

**2003 2.2L (L61) Saturn ION
ENGINE 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
Front O2 Heater Circuit Open/Ground short	P031	Detects an open or short to ground	O2 heater circuit current > .08 amps	Heater turned off, Batter Voltage > 10.9 Volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Front O2 Heater Power Short	P032	Detects a power short	O2 heater circuit current < .08 amps	Heater turned on, Battery Voltage > 10.9 Volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Rear O2 Heater Circuit open/ground short	P037	Detects a open or short to ground	O2 heater circuit current > .08 amps	Heater turnedoff, Battery Voltage > 10.9 Volts for .5 seconds	5 consecutive failures/ignition cycle Continuous	DTC Type B
Rear O2Heater Circuit Power Short	P038	Detects a power short	O2 heater circuit current < .08 amps	Heater turnedon, 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/TP sensor Rationality Test	Predicted TP/MAP value in relation to actual TP/MAP vs engine speed > 1600 rpm or < 4000 rpm	No TP, MAP, EGR, IAC, P0601, P0602, P0606, P0641, P1635. P0336 DTC's Engine speed Delta < 50 rpm	5 failures within a 20 test sample after two consecutive trips - 10 samples per second Continuous	DTC Type B
Manifold Absolute Pressure Circuit Low Input	P0107	.20 volts to 4.24 volts This DTC detects a continuous short to low or open in either the signal circuit or the MAP sensor Range check	Raw MAP < .20 volts, RPM >1600, TP >15.2 RPM < 1600, TP > 0	No TP DTC's TP >=15.2% when engine speed >1600rpm or TP >= 0% when eng speed <=1600rpm	100 test failures within a 100 test sample** Continuous	DTC Type A
Manifold Absolute Pressure Circuit High Input	P0108	.20 volts to 4.24 volts This DTC detects a continuous short to high in either the signal circuit or the MAP sensor Rationality Check	Raw MAP > 4.24 volts RPM > 1600, TP < 9.8 RPM < 1600, TP < 2	No TP DTC's TP <= 9.8% when eng speed >1600rpm or TP <=2% when eng. speed <=1600 rpm	100 test failures within a 100 sample** Continuous	DTC Type A
Intake Air Temperature Circuit Low Input	P0112	.15 volts To 4.94 volts This DTC detects a continuous short to ground in either the IAT signal circuit or the IAT sensor Range Check	IAT < .15 volts	NA	20 test failures within a 20 test sample - 1 sample per sec Continuous	DTC Type A

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Intake Air Temperature Circuit High Input	P0113	.15 volts To 4.94 volts This DTC detects a continuous short to high in the IAT signal circuit or the IAT sensor Range Check	IAT > 4.94 volts	NA	20 test failures within a 20 test sample - 1 sample per sec Continuous	DTC Type A
ECT sensor Range/Performance Stuck High	P0116	Detects a coolant sensor stuck hot	Start up coolant temperature > 15 degrees C of start up MAT	No IAT, ECT, VSS OR P0603 faults Vehicle driven > 10 mph for > 10 sec after engine has been off for more than 7.5 hours	Once per key cycle	DTC Type B
Engine Coolant Temperature Circuit Low Input	P0117	.14 volts to 4.94 volts This DTC detects a continuous short to ground in the ECT signal circuit or the ECT sensor Range Check	Coolant temperature < .14 Volts	Engine run time >= 10 sec	3 test failures within 10 samples - 1 sample per sec Continuous	DTC Type A
Engine Coolant Temperature Circuit High Input	P0118	.14 volts to 4.94 volts This DTC detects a continuous short to high or open in the ECT signal circuit or the ECT sensor Range Check	Coolant Temperature > 4.94 Volts	Engine run time >= 250 sec	3 test failures within 10 samples - 1 sample per sec Continuous	DTC Type A
Throttle Position Sensor A Circuit Low Input	P0122	.2 volts to 4.9 volts. This DTC detects a continuous short to low or open in either the signal circuit or the TP Range Check	TP < .20 volts	None	100 failures within a 100 test samples** Continuous	DTC Type A
Throttle Position Sensor A Circuit High Input	P0123	.2 volts to 4.9 volts. This DTC detects a continuous short to high in either the signal circuit or the TP Range Check	TP > 4.88 volts	None	100 failures within a 100 test samples** Continuous	DTC Type A

