

**2003 4.0L (L47) Aurora, 4.6L (LD8, L37) Eldorado, Seville, DeVille, Hearse / Limo
ENGINE and 4T80-E TRANSMISSION DIAGNOSTIC PARAMETERS**

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION TYPE
HO2S Heater Control Circuit Bank 1 Sensor 1	P0030	This DTC detects when the circuit is shorted to ground. -- Circuit check	Circuit fault indicated	10 V < System Voltage < 18 V	45 fails out of 50 samples	Type B
HO2S Heater Control Circuit Bank 1 Sensor 2	P0036	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	10 V < System Voltage < 18 V	45 fails out of 50 samples	Type B
Mass Air Flow Sensor System Performance	P0101	rationality	Actual MAF - Predicted MAF > interpolated allowable delta (refer to Supporting Data section for information regarding allowable delta map values)	No MAP DTC's failing No TP sensor DTC's failing No other MAF sensor DTC's failing Ignition voltage ≥ 11 , ≤ 18 volts TP sensor $\leq 47.9\%$. TP Delta < 2.9% Purge < 100% EGR < 89.9% Engine Vacuum < 58.5 kPa 100 ms MAP delta ≤ 3.8 kPa Mass Air flow ≤ 50 if ignition voltage ≤ 11.5 volts P0401 status = inactive Traction control status = inactive Fuel control status = closed loop Enable criteria stabilized for 10 seconds	25 fails in 50 tests frequency: 100 ms cont.	Type B
Mass Air Flow Sensor Circuit Low Voltage	P0102	range check - min	MAF sensor frequency ≤ 1135 Hz	Engine run state = running Ignition voltage ≥ 10.5 volts Engine speed > 250 rpm Engine run time > 1 seconds Enable criteria stabilized for 0 seconds	20 fails in 100 tests frequency: ref. interrupt cont.	Type B
Mass Air Flow Sensor Circuit High Voltage	P0103	range check - max	MAF sensor frequency ≥ 11000 Hz	Engine run state = running Ignition voltage ≥ 10.5 volts Engine speed > 250rpm Engine run time > 1 seconds Enable criteria stabilized for 0 seconds	20 fails in 100 tests frequency: ref. interrupt cont.	Type B
Manifold Air Pressure Sensor System Performance	P0106	rationality	Predicted minimum MAP < or predicted maximum MAP > interpolated allowable value based on throttle position and engine speed. (refer to Supporting Data section for information regarding allowable delta map values)	No TP sensor DTC's failing Engine Speed ≥ 1000 rpm but <4000 rpm IAC Delta < 15 cnts. Engine Speed variation ≤ 125 rpm TP sensor variation $\leq 100\%$. EGR delta < 10 g/sec TCC state = unchanged for 0.75 seconds Vehicle brake switch = off for 0.75 seconds A/C clutch state = unchanged for 2 seconds Traction control state = inactive Engine overtemp protection state = Inactive Above conditions meet for >1 second	10 fails in 20 tests frequency: 50 ms cont.	Type B

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Manifold Air Pressure Sensor Circuit Low Voltage	P0107	range check - min	Raw MAP \leq 1.5% of 5 volt reference	No TP sensor DTC's failing Engine run time \geq a time determined by a table based on start up coolant temperature Engine Speed > 1000 rpm TP sensor \geq 9.9 %. or Engine Speed \leq 1000 TP sensor \geq 0 %.	20 fails in 40 tests frequency: 50 ms cont.	Type B
Manifold Air Pressure Sensor Circuit High Voltage	P0108	range check - max	Raw MAP \geq 97.5% of 5 volt reference	No TP sensor DTC's failing Engine run time \geq a time determined by a table based on start up coolant temperature Engine Speed > 1000 rpm TP sensor \leq 97.5 %. or Engine Speed \leq 1000 TP sensor < 89.9 %.	20 fails in 40 tests frequency: 50 ms cont.	Type B
Intake Air Temp. Sensor Circuit Low Voltage	P0112	range check - min	Raw IAT \leq 1.5% of 5 volt reference	No ECT Sensor DTC's failing No VSS DTC's failing No MAF DTC's ECT \leq 100 °C Vehicle speed \geq 15.5 kph Engine run time \geq 10 seconds	20 fails in 40 tests frequency: 250 ms cont.	Type B
Intake Air Temp. Sensor Circuit High Voltage	P0113	range check - max	Raw IAT \geq 95.9% of 5 volt reference	No ECT Sensor DTC's failing No VSS DTC's failing No MAF DTC's ECT \geq 60 °C Vehicle speed < 80 kph Engine speed \geq 50 rpm for 5 seconds Engine run time \geq 10 seconds	20 fails in 40 tests frequency: 250 ms cont.	Type B
Coolant Temp Sensor Performance	P0116	This DTC detects if the engine coolant sensor is biased high while in range.	Raw ECT at powerup > IAT at powerup by 15.75°C after a minimum 9 hour soak.	No VSS DTC's No IAT DTC's No ECT sensor shorted DTC's Non-volatile memory failure has not been detected on power-up. Engine off time > 32400 seconds (9 hours) IAT > 15°C Test run this trip = false Test aborted this trip = false Block heater detection: Vehicle driven a minimum of 300 seconds above 24 kph and IAT does drop more than 5° C from powerup IAT.	<u>Frequency:</u> 100 ms cont.	Type B
Coolant Temp Sensor Circuit Low Voltage	P0117	range check - min	Raw ECT \leq 1.49% of 5 volt reference	No IAT DTC's failing IAT \leq 70 °C or Engine run time \geq 10 sec.	3 fails in 5 tests frequency: 1 sec. cont.	Type B

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Coolant Temp Sensor Circuit High Voltage	P0118	range check - max	Raw ECT > 97.9% of 5 volt reference	No IAT DTC's failing IAT \geq -7 °C or Engine run time \geq 60 sec.	3 fails in 5 tests frequency: 1 sec. cont.	Type B
Throttle Position Sensor Performance	P0121	rationality	Predicted minimum TP < or predicted maximum TP > interpolated allowable value based on MAP and engine speed. (refer to Supporting Data section for information regarding allowable delta map values)	No MAP DTC's failing No IAC DTC's failing No other TP sensor DTC's failing ECT \geq 0° C MAP \geq 63.5 kPa for low test or \leq 55 kPa for high test MAP delta <9.5 kPa MAP Stable > 5 seconds Engine run time >30 seconds IAC > 10 but < 160 cnts. Traction control status = not active Injector status = all enabled Engine Over-temp protection status = not active	25 fails in 50 tests frequency: 100 ms cont.	Type B
Throttle Position Sensor Circuit Low Voltage	P0122	range check - min.	Raw TP sensor \leq 3.1% of 5 volt reference	None	20 fails in 40 tests frequency: 100 ms cont.	Type B
Throttle Position Sensor Circuit High Voltage	P0123	range check - max.	Raw TP sensor \geq 95.1% of 5 volt reference	None	20 fails in 40 tests frequency: 100 ms cont.	Type B
Coolant Temp Sensor Excessive Time to Closed Loop Fuel Control	P0125	rationality	If actual accumulated air flow is > predicted air flow before engine coolant reaches 55 °C	No MAF DTC's No IAT sensor DTC's NO ECT sensor shorts DTC's No VSS DTC's ECT Sensor shorts tests not failing Start up ECT < 51 °C Average air flow > 14 g/sec Minimum distance traveled > 1 kilometers 120 sec < Engine Run Time < 1800 sec IAT \geq -7 °C ECT > -40 °C	10 sec. frequency: 1 sec. cont.	Type B
Coolant Temperature below Thermostat	P0128	rationality	If actual accumulated air flow is > predicted air flow before engine coolant reaches 80 °C	No MAF DTC's No IAT sensor DTC's NO ECT sensor shorts DTC's No VSS DTC's ECT Sensor shorts tests not failing Start up ECT < 85 °C Average air flow > 14 g/sec Minimum distance traveled > 1 kilometers 120 sec < Engine Run Time < 1800 sec IAT \geq -7 °C ECT > -40 °C	10 sec. frequency: 1 sec. cont.	Type B

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HO2S Closed Loop Rationality Bank 1 Sensor 1	P0130	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	<p>Closed loop fuel control O2 sensor Ready flag set to "Not Ready."</p> <p>O2 sensor voltage must be > 500 millivolts or < 350 millivolts to set closed loop fuel O2 Ready flag. Once set to "Ready," the O2 sensor voltage cannot be > 350 millivolts and < 500 millivolts for > 120 seconds or the O2 Ready flag will be reset to "Not Ready."</p> <p>Both Bank 1 Sensor 1 and Bank 2 Sensor 1 O2 sensor Ready flags must be set to Ready to enable closed loop fueling.</p>	<p>No injector DTC's No MAF DTC's No TP sensor DTC's No MAP DTC's No ECT sensor DTC's No Bank 1 Sensor 1 or Bank 2 Sensor 1 DTC's Engine Run Time > 12.75 sec. Coolant temp > 75 C Predicted O2 Heater Temp > 600 C 10 volts < Ignition Voltage < 18 volts Traction control not active. Catalyst Protection mode not active. 500 ≤ RPM ≤ 5000 3.0 gps ≤ MAF ≤ 30.0 gps Decel Fuel Cut Off not active. Power Enrichment not active.</p> <p>Above conditions must be met for 5.0 seconds.</p>	<p>160 test failures in a 200 test sample.</p> <p>100 millisecond execution rate.</p> <p>Continuous</p>	Type B
HO2S Circuit Low Voltage (bank 1 sensor 1)	P0131	This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and power enrichment (PE).	<p>O2 sensor voltage < 75 millivolts or O2 sensor voltage < 575 millivolts in PE mode</p>	<p>No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled No injectors are disabled 10 volts < Ignition Voltage < 18 volts Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position ≥ 3 % but ≤ 25 % Above conditions must be met for 3.0 seconds.</p> <p><u>PE Test:</u> No injectors are disabled PE mode active Above conditions must be met for 2.0 seconds.</p>	<p>90 test failures in a 100 test sample for 5 sets of samples</p> <p>76 failures in a 80 test sample for PE mode.</p> <p>100 millisecond execution rate.</p> <p>Continuous</p>	Type B

