2004 2.2L (L61) Saturn ION *(only)* Engine Diagnostic Parameters

SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA & THRESHOLD VALUE(S)	SECONDARY MONITORING PARAMETERS AND ENABLE CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MIL Illumination Type
Front O2S Heater Circuit Open/Ground short	P0031	Detects an open or short to ground	O2S heater circuit voltage < 1.25 volts	Heater turned off, Battery Voltage > 10.9 volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Front O2S Heater Power Short	P0032	Detects a power short	O2S heater circuit voltage > 1.25 volts	Heater turned on, Battery Voltage > 10.9 volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Rear O2S Heater Circuit open/ground short	P0037	Detects a open or short to ground	O2S heater circuit voltage < 1.25 volts	Heater turned off, Battery Voltage > 10.9 volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Rear O2S Heater Circuit Power Short	P0038	Detects a power short	O2S heater circuit voltage > 1.25 volts	Heater turned on, Battery Voltage > 10.9 volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Manifold Absolute Pressure /Throttle Position Rational	P0106	This DTC detects a skewed MAP sensor or TP sensor Rationality Test	Predicted MAP based on a Table Lookup of Throttle Position and RPM	No P0107, P0108,P0122, P0123,P0336, P0506, P0507, P0601, P0602, P0606, P0641 DTC's Engine speed Delta < 50 RPM, Engine speed > 1600 RPM or < 4000 RPM	**150 failures within 200 samples 10 samples per second**	DTC Type B
Manifold Absolute Pressure Circuit Low Input	P0107	Detects the MAP sensor or signal circuit, low or open Range Check	Raw MAP < .20 volts	No P0122, P0123 DTC's TP>=15.2% when engine speed >1600 RPM or TP >= 0% when engine speed <=1600 RPM	100 test failures within a 100 test sample** Continuous	DTC Type A

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

Manifold Absolute Pressure Circuit High Input	P0108	Detects the Map sensor or signal circuit, high Range Check	Raw MAP sensor > 4.22 volts	No P0122, P0123 DTC's TP <= 9.8% when engine speed >1600 RPM or TP <=2% when engine speed <=1600 RPM	100 test failures within a 100 sample** Continuous	DTC Type A
Intake Air Temperature Circuit Low Input	P0112	Detects a continuous short to ground in either the IAT signal circuit or the IAT sensor Range Check	IAT sensor < .16 volts	NA	20 test failures within a 20 test sample - 1 sample per sec Continuous	DTC Type A
Intake Air Temperature Circuit High Input	P0113	Detects a continuous short to high in the IAT signal circuit or the IAT sensor Range Check	IAT sensor > 4.94 volts	NA	20 test failures within a 20 test sample - 1 sample per sec Continuous	DTC Type A
Engine Coolant Temperature Circuit Low Input	P0117	Detects a continuous short to ground in the ECT signal circuit or the ECT sensor Range Check	Engine coolant temperature sensor < .14 volts	Engine run time>= 10 seconds	3 test failures within 10 samples - 1 sample per sec Continuous	DTC Type A

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

Engine Coolant Temperature Circuit High Input	P0118	Detects a continuous short to high or open in the ECT signal circuit or the ECT sensor Range Check	Engine coolant temperature sensor > 4.94 volts	Engine run time >= 250 seconds	3 test failures within 10 samples - 1 sample per sec Continuous	DTC Type A
Throttle Position Sensor A Circuit Low Input	P0122	Detects a continuous short to low or open in either the signal circuit or the TP sensor Range Check	TP sensor < .20 volts	None	100 failures within a 100 test samples** Continuous	DTC Type A
Throttle Position Sensor A Circuit High Input	P0123	Detects a continuous short to high in either the signal circuit or the TP sensor Range Check	TP sensor > 4.88 volts	None	**50 failures within 100 test samples** Continuous**	DTC Type A
Insufficient Coolant Temperature for Closed Loop Fuel Control	P0125	This DTC detects if a stabilized minimum coolant temperature to allow closed loop is reached after engine start-up Rationality Check	If total air grams (reference table ktectr_clminwarmarfl) is exceeded and ECT < 0 Degrees Celsius	No P0106, P0107, P0108, P0112, P0113, P0116, P0117, P0118**,** P0601, P0602, P0606, P0641 DTC's, No vehicle speed sensor faults Engine run time > 30 seconds < 1800 seconds Average airflow > 12 grams/seconds Ambient air temperature > -7 Degrees Celsius Start up coolant temperature < -1 Degrees Celsius Distance traveled > 2 Km	Exceed time after 2 consecutive trips - 1 sec Continuous	DTC Type B