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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, pg.582, ktctr_clminwarmarfl) is exceeded and ECT < 0 Deg C	No Coolant, IAT, MAP, VSS, P0601, P0602, P0606, P0641, DTC's, Engine run time > 30 sec < 1800 sec Average airflow > 12 grams/sec Ambient air temp > -7 Deg C Start up coolant temp < -1 Deg C. Distance traveled > 2 Km	Exceed time after 2 consecutive trips - 1 sec Continuous	DTC Type B
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 table, pg 582, dtctr_minwarmarfl) is exceeded and ECT < 80 Deg C	No Coolant, IAT, MAP, VSS, P0601, P0602, P0606, P0641 DTC's, Engine run time > 30 sec < 1800 sec Average airflow > 12 grams/sec Start up ambient air temp > -7 Deg C Start up coolant temp < 75 Deg C Distance traveled > 2 Km	Exceed time after 2 consecutive trips - 1 sec Continuous	DTC Type B
Front O2 closed loop rational	P0130	0 V to 1.1 V This DTC determines if the O2 sensor or O2 sensor circuit has developed an open Circuit Continuity Check	.3mVolt <= O2 voltage <= .6 mVolt	No MAP, CRK, IAT, ECT, TP, FUEL TRIM, MISFIRE, CAM EGR, CCP, VOLTAGE DTC'S engine run time > 60 secs Predictive front O2 temp > 549 DegC (pred. from RPM and Airflow) TPS > 6.3%	490 failures in a 500 sample test - .1 sec per sample Continuous	DTC Type B
Front O2 Sensor Circuit Low Voltage	P0131	0 to 1.1 V This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and PE Range check Low	O2 Voltage < .291 V & O2 Voltage <.291 V in PE mode	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP DTC's Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs In closed loop In drive (if auto)	900 failures in a 1000 sample test .90 failures in a 100 sample test in PE mode - .1 sec , continuous	DTC Type B

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O2 Sensor Circuit High Voltage	P0132	0 to 1.1 V This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and DFCO Range Check High	O2 Voltage > .787V O2 Voltage > .587 V in Decel fuel cut off	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP DTC's Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs In closed loop In drive (if auto)	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	0 to 1.1 V This DTC determines if the O2 sensor is functioning properly by checking its response time Functional Check	O2 Average transition time lean/rich > 140 msec or rich/lean > 225 msec	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's Closed loop O2 Voltage low threshold .300 O2 high threshold .600 V 7 g/sec < Airflow < 25 g/sec 1500 < rpm < 3200 O2 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 O2 Circuit No Activity Detected	P0134	0v to 1.1v This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open Circuit Continuity Check	.391 V <= O2 voltage <= .491V	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, Voltage, DTC's engine run time > 60 secs. Predictive front O2 temp > 450 Deg C (pred. from RPM and Airflow)	900 failures in a 1000 sample test - .1 sec per sample Continuous	DTC Type B
O2 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	0 to 1.1 V This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and PE Range Check Low	O2 voltage < .022 V O2 voltage < .291 V in Power Enrichment	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs. In drive(if auto). In closed loop.	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