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HO2S Circuit High Voltage (bank 1 sensor 1)	P0132	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and decel fuel cut off (DFCO)	O2 sensor voltage > 900 millivolts or O2 sensor voltage > 200 millivolts in DFCO mode	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position $\geq 3\%$ but $\leq 25\%$ Above conditions must be met for 3.0 seconds. <u>DFCO Test:</u> DFCO mode must be met for 3.0 seconds. Time not in PE with Air/Fuel ratio ≤ 13.0 must exceed time in PE with Air/Fuel ≤ 13.0	90 test failures in a 100 test sample for 5 sets of samples 110 failures in a 120 test sample for DFCO mode 100 millisecond execution rate. Continuous	Type B
HO2S Circuit Slow Response (bank 1 sensor 1)	P0133	This DTC determines if the O2 sensor functioning properly by checking its response time.	O2 sensor average transition time: L/R > 300.0 msec R/L > 182.0 msec O2 voltage between 325 mv and 625 mv.	No misfire DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No ECT sensor DTC's No AIR DTC's No Bank 1 Sensor 1 Voltage DTC's DTC P0135 (O2 Heater) not set DTC P1133 (Too Few Switches) not set EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Engine Run Time > 202 sec. Coolant temp > 75 C 1200 < RPM < 2300 15.0 gps < MAF < 30.0 gps Throttle position $\geq 3\%$ Transmission not in Park, Reverse or Neutral Above conditions met for 3.0 seconds.	90.00 seconds Once per key cycle	Type B

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HO2S Circuit Insufficient Activity (bank 1 sensor 1)	P0134	This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > 400 millivolts but < 500 millivolts	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active 10 volts < Ignition Voltage < 18 volts Engine run time > 200 seconds	510 test failures in a 600 test sample 100 millisecond execution rate. Continuous	Type B
HO2S Heater Circuit (bank 1 sensor 1)	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	The heater current is < 0.156 amps or > 0.906 amps	Heater driver DTC P0030, P1031, P1032 not set Delta ignition voltage during current measurement < 1 volt Engine Run Time > 180 seconds 500 < RPM < 3000 4 gps < MAF < 30gps O2 heater overtemp control not active. Above conditions must be met for 2.0 seconds.	Average of 10 current samples compared to thresholds for each test. 5 tests per key cycle, 120 second delay between tests. 1 second execution rate.	Type B
HO2S Circuit Low Voltage (bank 1 sensor 2)	P0137	This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and power enrichment (PE).	O2 sensor voltage < 9 millivolts Or O2 sensor voltage < 575 millivolts in PE mode	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled No injectors are disabled 10 volts < Ignition Voltage < 18 volts Air/Fuel ratio ≥ 14.50 but ≤ 14.8 Throttle position ≥ 3 % but ≤ 25 % Above conditions must be met for 3.0 seconds. <u>PE Test:</u> No injectors are disabled PE mode active Above conditions must be met for 2.0 seconds.	90 test failures in a 100 test sample for 5 sets of samples 76 failures in a 80 test sample for PE mode. 100 millisecond execution rate. Continuous	Type B

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HO2S Circuit High Voltage (bank 1 sensor 2)	P0138	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and decel fuel cut off (DFCO)	O2 sensor voltage > 950 millivolts or O2 sensor voltage > 200 millivolts in DFCO mode	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Air/Fuel ratio ≥ 14.50 but ≤ 14.80 Throttle position ≥ 3 % but ≤ 25 % Above conditions must be met for 3.0 seconds. <u>DFCO Test:</u> DFCO mode must be met for 3.0 seconds. Time not in PE with Air/Fuel ratio ≤ 13.0 must exceed time in PE with Air/Fuel ≤ 13.0	560 test failures in a 600 test sample for 2 sets of samples. 110 failures in a 120 test sample for DFCO mode 100 millisecond execution rate. Continuous	Type B
HO2S Circuit Insufficient Activity (bank 1 sensor 2)	P0140	This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > 400 millivolts but < 500 millivolts	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's DTC P0141 (O2 Heater) not set Closed Loop Fuel Enabled EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active 10 volts < Ignition Voltage < 18 volts Engine run time > 200.00 seconds Minimum 2 occurrences of a delta TP sensor > 5 % during diagnostic test	1300 test failures in a 1500 test sample 100 millisecond execution rate. Once per key cycle.	Type B

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HO2S Heater Circuit (bank 1 sensor 2)	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up.	The elapsed time to obtain ± 150 millivolts from the average O2 bias voltage. *Time based on table: Time vs average engine airflow during warm-up period. Offset to maximum time based on start-up coolant temperature.	No Bank 1 Sensor 2 voltage DTC's Engine cold start determined Avg MAF during warmup < 30 gps 10.0 < System Voltage < 18.0 360 mvolts < Avg Bias Voltage < 540 mvolts Cold start determination Based on last engine running ECT - startup ECT \geq delta temperature (table lookup based on last engine running ECT)	From cold start to a maximum time of 250 seconds. *Time determined by table.	Type B
HO2S Closed Loop Rationality Bank 2 Sensor 1	P0150	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed loop fuel control O2 sensor Ready flag set to "Not Ready." O2 sensor voltage must be > 500 millivolts or < 350 millivolts to set closed loop fuel O2 Ready flag. Once set to "Ready," the O2 sensor voltage cannot be > 350 millivolts and < 500 millivolts for > 120 seconds or the O2 Ready flag will be reset to "Not Ready." Both Bank 1 Sensor 1 and Bank 2 Sensor 1 O2 sensor Ready flags must be set to Ready to enable closed loop fueling.	No injector DTC's No MAF DTC's No TP sensor DTC's No MAP DTC's No ECT sensor DTC's No Bank 1 Sensor 1 or Bank 2 Sensor 1 DTC's Engine Run Time > 12.75 sec. Coolant temp > 75 C Predicted O2 Heater Temp > 600 C 10 volts < Ignition Voltage < 18 volts Traction control not active. Catalyst Protection mode not active. 500 \leq RPM \leq 5000 3.0 gps \leq MAF \leq 30.0 gps Decel Fuel Cut Off not active. Power Enrichment not active. Above conditions must be met for 5.0 seconds.	160 test failures in a 200 test sample. 100 millisecond execution rate. Continuous	Type B

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HO2S Circuit Low Voltage (bank 2 sensor 1)	P0151	This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and power enrichment (PE).	O2 sensor voltage < 75 millivolts or O2 sensor voltage < 575 millivolts in PE mode	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled No injectors are disabled 10 volts < Ignition Voltage < 18 volts Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position ≥ 3 % but ≤ 25 % Above conditions must be met for 3.0 seconds. <u>PE Test:</u> No injectors are disabled PE mode active Above conditions must be met for 2.0 seconds.	90 test failures in a 100 test sample for 5 sets of samples 76 failures in a 80 test sample for PE mode. 100 millisecond execution rate. Continuous	Type B
HO2S Circuit High Voltage (bank 2 sensor 1)	P0152	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and decel fuel cut off (DFCO)	O2 sensor voltage > 900 millivolts or O2 sensor voltage > 200 millivolts in DFCO mode	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position ≥ 3 % but ≤ 25 % Above conditions must be met for 3.0 seconds. <u>DFCO Test:</u> DFCO mode must be met for 3.0 seconds. Time not in PE with Air/Fuel ratio ≤ 13.0 must exceed time in PE with Air/Fuel ≤ 13.0	90 test failures in a 100 test sample for 5 sets of samples 110 failures in a 120 test sample for DFCO mode 100 millisecond execution rate. Continuous	Type B

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HO2S Circuit Slow Response (bank 2 sensor 1)	P0153	This DTC determines if the O2 sensor functioning properly by checking its response time.	O2 sensor average transition time: L/R > 300.0 msec R/L > 182.0 msec O2 voltage between 325 mv and 625 mv.	No misfire DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No ECT sensor DTC's No AIR DTC's No Bank 1 Sensor 1 Voltage DTC's DTC P0155 (O2 Heater) not set DTC P1153 (Too Few Switches) not set EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Engine Run Time > 202 sec. Coolant temp > 75 C 1200 < RPM < 2300 15.0 gps < MAF < 30.0 gps Throttle position ≥ 3 % Transmission not in Park, Reverse or Neutral Above conditions met for 3.0 seconds.	90.00 seconds Once per key cycle	Type B
HO2S Circuit Insufficient Activity (bank 2 sensor 1)	P0154	This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > 400 millivolts but < 500 millivolts	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No AIR DTC's No ECT sensor DTC's EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active 10 volts < Ignition Voltage < 18 volts Engine run time > 200 seconds	510 test failures in a 600 test sample 100 millisecond execution rate. Continuous	Type B
HO2S Heater Circuit (bank 2 sensor 1)	P0155	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	The heater current is < 0.156 amps or > 0.906 amps.	Heater driver DTC P0030, P1031, P1032 not set Delta ignition voltage during current measurement < 1 volt Engine Run Time > 180 seconds 500 < RPM < 3000 4 gps < MAF < 30 gps O2 heater overtemp control not active. Above conditions must be met for 2.0 seconds.	Average of 10 current samples compared to thresholds for each test. 5 tests per key cycle, 120 second delay between tests. 1 second execution rate.	Type B

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Fuel Trim System Lean - Bank 1	P0171	fuel trim limits exceeded - lean (bank 1)	Average of short term fuel trim samples ≥ 0.100006 and average of long term fuel trim samples ≥ 1.184998	<u>Malfunction Code Information</u> No MAF sensor DTC's failing No MAP sensor DTC's failing No ECT sensor DTC's failing ECT time to closed loop DTC not failing No IAT sensor DTC's failing No TP sensor DTC's failing No HO2S circuit, response, switches or ratio DTC's failing No injector circuit fault DTC's failing Misfire DTC not failing No IAC/Idle DTC's failing No EVAP system DTC's failing AIR system DTC not failing No AIR (Bank 1) circuit DTC's failing No EGR system DTC's failing <u>Test Enable Conditions</u> Barometric pressure > 75 kPa 20 °C < ECT < 115.25°C 3 g/sec < Mass Airflow < 60 g/sec 15.19922 kPa < MAP < 85.19922 kPa -20.5 °C < Intake Air Temp < 100 °C 500 rpm < Engine Speed < 4000 rpm Vehicle Speed < 131 kph	3 test fails frequency: 250 ms cont.	Type B