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

Engine Coolant Rationality	P0128	This DTC detects if a stabilized minimum coolant temperature is reached after engine start-up Rationality Check	If total air grams (reference dtectr_minwarmarfl) + Heat loss compensation factor of .1289 grams/second is exceeded and ECT < 80 Degrees Celsius	No P0106, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0601, P0602, P0606, P0641 DTC's, No vehicle speed sensor faults, Engine run time > 30 sec < 1800 sec Average airflow > 12 grams/sec Start up ambient air temp > -7 Degrees Celsius Start up coolant temp < 75 Degrees Celsius Distance traveled > 2 Km	Exceed time after 2 consecutive trips - 1 sec Continuous	DTC Type B
Front 02 closed loop rational	P0130	Determines if the system should be closed loop Rationality Check	.3 mVolt < = 02 voltage <= .6 mVolt	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC'S No vehicle speed sensor faults engine run time > 60 seconds Predictive front 02 temp > 549 Degrees Celsius (predicted from RPM and Airflow) TPS > 6.3%	490 failures in a 500 sample test - .1 sec per sample Continuous	DTC Type B
Front O2S Sensor Circuit Low Voltage	P0131	Determines if the Front 02 sensor or circuit is shorted to low or reading a lean condition in Power Enrichment (PE mode) Range check Low	02 Voltage < .291 volts (Shorted low) 02 Voltage <.291 volts while in PE mode	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC's No vehicle speed sensor faults Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 seconds In closed loop In drive (if auto) Above met for .3 sec in PE mode	900 failures in a 1000 sample test . 90 failures in a 100 sample test in PE mode - .1 sec , continuous	DTC Type B

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

Front O2S Sensor Circuit High Voltage	P0132	Determines if the Front 02 sensor or circuit is High or reading a rich condition in Deceleration Fuel Cut-off (DFCO) Range check High	02 Voltage > .786 volts (high volts) 02 Voltage > .586 volts in Deceleration fuel cut off	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC's No vehicle speed sensor faults Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 seconds In closed loop In drive (if auto) above met for .3 sec in DFCO	900 failures in a 1000 sample test. 90 failures in a 100 sample test in DFCO mode -.1 sec, continuous	DTC Type B
Front O2 Sensor Circuit Slow Response	P0133	Determines if the Front 02 sensor is functioning properly by checking its response time Functional Check	02 Average transition time lean/rich > 200 mSeconds or rich/lean > 130 mSeconds	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0131, P0132, P0133, P0134, P0137, P0138, P0140, P0171, P0172, P0300, P0336, P0340, P0341, P0506, P0507, P0601, P0602, P0606, P1133, P1134, P0641 DTC's No vehicle speed sensor faults Closed loop 02 Voltage low threshold .300 02 high threshold .600 V 7 g/sec < Airflow < 25 g/sec 1500 < rpm < 3200 02 temp model > 549 degrees for 5 sec, then needs to stay above 453 degrees	100 seconds after closed loop enable once per ignition	DTC Type B
Front O2S Circuit No Activity Detected	P0134	Determines if the Front 02 sensor or the 02 sensor circuit has developed an open Circuit Check	.391 V <= 02 voltage <= .491V	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC's No vehicle speed sensor faults engine run time > 60 seconds. Predictive front 02 temp > 450 Degrees Celsius (predicted from RPM and Airflow)	900 failures in a 1000 sample test - .1 sec per sample Continuous	DTC Type B