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Rear O2 Sensor Circuit High Voltage	P0138	0v to 1.1v This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and DFCO Range Check High	O2 voltage > 1.065 V O2 voltage > .587 V in Decel fuel cut off	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs. In closed loop. In drive (if auto).	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	0 V to 1.1 V This DTC determines if the O2 sensor or O2 sensor circuit has developed an open Circuit Continuity Check	.426 V <= O2 Voltage <= .461 V	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's engine run time > 60 secs Predictive O2 rear temp > 426 Deg C (rpm/airflow)	1450 failures in a 1500 sample test - .1 sec per sample, continuous	DTC Type B
O2 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 ECT, CRK, MAP, IAT,IAC, TP, CCP, Map, TP,CAM, O2's, EGR Flow, Misfire, PCM DTC's 70 KPa< Baro 2< Airflow < 80 g/sec 30 < MAP < 90 KPa -20 < IAT < 80 Deg C 500 < RPM < 4000 TP < 75% 60 < ECT < 115 deg C	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 ECT, MAP, CRK, IAC, CAM, IAT, TP, VSS, CCP, O2S DTC's 70 KPa< Baro 2< Airflow < 80 g/sec 30 < MAP < 90 KPa -20 < IAT < 80 Deg C 500 < RPM < 4000 TP < 75% 60 < ECT < 115 deg C	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 - 1.75%, IM - 1.75% (Calif) See tables pgs 585-588.	No TP, CRK, IAT, MAP, CAM, IAC, FUEL TRIM, ECT, V5B, Front O2 high or low, Misfire DTC's 400 < Eng. Spd < 6500 rpm 8 < ign. V < 18 -7 Deg C < Coolant < 122 Deg C If startup coolant < -7 Deg C, then delay until Coolant > 20 Deg C Fuel Level > 16%, engine not in DFCO Engine run time > 2 crankshaft revolutions	<u>Long Term Software:</u> Emmission 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
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	No Codes P0117, P0118, P0336, P0340, P0341, P0572, P0573, P0601, P0602, P0606, P0641, P0700, P1635 Vehicle speed = 0 mph Engine Coolant > 65 Deg C AC off Brake on If Auto, Vehicle in P or N	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/ Ign. 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, pg 583, which is a function of RPM	1400 < RPM < 4000	2 failures/ Ign. cycle Continuous	DTC Type B

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Crankshaft Position Sensor Circuit Range/Performance	P0336	This DTC will detect an open or short in the crankshaft position sensor circuit Range Check	Low res Period > 6.41 & 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
Camshaft Position Sensor Circuit Range/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 Efficiency Below Threshold	P0420	Oxygen Storage	Oxygen Storage Capacity (OSC) Time Difference > .5 sec OSC time difference = OSC worst Pass Threshold - OSC Compensation factor X (Post cat. O2 Response time - Precat O2 response time). See table pg 584. OSC Worst Pass Threshold = 1.4 sec	No O2s, ECT, Fuel Trim, EGR, CAM, CRK, CCP, V5B, VSS, misfire, MAP, IAT, TP, low and high idle, c/l coolant, ECM A/D DTC's system C/L Delta Map < 6 kpa Test attempt this ign < 10	1 Test attempted/valid idle period. Max of 4 tests/trip until Catalyst i/m flag set or low O2 storage detected. Max 1 test/trip with passing OSC Frequency - 25 ms	DTC Type A
				Engine Run Time > 570 sec engine Rpm > 1200 for 30 sec 122 < int < 134 650 < rpm < 900 375 < cat Temp < 750 vehicle speed < 1 mph		
Evaporative Emission Control System Leak Detected (small leak)	P0442	This Diagnostic will detect a small leak in the evap system Functional Check	Tank Vacuum Decay Slope is compared and subtracted from a threshold value from a lookup table, pg 583, based on fill level of fuel tank. The result is statistically filtered (EWMA) and compared to a decision limit	Engine Running No IAT, CT, Tank Pressure, VSS, MAP, PCM DTC's 11 v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% ≤ Fuel Lvl ≤ 43.75% (.40" lk) 43.75% < Fuel Lvl < 85% (.020" lk) 41 F < IAT < 90F 41F < Coolant < 90F Coolant - IAT <= 10C Vacuum decay < 8.0" H2O	Once/ cold start 240 seconds	DTC Type A (Will Set within 8 - 10 trips based on EWMA value)

