vanes open or closed during a position learn process Injected Fuel <30 mm^3/S 600 rpm< engine speed <750 rpm 0 mph< vehicle speed< 200 kph 71C< Engine Coolant Temp <96C	Diagnostic fail conditions true for for 30 seconds. Performed once per ignition cycle	Turbocharger Vane Position Sensor.	B	
Turbocharger Boost Control Solenoid Circuit Low	P0047	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist on the Turbo Boost Solenoid Cntrl Circuit.	Electronic out-put driver circuitry determines the faults (open/short/no load) do exist on the Turbo Boost Solenoid Cntrl Circuit.	Ignition On	Diagnostic fail conditions true for 4 seconds. Test performed continuously	ECM Electronic out-put driver circuitry	B	new
Turbocharger Boost Control Solenoid Circuit High	P0048	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist on the Turbo Boost Solenoid Cntrl Circuit.	Electronic out-put driver circuitry determines the faults (open/short/no load) do exist on the Turbo Boost Solenoid Cntrl Circuit.	Ignition On	Diagnostic fail conditions true for 4 seconds. Test performed continuously	ECM Electronic out-put driver circuitry	B	new
Fuel Rail Pressure [FRP] Too Low	P0087	22.5 Mpa to 198 Mpa Measured Rail Pressure sensor < 15 MPa below Desired rail Pressure. AND Measured Rail Pressure sensor > = 22.5 MPa	Measured Rail Pressure sensor > 15 MPa below Desired rail Pressure. OR Measured Rail Pressure < = 22.5 MPa	P0090,P0192,P0193, DTCs are not set Rail Pressure control in closed loop control. (closed loop RP control occurs when engine traniations from crank to Run mode) Fuel level is > 10%	Diagnostic fail conditions true for 12.5 seconds . Test performed continuously	Rail Pressure Sensor	A	fuel level? Fuel level DTC inhibit?
Fuel Rail Pressure [FRP] Too High	P0088	22.5 Mpa to 198 Mpa Measured Rail Pressure sensor < 20 MPa above Desired rail Pressure. AND Measured Rail Pressure sensor < = 189 MPa	PATH 1) Measured Rail Pressure sensor > 20 MPa above Desired rail Pressure AND Rail Pressure Desired Fuel Flow <= 100 mm3/sec. AND fuel injection qty > 1 mm3/stroke. OR	P0087,P0192,P0193 DTCs are not set Rail Pressure control in closed loop control. (closed loop RP control occurs when engine transitions from crank to Run mode) "Rail Pressure Desired Fuel Flow is calculated based on RPM and FR	PATH 1) 10 seconds continuous PATH 2) 6 seconds continuous	Rail Pressure Sensor	A	
Fuel Rail Pressure Regulator Control Circuit	P0090	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist on the Fuel Pressure Regulator Cntrl Circuit.	Electronic out-put driver circuitry determines the faults do exist on the Fuel Pressure Regulator Cntrl Circuit. PATH 1) open / short to GND / no load) PATH 2) Short	Ignition On	Diagnostic fail conditions true for: PATH1) 220 m seconds PATH 2) 500 m seconds Test	ECM Electronic out-put driver circuitry	A	

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Fuel Rail Pressure Relief (PRV) valve performance	P009E	FRP is to be between 25Mpa - 189Mpa during engine run. Measured FRP gradients must be < negative compared to FRP gradients to detect NO open PRV	Test Enabler: FRP > 189 Mpa Condition #1 to detect open PRV 3 Measured FRP gradients must be more negative then compared gradient to detect open PRV. Condition #2 to detect open PRV 1 Measured FRP gradient must be more negative then compared gradient, AND the SUM of all 3 measured FRP gradients must	Ignition On	Peformed continuoulsy when FRP is > then 189 Mpa	Monitor FRP gradients	A	new

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Intake Air Temperature (IAT) Sensor 2 Circuit Low Voltage	P0097	0.10 volt to 4.8 volts -40degC to 200 degC Detects a sensor circuit short to ground	Air temperature sensor voltage <= 0.10 volt -same as- Air temperature>200degC	Ignition On	Diagnostic fail conditions true for 1 seconds Test performed continuously 100msec rate	Air temperature sensor	B	
Intake Air Temperature (IAT) Sensor 2 Circuit High Voltage	P0098	0.10 volt to 4.8 volts -40degC to 200 degC Detects a sensor circuit short high voltage or a sensor circuit open	Air temperature sensor voltage>=4.8 volt -same as- Air temperature<-40degC	Ignition On	Diagnostic fail conditions true for 1 seconds Test performed continuously	Air temperature sensor	B	
P01XX Fuel and Air Metering								
Mass Air Flow (MAF) Sensor Performance	P0101	106 kg/hr to 1800 kg/hr. (309 us to 109 us) 0 .87 < Normalized air flow ratio < 1.15 The normalized air flow ratio is derived by dividing the reference air flow by the actual air flow.	Normalized air flow ratio < 0.87 OR Normalized air flow ratio > 1.15	P0102,P0103,P0107,P0108,P0106,P2228, P2229,P0117,P0118,P0112,P0113,P0652, P0653,P0642,P0643,P0652,P0653,P0698, P0699 DTCs are not set. Baro >= 72kPa , 500 < RPM < 3100.	Diagnostic fail conditions true for 16 seconds Test performed continuously .	Mass Air Flow Sensor	B	frequency based sensor
Mass Air Flow (MAF) Sensor Circuit Low Voltage	P0102	106 kg/hr to 1800 kg/hr. (309 us to 109 us) Signal > 90 us same as Flow > 2970 kg/hr Lower threshold for the SRC of the raw airmass signal HFM6 sensor.	Signal > 106 us same as Flow > 1900 kg/hr	500 < RPM < 3100.	Diagnostic fail conditions true for 3 seconds Test performed continuously	Mass Air Flow Sensor	B	frequency based sensor
Mass Air Flow (MAF) Sensor Circuit High Voltage	P0103	106 kg/hr to 1800 kg/hr. (309 us to 109 us) Signal > 881 us same as Flow > 10 kg/hr Lower threshold for the SRC of the raw airmass signal HFM6 sensor.	Signal < 360 us same as Flow > 72 kg/hr	Ignition On	Diagnostic fail conditions true for 3 seconds Test performed	Mass Air Flow Sensor	B	frequency based sensor
Manifold Absolute Pressure (MAP) Sensor Performance	P0106	43.9 mv - 4149 mv (10 kPA - 307kPa) Absolute value (Baro - MAP) < 15kPa	Absolute value (Baro - MAP) > 15kPa	P0107,P0108,P2228,P2229 DTCs are not set. ECM powered On, RPM < 750.	Diagnostic fail conditions true for 10 sec. Test performed	Manifold Absolute Pressure (MAP) Sensor and Baro	A	widen operating range do to TVA
Manifold Absolute Pressure (MAP) Sensor Circuit Low Voltage	P0107	43.9 mv - 4149 mv (10 kPA - 307kPa) Detects MAP sensor circuit open or short to ground	MAP Sensor Signal <43.9 mv same as 10kpa	Ignition voltage >11 volts Engine Run time >1sec	Diagnostic fail condition true for 2 seconds Test performed continuously	Manifold Absolute Pressure (MAP) Sensor	A	
Manifold Absolute Pressure (MAP) Sensor Circuit High Voltage	P0108	43.9 mv - 4149 mv (10 kPA - 307kPa) Detects MAP sensor circuit short to high voltage	MAP Sensor Signal >4149 mv same as 307kpa	Engine Run time >1sec	Diagnostic fail condition true for 2 seconds Test performed continuously	Manifold Absolute Pressure (MAP) Sensor	A	
Intake Air Temperature (IAT) Sensor Circuit Low Voltage	P0112	0.10 volt to 4.8 volts -40degC to 150 degC Detects a sensor circuit short to ground	Intake Air temperature sensor voltage <= 0.10 volt -same as- Air temperature>150degC	Ignition On	Diagnostic set conditions true for 1 second Test performed continuously	Intake Air temperature sensor	B	
Intake Air Temperature (IAT) Sensor Circuit High Voltage	P0113	0.10 volt to 4.8 volts -40degC to 150 degC Detects a sensor circuit short high voltage or a sensor circuit open	Intake Air temperature sensor voltage>=4.8 volt -same as- Air temperature<-40degC	Ignition On	Diagnostic set conditions true for 1 second Test performed continuously 100msec rate	Intake Air temperature sensor	B	