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

02 sensor front heater current out of range	P0135	This DTC determines if the front O2 sensor heater has too much or too little current running through it	Current > 1502.7 mAmps or < 249.39 mAmps	Heater turned on	Failed for 5 sec Continuous	DTC Type B
Rear O2 Sensor Circuit Low Voltage	P0137	Determines if the Rear 02 sensor or circuit is shorted to low or reading a lean condition in Power Enrichment Range check Low	02 voltage < .022 volts (shorted low) 02 voltage < .291 volts in Power Enrichment (PE mode)	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC's No vehicle speed sensor faults Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 seconds. In drive (if auto). In closed loop. Above met for .3 sec in PE mode	1000 failures in a 1000 sample test , 2 consecutive tests 90 failures in a 100 sample test in PE mode - .1 sec per sample, Continuous	DTC Type B
Rear O2 Sensor Circuit High Voltage	P0138	Determines if the Rear 02 sensor or circuit is High or reading a rich condition in Deceleration Fuel Cut-off (DFCO) Range check High	02 voltage > 1.064 volts (high volts) 02 voltage > .586 volts in Deceleration fuel cut off	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC's No vehicle speed sensor faults Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 seconds. In closed loop. In drive (if auto). above met for .3 sec in DFCO	1000 failures in a 1000 sample test , 2 consecutive tests 90 failures in a 100 sample test in PE mode - .1 sec per sample, Continuous	DTC Type B
Rear O2 Sensor Circuit No Activity Detected	P0140	Determines if the Rear 02 sensor or 02 sensor circuit has developed an open Circuit Continuity Check	.421 V <= 02 Voltage<=.482 V	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0141, P0171, P0172, P0300, P0336, P0340, P0341, P0455, P0601, P0602, P0606, P0641 DTC's No vehicle speed sensor faults engine run time > 60 seconds Predictive 02 rear temp > 426 Degrees Celsius (rpm/airflow)	1450 failures in a 1500 sample test - .1 sec per sample, continuous	DTC Type B

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

02 sensor Rear heater Current out of range	P0141	This DTC determines if the rear O2 sensor heater has too much or too little current running through it	Current > 1502.7 mAmps or < 249.39 mAmps	Heater turned on	Failed for 5 sec Continuous	DTC Type B
Fuel System too Lean	P0171	Determines if the system is in a lean condition	Long Term Fuel > 20.3%	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0131, P0132, P0133, P0134, P0137,P0138, P0140, P0141, P0300, P0336, P0340, P0341, P0401, P0404, P0405, P0455, P0506, P0507, P0601, P0602, P0606, P0641, P1133, P1134 DTC's No speed sensor faults 70 KPa< BARO 2< Airflow < 80 grams/second 30 < MAP < 90 KPa -20 < IAT < 80 Degrees Celsius 500 < RPM < 4000 TP < 75% 60 < ECT < 115 Degrees Celsius	If lean counter > 3 seconds Continuous	DTC Type A
Fuel System Too Rich	P0172	Determines if the system is in a rich condition	Long Term Fuel < -21.1%	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0131, P0132, P0133, P0134, P0137,P0138, P0140, P0141, P0300, P0336, P0340, P0341, P0401, P0404, P0405, P0455, P0506, P0507, P0601, P0602, P0606, P0641, P1133, P1134 DTC's No speed sensor faults 70 KPa< BARO 2< Airflow < 80 grams/second 30 < MAP < 90 KPa -20 < IAT < 80 Degrees Celsius 500 < RPM < 4000 TP < 75% 60 < ECT < 115 Degrees Celsius	If rich counter > 3 seconds Continuous	DTC Type A