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Fuel Trim System Rich - Bank 1	P0172	fuel trim limits exceeded - rich (bank 1)	<p>Average of short term fuel trim samples ≤ 1.899994, and average of long term fuel trim samples ≤ 0.834992</p> <p>Change in short term fuel trim < 0.09997559 and change in long term fuel trim < 3.999878 during five second excessive purge test.</p> <p>If a rich failure condition is present due to the average of long or short term samples being out of range, the purge valve is ramped from a higher duty cycle ($\geq 35\%$) to a lower duty cycle (6%) to evaluate changes in fuel control.</p>	<p><u>Malfunction Code Information</u> No MAF sensor DTC's failing No MAP sensor DTC's failing No ECT sensor DTC's failing ECT time to closed loop DTC not failing No IAT sensor DTC's failing No TP sensor DTC's failing No HO2S circuit, response, switches or ratio DTC's failing No injector circuit fault DTC's failing Misfire DTC not failing No IAC/Idle DTC's failing No EVAP system DTC's failing AIR system DTC not failing No AIR (Bank 1) circuit DTC's failing No EGR system DTC's failing</p> <p><u>Test Enable Conditions</u> Barometric pressure > 75 kPa 20 °C $< ECT < 115.25$°C 3 g/sec $< Mass\ Airflow < 60$ g/sec 15.19922 kPa $< MAP < 85.19922$ kPa -20.5 °C $< Intake\ Air\ Temp < 100$ °C 500 rpm $< Engine\ Speed < 4000$ rpm Vehicle Speed < 131 kph</p>	<p>3 test fails</p> <p>frequency: 250 ms cont.</p>	Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION TYPE
Fuel Trim System Lean - Bank 2	P0174	fuel trim limits exceeded - lean (bank 2)	Average of short term fuel trim samples ≥ 0.100006 and average of long term fuel trim samples ≥ 1.184998	<u>Malfunction Code Information</u> No MAF sensor DTC's failing No MAP sensor DTC's failing No ECT sensor DTC's failing ECT time to closed loop DTC not failing No IAT sensor DTC's failing No TP sensor DTC's failing No HO2S circuit, response, switches or ratio DTC's failing No injector circuit fault DTC's failing Misfire DTC not failing No IAC/Idle DTC's failing No EVAP system DTC's failing AIR system DTC not failing No AIR (Bank 1) circuit DTC's failing No EGR system DTC's failing <u>Test Enable Conditions</u> Barometric pressure > 75 kPa 20 °C < ECT < 115.25°C 3 g/sec < Mass Airflow < 60 g/sec 15.19922 kPa < MAP < 85.19922 kPa -20.5 °C < Intake Air Temp < 100 °C 500 rpm < Engine Speed < 4000 rpm Vehicle Speed < 131 kph	3 test fails frequency: 250 ms cont.	Type B

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Fuel Trim System Rich - Bank 2	P0175	Fuel trim limits exceeded - rich (bank 2)	<p>Average of short term fuel trim samples ≤ 1.899994, and average of long term fuel trim samples ≤ 0.834992</p> <p>Change in short term fuel trim < 0.09997559 and change in long term fuel trim < 3.999878 during five second excessive purge test.</p> <p>If a rich failure condition is present due to the average of long or short term samples being out of range, the purge valve is ramped from a higher duty cycle ($\geq 35\%$) to a lower duty cycle (6%) to evaluate changes in fuel control.</p>	<p><u>Malfunction Code Information</u> No MAF sensor DTC's failing No MAP sensor DTC's failing No ECT sensor DTC's failing ECT time to closed loop DTC not failing No IAT sensor DTC's failing No TP sensor DTC's failing No HO2S circuit, response, switches or ratio DTC's failing No injector circuit fault DTC's failing Misfire DTC not failing No IAC/Idle DTC's failing No EVAP system DTC's failing AIR system DTC not failing No AIR (Bank 1) circuit DTC's failing No EGR system DTC's failing</p> <p><u>Test Enable Conditions</u> Barometric pressure > 75 kPa 20 °C $< ECT < 115.25$°C 3 g/sec $< Mass\ Airflow < 60$ g/sec 15.19922 kPa $< MAP < 85.19922$ kPa -20.5 °C $< Intake\ Air\ Temp < 100$ °C 500 rpm $< Engine\ Speed < 4000$ rpm Vehicle Speed < 131 kph</p>	<p>3 test fails</p> <p>frequency: 250 ms cont.</p>	Type B
Fuel Injector 1 Control Circuit	P0201	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Fuel Injector 2 Control Circuit	P0202	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Fuel Injector 3 Control Circuit	P0203	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Fuel Injector 4 Control Circuit	P0204	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Fuel Injector 5 Control Circuit	P0205	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B

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Fuel Injector 6 Control Circuit	P0206	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Fuel Injector 7 Control Circuit	P0207	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Fuel Injector 8 Control Circuit	P0208	circuit continuity	Injector Driver feedback indication = fault	Ignition voltage > 11.5 for 5 seconds ALDL mode \$AE state = inactive	10 failures out of 20 samples frequency: 250 ms cont.	Type B
Engine Misfire Detected	P0300	This DTC will determine if a misfire is occurring by monitoring crankshaft velocity.	Deceleration index vs Engine Speed vs Load and Camshaft Position Emission Failure Threshold. = 2.25% Misfire Catalyst Damage Threshold 1.875% to 11.25% Misfire depending on engine speed and load.	No VSS DTC's No crank sensor DTC's No TP sensor DTC's No EST sensor DTC's No ECT sensor DTC's No CAM sensor DTC's No transmission DTC's No MAF DTCs No IAT sensor DTC's No P1336-Crankshaft Position System Variation Not Learned and RPM>1000 Fuel cutoff not active Engine torque management not active Fuel level > 8% Disablement ends 200 cycles after fuel level condition ceases. (Does not disable if a Fuel system DTC is active) Fuel Delay when below minimum level = 200 cycles ECT > -7 °C but < 128.00 °C (L47) ECT > -7°C but < 129.00 °C (LD8 & L37) If start up ECT below -7°C, then delayed until ECT above 20.75°C Engine speed > 500 RPM but < 6500 RPM System voltage > 9.0 volts but < 18.0 volts + Throttle position Δ < 5.0% / 100ms - Throttle position Δ < 3.0% / 100ms Misfire diagnostic is not requesting to disable TCC when transmission is in hot mode. No ABS - Rough Road No ABS or TCS active No abnormal engine speed A/C compressor has not just engaged or disengaged Positive or zero torque. AIR / EGR intrusive test not active Automatic transmission is not shifting	Emission Level Exceedence = (5) failed 200 revolution blocks out of 16. Failure reported with (1) Exceedence in 1st (16) 200 revolution block, or (4) Exceedences thereafter. Catalyst Damaging Exceedence = (1) failed 200 revolution block. Failure reported with (3) Exceedences in FTP, or (1) Exceedence outside FTP. <u>Frequency:</u> Continuous	DTC Type B EMISSION DTC Type B CATALYST DAMAGING

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Knock Sensor Circuit	P0325	rationality	Knock sensor voltage > 4.4V	Ignition 1 voltage \geq 11 volts Time since PCM powered \geq 5 sec. Engine speed \geq 2000 rpm Engine run time \geq 30 seconds	35 failures out of 40 frequency: 250 ms cont.	Type B
Knock Sensor Circuit Excessive Spark Retard	P0326	performance check	Knock total retard \geq a value f(MAP, RPM)	Knock detection = enabled	35 failures out of 40 samples frequency: 100 msec cont.	Type B
Knock Sensor Circuit Low Voltage - Bank 1	P0327	range check	Knock sensor background noise - learned min. noise \leq 0.32V	Ignition voltage Present ECT. \geq 40 °C Ignition 1 Voltage \geq 11V Throttle Angle \geq 5deg. Engine Speed \geq 2000 RPM	2 failures out of 2 frequency: 250 ms cont.	Type B
Crank Sensor A Circuit	P0335	24X Signal This diagnostic determines whether a fault exists with crank position sensor circuit A signal	The number of medium resolution reference pulses with or without CAM present \leq 47 or \geq 49.	PCM state = crank or run MAF > 2.5 gps 50 RPM \leq CAM RPM Cranking \leq 400 RPM 100 RPM \leq CAM RPM Running \leq 6000 RPM 20 RPM \leq Med. Res. RPM Crank \leq 400 RPM 100 RPM \leq Med. Res. RPM Run \leq 6000 RPM	No CAM faults <u>present</u> : Crank > 1 fail count Run > 1 fail count <u>CAM fault present</u> : Crank > 2 sec. Run > .6 sec. 12.5 msec Continuous	Type B
Crank Sensor A Circuit Performance	P0336	24X Signal This diagnostic determines if the signal is corrupted (ie excessive noise is present) on the crank position sensor A circuit.	The number of loss of match occurrences is \geq 6 within 85 cylinder events.	PCM state = crank or run Decode mode = Time based A P0385 active No cam faults present	Execute at low resolution interrupt	Type B
Camshaft Position Sensor Circuit	P0340	circuit continuity	Low resolution with no cam pulse \geq 9	4X reference pulses = received	Number of mismatch > 8. of 50 frequency: 250 ms cont.	Type B
Camshaft Position Sensor Circuit Performance	P0341	This diagnostic determines if the signal is corrupted (ie excessive noise is present or phase shift) on the camshaft position sensor circuit.	More than 8 cam events out of 60 have occurred outside of the correct 24X region.	PCM state = crank or run Calculated low resolution RPM < 2000 24X region between 1 and 5	137.5 msec max. frequency: 12.5 msec.	Type B
Ignition Coil 1 Control Circuit	P0351	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Ignition Coil 2 Control Circuit	P0352	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B

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Ignition Coil 3 Control Circuit	P0353	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Ignition Coil 4 Control Circuit	P0354	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Ignition Coil 5 Control Circuit	P0355	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Ignition Coil 6 Control Circuit	P0356	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Ignition Coil 7 Control Circuit	P0357	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Ignition Coil 8 Control Circuit	P0358	This DTC detects when the circuit is shorted to ground Circuit check	Fault flag indicated.	Ignition 1 is powered	5 failures for 10 cylinder events	Type B
Crank Sensor B Circuit	P0385	24X Signal This diagnostic determines whether a fault exists with crank position sensor circuit B signal	The number of medium resolution reference pulses with or without CAM present ≤ 47 or ≥ 49 .	PCM state = crank or run MAF > 2.5 gps 50 RPM \leq CAM RPM Cranking ≤ 400 RPM 100 RPM \leq CAM RPM Running ≤ 6000 RPM 20 RPM \leq Med. Res. RPM Crank ≤ 400 RPM 100 RPM \leq Med. Res. RPM Run ≤ 6000 RPM	No CAM faults <u>present</u> : Crank > 1 fail count Run > 1 fail count <u>CAM fault present</u> : Crank > 2 sec. Run > .6 sec. 12.5 msec Continuous	Type B
Crank Sensor B Circuit Performance	P0386	24X Signal This diagnostic determines if the signal is corrupted (ie excessive noise is present) on the crank position sensor B circuit.	The number of loss of match occurrences is ≥ 6 within 85 cylinder events.	PCM state = crank or run Decode mode = Time based B P0335 active No cam faults present	Execute at low resolution interrupt	Type B