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Engine Coolant Temperature (ECT) Sensor Performance	P0116	absolute value of (Startup Coolant Temperature Sensor - Startup Air Temperature Sensor 2) < 15degC. Detects biased Air Temperature Sensor 2	PATH 1) absolute value of (Startup Coolant Temperature Sensor - Air Temperature Sensor 2) > 15degC AND block heater influenced determined to be not true. Block heater influence is true if after 6.5 mins at	P0097, P0098, P0117,P0118, DTCs are not set. Engine Off Timer > 10hrs, IAT > 10deg C, Engine running > 2 seconds	Diagnostic sets on first fail Test performed once per key cycle	Coolant Temperature Sensor and Intake Air Temperature Sensor 2	B	
Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage	P0117	0.065 V to 4.75 V -40degC to 150 degC Detects a sensor circuit short to ground	Coolant Temperature Sensor voltage <= 0.065 volt -same as- Coolant Temperature>150degC	Ignition On	Diagnostic set conditions true for 15 second Test performed continuously	Coolant Temperature Sensor	B	clt sensor #1
Engine Coolant Temperature (ECT) Sensor Circuit High Voltage	P0118	0.065 V to 4.75 V -40degC to 150 degC Detects a sensor circuit short high voltage or a sensor circuit open	Coolant Temperature Sensor voltage >= 4.8 V -same as- Coolant Temperature >-40 degC	Ignition On	Diagnostic set conditions true for 60 second Test performed continuously	Coolant Temperature Sensor	B	clt sensor #1
Engine Coolant Temperature (ECT 1/ ECT2) Corrolation	P011A	absolute value of (Engine Coolant Temperature 1 - Engine Coolant Temperature 2) < 5deg C. Detects biased Coolant Temperature Sensor (ECT1 or ECT 2)	absolute value of (Engine Coolant Temperature 1 - Engine Coolant Temperature 2) > 5deg C. Detects biased Coolant Temperature Sensor (ECT1 or ECT 2)	P00117, P0118 DTCs are not set. IAT > -30deg C	Diagnostic set conditions true for 4 seconds. Test performed continuously	Engine Coolant temperature sensor 1 and Engine Coolant temperature	B	new
Engine Coolant Temperature (ECT) Below Thermostat Regulating Temperature	P0128	Engine Temperature > 72degC AND ambient air temperature > 10 degC OR Engine Temperature >50 degC AND ambient air temperature <= 10 degC. Detects thermostat failures causing engine to run cooler than expected.	PATH 1 High Region) Modeled coolant temp predicts coolant temp should be > 80 deg C AND Actual coolant temp is < 72 degC PATH 2 Low Region) Modeled coolant temp > 55 and Actual coolant temp < 50 degC	P0128 not yet passed; AND P0112, P0113,P0116,P0117,P0118 DTCs are not set PATH 1 High Region) Ambient air temp >10 deg C PATH 2 Low Region) Ambient air temp <=10 deg C '-7 degC<Ambient air temp < 100 degC; -40degC < Engine start-up temp < 65degC; Engine is running;	Test performed once from start-up until a pass/fail/disable condition exists.	Engine coolant temperature sensor. IAT 1 sensor	B	
Fuel Tempertaure Sensor Performance	P0181	absolute value of (Startup Intake Air Temperature Sensor - Startup Fuel Temperature Sensor) < 10 degC. Detects bias Fuel Temperature Sensor or Intake Air Temperature Sensor	PATH 1) absolute value of (Startup Intake Air Temperature Sensor - Startup Fuel Temperature Sensor) > 10degC AND block heater influenced determined to be not true. Block heater influence is true if after 6.5 mins	P0097, P0098, P0182,P0183, DTCs are not set. Engine Off Timer > 10hrs, IAT 2 > 10deg C, Engine running > 2 seconds	Diagnostic sets on first fail Test performed once per key cycle	Intake Air Temperature Sensor and Fuel Temperature Sensor	B	new comparison from MY06
Fuel Temperature Sensor Circuit Low Voltage	P0182	0.12V -4.57V -30degC to 120degC Detects a sensor circuit short to ground	Fuel temperature<0.07 V - same as - Fuel temperature > 120degC	Ignition On	Diagnostic set conditions true for 1 seconds Test performed continuously at	Fuel temperature sensor	B	
Fuel Temperature Sensor Circuit High Voltage	P0183	0.12V -4.57V -30degC to 120 degC Detects a sensor short to high voltage or sensor circuit open	Fuel temperature > 4.72 V - same as - Fuel temperature < -30degC	Ignition On	Diagnostic set conditions true for 1 seconds Test performed continuously100msec	Fuel temperature sensor	B	

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Fuel Rail Pressure [FRP] Sensor Performance	P0191	0.352V (-7.5 Mpa) < FRP at engine off < 0.65 V (7.7 Mpa) Detects a biased sensor by determining the FRP sensor voltage to be in the correct range for atmospheric pressure at engine off and with sufficient pressure bleed-off time.	PATH 1) FRP voltage < 0.352V (-7.5 Mpa) OR FRP voltage > 0.65V (7.7 Mpa) at ECM initialization PATH 2) FRP voltage < 0.352V (-7.5 Mpa) OR FRP voltage > 0.65V (7.7Mpa) at ECM After -run given bleed off time.	PATH 1) P0016, P062F, P0116, P0117, P0118, P0192, P0193, P0652, P0653 DTCs are not set, ECM in INITIALIZATION status, Engine off timer > 20 min 0 degC <= Coolant temperature <= 120 degC, Engine Speed = 0 rpm PATH 2) P0652, P0653, P0191, P0192, P0193 DTCs are not set, ECM status = AFTERRUN (engine off, ECM still active), fuel temperature ≥ 60 degC, wait timer has elapsed (30-70 seconds after engine shutoff, depending on FRP at shutoff: higher pressure == higher wait time (see chart 2a)	Failure exists for one sample cycle (cycle location either at ECM initialization (PATH1) or during afterrun (PATH2), depending on entry conditions)	Fuel Rail Pressure Sensor (FRP)	A	

Chart 2a

Rail Pressure at engine shut down (MPa)	Engine Off Time (seconds)
200	30
250	50
400	55
1000	60
1150	65
1300	70

Fuel Rail Pressure [FRP] Sensor Circuit Low Voltage	P0192	0.254 V to 4.75 V (-12.44 Mpa to 216.4 Mpa) Detects a Rail Pressure Sensor circuit short to ground	Rail Pressure Sensor voltage < 0.254 V (-12.44 Mpa)	P0652, P0653 DTCs not set	Diagnostic set conditions true for 200 msec Test performed continuously	Rail Pressure Sensor	A	
Fuel Rail Pressure [FRP] Sensor Circuit High Voltage	P0193	0.254 V to 4.75 V (-12.44 Mpa to 216.4 Mpa) Detects a Rail Pressure Sensor short to high voltage or sensor circuit open	Rail Pressure Sensor voltage > 4.75 V (216.4 Mpa)	P0652, P0653 DTCs not set	Diagnostic set conditions true for 200 msec Test performed continuously	Rail Pressure Sensor	A	
P02XX Fuel and Air Metering								
Injector 1 Control Circuit	P0201	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 1	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 2 Control Circuit	P0202	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 2	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 3 Control Circuit	P0203	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 3	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 4 Control Circuit	P0204	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 4	Fault exists for 6 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	cly4 longer detection time required because of unique bank charging time