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Random/Multiple Cylinder Misfire Detected	P0300	These DTC's will determine if a random misfire or a cylinder specific misfire is occurring by monitoring crankshaft velocity	Deceleration/Acceleration Spike vs Engine Speed vs Load vs Camshaft position vs Crankshaft position % Misfire FTP – 2**%**, IM - 2**%** (California)	No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0131, P0132, P0171, P0172, P0336, P0506, P0601, P0602, P0606, P0641 DTC's 400 < Eng. Speed< 6500 rpm 8< ignition V<18 -7 < Coolant temperature < 122 Degrees Celsius If startup coolant <-7 Degrees Celsius, then delay until Coolant > 20 Degrees Celsius Fuel Level > 10**%**, engine not in DFCO Engine run time > 2 crankshaft revolutions	<u>Long Term Software</u>: Emission Exceedence - 5 failed 200 revolution blocks out of 16. Failure reported with (1) exceedence in 1st (16) 200 revolution block, or (4) exceedences thereafter. 1st Catalyst Exceedence = number of 200 revolution blocks as data supports for catalyst damage. 2nd and 3rd catalyst exceedence = (1) 200 revolution block with catalyst damage. Failure reported with (3) exceedences in FTP, or (1) exceedence outside FTP. <u>Frequency</u> – Continuous	DTC Type B (emission Level) <u>Long Term Software</u> DTC Type B (Catalyst damaging) MIL still flashes but will not latch until 2nd trip
Cylinder 1 Misfire Detected	P0301	Same as above	Same as above	same as above	same as above	same as above
Cylinder 2 Misfire Detected	P0302	Same as above	Same as above	same as above	same as above	same as above
Cylinder 3 Misfire Detected	P0303	Same as above	Same as above	same as above	same as above	same as above
Cylinder 4 Misfire Detected	P0304	Same as above	Same as above	same as above	same as above	same as above

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Crankshaft not learned	P0315	This DTC determines whether the crankshaft position sensor learned allowing it to be used in the misfire diagnostic Range Check	Position error not learned in the PCM processor	None	1 failure/ignition cycle Continuous	DTC Type A
Knock Sensor Circuit Check	P0324	This DTC determines if the knock detection IC in the PCM is responding	Knock IC in PCM is not responding to knock signal	1400< RPM < 4000	2 failures/ ignition cycle Continuous	DTC Type B
Knock Sensor Input	P0327	This DTC will detect an open or short in the knock sensor circuit Range Check	ESC Noise accumulator less than diagnostic noise threshold calibration table which is a function of RPM	1400< RPM < 4000	2 failures/ ignition cycle Continuous	DTC Type B
Crankshaft Position Sensor Circuit Performance	P0336	This DTC will detect an open or short in the crankshaft position sensor circuit Range Check	Engine speed > 200 RPM & sync pulse missing	None	21 fails to turn on light** Continuous	DTC Type B
Camshaft position Sensor Circuit Malfunction	P0340	This DTC will detect if a cam signal is not present Circuit Continuity	Cam pulse not seen in 107 engine revolutions	MAP > 30 KPa	Once per ignition	DTC Type B

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Camshaft Position Sensor Performance	P0341	This DTC will determine if the Cam is synchronized correctly	If the cam signal falls in the wrong location 10 times	MAP > 30 KPa	Once per ignition	DTC Type B
Catalyst System Low Efficiency	P0420	Oxygen Storage Capacity of Converter	Oxygen Storage Capacity (OSC) Time Difference > 1 sec OSC time difference = OSC worst Pass Threshold – OSC Compensation factor X (Post cat. O2S Response time – Pre cat O2S response time) OSC Worst Pass Threshold = 2.0 sec	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0131, P0132, P0133, P0134, P0137, P0138, P0140, P0141, P0171, P0172, P0300, P0340, P0341, P0336, P0506, P0507, P0601, P0602, P0606, P0641, P1133, P1134, DTC's, No vehicle speed sensor faults system C/L Delta Map < 6 KPa Test attempt this ignition < 10 Engine Run Time > 570 sec engine Rpm > 1200 for 30 sec 122 < integrator < 134 650 < rpm < 900 375 < catalyst Temperature < 750 vehicle speed < 1 mph	1 Test attempted/valid idle period. **Max of 3 tests/trip** until Catalyst i/m flag set or low O2S storage detected. Max 1 test/trip with passing OSC Frequency - 25 ms	DTC Type A
Evaporative Emission Control System Leak Detected (small leak Detected)	P0442	This Diagnostic will detect a small leak in the evaporative system Functional Check	Tank Vacuum Decay Slope is compared and subtracted from a threshold value from a lookup table based on fill level of fuel tank. The result is statistically filtered (EWMA) and compared to a decision limit	Engine Running No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0452, P0453, P0601, P0602, P0606, P0641 DTC's, No vehicle speed sensor faults 11 v <= Battery Volt<= 18 v BARO > 74.2 KPa 15% ≤ Fuel Level ≤ 43.75% (.040" leak) 43.75% < Fuel Level < 85% (.020"leak) 5 C (41 F) < IAT < 32.2 C (90F) 5 C (41F) <Coolant< 32.2 C (90F) Coolant – IAT < = 9.75 C Vacuum decay < 1990 Pa (8.0" H20)	Once/ cold start 240 seconds	DTC Type A (Will Set within 8 - 10 trips based on EWMA value)