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Exhaust Gas Recirculation -- Insufficient Flow Detected	P0401	This diagnostic will determine if there is a reduction in EGR flow.	With EGR valve open, the peak + MAP Δ is monitored over a period of time. This value is compared with a threshold from an engine speed vs BARO table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit. DTC is set when the filtered result exceeds the decision limit.	<p><u>Test Enable:</u> No TP sensor DTC's failing. No MAP sensor DTC's failing. No VS sensor DTC's failing. No ECT sensor DTC's failing. No IAC DTC's failing. No LEGR pintle pos. DTC failing. 80 °C ≤ ECT ≤ 110 °C. BARO > 70 kPa. vehicle speed > 37 kph. IAC delta < 8 counts. trans. state unchanged for 0.3 sec.. A/C state unchanged for 0.3 sec.. 11 volts ≤ sys. volts ≤ 18 volts. IAT < 50°C</p> <p><u>Start Test (decel):</u> TP sensor ≤ 1.2% EGR pos. ≤ 3%. 700 ≤ Engine RPM ≤ 1200. Delta MAP ≤ 2 kPa. 11 ≤ MAP ≤ 50 kPa. The above conditions must be present for 1.0 consecutive sec..</p> <p><u>Run Test (decel):</u> Stabilized MAP (valve closed) recorded and EGR valve "ramped" open over a time interval and peak MAP value recorded and MAP computed. EGR valve "ramped" closed over a time interval.</p> <p><u>Response Test:</u> IF the difference between the current EWMA and the current map diff > 3.2 kpa THEN 3 tests will be run per trip until 10 tests have been met.</p>	<p>1 test per trip 15 tests if KAM reset</p> <p>frequency: 100 ms. cont.</p>	Type A
EGR Valve Control Circuit	P0403	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	9 V < System Voltage < 18 V Engine Speed > 425 RPM	100 fails out of 120 samples	Type B

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EGR Circuit Performance	P0404	functional check	Pintle position error > 10% for 100 occurrences	Desired EGR Position > 0 cnts Code P0401 status = not in progress Δ Desired EGR Position < 20% Ignition Voltage \geq 11.7 volts	100 occurrences frequency: 250 ms cont./ position error every 12.5 ms. cont.	Type B
EGR Sensor Circuit Low Voltage	P0405	Circuit check	Filtered Closed Valve Pintle Position \leq 2.2%	Ignition Voltage \geq 11.7 volts	2 seconds frequency: 250 ms cont./ position error every 12.5 ms. cont.	Type B

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AIR System	P0410	<p>Passive: Part 1 HO2S sensors indicate lean condition present during open loop operation. Verifies proper operation of AIR pump.</p> <p>Part 2 Monitors the transition from open loop to closed loop to verify O2 sensor activity indicating that the AIR pumps have turned off.</p> <p>Active: HO2S sensors indicate lean condition present when AIR pump is turned on during closed loop operation</p>	<p>Passive: Part 1 HO2S sensor > approx. 470 mv during open loop operation 27% of the time.</p> <p>Part 2 HO2S sensor does not toggle above 600 mv at least 85 times in 25 seconds.</p> <p>Active: HO2S sensor > 30.81 mv for > 1.5 seconds or fuel integrator delta of < 0.09 when pump turned on during closed loop operation.</p>	<p>General Enable: No MAF DTC's set No MAP DTC's set No IAT DTC's set No ECT DTC's set No TP sensor DTC's set No HO2S DTC's set No Injector DTC's set No Misfire DTC's set No CKP DTC's set No EGR DTC's set No Fuel Trim DTC's set No IAC DTC's set No AIR pump relay DTC's set No AIR Solenoid DTC's set No EVAP DTC's set 5°C < IAT < 72.5°C 5°C < ECT < 108.5°C 5°C < Power Up ECT < 80°C Manifold Vacuum > 35 kpa Ignition voltage > 10.2V for a time > 10 seconds Engine Run Time > 3 seconds Airflow < 35 g/s Engine load < 79.9% A/F Ratio > 11.1:1 ΔTPS < 9.9% PE, COT, DFCO Not Active</p> <p>Passive Part 1 Air Pumps = on A/F State = Open Loop</p> <p>Passive Part 2 Air Pumps = off A/F State = Closed Loop</p> <p>Active Passive Test = Fail or inconclusive A/F State = Closed Loop Fuel integrator > 0.95 & < 1.05 BLM cell is valid RPM > 1000 RPM Engine Load < 79.9% Manifold Vacuum > 35 kpa</p>	<p>Passive: During open loop operation. Once per trip.</p> <p>Active: 3 seconds Up to 3 times per trip if passive test fails or is inconclusive.</p>	Type B
AIR Solenoid Relay Control Circuit - Bank 1	P0412	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	8V < System Voltage < 18 V Engine Speed > 425RPM	100 fails out of 120 samples	Type B

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AIR Pump Relay Control Circuit - Bank 1	P0418	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	8V < System Voltage < 18 V Engine Speed > 425RPM	100 fails out of 120 samples	Type B
Catalyst Low Efficiency - Bank 1	P0420	Oxygen Storage	<p>OSC Worst Pass Thresh = 3.43125 seconds</p> <p>OSC Time Difference > 0.294922 seconds</p> <p>OSC Time Difference = OSC Worst Pass Threshold – (OSC Compensation Factor * (Post Cat O2 Response Time - Pre Cat O2 Response Time))</p>	<p><u>Malfunction Code Information</u> No MAF system or sensor DTC's failing No MAP system or sensor DTC's failing No ECT sensor DTC's failing No IAT sensor DTC's failing No TP sensor DTC's failing No HO2S circuit, response DTC's failing No fuel trim DTC's failing Misfire DTC not failing No IAC/Idle DTC's failing No VSS DTC's failing No fuel tank pressure sensor DTC's failing No CKP sensor DTC's failing No CMP sensor DTC's failing No AIR system DTC's failing EGR valve pintle stuck open DTC not failing No EVAP Purge System DTC's failing</p> <p><u>Valid Idle Period Criteria</u> Engine Speed > 800 RPM for minimum of 42 – 46 sec (dependent on configuration) since end of last idle period Minimum engine runtime for stable BLM & PLM ≥ 600 seconds</p> <p><u>Test Enable Conditions</u> 400 < Predicted Catalyst Temperature < 540 °C Closed Loop Fuel Control Barometric Pressure ≥ 75 kPa -6.25 ≤ IAT ≤ 200 °C 71 ≤ ECT ≤ 120 °C 0 < Idle Period ≤ 45 seconds Tests Attempted this trip ≤ 6 Tests Attempted this idle period ≤ 1 -100 rpm < (Engine Speed - Desired Speed) < 100 rpm</p> <p><u>Rapid Step Response Enable Criteria:</u> OSC Time Diff Step > 0.962891 sec (NLEV LD8/L37) OSC Time Diff Step > 0.907227 sec (NLEV L47) OSC Time Difference ≥ 0.000 sec</p>	<p>1 test attempted per valid idle period.</p> <p>Minimum of 1 test per trip.</p> <p>Maximum of 6 tests per trip.</p> <p>Maximum of 6 trips to detect failure when rapid step response is enabled.</p> <p>frequency: 12.5 ms cont.</p>	Type A

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Evap. Emission Control System - Malfunction	P0440	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the Evap. system.	Purge Volume > 3 liters BEFORE Tank Vacuum > 8.0 "H2O	<u>General Test Enable:</u> No IAT DTC's active No MAP DTC's active No TP sensor DTC's active No VS sensor DTC's active No ECT sensor DTC's active No EVAP output circuit DTC's active No Fuel Tank Pressure Sensor DTC's active DTC P0125 not active 15 % < Fuel Level < 85 % 10 V < System Voltage < 18 V 4 °C < IAT < 30 °C Baro > 75 kPa (8000 ft) Engine Coolant Temp. < 30 °C Cold Temperature Δ (ECT - IAT): < 150 °C if IAT > ECT < 8 °C if ECT > IAT	Once per cold start. Time is dependent on driving conditions. Max time before test abort is 780 seconds	Type B
Evap. Emission System Leak Detection (Small Leak)	P0442	This DTC will detect a small leak in the evap system between the fuel fill cap and up to the purge solenoid.	.040" EWMA Value > 0.032196 in. dia. OR 0.02" EWMA Value > 0.014999 in. dia.	<u>General Test Enable:</u> No IAT DTC's active No MAP DTC's active No TP sensor DTC's active No VS sensor DTC's active No ECT sensor DTC's active No EVAP output circuit DTC's active No Fuel Tank Pressure Sensor DTC's active DTC P0125 not active 15 % < Fuel Level < 85 % 35 % < Fuel Level < 85 % (0.02" leak only) 10 V < System Voltage < 18 V 4 °C < IAT < 30 °C Baro > 75 kPa (8000 ft) Engine Coolant Temp. < 30 °C Cold Temperature Δ (ECT - IAT): < 150 °C if IAT > ECT < 8 °C if ECT > IAT ΔVacuum Slosh < 0.44-0.95" H2O based on fuel level OR ΔFuel Slosh < 0.75-2.33% based on fuel level If these occur, test will try to run again ΔVacuum Slosh < 0.22-0.47" H2O based on fuel level OR ΔFuel Slosh < 0.64-1.99% based on fuel level If these occur, the 0.02" EWMA will not be updated	Once per cold start. Time is dependent on driving conditions. Max time before test abort is 780 seconds	Type A