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Injector 5 Control Circuit	P0205	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 5	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 6 Control Circuit	P0206	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 6	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 7 Control Circuit	P0207	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 7	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 8 Control Circuit	P0208	Electronic out-put driver circuitry determines that the faults (open no load) do not exist.	Electronic out-put driver circuitry determines that the faults (open no load) do exist	Engine running. Injection event is being attempted for Cly 8	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Turbocharger Engine Overboost	P0234	Measured Boost is < (see Worksheet Boost Deviation Map) above desired boost. Detects an Overboost condition or a biased high boost sensor.	Measured Boost is>(see Worksheet Boost Deviation Map) above desired boost Detects an Overboost condition or a biased high boost sensor.	P2564,P2565 DTCs are not set 800 rpm <= Engine RPM <=3600 rpm	Diagnostic fail condition true for 10 second Test performed continuously	MAP Sensor (aka Boost Sensor)	A	
Turbochager Engine Underboost	P0299	Measured Boost is < (see Worksheet Boost Deviation Map) below Desired Boost Detects an underboost condition or a biased low sensor.	Measured Boost is > (see Worksheet Boost Deviation Map) below Desired Boost Detects an underboost condition or a biased low sensor.	P2564,P2565 DTCs are not set 800 rpm <= Engine RPM <=3600 rpm	Diagnostic fail condition true for 10 second Test performed continuously	MAP Sensor (aka Boost Sensor)	A	
Cylinder 1 Injector Leaking	P029D	Cylinder #1, FBC is < -7.0	Cylinder #1, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new
Cylinder 2 Injector Leaking	P02A1	Cylinder #2, FBC is < -7.0	Cylinder #2, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new
Cylinder 3 Injector Leaking	P02A5	Cylinder #3, FBC is < -7.0	Cylinder #3, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new
Cylinder 4 Injector Leaking	P02A9	Cylinder #4, FBC is < -7.0	Cylinder #4, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new
Cylinder 5 Injector Leaking	P02AD	Cylinder #5, FBC is < -7.0	Cylinder #5, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new
Cylinder 6 Injector Leaking	P02B1	Cylinder #6, FBC is < -7.0	Cylinder #6, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new

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Cylinder 7 Injector Leaking	P02B5	Cylinder #7, FBC is < -7.0	Cylinder #7, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle	Monitor FBC (fuel balance control)	B	new
Cylinder 8 Injector Leaking	P02B9	Cylinder #8, FBC is < -7.0	Cylinder #8, FBC is to be > -7.0	RPM 600 - 850, coolant temp > 40c, Fueling < 15mm3, Vehicle speed < 5km/hr.	Diagnostic fail condition true for 1 minute Test performed once per key cycle.	Monitor FBC (fuel balance control)	B	new
Throttle Valve Actuator Solenoid Control Circuit	P02E0	At a 10% or greater TVA duty cycle signal, circuit current > 25 mA	At a 10% or greater EGR duty cycle signal, circuit current < 25 mA	ECM powered up > 0.5sec 10% < TVA Duty Cycle	Diagnostic fail condition true for 1 second Test performed continuously	ECM Electronic out-put driver circuitry	B	new
Throttle Valve Actuator (TVA) Position Sensor Performance	P02E7	Delta from target position < = +/- 3% Delta is the difference between desired TVA position and actual TVA position. TVA is adjusted to achieve desired air flows during regeneration. Detects in range TVA position errors	Delta from target position > = +/- 3%	P02E0,P02E8,P02E9,P0642,P0643 DTCs are not set TVA Actively being controlled	Diagnostic set conditions true for 10 sec. Test performed continously during TVA operation	TVA Position Sensor	B	new
Throttle Valve Actuator (TVA) Position Sensor Circuit low Voltage	P02E8	0.102 v to 4.75 v (0% to 100% position) Detects a sensor circuit Low voltage.	TVA Position sensor >= 0.102 v (0% position)	P0698,P0699 DTCs are not set Ignition on	Diagnostic fail condition true for 3 seconds Test performed continuously	EGR Position Sensor	B	new
Throttle Valve Actuator (TVA) Position Sensor High Voltage	P02E9	0.102 v to 4.75 v (0% to 100% position) Detects a sensor circuit High voltage.	TVA Position sensor <= 4745 mv (100% position)	P0698,P0699 DTCs are not set Ignition on	Diagnostic fail condition true for 3 seconds Test performed continuously	EGR Position Sensor	B	new
P03XX Ignition System or Misfire								
Engine Misfire Detected	P0300	Misfires do not exist on more than one clyinder	Misfires do exist on more than one clyinder	Ignition On	Diagnostic sets on first fail Test performed once per key cycle	Cylinder to Cylinder engine speed. SW Poling of individual cly	B	
Cylinder 1 Misfire Detected	P0301	Cylinder #1 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #1 RPM < minimum average cylinder speed. after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine run time > 12 seconds	Diagnostic fail condition true for 180 revolutions. Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	

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Cylinder 2 Misfire Detected	P0302	Cylinder #2 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #2 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine running time > 10 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	
Cylinder 3 Misfire Detected	P0303	Cylinder #3 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #3 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine running time > 10 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	
Cylinder 4 Misfire Detected	P0304	Cylinder #4 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #4 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine running time > 10 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	
Cylinder 5 Misfire Detected	P0305	Cylinder #5 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #5 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine running time > 10 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATIO N	Note
Cylinder 6 Misfire Detected	P0306	Cylinder #6 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #6 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine cranking > 12 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	
Cylinder 7 Misfire Detected	P0307	Cylinder #7 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #7 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine cranking > 12 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	
Cylinder 8 Misfire Detected	P0308	Cylinder #8 RPM >= minimum average cylinder speed after an injection event. The minimum average cly speed is calculated every 2 rotations and represents the average speed that all cly are rotating at after a combustion event.	Cylinder #8 RPM < minimum average cylinder speed after an injection event for at least 180 counts	1)P0335,P0336,P0117,P0118,P0201,P0202, P0203,P0204,P0205,P0206,P0207,P0208, P2146,P2149,P2152,P2155,P0502,P062C DTCs are not set. 2)Engine is running 3)Coolant temperature >= 40degC 4)500 rpm < Engine speed < 1500 rpm 5) 3 mm3/S < injected fuel < 25 mm3/S 6)vehicle speed<= 3 Kph 7)Engine cranking > 12 seconds	Test performend once per key cycle in a total of 440 revolutions	Cylinder to Cylinder engine speed	B	
Crankshaft Position [CKP] Sensor Circuit	P0335	Receiving valid signals from CKP sensor while CMP sensor is also sending valid signals. Detects crankshaft sensor circuit failure.	CKP edge detection status = FALSE (no digital edge transitions measured in CKP signal.) CKP signal does not match calibrated pattern	P0652, P0653 not set Ignition is ON Engine is running	Failure exists for 20 camshaft phases (4 phases per cam revolution)	Crankshaft Position Sensor (CKP)	A	
Crankshaft Position [CKP] Sensor Performance	P0336	Receiving valid signals from CKP. Detects implausible crankshaft sensor operation (correct pattern not detected).	A.) CKP pattern not yet recognized AND no transitions in CKP signal are seen. OR B	P0652, P0653 not set Ignition is ON, Engine running Engine Speed < 0 rpm for one sample (implies engine CKP speed is being calculated but sign	A.) Failure exists for 312 crankshaft increments B.) Failure exists for 312 increments (elapsed from A.) AND	Crankshaft Position Sensor (CKP)	A	
Camshaft Position [CMP] Sensor Circuit	P0340	Receiving valid signals from CMP sensor while CKP sensor is also sending valid signals. Detects camshaft sensor circuit failure.	CMP edge detection status = FALSE (no digital edge transitions measured in CMP signal.) CMP signal does not match calibrated pattern	P0642, P0643, P0335, P0336 not set Ignition is ON Engine Speed ≥ 50 rpm (implies engine crankshaft speed recognized)	Failure exists for 132 crankshaft increments	Camshaft Position Sensor (CMP)	A	
Camshaft Position [CMP] Sensor Performance	P0341	Receiving valid signals from CMP. Detects implausible camshaft sensor operation (correct pattern not detected).	CKP signal pattern detected as calibrated AND CMP pattern NOT detected as calibrated.	P0335, P0336 not set Ignition is ON Engine Speed ≥ 50 rpm (implies engine crankshaft speed recognized)	Failure exists for 240 crankshaft (CKP) increments.	Camshaft Position Sensor (CMP)	A	