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Evaporative Emission Vent System Performance	P0446	This diagnostic will detect a blockage in the evaporative system which would keep the system from venting Functional Check	Tank Vacuum > 2989 Pa (12 "H20) for 1.6 seconds Purge flow accumulated > or = 350 grams	Engine Running No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0452, P0453, P0601, P0602, P0606, P0641 DTC's, No vehicle speed sensor faults 11v <= Battery Volt <= 18 v BARO > 74.2 KPa 15% < Fuel Level < 85% tank vacuum > 2240 Pa (9" H20) 5 C (41 F) < IAT < 32.2 C (90F) 5 C (41F) <Coolant< 32.2 C (90F) Coolant – IAT < = 9.75 C ERT < or = 144 seconds	Once/ cold start 96 seconds	DTC Type A (Behaves as a B code)
Fuel Tank Pressure Sensor Circuit Low Voltage	P0452	Rationality Test	Tank Pressure < 5 counts for 15 seconds	Engine Running	Once/ignition cycle 100 mSeconds	DTC Type A
Fuel Tank Pressure Sensor Circuit High Voltage	P0453	Rationality Test	Tank Pressure > 249 counts for 15 seconds	Engine Running	Once/ignition cycle 100 mSeconds	DTC Type A
Evaporative Emission Control System Malfunction (Large Leak Detected)	P0455	This diagnostic will detect a missing gas cap or a "gross" leak in the system Functional Check	Tank Vacuum < 1990 PA (8" H20) For 3.2 seconds	Engine running No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0452, P0453, P0601, P0602, P0606, P0641 DTC's, No vehicle speed sensor faults 11v <= Battery Volt <= 18 v BARO > 74.2 KPa 15% < Fuel Level < 85% 5 C (41 F) < IAT < 32.2 C (90F) 5 C (41F) <Coolant< 32.2 C (90F) Coolant – IAT < = 9.75 C ERT < or = 600 sec Purge mass accumulated > or = 6000 grams	Once/cold start 120 sec warm test 240 sec cold test	DTC Type A (Behaves as a B code)

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Evaporative Emission Control System Continuous Open Purge Flow	P0496	This diagnostic will detect a purge valve stuck open. Functional Check	Tank Vacuum > 996 Pa (4" H20) for 4 seconds	Engine Running No P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0452, P0453, P0601, P0602, P0606, P0641 DTC's, No vehicle speed sensor faults 11 v <= Battery Volt < = 18 v BARO > 74.2 KPa 15% < Fuel Level < 85% 5 C (41 F) < IAT < 32.2 C (90F) 5 C (41F) <Coolant< 32.2 C (90F) Coolant – IAT < = 9.75 C Tank Vacuum < 623 Pa (2.5" H20) Purge mass accumulated > 15000 counts	96 seconds Once/ cold start	DTC Type A (Behaves as a B code)
Vehicle Speed Sensor Malfunction	P0500	This DTC detects a loss of vehicle speed signal This DTC is for Manual Transmission only. Refer to TCM documentation for Automatics. Functional check	MAP > Baro value found in table KySSD_t_VSSFailMapThresh and vehicle speed < 3 mph for 6.2 seconds	No P107, P0108 Not in park or neutral and rpm > 1500 RPM. Note: Code will only set on a Manual transmission	2 failures/ignition cycle continuous	DTC Type A
Idle Control system RPM lower than expected	P0506	This DTC will determine if a low idle is the result of an IAC valve or circuit at normal operating temperature. Functional Check	Actual rpm < desired rpm + or - 100 rpm once operating temperature is reached	No P0106, P0107, P0108, P0117, P0118, P0122, P0123, P0300, P0336, P0340, P0341, P0641 DTC's, No vehicle speed sensor fault VSS=0 TP = 0 BARO > 70 KPa 9< Battery Voltage < 18 IAT > -25 Degrees Celsius	Continuous 17 seconds	DTC Type B