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Canister Purge Circuit Fault	P0443	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	8V < System Voltage < 18 V Engine Speed > 425RPM	100 fails out of 120 samples	Type B
Evap. Emission Control System - Vent Control Malfunction	P0446	This DTC will determine if a restriction is present in the vent solenoid, vent filter, vent hose or canister.	Tank Vacuum > 10" H2O for 5 seconds BEFORE Purge Volume > 4 liters OR Vented Vacuum < -2.5" H2O or Vented Vacuum > 5 " H2O for 15 seconds	No IAT DTC's active No MAP DTC's active No TP sensor DTC's active No VS sensor DTC's active No ECT sensor DTC's active No EVAP output circuit DTC's active No Fuel Tank Pressure Sensor DTC's active DTC P0125 not active 15 % < Fuel Level < 85 % 10 V < System Voltage < 18 V 4 °C < IAT < 30 °C Engine Coolant Temp < 30 °C Baro > 75 kPa (8000 ft)	Once per trip. Time is dependent on driving conditions.	Type B
Fuel Tank Vent Circuit Fault	P0449	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	8V < System Voltage < 18 V Engine Speed > 425RPM	100 fails out of 120 samples	Type B
Evap. Fuel Tank Pressure Sensor Circuit Low Voltage	P0452	This DTC will detect a vacuum sensor signal that is too low out of range.	Fuel Tank Pressure Sensor Circuit Voltage < 0.099609 volts	0.1 second delay after sensor power-up for sensor warm up.	5 seconds continuous. frequency: Runs continuously every 100 ms after delay period for sensor warm-up.	Type B
Evap. Fuel Tank Pressure Sensor Circuit High Voltage	P0453	This DTC will detect a vacuum sensor signal that is too high out of range.	Fuel Tank Pressure Sensor Circuit Voltage > 4.900391 volts	0.1 second delay after sensor power-up for sensor warm up.	5 seconds continuous. frequency: Runs continuously every 100 ms after delay period for sensor warm-up.	Type B
Fuel Level Sensor Circuit Performance	P0461	rationality check	Fuel level delta < 2 liters within 100 kilometers	No fuel level DTC's set 11 volts < system voltage < 16 volts	12.5 ms Continuous	Type C

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION TYPE
Fuel Level Sensor Circuit Low Input	P0462	This diagnostic will detect a fuel sender failed to a low voltage level.	Output voltage amplitude is low and stays constant	Discrete: Fuel level input < 10.5% (GMX270/S5S) Fuel level input < 10.9% (GMX160) 11 volts< system voltage < 16 volts OR ClassII/UART: Communication between the cluster and PCM is lost Default to gauge: 0 % Default to evap and misfire: 40%	12.5 ms Continuous Failed for 10 consecutive seconds	Type C
Fuel Level Sensor Circuit High Input	P0463	This diagnostic will detect a fuel sender failed to a high voltage level.	Output voltage amplitude is high and stays constant	Discrete: Fuel level input > 62.1% (GMX270/S5S) Fuel level input >62.2% (GMX160) 11 volts< system voltage < 16 volts OR ClassII/UART: Communication between the cluster and PCM is lost Default to gauge: 0% Default to evap and misfire: 40%	12.5 ms Continuous Failed for 60 consecutive seconds	Type C
Engine Cooling Fan Relay 1 Control Circuit	P0480	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	8V < System Voltage < 18 V Engine Speed > 425RPM	100 fails out of 120 samples	Type B
Engine Cooling Fan Relay 2 Control Circuit	P0481	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	8V < System Voltage < 18 V Engine Speed > 425RPM	100 fails out of 120 samples	Type B
Vehicle Speed Sensor Circuit Low	P0502	Circuit check - low input	Raw OSS \leq 90 RPM Note: Raw OSS = OSS/FDR	No IMS DTC's failing No TP sensor DTC's failing No ISS DTC's failing No DTC P0503 failure Engine Torque not defaulted Gear Range \neq Park or Neutral TP sensor \geq 12% 60 N-m \leq Engine Torque \leq 395 N-m 8 V \leq System Voltage \leq 18 V 450 \leq Engine RPM \leq 7500 for 5 sec 1000 \leq ISS \leq 5000 RPM \geq 5 sec.	3 sec. Frequency: 25 ms cont.	Type B

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Vehicle Speed Sensor Intermittent Performance	P0503	This diagnostic detects unrealistically large Δ VSS with no gear range change -- rationality	Drop in raw OSS \geq 350 RPM in one execution loop.	No IMS DTC's failing No ISS DTC's failing No DTC P1843 failure Gear Range \neq Park or Neutral Last manual range $\Delta \geq$ 6 sec. $450 \leq$ Engine RPM \leq 7500 for 5 sec. Raw OSS > 400 RPM \geq 2.0 sec $+\Delta$ OSS \leq 500 RPM \geq 2.0 sec Δ ISS, loop-to-loop \leq 500 RPM for \geq 4.8 sec.	1.0 sec. Frequency: 25 ms cont.	Type B
Idle System Low	P0506	functional check	Idle rpm > 100 rpm below desired rpm based on coolant temperature. or idle spark > 12.3 degrees	<u>General Test Enable:</u> No MAF DTC's failing. No MAP DTC's failing. No IAT DTC's failing. No ECT DTC's failing. No TP sensor DTC's failing. No injector fault DTC's failing. No VS sensor DTC's failing. No EGR pintle pos. DTC failing. No purge flow DTC's failing. No crank sensor DTC's failing. EGR diag. test not in progress. $10.5 \leq$ System volt \leq 18 volts. IAT \geq -18 °C BARO \geq 75 kPa $-40 \text{ °C} \leq$ ECT \leq 110 °C Engine run time \geq 40 sec. Closed loop fueling enabled <u>Idle test:</u> General conditions met. vehicle speed \leq 3 kph. TP sensor \leq 1.5% Time since a transition to or from park/neutral > 3 sec.. Time since TCC mode change > 3 sec.	idle test - 3 sec. frequency: 250 ms cont.	Type B

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Idle System High	P0507	functional check	Idle rpm > 100 RPM above desired RPM based on coolant temperature. or idle spark < -13.7 degrees	<u>General Test Enable:</u> No MAF DTC's failing. No MAP DTC's failing. No IAT DTC's failing. No ECT DTC's failing. No TP sensor DTC's failing. No injector fault DTC's failing. No VS sensor DTC's failing. No EGR pintle pos. DTC failing. No purge flow DTC's failing. No crank sensor DTC's failing. EGR diag. test not in progress. 10.5 ≤ System volt ≤ 18 volts. IAT ≥ -18 °C BARO ≥ 75 kPa -40 °C ≤ ECT ≤ 110 °C Engine run time ≥ 40 sec. Closed loop fueling enabled <u>Idle test:</u> General conditions met. vehicle speed ≤ 3 kph. TP sensor ≤ 1.5% Time since a transition to or from park/neutral > 3 sec.. Time since TCC mode change > 3 sec.	idle test - 3 sec. frequency: 250 ms cont.	Type B
PCM Memory	P0601	functional check	Computed EPROM checksum not equal to expected	None	1 failure during the first execution 5 failures thereafter Background loop cont.	Type A
PCM not Programmed	P0602	functional check	Calibration parameter not equal to expected value	None	1 failure 250 ms cont.	Type A
PCM Memory - RAM	P0604	functional check	Bad RAM location found	DTC P0604 not failed.	1 failure if found during first test in ignition cycle. 3 failures if found during subsequent tests in the ignition cycle. Continuous	Type A