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Wait to Start Lamp (WTS) Control Circuit	P0381	Electronic out-put driver circutry determines that faults (open/short and no load) do not exist on the WTS circuit.	Electronic out-put driver circutry determines faults (open/short and no load) do exist on the WTS circuit.	Lamp must be commanded on for short to battery/open faults. Lamp must be commanded off for shot to ground/no load	Failure exists for 3 sec. Monitoring is continuos	Sensing circuity in the out put drver electronics.	B	
	P04XX EGR System							
Exhaust Gas Recirculation(EGR) Flow Insufficient	P0401	Measured Mass Air Flow values < 60 mg/cly above Desired MAF values. Measured MAF verses Desired MAF indicates EGR flow. When Measured MAF is above Desired MAF, EGR flow has been reduced. **Conversion** is (mg/cly) / (RPM/15) = grams per second	Measured Mass Air Flow values ,60 mg/cly above Desired MAF values.	P0101,P0102,P0103,P0403,P0405,P0406 DTCs are not set. EGR Actively being controlled	Diagnostic fail condition true for 15 seconds Test performed continuously	Mass Airflow sensor	B	
Exhaust Gas Recirculation(EGR) Flow Excessive	P0402	Measured Mass Air Flow values < 50 mg/hub below Desired MAF values. Measured MAF verses Desired MAF indicates EGR flow. When Measured MAF is below Desired MAF, EGR flow has been increased. **Conversion** is (mg/cly) / (RPM/15) = grams per second	Measured Mass Air Flow values > 50 mg/hub below Desired MAF values.	P0101,P0102,P0103,P0403,P0405,P0406 DTCs are not set EGR Actively being controlled	Diagnostic fail condition true for 15 seconds Test performed continuously	Mass Airflow sensor	B	
Exhaust Gas Recirculation (EGR) Solenoid Control Circuit	P0403	At a 10% or greater EGR duty cycle signal, circuit current > 25 mA	At a 10% or greater EGR duty cycle signal, circuit current < 25 mA	ECM Power Up Time > 0.5sec Engine running 10% < EGR Duty Cycle	Diagnostic fail condition true for 1 second Test performed	ECM Electronic out-put driver circuitry	B	
Exhaust Gas Recirculation(EGR) Position Sensor Circuit Low Voltage	P0405	0.254 v to 4.75 v (0% to 100% position) Detects a sensor circuit Low voltage.	EGR Position sensor <= 254 mv (0% position)	P0698,P0699 DTCs are not set Ignition on	Diagnostic fail condition true for 3 seconds Test performed	EGR Position Sensor	B	
Exhaust Gas Recirculation(EGR) Position Sensor Circuit High Voltage	P0406	0.254 v to 4.75 v (0% to 100% position) Detects a sensor circuit High voltage.	EGR Position sensor >= 4745 mv (100% position)	P0698,P0699 DTCs are not set Ignition on	Diagnostic fail condition true for 3 seconds Test performed	EGR Position Sensor	B	
Catalyst System Low Efficiency	P0420	DOC out temp > 540 deg C at the start of regen.	DOC out temp < 540deg C at the start of regen.	Must be in Regen	Diagnostic set when conditions true for 10 min. Test performed once per regen event	Exhaust Gas Temp sensor (DOC out)	A	new
Fuel Level Sensor 1 Performance	P0461	Difference between Maximum fuel volume and Minimum fuel volume > 3 Liters.	PATH1:Difference between Maximum fuel volume and Minimum fuel volume < 3 Liters. AND Difference between current vehicle driven distance and vehicle distance at beginning of diagnostic > =160 Km OR PATH2:Initial volume in tank 1 – current volume in tank 1 < 0.8 L AND Initial volume in tank 2 – current volume in tank 2 >=0.8 L	PATH1:P0462,P0463 not set Engine run time > 10 secIgnition is ON Transfer pump is OFF PATH2:P0461,P0462,P0463,P2067,P2068 not set Fuel transfer pump ON for 200 seconds vehicle speed <=0	Monitor time is 100msec. Continuous	Fuel Level 1 Fault Detection	B	new

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Fuel Level Sensor 1 Circuit Low	P0462	0.2V to 4.81V Detects circuit faults which causes the fuel level voltage to fall below 200mV	fuel level 1 voltage < 0.2V	Ignition on Engine run time > 1 sec or Powerup time > 1 sec	Monitor time is 100msec. Continuous	Fuel Level 1 Fault Detection	B	new
Fuel Level Sensor 1 Circuit High	P0463	0.2V to 4.81V Detects circuit faults which causes the fuel level voltage to rise above 4.8 V	fuel level 2 voltage > 4.8V	Ignition on Engine run time > 1 sec or Powerup time > 1 sec	Monitor time is 100msec. Continuous	Fuel Level 1 Fault Detection	B	new
Exhaust Gas Recirculation(EGR) Position Sensor Performance	P046C	Delta from target position < = +/- 3% Delta is the difference between desired EGR position and actual EGR position. Detects in range EGR valve positi	Delta from target position > = +/- 3%	P0401,P0402,P0403,P0642,P0643 DTCs are not set EGR Actively being controlled	Diagnostic set conditions true for 5 sec. Test performed continously during EGR	EGR Position Sensor	B	
Cooling Fan Speed Output Circuit	P0480	Electronic out-put driver circutry determines that faults (open/short and no load) do not exist on the Fan Speed Output circuit.	Electronic out-put driver circutry determines that faults (open/short and no load) do exist on the Fan Speed Output circuit.	Cooling Fan must be commanded on for short to battery/open faults. Cooling Fan must be commanded off for shot to ground/no load	Failure exists for 3 sec. Monitoring is continuos 20msec rate	Sensing circuity in the out put drIver electronics.	B	new
Cooling Fan System Performance	P0483	(Actual Cooling Fan Speed - Commanded Cooling Fan Speed) is <+/- 500 rpm.	(Actual Cooling Fan Speed - Commanded Cooling Fan Speed) is < +/- 500 rpm.	Cooling Fan Output Driver Duty Cycle > 35% Cooling Fan Input Shaft speed < 6000 rpm	30 seconds of weighted, acumulated difference. Monitoring is	Cooling Fan speed sensor	B	new
Cooling Fan Speed High	P0495	Cooling Fan Speed is within a tolerance of the Cooling Fan Input speed as indicated in worksheet P0495 Tables dragspeed.	Cooling Fan Speed is not within a tolerance of the Cooling Fan Input speed as indicated in worksheet P0495 tables drag speed.	Cooling Fan Output Driver Duty Cycle < 35% Cooling Fan clutch fluid model indicates < 6ml in fan clutch working chamber AND Cooling Fan Input Speed > 1500 rpm	Diagnostic set conditions true for timer dependent on altitude (see Worksheet P0495 tables pump out times) Test performed continutously.	Cooling Fan speed sensor	B	new
Idle Speed Too Low	P0506	Actual Engine Speed < 100 rpm below TargetTarget Idle Speed	Actual Engine Speed > 100 rpm below TargetTarget Idle Speed	No Related fault code set(P0016,P0117,P0118,P0335,P0336) Engine is running Engine RPM > 300 Idle governor is enabled and requesting torque Engine Coolant Temp > 40 degC	Diagnostic set for 20 seconds. Samples taken every 100msec	Monitoring Engine Speed	B	Idle Speed Too Low
Idle Speed Too High	P0507	Actual Engine Speed < 200 rpm above TargetTarget Idle Speed	Actual Engine Speed > 200 rpm above TargetTarget Idle Speed	No Related fault code set(P0016,P0117,P0118,P0335,P0336,) Engine is running Engine RPM > 300 Idle governor is enabled and requesting torque Engine Coolant Temp > 40 degC	Diagnostic set for 20 seconds. Samples taken every 100msec	Monitoring Engine Speed	B	Idle Speed Too High
Cooling Fan Speed Sensor Circuit	P0526	Fan speed pulses present Detects lack of target wheel pulses	No pulses detected	Engine running	Diagnostic set conditions true for 1.19 seconds. Test performed	Fan Speed Sensor	B	new