** 2 samples per revolution, 600 rpm = 20 samples/second, 3000 rpm = 100 samples/second, 6000 rpm = 200 /second samples

Idle Control System RPM higher than expected	P0507	This DTC will determine if a high idle is the result of an IAC valve or circuit at normal operating temperature. Functional Check	Actual rpm > desired rpm + or - 200 rpm once operating temperature is reached	Same as above	Same as above	DTC Type B
Internal Control Module Memory Check Sum Error	P0601	This DTC will determine when the ECM RAM is faulty Functional Check	Calculated check sum does not equal stored check sum	None	1 failure/ Ignition cycle Continuous	DTC Type A
Control Module Programming Error	P0602	This DTC will check to see if the ECM is programmed properly Functional Check	Write patterns are not equal	None	1 failure / Ignition cycle on key up	DTC Type A
ECM internal error/illegal rest	P0606	This DTC detects an illegal reset in the ECM	This DTC will set when any one of the following reset conditions occur: External reset, cpu timeout, double bus fault, loss of clock	None	2 failures/ Ignition cycle Continuous	DTC Type A
5 Volt Reference circuit low or high	P0641	This DTC verifies the 5 volt reference line Functional Check	4.655< AD Volt < 5.255	Ignition voltage > 10.9 Volts for 500 mSeconds	Continuous	DTC Type A

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MIL control circuit	P0650	This DTC checks the circuit status for the malfunction indicator lamp	Voltage > 2.2 Volts when lamp is driven on, or < 2.2 Volts when lamp is off	None	Continuous	DTC Type A
TCM Requested MIL illumination	P0700	This DTC is latched when the TCM requests the MIL to be illuminated	ECM needs three successive messages from the TCM requesting the MIL to be illuminated. These messages are spaced every 100 mSeconds.	None	Continuous	DTC Type A (This does not illuminate the MIL, TCM controls the MIL)
Oxygen Sensor System - Too Few O2S R/L and L/R Switches	P1133	Determines if the Front 02 sensor has enough switches during the response test Rationality Check	02 sensor switches < 10 counts	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0131, P0132, P0133, P0134, P0137, P0138, P0140, P0171, P0172, P0300, P0336, P0340, P0341, P0506, P0507, P0601, P0602, P0606, P1133, P1134, P0641 DTC's No vehicle speed sensor faults Closed loop 02 Voltage low threshold .300 02 high threshold .600 V Airflow > 7 g/sec 1500 < RPM < 3200 453 < 02 temp model and > 549 for 5 sec	100 seconds after closed loop enable, Once per ignition	DTC Type B
02 Sensor Circuit Transfer Switch Time Ratio Malfunction	P1134	Determine if the Front 02 sensor RLA/LRA ratio is correct during the response test Rationality Check	Ratio of average response time ratio < .375 or Ratio of average response time ratio > 2.375	No P0037, P0038, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0122, P0123, P0125, P0130, P0131, P0132, P0133, P0134, P0137, P0138, P0140, P0171, P0172, P0300, P0336, P0340, P0341, P0506, P0507, P0601, P0602, P0606, P1133, P1134, P0641 DTC's No vehicle speed sensor faults Closed loop 02 Voltage low threshold .300 02 high threshold .600 V Airflow > 7 g/sec 1500 < RPM < 3200	100 seconds after closed loop enable, Once per ignition	DTC Type B

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				453 < 02 temp model and > 549 for 5 sec		
CAN Data link failed (U2100)	U2100	This diagnostic detects when the CAN Bus is an illegal electrical state for certain amount of time	If Bus off condition is active for four integrated seconds then code is set	Ignition voltage must be between 9 and 16 volts	Continuous	DTC Type A
Lost communication with the TCM (U2106)	U2106	This DTC will set when the diagnostic detects that communication is lost with the TCM	If expected message from TCM is not received within 500 mili-seconds	Ignition voltage must be between 9 and 16 volts	Continuous as long as there is a TCM present	DTC Type A

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