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Trans. Fluid Temperature Sensor Circuit - Range/Performance	P0711	Rationality	1 - Transmission Fluid Temp. has not changed $\geq 2^{\circ}\text{C}$ (absolute value) since start-up. 2 - Transmission Fluid Temp. changes $> 20^{\circ}\text{C}$ (absolute value) in 200 msec.	No ECT Sensor DTC's failing No ISS DTC's failing No VSS DTC's failing $8\text{V} \leq \text{System Voltage} \leq 18\text{V}$ $-38^{\circ}\text{C} < \text{Transmission Fluid Temp.} < 143^{\circ}\text{C}$ $450 \leq \text{Engine RPM} \leq 7500$ for 5 sec. Vehicle speed ≥ 5 mph continuously for ≥ 900 sec. at least once this ignition cycle. TCC slip ≥ 120 rpm continuously for ≥ 900 sec. at least once this ignition cycle. Trans. temp at startup between -38 and 21°C . Coolant temp $\geq 70^{\circ}\text{C}$. Engine Coolant Temp. has changed by $\geq 50^{\circ}\text{C}$. since startup.	1 - 100 seconds 2 - 14 times in 7 sec. Frequency : 200ms cont.	Type C
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0712	This DTC detects when the transmission fluid temperature sensor circuit is open or shorted to ground.	Transmission Fluid Temp. $\geq 149^{\circ}\text{C}$.	$8\text{V} \leq \text{System Voltage} \leq 18\text{V}$ $450 \leq \text{Engine RPM} \leq 7500$ for 5 sec.	10 sec. Frequency : 200ms cont.	Type C
Transmission Fluid Temperature Sensor Circuit High Voltage	P0713	This DTC detects when the transmission fluid temperature sensor circuit is shorted to + 12V	Trans. Fluid Temp. $\leq -39.5^{\circ}\text{C}$.	No VSS DTC's failing No ISS DTC's failing $8\text{V} \leq \text{System Voltage} \leq 18\text{V}$ $450 \leq \text{Engine RPM} \leq 7500$ for 5 sec. TCC slip ≥ 50 RPM for ≥ 400 sec. cumulative Output speed ≥ 200 RPM for ≥ 300 sec. cumulative	6 sec Frequency : 200ms cont..	Type C
A/T Input Speed Sensor Circuit Performance	P0716	Detects large Δ ISS -- rationality	Input speed delta ≥ 1000 RPM in one execution loop.	No SSA sol. DTC's failing No VSS DTC's failing No TP sensor DTC's failing No ISS low DTC fault act. or act. this key on SSA stuck on code counters = 0 Transmission in D4 $450 \leq \text{Engine RPM} \leq 7500 \geq 5$ sec. Throttle Position $\geq 12\%$ Vehicle speed ≥ 16 kph Raw ISS > 1050 RPM ≥ 2.0 sec Raw $+\Delta$ ISS $\leq 500 \geq 2.0$ sec $8\text{V} \leq \text{System Voltage} \leq 18\text{V}$	1.0 sec. Frequency: 25 ms cont.	Type B
A/T Input Speed Sensor Circuit No Activity	P0717	range check - low	Input speed ≤ 50 RPM	No IMS DTC failing No VSS DTC's failing Vehicle speed > 16 kph Transmission Range \neq Park or Neutral $450 \leq \text{Engine RPM} \leq 7500 \geq 5$ sec $8\text{V} \leq \text{System Voltage} \leq 18\text{V}$	6 sec. Frequency: 100 ms cont.	Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION TYPE																				
Torque Converter Clutch System Performance - Stuck Off	P0741	Detects high torque converter slip when TCC is commanded on --rationality	Torque converter slip \geq interpolated table look up f(torque). See below: <table border="1"> <thead> <tr> <th>Slip (RPM)</th> <th>Torque (ft-bs)</th> </tr> </thead> <tbody> <tr><td>48</td><td>0</td></tr> <tr><td>80</td><td>48</td></tr> <tr><td>200</td><td>95</td></tr> <tr><td>252</td><td>143</td></tr> <tr><td>271</td><td>191</td></tr> <tr><td>280</td><td>239</td></tr> <tr><td>280</td><td>286</td></tr> <tr><td>280</td><td>334</td></tr> <tr><td>280</td><td>382</td></tr> </tbody> </table>	Slip (RPM)	Torque (ft-bs)	48	0	80	48	200	95	252	143	271	191	280	239	280	286	280	334	280	382	No IMS DTC failing No VSS DTC failing No TP sensor DTC failing No ISS DTC failing No TCC Stuck on DTC failing No TCC Electrical DTC failing TCC capacity $\geq 0\% \geq 5$ sec No Engine Torque Default Transmission range = D2, D3, or D4 10% \leq Throttle position $\leq 50\%$ 20° C. \leq Transmission Fluid Temp. $\leq 133^\circ$ C. 43 N-m \leq Engine Torque ≤ 215 N-m 450 \leq Engine RPM $\leq 7500 \geq 5.0$ sec TCC Pressure ≥ 450 kPa ≥ 5.0 sec. Last manual range $\Delta \geq 6$ sec.	5 sec. Fail test count ≥ 1 Frequency: 100 ms cont.	Type B
Slip (RPM)	Torque (ft-bs)																									
48	0																									
80	48																									
200	95																									
252	143																									
271	191																									
280	239																									
280	286																									
280	334																									
280	382																									
Torque Converter Clutch System Performance - Stuck On	P0742	Detects low converter slip when TCC commanded off --rationality	-20 \leq Slip speed ≤ 135 rpm	No IMS DTC failing No VSS DTC failing No TP sensor DTC failing No ISS DTC failing No TCC Stuck off DTC failing No TCC Electrical DTC failing TCC is commanded OFF No Engine Torque Default Transmission is in D4, not in 1st gear 14% $<$ Throttle position $\leq 90\%$ 180 N-m \leq Delivered Torque ≤ 294 N-m 450 \leq Engine RPM $\leq 7500 \geq 5$ sec 20° C. $<$ Transmission Fluid Temp. $< 133^\circ$ C. 500 \leq Engine RPM ≤ 5500 16 kph \leq Vehicle Speed ≤ 130 kph 0.65 \leq Diag. Trans. Ratio ≤ 1.05	5 sec. Fail Test count ≥ 2 Frequency: 100 ms cont.	Type B																				
Shift Solenoid A Circuit Performance	P0751	This DTC detects when 1-2 shift solenoid is stuck off	<u>Fail Case 1</u> Commanded Gear = 1 1.54 \leq Diag. Transmission Ratio ≤ 1.71 <u>Fail Case 2</u> Commanded Gear = 4 0.95 \leq Diag. Transmission Ratio ≤ 1.05	No IMS DTC failing No VSS DTC failing No TP sensor DTC failing No ISS DTC failing No Shift Solenoid Electrical DTC failing No Engine Torque Default Vehicle Speed ≥ 8 kph Transmission is in D4, D3, D2, or D1 20° C. $<$ Transmission Fluid Temp. $< 133^\circ$ C Throttle position $\geq 7.5\%$ 450 \leq Engine RPM $\leq 7500 \geq 5$ sec. 80 N-m \leq Engine Torque ≤ 395 N-m	Case 1. 1.5 sec. Case 2. 4.0 sec. Frequency: 100 ms cont.	Type B																				

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Shift Solenoid A Circuit Performance	P0752	This DTC detects when 1-2 shift solenoid is stuck on	<p><u>Fail Case 1</u> Commanded Gear = 2 $2.87 \leq \text{Diag. Transmission Ratio} \leq 3.11$</p> <p><u>Fail Case 2</u> Commanded Gear = 3 $0.65 \leq \text{Diag. Transmission Ratio} \leq 0.71$</p>	No IMS DTC failing No VSS DTC failing No TP sensor DTC failing No ISS DTC failing No Shift Solenoid Electrical DTC failing No Engine Torque Default Vehicle Speed ≥ 8 kph Transmission is in D4, D3, D2, or D1 $20^\circ \text{ C.} < \text{Transmission Fluid Temp.} < 133^\circ \text{ C}$ Throttle position $\geq 7.5\%$ $450 \leq \text{Engine RPM} \leq 7500 \geq 5 \text{ sec.}$ $80 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$	Case 1. 2.0 sec. Case 2. 4.0 sec. Frequency: 100 ms cont.	Type B
Shift Solenoid B Circuit Performance	P0756	This DTC detects when 2-3 shift solenoid is stuck on	<p><u>Fail Case 1</u> Vehicle Speed ≥ 8 kph $10\% \leq \text{Throttle Position} < 100\%$ $80 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$ Commanded Gear = 1 $0.65 \leq \text{Diag. Transmission Ratio} \leq 0.71$</p> <p><u>Fail Case 2</u> Vehicle Speed ≥ 8 kph $10\% \leq \text{Throttle Position} \leq 100\%$ $80 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$ Commanded Gear = 2 $0.95 \leq \text{Diag. Transmission Ratio} \leq 1.05$</p>	No IMS DTC failing No VSS DTC failing No TP sensor DTC failing No ISS DTC failing No Shift Solenoid Electrical DTC failing Transmission is in D4, D3, D2, or D1 No Engine Torque Default $20^\circ \text{ C.} \leq \text{Transmission Fluid Temp.} \leq 133^\circ \text{ C.}$ $450 \leq \text{Engine RPM} \leq 7500 \geq 5 \text{ sec.}$	Case 1. 1.0 sec. Case 2. 0.5 sec. Frequency: 100 ms cont.	Type A
Shift Solenoid B Circuit Performance	P0757	This DTC detects when 2-3 shift solenoid is stuck off	<p><u>Fail Case 1</u> Vehicle Speed ≥ 8 kph Throttle Position $> 10\%$ $80 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$ Commanded Gear = 3 $1.54 \leq \text{Diag. Transmission Ratio} \leq 1.71$</p> <p><u>Fail Case 2</u> Vehicle Speed ≥ 8 kph Throttle Position $> 10\%$ $10 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$ Engine speed $\leq 7500 \text{ RPM}$ Commanded Gear = 4 $2.87 \leq \text{Diag. Transmission Ratio} \leq 3.11$</p>	No IMS DTC failing No VSS DTC failing No TP sensor DTC failing No ISS DTC failing No Shift Solenoid Electrical DTC failing Transmission is in D4, D3, D2, or D1 No Engine Torque Default $20^\circ \text{ C.} \leq \text{Transmission Fluid Temp.} \leq 133^\circ \text{ C.}$ $450 \leq \text{Engine RPM} \leq 7500 \geq 5 \text{ sec.}$	Case 1. 3.0 sec. Case 2. 2.0 sec. Frequency: 100 ms cont.	Type A
HO2S Heater Current Monitor Control Circuit Sensors 1	P1031	This DTC detects when the circuit is shorted to +12V. -- Circuit check	Circuit fault indicated	$10 \text{ V} < \text{System Voltage} < 18 \text{ V}$	45 fails out of 50 samples	Type B

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HO2S Heater Warm Up Control Circuit Sensors 1	P1032	This DTC detects when the circuit is open, shorted to ground or shorted to +12V. -- Circuit check	Circuit fault indicated	10 V < System Voltage < 18 V	45 fails out of 50 samples	Type B
HO2S Circuit Insufficient Switching (bank 1 sensor 1)	P1133	This DTC determines if the O2 sensor functioning properly by monitoring the number of L/R and R/L switches.	Number of switches in 85 seconds: L/R switches < 1 R/L switches < 1 O2 voltage between 325 millivolts and 625 millivolts	No misfire DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No ECT sensor DTC's No AIR DTC's No Bank 1 Sensor 1 Voltage DTC's DTC P0135 (O2 Heater) not set EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Engine Run Time > 202 sec. Coolant temp > 75 C 1200 < RPM < 2300 15.0 gps < MAF < 30.0 gps Throttle position ≥ 3 % Transmission not in Park, Reverse or Neutral Above conditions met for 3.0 seconds.	85 seconds after closed loop enable Once per key cycle	DTC Type B

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HO2S Circuit Transition Time Ratio (bank 1 sensor 1)	P1134	This DTC diagnoses degraded slow rich to lean or lean to rich response times.	Ratio of average response times. Ratio > 8 or < 0.40 O2 voltage between 325 millivolts and 625 millivolts	No misfire DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No ECT sensor DTC's No AIR DTC's No Bank 1 Sensor 1 Voltage DTC's DTC P0135 (O2 Heater) not set DTC P1133 (Too Few Switches) not set EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Engine Run Time > 202 sec. Coolant temp > 75 C 1200 < RPM < 2300 15.0 gps < MAF < 30.0 gps Throttle position ≥ 3 % Transmission not in Park, Reverse or Neutral Above conditions met for 3.0 seconds.	85 seconds after closed loop enable Once per key cycle	DTC Type B

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HO2S Circuit Insufficient Switching (bank 2 sensor 1)	P1153	This DTC determines if the O2 sensor functioning properly by monitoring the number of L/R and R/L switches.	Number of switches in 85 seconds: L/R switches < 1 R/L switches < 1 O2 voltage between 325 millivolts and 625 millivolts	No misfire DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No ECT sensor DTC's No AIR DTC's No Bank 2 Sensor 1 Voltage DTC's DTC P0155 (O2 Heater) not set EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Engine Run Time > 202 sec. Coolant temp > 75 C 1200 < RPM < 2300 15.0 gps < MAF < 30.0 gps Throttle position ≥ 3 % Transmission not in Park, Reverse or Neutral Above conditions met for 3.0 seconds.	85 seconds after closed loop enable Once per key cycle	DTC Type B