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Exhaust Gas Temperature (EGT) Sensor 1 Circuit Low Voltage	P0545	0.318 v - 3.37 v (-40 degC - 1000 degC) Detects EGT 1 sensor circuit short to ground	Exhaust Temp Sensor 1 Signal <0.318 v same as -40 degC	Ignition on	Diagnostic fail condition true for 1 sec Test performed continuously	Exhaust Gas Temperature sensor 1	A	new
Exhaust Gas Temperature (EGT) Sensor 1 Circuit High Voltage	P0546	0.318 v - 3.37 v (-40 degC - 1000 degC) Detects EGT 1 sensor circuit short to high voltage or sensor circuit open.	Exhaust Temp Sensor 1 Signal > 3.37 v same as 1000 degC	Ignition on	Diagnostic fail condition true for 1sec Test performed continuously	Exhaust Gas Temperature sensor 1	A	new
	P06XX Computer and Auxiliary Outputs							
Control Module Not Programmed	P0602	ECM is programmed.	ECM is not programmed (K_Check_Service_Calibration = TRUE.)	Ignition on	Run every key cycle		A	
Control Module Internal Performance	P0606	ECM is operating correctly at proper voltage. All internal hardware modules are communicating correctly. Injector power stages can be properly shut off by ECM during start-up test. Internal watchdog module reports that microprocessor responds to querie	PATH1: Microprocessor overvoltage is detected by hardware-based diagnositcs. PATH3: Internal SPI bus communication error detected in hardware. PATH4: Redunudant injector shut-off path tests faulted during engine startup (test to confirm that ECM can disable injection successfully). PATH5: Internal watchdog module (seperate HW) reports calculation and/or timing error with microprocessor. PATH6: Injector on-time > 220 microseconds (i.e. still torque-producing) is still being commanded after the driver has released the accelerator pedal and all applicable debounce timers that account for torque interventions have elapsed. PATH7: An ECM recovery has been triggered	PATH1: None. PATH2: None. PATH3: None.	PATH1: Continuous PATH2: Continuous PATH3: Continuous PATH4: Continuous	ALL: Internal ECM Hardware Fault Detection	A	
Control Module Analog to Digital Performance	P060B	ADC is correctly converting signals within the correct time periods.	Converted ADC voltage from special channel connected to 3.5V microprocessor supply >= 3.87V OR <= 3.37V OR	ECM powered up Engine speed >= 400rpm for engine - speed sync ADC queue test APP2 test impulse carried out for APP2	Continuous	Analog to Digital Converter	A	
Internal Control Module Engine RPM Performance	P061C	Main and redundant engine speed calculations agree. Detects failure in engine speed calculation through redundant calculation	Difference between CKP engine speed and redundantly-calculated engine speed > 320 rpm	Engine speed < 1300 rpm.	Failure exists for 880 ms.	Crankshaft Position Sensor (CKP)	A	
TPU error on VSS signal	P062C	Electronic ECM circuitry determines that faults related to the TPU chip used to calculate Vehicle speed do not exist.	Electronic ECM circuitry determines that faults related to the TPU chip used to calculate Vehicle speed do exist.	Ignition on	Failure exists for 1 sec. Monitoring is continuos	ECM electronic circuitry	A	
Control Module Long Term Memory Performance	P062F	Each data block of memory is read for a check sum error and flags a fault is found.		Ignition on	once at key-up	ECM Hardware Fault Detection	A	
Intake Air (IA) Heater Switch/Control Circuit	P0640	digital response signal = low when heartbeat signal is activated	digital response signal = high when heartbeat signal is activated	1)IAH Commanded OFF 2)11.7 = FALSE	Monitor time is 650msec. Test is conducted every 2 seconds	Monitored by GPCM and message transferred by	B	new

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
5 Volt Reference 1 Circuit Low Voltage	P0642	4.86V to 5.1V Detects circuit faults which lower the 5V reference 1 supply voltage out of regulation	5 Volt Reference 1 < 4.86V	Ignition on	Monitor time is 160msec. Continuous	ECM Hardware Fault Detection	A	
5 Volt Reference 1 Circuit High Voltage	P0643	4.86V to 5.1V Detects circuit faults which raise the 5V reference 1 supply voltage out of regulation	5 Volt Reference 1 > 5.1V	Ignition on	Monitor time is 160msec. Continuous	ECM Hardware Fault Detection	A	
Glow Plug Control Module Performance	P064C	P064C Error Message not received from the Glow Plug Control Module via GMLAN	P064C Error Message received from the Glow Plug Control Module via GMLAN indicating one or more of the conditions below; 1) Any of the 8 glow plug switches is defective 2)No IGN1 voltage 3)GPCM is overtemp 4)GPCM is overvoltage or undervoltage 5)Internal voltage supply to the Intake Air heater is too low 6)Difference between IGN1 and KI 30 (Battery) voltage is too high 7)Difference between battery voltage measured by ECM and battery voltage measured by the GPCM is too high	Ignition on	Monitor time is 3000msec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the ECM	B	
Malfunction Indicator Lamp (MIL) Control Circuit	P0650	Electronic out-put driver circutry determines that faults (open/short and no load) do not exist on the MIL circuit.	Electronic out-put driver circutry determines faults (open/short and no load) do exist on the MIL circuit.	Lamp must be commanded on for short to battery/open faults. Lamp must be commanded off for shot to ground/no load	Fault exists for 2 sec monitored continuosly	ECM electronic circuitry	A	
5 Volt Reference 2 Circuit Low Voltage	P0652	4.86V to 5.1V Detects circuit faults which lower the 5V reference 2 supply voltage out of regulation	5 Volt Reference 2 < 4.86V	Ignition on	Monitor time is 160msec. Continuous	ECM Hardware Fault Detection	A	
5 Volt Reference 2 Circuit High Voltage	P0653	4.86V to 5.1V Detects circuit faults which raise the 5V reference 2 supply voltage out of regulation	5 Volt Reference 2 > 5.1V	Ignition on	Monitor time is 160msec. Continuous	ECM Hardware Fault Detection	A	
Cylinder #1 Glow Plug Control Circuit	P0671	P0671 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #1 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
Cylinder #2 Glow Plug Control Circuit	P0672	P0672 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #2 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the ECM	B	

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Cylinder #3 Glow Plug Control Circuit	P0673	P0673 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #3 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
Cylinder #4 Glow Plug Control Circuit	P0674	P0674 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #4 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
Cylinder #5 Glow Plug Control Circuit	P0675	P0675 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #5 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
Cylinder #6 Glow Plug Control Circuit	P0676	P0676 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #6 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
Cylinder #7 Glow Plug Control Circuit	P0677	P0677 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #7 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
Cylinder #8 Glow Plug Control Circuit	P0678	P0678 Error Message not received from the Glow Plug Control Module via GMLAN indicating an error on Cyl #8 Glow Plug	1)Glow Plug line is open 2)Glow Plug line is shorted 3)Glow Plug line high resistance 4)Glow Plug line low resistance SEE "GPCM Cert Doc" worksheet	Ignition on Glow plugs commanded on	Monitor time is 1 sec. Frequency is every 250msec.	GPCM detects the faults and sends serial data message via GMLAN to the	B	
5 Volt Reference 3 Circuit Low Voltage	P0698	4.86V to 5.1V Detects circuit faults which lower the 5V reference 3 supply voltage out of regulation	5 Volt Reference 3 < 4.86V	Ignition on	Monitor time is 160msec. Continuous	ECM Hardware Fault Detection	A	
5 Volt Reference 3 Circuit High Voltage	P0699	4.86V to 5.1V Detects circuit faults which raise the 5V reference 3 supply voltage out of regulation	5 Volt Reference 3 > 5.1V	Ignition on	Monitor time is 160msec. Continuous	ECM Hardware Fault Detection	A	
P07XX-P08XX Transmission								
Transmission Control Module (TCM) Requested MIL Illumination	P0700	Serial Data communication from the TCM indicates a fault exists with the transmission.	Serial Data communication from the TCM indicates no faults exists with the transmission.	Ignition on	active on first message received. Monitored continuosly	GMLAN Bus	A	