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HO2S Circuit Transition Time Ratio (bank 2 sensor 1)	P1154	This DTC diagnoses degraded slow rich to lean or lean to rich response times.	Ratio of average response times. Ratio > 8 or < 0.40 O2 voltage between 325 millivolts and 625 millivolts	No misfire DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No ECT sensor DTC's No AIR DTC's No Bank 2 Sensor 1 Voltage DTC's DTC P0155 (O2 Heater) not set DTC P1153 (Too Few Switches) not set EGR Flow diag. test not active AIR diag. test not active Catalyst diag. test not active Closed Loop Fuel Enabled 10 volts < Ignition Voltage < 18 volts Engine Run Time > 202 sec. Coolant temp > 75 C 1200 < RPM < 2300 15.0 gps < MAF < 30.0 gps Throttle position ≥ 3 % Transmission not in Park, Reverse or Neutral Above conditions met for 3.0 seconds.	85 seconds after closed loop enable Once per key cycle	DTC Type B
Engine Metal Overtemperature Protection	P1258	activity check	Engine Overtemperature mode activity status = active	None	8 sec. frequency: 500 ms cont.	Type A
Crankshaft Position System Variation Not Learned	P1336	The DTC will determine if the Crankshaft Position System Variation has not been learned.	Sum of compensation factors not within range	PCM state = run Manufacturers enable counter must be Zero.	0.50 sec 100ms loop continuous	Type A
Ignition Control Circuit Group A (Cylinders 1,7,4,6)	P1359	This DTC detects when the circuit is open or shorted to +12V. -- Circuit check	Fault flag indicated	Ignition 1 is powered	Open - fault count = 5 out of 10 Short to +12V - fault count = 5 out of 10 frequency: 250 ms cont. Note : open detection is only performed at key-on with PCM in reset state.	Type B

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Ignition Control Circuit Group B (cylinders 2,3,5,8)	P1360	This DTC detects when the circuit is open or shorted to +12V. -- Circuit check	Fault flag indicated	Ignition 1 is powered	Open - fault count = 5 out of 10 Short to +12V - fault count = 5 out of 10. frequency: 250 ms cont. Note : open detection is only performed at key-on with PCM in reset state.	Type B
Crank Sensor Circuits Performance	P1372	24X Signal This diagnostic determines if the signals for crank sensors A and/or B corrupted (ie excessive noise is present) resulting in an occasional re-synch	The number of loss of match occurrences is ≥ 6 within 85 cylinder events.	PCM state = crank or run Decode mode = Angle based No cam faults present	Execute at low resolution interrupt	Type B
ABS Rough Road Malfunction	P1380	This diagnostic detects if the ABS controller is indicating a fault. When this occurs, misfire will STILL run.	ABS controller sends a message to PCM indicating that a failure has occurred in the ABS module	none	16 failures out of 20 samples	Type C (DTC sets when a P0300 is active)
ABS System Rough Road Detection Communication Fault	P1381	This diagnostic detects if the rough road information is no longer being received from the ABS module. When this occurs, misfire will STILL run.	Serial data messages are lost for 5 seconds	none	16 failures out of 20 samples	Type C (DTC sets when a P0300 is active)
EGR Valve Pintle Circuit	P1404	functional check	Pintle position > 5% from learned closed position for 10 seconds increments the failure counter.	Ignition Voltage ≥ 11.7 volts EGR Valve commanded closed.	4 failures for 10 seconds (with pintle movement > 30% for 5 seconds opening time between tests) frequency: 250 ms cont./ position error every 12.5 ms. cont.	Type A

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AIR System - Bank 1	P1415	<p>Passive: Part 1 HO2S sensors indicate lean condition present during open loop operation. Verifies proper operation of AIR pump.</p> <p>Part 2 Monitors the transition from open loop to closed loop to verify O2 sensor activity indicating that the AIR pumps have turned off.</p> <p>Active: HO2S sensors indicate lean condition present when AIR pump is turned on during closed loop operation</p>	<p>Passive: Part 1 HO2S sensor > approx. 470 mv during open loop operation 27% of the time.</p> <p>Part 2 HO2S sensor does not toggle above 600 mv at least 85 times in 25 seconds.</p> <p>Active: HO2S sensor > 30.81 mv for > 1.5 seconds or fuel integrator delta of 0.09 when pump turned on during closed loop operation.</p>	<p>General Enable: No MAF DTC's set No MAP DTC's set No IAT DTC's set No ECT DTC's set No TP sensor DTC's set No HO2S DTC's set No Injector DTC's set No Misfire DTC's set No CKP DTC's set No EGR DTC's set No Fuel Trim DTC's set No IAC DTC's set No AIR pump relay DTC's set No AIR Solenoid DTC's set No EVAP DTC's set 5°C < IAT < 72.5°C 5°C < ECT < 108.5°C 5°C < Power Up ECT < 80°C Manifold Vacuum > 35 kpa Ignition voltage > 10.2V for a time > 10 seconds Engine Run Time > 3 seconds Airflow < 35 g/s Exhaust backpressure < 79.9% A/F Ratio > 11.1:1 ΔTPS < 9.9% PE, COT, DFCO Not Active</p> <p>Passive Part 1 Air Pumps = on A/F State = Open Loop</p> <p>Passive Part 2 Air Pumps = off A/F State = Closed Loop</p> <p>Active Passive Test = Fail or inconclusive A/F State = Closed Loop Fuel integrator > 0.95 & < 1.05 BLM cell is valid RPM > 1000 RPM Engine Load < 79.9% Manifold Vacuum > 35 kpa</p>	<p>Passive: During open loop operation. Once per trip.</p> <p>Active: 3 seconds Up to 3 times per trip if passive test fails or is inconclusive.</p>	Type B

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AIR System - Bank 2	P1416	<p>Passive: Part 1 HO2S sensors indicate lean condition present during open loop operation. Verifies proper operation of AIR pump.</p> <p>Part 2 Monitors the transition from open loop to closed loop to verify O2 sensor activity indicating that the AIR pumps have turned off.</p> <p>Active: HO2S sensors indicate lean condition present when AIR pump is turned on during closed loop operation</p>	<p>Passive: Part 1 HO2S sensor > approx. 470 mv during open loop operation 27% of the time.</p> <p>Part 2 HO2S sensor does not toggle above 600 mv at least 85 times in 25 seconds.</p> <p>Active: HO2S sensor > 30.81 mv for > 1.5 seconds or fuel integrator delta of 0.09 when pump turned on during closed loop operation.</p>	<p>General Enable: No MAF DTC's set No MAP DTC's set No IAT DTC's set No ECT DTC's set No TP sensor DTC's set No HO2S DTC's set No Injector DTC's set No Misfire DTC's set No CKP DTC's set No EGR DTC's set No Fuel Trim DTC's set No IAC DTC's set No AIR pump relay DTC's set No AIR Solenoid DTC's set No EVAP DTC's set 5°C < IAT < 72.5°C 5°C < ECT < 108.5°C 5°C < Power Up ECT < 80°C Manifold Vacuum > 35 kpa Ignition voltage > 10.2V for a time > 10 seconds Engine Run Time > 3 seconds Airflow < 35 g/s Exhaust backpressure < 79.9% A/F Ratio > 11.1:1 ΔTPS < 9.9% PE, COT, DFCO Not Active</p> <p>Passive Part 1 Air Pumps = on A/F State = Open Loop</p> <p>Passive Part 2 Air Pumps = off A/F State = Closed Loop</p> <p>Active Passive Test = Fail or inconclusive A/F State = Closed Loop Fuel integrator > 0.95 & < 1.05 BLM cell is valid RPM > 1000 RPM Engine Load < 79.9% Manifold Vacuum > 35 kpa</p>	<p>Passive: During open loop operation. Once per trip.</p> <p>Active: 3 seconds Up to 3 times per trip if passive test fails or is inconclusive.</p>	Type B

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Evap. Emission Control System - Continuous Open Purge Flow	P1441	This DTC will determine if the purge solenoid is leaking to engine manifold vacuum.	Tank Vacuum > 10" H2O for 5 seconds before purge time > 60 sec	No IAT DTC's active No MAP DTC's active No TP sensor DTC's active No VS sensor DTC's active No ECT sensor DTC's active No EVAP output circuit DTC's active No Fuel Tank Pressure Sensor DTC's active DTC P0125 not active 15 % < Fuel Level < 85 % 10 V < System Voltage < 18 V 4 °C < IAT < 30 °C Engine Coolant Temp < 30°C Baro > 75 kPa (8000 ft)	Once per trip. Max time is 65 sec	Type B
PCM EEPROM Performance	P1621	This DTC detects a hardware error in the PCM non-volatile memory areas.	All blocks of non-volatile memory storage are bad except for the one currently being used.	None	Immediate set. continuous	Type B
5 Volt Reference A Circuit	P1635	This DTC detects a problem with the 5 volt reference A circuit	5 volt reference is too high or too low. Determined by the HW IO	Ignition On	200 fails out of 240 samples 100 ms	Type B
5 Volt Reference B Circuit	P1639	This DTC detects a problem with the 5 volt reference B circuit	5 volt reference is too high or too low. Determined by the HW IO	Ignition On	200 fails out of 240 samples 100 ms	Type B
Internal Mode Switch Mode A Circuit Low	P1820	This DTC detects when the IMS mode A circuit reads low (0 volts) when it should be high.	Mode A has always been low in Park > 2 sec and later in Transitional_1 > 5 sec. Note: PRNDL code changes from D4 to Transitional_1 when Mode A is Low.	Engine Torque not defaulted 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V 40 N-m ≤ Engine Torque ≤ 200 N-m	Fail count ≥ 1	Type B
Internal Mode Switch Mode B Circuit High	P1822	This DTC detects when the IMS Mode B circuit reads high (12 Volts) when it should read low.	Mode B has always been high in Park > 2 sec. and later in Transitional_13 > 5 sec. Note: PRNDL code changes from D4 to Transitional_13 when Mode B is High.	Engine Torque not defaulted 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V 40 N-m ≤ Engine Torque ≤ 200 N-m	Fail count ≥ 1	Type B
Internal Mode Switch Mode P Circuit Low	P1823	This DTC detects when the IMS Mode P circuit reads low (0 volts) when it should read high.	Mode P has always been low in Park > 2 sec and later in Transitional_8 > 5 sec. Note: PRNDL code changes from D4 to Transitional_8 when Mode P is Low.	Engine Torque not defaulted 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V 40 N-m ≤ Engine Torque ≤ 200 N-m	Fail count ≥ 1	Type B
Transmission Internal Mode Switch state = Illegal Range	P1825	This DTC detects when the transmission IMS indicates an illegal range	Illegal Range Switch State	8 V < System Voltage < 18 V 450 ≤ Engine Torque ≤ 7500 ≥ 5 sec.	5 sec. continuous	Type B

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Shift Solenoid A Control Circuit - Low Voltage	P1842	This DTC detects a continuous open or short to ground in SSA ckt/sensor	Shift Solenoid A commanded ON AND (Open flag = 1 OR Short to ground flag = 1)	High Side Driver 2 enabled 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V	43 fails out of 50 samples	Type B
Shift Solenoid A Control Circuit - High Voltage	P1843	This DTC detects a continuous short to +12 volts in SSA ckt/sensor	Shift Solenoid A short to power = 1	Shift Solenoid A commanded on. 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V < System Voltage < 18 V	43 fails out of 50 samples	Type B
Shift Solenoid B Control Circuit - Low Voltage	P1845	This DTC detects a continuous open or short to ground in SSB ckt/sensor	Shift Solenoid B commanded ON AND (Open flag = 1 OR Short to ground flag = 1)	High Side Driver 2 enabled 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V	43 fails out of 50 samples	Type B
Shift Solenoid B Control Circuit - High Voltage	P1847	This DTC detects a continuous short to +12 volts in SSB ckt/sensor	Shift Solenoid B short to power = 1	Shift Solenoid B commanded on. 450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V	43 fails out of 50 samples	Type B
Torque Converter Clutch PWM Solenoid Control Circuit	P1860	This DTC detects a continuous open or short to ground in TCC PWM ckt/sensor	TCC failure mode = 1	450 ≤ Engine RPM ≤ 7500 ≥ 5 sec. 8 V ≤ System Voltage ≤ 18 V TCC Solenoid DC ≤ 10% or ≥ 90%	43 fails out of 50 samples	Type B

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P0101: MAF System Performance

Maximum allowed delta of sensed and derived MAF before fault

Grams per Second	Max Delta
0	10
40	14
80	24
120	36
160	48
200	48
240	48
280	48
320	48
360	48
400	48

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P0106: MAP Performance

Predicted maximum Manifold Air Pressure as a function of TPS and Engine RPM

RPM	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
800	100	100	100	100	100	100	100	100	100	100	100
1600	100	100	100	100	100	100	100	100	100	100	100
2400	90	94	98	98	100	100	100	100	100	100	100
3200	70	76	82	88	90	100	100	100	100	100	100
4000	40	44	70	84	92	100	100	100	100	100	100
4800	40	44	70	84	92	100	100	100	100	100	100
5600	40	44	70	84	92	100	100	100	100	100	100

Predicted minimum Manifold Air Pressure as a function of TPS and Engine RPM

RPM	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
800	10	50	65	65	65	65	65	65	65	65	65
1600	10	36	58	60	62	65	65	65	65	65	65
2400	10	22	50	55	58	62	65	65	65	65	65
3200	10	20	43	50	53	60	63	65	65	65	65
4000	10	16	36	40	50	55	60	63	65	65	65
4800	10	16	36	40	48	51	57	60	63	65	65
5600	10	16	36	40	45	49	53	57	60	65	65

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P0107: Manifold Air Pressure Sensor Circuit Low Voltage

P0108: Manifold Air Pressure Sensor Circuit High Voltage

Minimum run time based on start-up coolant temp (°C)

Start-up Coolant (Degrees Celsius)	Time (sec)
-30	8
-15	8
0	4
15	3
30	3

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P0121: TPS Performance

Predicted TPS value as a function of engine RPM for the stuck high test

RPM	Value
0	0.0
400	14.0
800	16.0
1200	17.4
1600	18.4
2000	20.0
2400	25.0
2800	29.9
3200	29.9
3600	29.9
4000	29.9
4400	29.9
4800	29.9
5200	29.9
5600	29.9
6000	29.9
6400	29.9

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P0121: TPS Performance

Predicted TPS value as a function of engine RPM for the stuck low test

RPM	Value
0	0.0
400	0.0
800	0.0
1200	0.5
1600	1.2
2000	2.4
2400	3.7
2800	4.8
3200	6.3
3600	7.5
4000	9.0
4400	10.0
4800	10.0
5200	11.0
5600	12.0
6000	13.0
6400	13.0

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P0125/P0128: Coolant Temperature Sensor

Total accumulated airflow

Power-up Coolant	P0125 Grams of Air	P0128 Grams of Air
-40	15432	20534
-28	13642	18769
-16	11851	17004
-4	10061	15239
8	8270	13474
20	6480	11709
32	4689	9944
44	2899	8179
56	1108	6414
68	1108	4696
80	1108	2884

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P0128: Coolant Temperature below Thermostat

Time required to detect a threshold thermostat at various engine start temperatures

Power Up Coolant	Total Air Flow	RunTime	Target Temp.	Total Air Flow	RunTime	Target Temp.
6.23	5782	282	55	10295	446	80
0.219	7145	232	55	10909	381	80
3.37	7862	217	55	10733	358	80
7.39	6839	212	55	10938	422	80
-5.77	8169	262	55	12306	440	80
25.2	3081	209	55	7046	370	80
1.45	6700	275	55	11528	478	80
-11	9487	257	55	13302	482	80
5.16	5989	327	55	11060	463	80
37.7	918	186	55	4112	377	80
30.6	2645	191	55	7440	383	80
-6.05	8610	238	55	12898	459	80
10.2	5675	275	55	11137	427	80
58.6	-	-	-	4577	170	80
-3.01	8737	202	55	13664	323	80
50.7	1184	81	55	5474	246	80
-1.14	8128	196	55	12583	323	80
5.71	6798	219	55	11654	400	80
-11.8	9493	243	55	14181	360	80
43.4	1825	135	55	6061	373	80
-5.36	8409	213	55	13426	378	80
-9.2	9670	238	55	14413	346	80

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P0141: HO2S Heater Circuit (bank 1 sensor 2)

Maximum time to activity based on engine airflow (grams per second)

Cnts	0 Grams per Second	2 Grams per Second	4 Grams per Second	6 Grams per Second	8 Grams per Second	10 Grams per Second	12 Grams per Second	14 Grams per Second	16 Grams per Second	18 Grams per Second	20 Grams per Second
Time (sec)	250	230	210	190	170	150	142	134	126	118	110

22 Grams per Second	24 Grams per Second	26 Grams per Second	28 Grams per Second	30 Grams per Second	32 Grams per Second	34 Grams per Second	36 Grams per Second	38 Grams per Second	40 Grams per Second	42 Grams per Second
106	102	98	94	90	90	90	90	90	90	90

44 Grams per Second	46 Grams per Second	48 Grams per Second	50 Grams per Second	52 Grams per Second	54 Grams per Second	56 Grams per Second	58 Grams per Second	60 Grams per Second	62 Grams per Second	64 Grams per Second
90	90	90	90	90	90	90	90	90	90	90

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P0141: HO2S Heater Circuit (bank 1 sensor 2)

Cold start determination

Based on last engine running ECT - startup ECT \geq delta temperature
(table lookup based on last engine running ECT)

Power down coolant (°C)	Delta Temperature
-40	0
-28	7
-16	9
-4	11
8	13.5
20	20
32	22.5
44	24
56	26
58	33
80	40.5
92	47
104	59
116	71
128	83
140	95
152	107

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P0401: Exhaust Gas Recirculation -- Insufficient Flow Detected

Map delta threshold based on RPM and Baro

Barometric Pressure

RPM	65 kPa	85 kPa	105 kPa
500	8.246094	9.699219	9.699219
550	7.988281	9.398438	9.398438
600	7.648438	9	9
650	7.394531	8.699219	8.699219
700	7.054688	8.300781	8.300781
750	6.714844	7.898438	7.898438
800	6.375	7.5	7.5
850	6.035156	7.101563	7.101563
900	5.695313	6.699219	6.699219
950	5.269531	6.199219	6.199219
1000	4.84375	5.699219	5.699219
1050	4.503906	5.300781	5.300781
1100	4.078125	4.800781	4.800781
1150	3.65625	4.300781	4.300781
1200	3.230469	3.800781	3.800781
1250	2.71875	3.199219	3.199219
1300	2.296875	2.699219	2.699219

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P0300: Catalyst Damaging Misfire Percentages as a Function of Engine Speed and Load

Eng. Load ↓ / Eng. RPM →	0 RPM	1000 RPM	2000 RPM	3000 RPM	4000 RPM	5000 RPM	6000 RPM	7000 RPM
0 Load_In_Percent	92%	92%	92%	92%	92%	77%	77%	64%
10 Load_In_Percent	92%	92%	92%	92%	92%	64%	60%	49%
20 Load_In_Percent	92%	92%	92%	92%	92%	43%	45%	36%
30 Load_In_Percent	92%	92%	92%	82%	77%	34%	29%	24%
40 Load_In_Percent	92%	92%	92%	66%	51%	31%	22%	19%
50 Load_In_Percent	92%	92%	92%	51%	26%	26%	15%	15%
60 Load_In_Percent	92%	92%	77%	51%	31%	31%	20%	18%
70 Load_In_Percent	92%	92%	77%	51%	36%	36%	26%	20%
80 Load_In_Percent	92%	92%	77%	51%	43%	43%	34%	24%
90 Load_In_Percent	92%	92%	77%	51%	43%	43%	36%	31%
100 Load_In_Percent	92%	92%	77%	51%	43%	43%	36%	33%

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P0326: Knock Sensor

Maximum fast retard allowed as a function of RPM and MAP

RPM	20 kPa	30 kPa	40 kPa	50 kPa	60 kPa	70 kPa	80 kPa	90 kPa	100 kPa
0	0	0	0	0	0	0	0	0	0
512	0	0	0	4	5	8	9	9	9
1024	0	0	0	4	5	9	10	10	10
1536	0	0	0	4	5	9	10	10	10
2048	0	0	0	4	5	9	10	10	10
2560	0	0	0	4	5	9	10	10	10
3072	0	0	0	4	5	9	10	10	10
3584	0	0	0	4	5	9	10	10	10
4096	0	0	0	4	5	9	10	10	10
4608	0	0	0	4	5	9	10	10	10
5120	0	0	0	4	5	9	10	10	10
5632	0	0	0	4	5	9	10	10	10
6144	0	0	0	4	5	9	10	10	10
6656	0	0	0	4	5	9	10	10	10
7168	0	0	0	4	5	9	10	10	10
7680	0	0	0	4	5	9	10	10	10
8191	0	0	0	4	5	9	10	10	10