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Park/Neutral Position (PNP) Switch Circuit Low Voltage	P0851	GMLAN Message for PNP position indicates park nuetral position and agrees with ECM sensed position based on PNP switch inputs to	GMLAN Message for PNP position indicates park nuetral and dis-agrees with ECM sensed position based on PNP switch inputs to ECM	11v < Battery voltage < 18v , No GMLAN error messages, P0852 not active Ignition on	Failure being transmitted for 5 sec. Checked continuosly	GMLAN, PNP switch inputs to ECM	B	
Park/Neutral Position (PNP) Switch Circuit High Voltage	P0852	ECM sensed position based on PNP switch inputs to ECM indacates not park or nuetral.	ECM sensed position based on PNP switch inputs to ECM indacates park or nuetral.	Engine speed > 650rpm, Vehicle speed > 24kPH, Actual Engine Torque > 120 newton meters, 11v < Battery voltage < 18v, No GMLAN error messages, P0851	Failure being transmitted for 5 sec. Checked continuosly	GMLAN, PNP switch inputs to ECM	B	
P12XX-P22XX Fuel and Air Metering and Auxiliary Emission Controls								
Injector 1 Control Circuit Shorted	P1224	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 1	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 2 Control Circuit Shorted	P1227	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 2	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 3 Control Circuit Shorted	P122A	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 3	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 4 Control Circuit Shorted	P1233	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 4	Fault exists for 6 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	cly4 longer detection time required because of unique bank charging time
Injector 5 Control Circuit Shorted	P1236	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 5	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 6 Control Circuit Shorted	P1239	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 6	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 7 Control Circuit Shorted	P1242	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 7	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector 8 Control Circuit Shorted	P1247	Electronic out-put driver circuitry determines that the faults (short load) do not exist.	Electronic out-put driver circuitry determines that the faults (short load) do exist	Engine running. Injection event is being attempted for Cly 8	Fault exists for 3 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Diesel Particulate Filter Regeneration Frequency Too Low	P1448	Average time between DPF regenerations > 20 hours	Running average of time between *completed* DPF regens (with idle time subtraced out) > 20 hours.	Engine running	Diagnostic fail condition true 1 time. Test performed continuously.	Running average of the time between completed DPF regenerations.	A	new
Intake Air (IA) Heater Feedback Circuit	P154A	digital response signal = high	digital response signal = low and current IAH > 20 A	1)IAH Commanded ON 2)Battery Voltage at IAH > 8.6 Volt	Monitor time is 650msec. Frequency is every 10msec.	Monitored by GPCM and message transferred by	B	new

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Intake Air (IA) Heater Voltage Signal Circuit	P154B	6.9 volts <= IAH Battery voltage <= 16.0 volts	IAH Battery voltage > 16.0 Volt AND 8.0 volts < GPCM Battery voltage GPCMKL30 < 16.0 Volt	1)IAH Commanded ON	Monitor time is 650msec. Frequency is every 10msec.	Monitored by GPCM and message transferred by	B	new
Intake Air (IA) Heater Current Signal Circuit	P154C	No failures detected on the IAH line current	IAH current line detected open, shorted to ground or shorted to battery	1)IAH Commanded ON 2)Battery Voltage at IAH > 6.9 Volt 3)GPCM Ignition voltage >= 6.9 Volt	Monitor time is 320 msec. Frequency is every 10msec.	Monitored by GPCM and message transferred by	B	new
Intake Air (IA) Heater Temperature Signal Circuit	P154D	No failures detected on the temperature signal	IAH temperature line detected open, shorted to ground or shorted to battery	1)IAH Commanded ON 2)6.9 volts < Battery Voltage at IAH > 16.0 volts	Monitor time is 650msec. Frequency is every 10msec.	Monitored by GPCM and message transferred by	B	new
Engine Calibration Information Not Programmed – GPCM	P160C	P160C Error Message not received from the Glow Plug Control Module via GMLAN	P160C Error Message received from the Glow Plug Control Module via GMLAN indicating IQA data has not been programmed in the GPCM	Ignition ON	Monitor time is 1 second. Frequency is every 160msec.	GPCM detects the fault and sends serial data message via GMLAN to the	A	
Diesel Particulate Filter Efficiency Below Threshold Bank 1	P2002	Res flow > f(Delta Pressure and exhaust flow) (see Chart 3A below) detects 8X the standard.	Res flow < f(Delta Pressure and exhaust flow) (see Chart 3A below) detects 8X the standard.	Time since successful regen < = 600 seconds. Distance since successful regen <= 18.6 Miles. Accumulated soot <= 15 grams.	Diagnostic set when conditions true for 30 sec. Test performed after a regen	DPF Delta pressure sensor	A	new

Chart 3a

Volume of exhaust Flow in meters^3 / hours	Calculated Res Flow= DPF Delta pressure / exhaust flow in hPa/(meters^3/hours)
0	-0.0418
25	-0.0418
50	-0.0418
100	-0.0418
200	-0.0418
400	-0.0418
1000	-0.0468
1001	-0.0468
1002	-0.0468
1600	-0.0518
1601	-0.0518
1602	-0.0518
1800	-0.0518
2000	-0.0518
2200	-0.0518
2400	-0.0518

Exhaust Gas Temperature (EGT) Sensor 2 Circuit Low Voltage	P2032	0.318 v - 3.37 v (-40 degC - 1000 degC) Detects EGT 2 sensor circuit open or short to ground	Exhaust Temp Sensor 2 Signal <0.318 v same as -40 degC	Ignition on	Diagnostic fail condition true for 1 sec Test performed continuously	Exhaust Gas Temperature sensor 2	A	new

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SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Exhaust Gas Temperature (EGT) Sensor 2 Circuit High Voltage	P2033	0.318 v - 3.37 v (-40 degC - 1000 degC) Detects EGT 2 sensor circuit open or short to ground	Exhaust Temp Sensor 2 Signal > 3.37 v same as 1000 degC	Ignition on	Diagnostic fail condition true for 1 sec Test performed continuously	Exhaust Gas Temperature sensor 2	A	new
Fuel Level Sensor 2 Performance	P2066	Initial volume in tank 2 – current volume in tank 2 >=0.8 L	Initial volume in tank 2 – current volume in tank 2 < 0.8 L	PATH1:P0462,P0463 not set Engine run time > 10 sec, Transfer pump is OFF PATH2:P0461,P0462,P0463,P2067,P2068 not set Fuel transfer pump ON for 240 seconds OR tank indication < 72 L vehicle speed <=0	Monitor time is 100msec. Continuous	Fuel Level 2 input	B	ok
Exhaust Gas Temperature (EGT) Sensor 1-2 Correlation	P20E2	absolute value of (Startup Exhaust Gas Temperature 1 Sensor - Startup Exhaust Gas Temperature 2 Sensor) < 12 degC.	absolute value of (Startup Exhaust Gas Temperature 1 Sensor - Startup Exhaust Gas Temperature 2 Sensor) > 12 degC.	P0545,P0546,P2032,P2033 DTCs are not set. Engine Off Timer > 5 hrs	Diagnostic sets on first fail Test performed once per key cycle	EGT Temperature sensor 1 and EGT Temperature sensor 2	B	new
Accelerator Pedal Position (APP) Sensor 1 Circuit Low Voltage	P2122	0.806 volt to 4.75 volts Detects a sensor circuit short to ground	Accelerator pedal supply voltage <= 0.806 volts	P2122, P2123 are not currently set No sensor supply errors. No A-to-D pulse test Ignition ON	Diagnostic fail conditions true for 0.24 seconds Test performed continuously 100msec	Accelerator pedal sensor 1	C	
Accelerator Pedal Position (APP) Sensor 1 Circuit High Voltage	P2123	0.806 volt to 4.75 volts Detects a sensor circuit short high voltage or a sensor circuit open	Accelerator pedal supply voltage >= 4.75 volts	P2122, P2123 are not currently set No sensor supply errors. No A-to-D pulse test Ignition ON	Diagnostic fail conditions true for 0.24 seconds Test performed continuously 100msec	Accelerator pedal sensor 1	C	
Accelerator Pedal Position (APP) Sensor 2 Circuit Low Voltage	P2127	0.308 volt to 2.5 volts Detects a sensor circuit short to ground	Accelerator pedal supply voltage <= 0.308 volts	P2127, P2128 are not currently set No sensor supply errors. No A-to-D pulse test Ignition ON	Diagnostic fail conditions true for 0.24 seconds Test performed continuously 100msec	Accelerator pedal sensor 2	C	
Accelerator Pedal Position (APP) Sensor 2 Circuit High Voltage	P2128	0.308 volt to 2.5 volts Detects a sensor circuit short high voltage or a sensor circuit open	Accelerator pedal supply voltage >= 2.5 volts	P2127, P2128 are not currently set No sensor supply errors. No A-to-D pulse test Ignition ON	Diagnostic fail conditions true for 0.24 seconds Test performed continuously 100msec	Accelerator pedal sensor 2	C	
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	P2138	0.806 volt to 4.75 volts Detects a sensor 1 to sensor 2 correlation error	Accelerator pedal sensor 1 & 2 differ by more than 2%.	P2122, P2123, P2127, P2128 are not currently set. No sensor supply errors. Ignition ON	Diagnostic fail conditions true for 0.3 seconds Test performed continuously 100msec	Accelerator pedal sensor 1 & 2	C	
Injector Positive Voltage Control Circuit Group 1	P2146	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist	Electronic out-put driver circuitry determines the faults (open/short/no load) do exist	Engine running. Injection event is being attempted for injectors 1&4 connected to bank 1	Fault exists for 6 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Injector Positive Voltage Control Circuit Group 2	P2149	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist	Electronic out-put driver circuitry determines the faults (open/short/no load) do exist	Engine running. Injection event is being attempted for injectors 7&6 connected to bank 2	Fault exists for 6 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector Positive Voltage Control Circuit Group 3	P2152	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist	Electronic out-put driver circuitry determines the faults (open/short/no load) do exist	Engine running. Injection event is being attempted for injectors 2&5 connected to bank 3	Fault exists for 6 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Injector Positive Voltage Control Circuit Group 4	P2155	Electronic out-put driver circuitry determines the faults (open/short/no load) do not exist	Electronic out-put driver circuitry determines the faults (open/short/no load) do exist	Engine running. Injection event is being attempted for injectors 8&3 connected to bank 4	Fault exists for 6 msec. Monitored continuosly	ECM Injector Electronic out-put driver circuitry	A	
Engine Coolant Temperature (ECT) Sensor 2 Circuit Low Voltage	P2184	0.065 V to 4.75 V -40degC to 150 degC Detects a sensor circuit short to ground	Coolant Temperature Sensor voltage <= 0.065 volt -same as- Coolant Temperature>150degC	Ignition On	Diagnostic set conditions true for 15 second Test performed continuously 100msec rate	Coolant Temperature Sensor	B	new
Engine Coolant Temperature (ECT) Sensor 2 Circuit High Voltage	P2185	0.065 V to 4.75 V -40degC to 150 degC Detects a sensor circuit short high voltage or a sensor circuit open	Coolant Temperature Sensor voltage >= 4.8 V -same as- Coolant Temperature >-40 degC	Ignition On	Diagnostic set conditions true for 60 second Test performed continuously 100msec rate	Coolant Temperature Sensor	B	new
Barometric Pressure (BARO) Circuit Low Input	P2228	1.5 v - 4.8 v (60kPA - 120kPa) Detects Baro sensor circuit open or grounded	Baro Sensor Signal <1.5 v	P0652,P0653 DTCs not set Ignition On	Diagnostic fail condition true for 800msec Test performed continuously	Barometric Pressure (Baro) Sensor	B	
Barometric Pressure (BARO) Circuit High Input	P2229	1.5 v - 4.8 v (60kPA - 120kPa) Detects Baro sensor circuit shorted to high voltage	Baro Sensor Signal >4.8v	P0652,P0653 DTCs not set Ignition On	Diagnostic fail condition true for 800msec Test performed continuously	Barometric Pressure (Baro) Sensor	B	
Diesel Particulate Filter Differential Pressure Too High	P244B	Differential pressure less than a calibration map See Worksheet 244B Temp Map.	Differential pressure sensor > calibration map based on exhaust flow rate and DPF temperature	Engine running	Diagnostic fail conditions true for 30 sec. Test performed continuously	Differential pressure sensor	A	new
Catalyst Temperature Too Low During Regeneration	P244C	Exhaust temperature before the DPF below the control target temperature. See Worksheet 244C Target Temp Map.	Exhaust temperature sensor before the DPF below the control target temperature by 75 Deg C.	Control system in active DPF regeneration	Diagnostic fail conditions true for 45 sec. Test performed continuously.	Exhaust temperature sensor before the DPF	B	new
Catalyst Temperature Too High During Regeneration	P244D	Exhaust temperature before the DPF above the control target temperature. See Worksheet 244C Target Temp Map.	Exhaust temperature sensor before the DPF above the control target temperature by 100 Deg C.	Control system in active DPF regeneration	Diagnostic fail conditions true for 5 min. Test performed continuously.	Exhaust temperature sensor before the DPF	B	new

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Diesel Particulate Filter Differential Pressure Sensor Performance	P2453	1. Not more than + or - 41 hPa from the differential pressure sensor value with engine off. 2. Or sensor detects and increase in pressure with increase in exhaust flow. 3. Or sensor detects and decrease in pressure with decrease in exhaust flow. 4. Or sensor does not reads less than -20 hPa with engine on.	1. abs(Differential pressure sensor signal) > 41 hPa. 2. Or Differential pressure sensor signal < -20 hPa. 3. Or Differential pressure sensor gradient > 6 hPa/sec. 4. Or Differential pressure sensor gradient < -6 hPa/sec.	1. Engine off. 2. Engine running. 3. When a change in the exahust flow gradient > 200 m^3/h/sec. 4. When a change in the exhausf flow gradient < -200 m^3/h/sec.	1. Fail conditions true for 500 msec. Test performed once during ECM power down. 2. Fail conditions true for 4 sec. Test performed continuously. 3. Fail conditions true for 900 msec. Test performed continuously	Differential pressure sensor	A	new
Diesel Particulate Filter Differential Pressure Sensor Circuit Low Voltage	P2454	0.273 v - 4.745 v (-144 hPA to 1000 hPa) Detects differential pressure sensor circuit short to low voltage	Differential pressure sensor signal < .273 v	Ignition On	Diagnostic fail condition true for 3.75 seconds. Test performed continuously	Differential pressure sensor	A	new
Diesel Particulate Filter Differential Pressure Sensor Circuit High Voltage	P2455	0.273 v - 4.745 v (-144 hPA to 1000 hPa) Detects differential pressure sensor circuit short to high voltage	Differential pressure sensor signal > 4.745 v	Ignition On	Diagnostic fail condition true for 3.75 seconds. Test performed continuously	Differential pressure sensor	A	new
Diesel Particulate Filter Regeneration Frequency Too High	P2459	Average time between DPF regenerations < 2 hours 45 min.	Running average of the time between *completed* DPF regens < 2 hours 45 min.	Engine running, after a completed regeneration.	Diagnostic fail condition true 1 time. Test performed continuously.	Time in active DPF regeneration.	A	new
Diesel Particulate Filter - Soot Accumulation	P2463	DPF has accumulated < 70 grams of particulates	DPF has accumulated >= 70 grams of particulates	Engine running	Diagnostic fail condition true for 30sec. Test performed continuosly	DPF Delta pressure sensor	A	new
P25XX Auxiliary Inputs								
ECM Power Relay Circuit	P2510	Relay is responding corectly to ECM command to turn off.	Relay is responding incorrectly to ECM command to turn off.	Engine has tranistioned from start to run or After run (Power down) has occurred	Diagnostic set conditions !st failure Test performed twice a drive cycle	Updates to the EEPROM Variables.	A	
Turbocharger Boost Control Position Sensor Performance	P2563	Delta from target turbo vane position < +/- 15%. Delta is the difference between desired turbo vane position and the actual turbo vane position. Detects turbo vane position	Delta from target turbo vane position > +/- 15%.	P0045, P2564 Engine Run time>30 sec	Diagnostic set conditions true for for 5 seconds Test performed continuosly	Turbocharger Vane Position Sensor.	B	
Turbocharger Boost Control Position Sensor Circuit Low Voltage	P2564	0.277 v to 4.780 v (0% to 100% position) Detects Turbocharger Vane Position sensor circuit open and shorted to ground	Turbocharger Vane Position Sensor Signal < 0.277v	Engine Run time>3sec	Diagnostic set condition true for 1Seconds Test performed continuously	Turbocharger Vane Position Sensor.	B	

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Turbocharger Boost Control Position Sensor Circuit High Voltage	P2565	0.277 v to 4.780 v (0% to 100% position) DetectsTurbocharger Vane Position sensor circuit shorted to high voltage voltage	Turbocharger Vane Position Sensor Signal > 4.78v	Engine Run time>3sec	Diagnostic set condition true for 1 seconds Test performed continuously	Turbocharger Vane Position Sensor.	B	
P26XX Computer and Auxiliary Outputs								
Control Module Ignition Off Timer Performance	P2610	ignition off time delta = 1sec AND ignition off timer >= 0 sec AND ignition off timer <= 10 sec AND timer is incrementing Detects a faulty Ignition off Timer circuit.	Ignition off timer reads < 0 sec OR Ignition off timer reads <=5 sec >10 sec OR timer unchanged for 60 sec OR	ECM powered up	Diagnostic set conditions 1st failure Test performed once during drive cycle and once at after run	SW calculation	B	
Fuel Transfer Pump Flow Insufficient	P2636	Initial volume in tank 1 – current volume in tank 1 >= 0.8 L AND Initial volume in tank 2 – current volume in tank 2 >= 0.8 L	Initial volume in tank 1 – current volume in tank 1 < 0.8 L AND Initial volume in tank 2 – current volume in tank 2 < 0.8 L	P0461,P0462,P0463,P2067,P2068 not set Transfer pump is ON for 200 seconds	Monitor time is 100msec. Continuous	Transfer pump Fault Detection	B	new
Fuel Injector Calibration Not Programmed	P268A	Injector Calibration Data (IQA) is programmed in the ECM	Injector Calibration Data (IQA) is not programmed in the ECM	Ignition on	Diagnostic set conditions 1st failure Test performed once at key-up	SW calculation	A	
Cylinder 1 Injector Data Incorrect (IQA)	P268C	Cylinder #1, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #1 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
Cylinder2 Injector Data Incorrect (IQA)	P268D	Cylinder #2, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #2 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
Cylinder 3 Injector Data Incorrect (IQA)	P268E	Cylinder #3, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #3 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
Cylinder 4 Injector Data Incorrect (IQA)	P268F	Cylinder #4, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #4 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
Cylinder 5 Injector Data Incorrect (IQA)	P2690	Cylinder #5, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #5 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new

SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION	Note
Cylinder 6 Injector Data Incorrect (IQA)	P2691	Cylinder #6, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #6 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
Cylinder 7 Injector Data Incorrect (IQA)	P2692	Cylinder #7, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #7 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
Cylinder 8 Injector Data Incorrect (IQA)	P2693	Cylinder #8, IQA values are to be = between ECM and GPCM for successful pass	Cylinder #8 IQA values are not = between ECM and GPCM	NONE	Runs continuously at key on, engine run	Compare IQA values stored in ECM and GPCM. Must be equal to pass	A	new
UXXXX Communications								
Lost communications with Transmission Control System	U0101	ECM reports no loss of communication with the TCM	PATH 1)The ECM fails to receive messages $19D, $0F9, $1F5, $4C9 or $199 PATH 2) Rolling counts for messages $199 or $19D are not increasing by one.	Ignition on	Monitor time is 1000msec. Frequency is every 160msec.	CAN Message from the TCM	A	
Lost Communications with Glow Plug Control Module	U0106	ECM reports no loss of communication with the GPCM	PATH 1)The ECM fails to receive message $3BD. PATH 2)GPCM reports message $3B9 from ECM is missing	Ignition on	Monitor time is 1000msec. Frequency is every 160msec.	Message from GPCM and ECM signal indicating loss of	B	

LOOK-UP Tables

Boost Deviation Map

AirCtl_mMaxDvt_MAP

y/x	40	1800	2000	3000	4000
1	400	400	100	300	400
20	400	400	100	300	400
40	400	400	100	300	400
80	400	400	400	400	400
125	400	400	400	400	400

AirCtl_mMinDvt_MAP

y/x	40	1800	2000	3000	4000
1	-400	-400	100	300	-400
20	-400	-400	100	300	-400
40	-400	-400	100	300	-400
80	-400	-400	-400	-400	-400
125	-400	-400	-400	-400	-400

P0495--LOOK-UP TABLE

Coolant Temp °C	Barometric pressure 760 hpa (>= 8000 ft)	761 hpa (7966 ft)	805 hpa (6500 ft)	850 hpa (5000 ft)	910 hpa (3000 ft)	990 hpa (1000 ft)	1000 hpa
-6.68	27min	27	27	27	27	27	27
-6.67	27	19	17	14	12	11	10
0	27	19	17	14	12	11	10
30	27	19	17	14	12	11	10
60	27	19	17	14	12	11	10
90	27	19	17	14	12	11	10
120	27	19	17	14	12	11	10

Fan Input Speed	400	800	1200	1600	2000	2400	2800	3600	4000
Fan Speed	400	800	1200	1500	1500	1500	1700	1750	1750

4400	4800	5200	5600	6000	6400	6800
1750	1750	1750	1750	1750	1750	1750

244B Temperature Map

Diesel Particulate Filter Differential Pressure Too High cal m

Exhaust flow rate [m^3/hr]	DPF Surface Tempera								
	100	**200**	**275**	**300**	**325**	**350**	**375**	**400**	**425**
100	56	56	56	60	80	31	31	36	1000
300	77	94	108	95	113	113	119	103	129
400	113	134	149	131	160	165	165	134	170
500	144	184	180	178	191	196	206	159	216
600	186	234	216	224	237	247	253	184	268
700	222	247	268	274	278	294	299	233	314
900	299	335	356	479	371	381	392	326	407
1100	366	443	469	577	490	500	510	526	531
1300	495	536	567	706	593	603	634	644	655
1500	613	655	691	897	722	732	742	763	778
1700	613	794	876	1000	912	923	917	928	938
1900	613	794	1000	1000	1000	1000	1000	1000	1000
2100	613	794	1000	1000	1000	1000	1000	1000	1000
2400	613	794	1000	1000	1000	1000	1000	1000	1000
2700	613	794	1000	1000	1000	1000	1000	1000	1000
3000	613	794	1000	1000	1000	1000	1000	1000	1000

ture [deg. C]

450	475	500	525	550	600	650	
36	36	36	1000	41	41	41	41
124	134	1000	139	139	139	144	
175	186	123	191	196	196	201	
222	232	152	242	247	247	258	
273	283	181	294	304	304	314	
320	335	207	345	356	356	371	
417	438	270	448	464	464	484	
541	562	347	582	603	603	624	
665	691	414	711	737	737	758	
783	819	512	845	871	474	897	
953	984	1000	1000	1000	588	1000	
1000	1000	1000	1000	1000	702	1000	
1000	1000	1000	1000	1000	1000	1000	
1000	1000	1000	1000	1000	1000	1000	
1000	1000	1000	1000	1000	1000	1000	
1000	1000	1000	1000	1000	1000	1000	

244C Target Temperature Map

Catalyst Temperature Too Low/High During Regeneration Target Temp Map

Injector Fuel Rate [mm^3/c]	Engine RPM 900	1000	1500	2100
0	630	630	630	630
40	630	630	630	630
50	630	630	630	630
60	630	630	630	630