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Evaporative Emission Control System Vent Control Malfunction	P0446	This diagnostic will detect a blockage in the evap system which would keep the system from venting Functional Check	Tank Vacuum > 12 "H2O for 1.6 seconds Purge flow accumulated > or = 350 grams	Engine Running No IAT, CT, Tank Pressure Sensor, VSS, MAP, PCM Dtc's 11v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% < Fuel Level < 85% tank vacuum > 9" H2O 41 deg F < IAT < 90F 41F<Coolant< 90F Coolant - IAT <= 10C ERT < or = 144 seconds	Once/ cold start 96 seconds	DTC Type A (Behaves as a B code)
Evaporative Emission Control System PressureSensor Low Input	P0452	Rationality Test	Tank Pressure < 5 counts	Engine Running	Once/ignition cycle 100 msec	DTC Type A
Evaporative Emission Control System Pressure Sensor High Input	P0453	Rationality Test	Tank Pressure > 249 counts	Engine Running	Once/ignition cycle 100 msec	DTC Type A
Evaporative Emission Control System Malfunction (Large Leak)	P0455	This diagnostic will detect a missing gas cap or a "gross" leak in the system Functional Check	Tank Vacuum < 8" H2O for 3.2 seconds	Engine running No IAT, CT, Tank Pressure, MAP, VSS, PCM DTC's 11v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% < Fuel Level < 85% 41F < IAT < 90F 41F<Coolant< 90F Coolant - IAT <= 10C 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)
Evaporative Emission Control System Continuous Open Purge Flow	P0496	This diagnostic will detect a purge valve stuck open. Functional Check	Tank Vacuum > 6" H2O for 4 seconds	Engine Running No IAT, CT, VSS, MAP, tank pressure, PCM DTC's 11 v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% < Fuel Level < 85% 41deg F < IAT < 90F 41F<Coolant< 90F Coolant - IAT <= 10C Tank Vacuum < 2.5" H2O purge mass accumulated > 4000 grams	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 Functional check	MAP > 23 Kpa and vehicle speed < 5 kph 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

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Idle Control system RPM lower than expected	P0506	This DTC will determine if a low idle is the result of a IAC valve or circuit at normal operating temperature. Functional Check	Actual rpm < desired rpm + or - 100 rpm once operating temperature is reached	No TP, ECT, MAP, Misfire, VSS, EGR Pintle DTC's VSS=0 TP = 0 Baro > 70 Kpa 9<Voltage < 18 IAT > -25 Deg C	Continuous 17 seconds	DTC Type B
Idle Control System RPM higher than expected	P0507	This DTC will determine if a high idle is the result of a 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	Cal'd check sum does not equal stored check sum	none	1 failure/ Ign. cycle Continuous	DTC Type A
Control Module Programming Error	P0602	This DTC will check to see if the PCM is programmed properly Functional Check	Write patterns are not equal	none	1 failure / Ign. cycle on key up	DTC Type A
PCM internal error/illegal rest	P0606	This DTC detects an illegal reset in the PCM	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/ Ign. cycle Continuous	DTC Type A
Sensor 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 msec	Continuous	DTC Type A
MIL circuit fault	P0650	This DTC checks the curcuit 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 MIL Request	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)

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Oxygen Sensor System - Too Few O2S R/L and L/R Switches	P1133	0 V to 1.0 V This DTC determines if the O2 sensor is functioning properly by checking its switches Rationality Check	O2 sensor switches < 10 counts	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's Closed loop O2 Voltage low threshold .300 O2 high threshold .600 V Airflow > 7 g/sec 1500 < rpm < 3200 453 < O2 temp model and > 549 for 5 sec	100 seconds after closed loop enable, Once per ignition	DTC Type B
O2 Sensor Circuit Transfer Switch Time Ratio Malfunction	P1134	0 V to 1.0 V This DTC will determine if the O2 sensor is functioning properly by checking its ratio Rationality Check	Ratio of average response time ratio < .6 or Ratio of average response time ratio > 2.8	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's Closed loop O2 Voltage low threshold .300 O2 high threshold .600 V Airflow > 7 g/sec 1500 < rpm < 3200 453 < O2 temp model and > 549 for 5 sec	100 seconds after closed loop enable, Once per ignition	DTC Type B
Ignition Off Clock Performance	P1683	This DTC checks the operation of the ignition off clock	Software loop timer and ignition off clock more than 2 seconds or 5% different	None	Once during power down	DTC Type B
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 miliseconds	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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For P0125:

KtECTR_CLMinWarmArfl

-40 Deg C =	4596
-28 Deg C =	3418
-16 Deg C =	2240
-4 Deg C =	1063
8 Deg C =	1063
20 Deg C =	1063
32 Deg C =	1063
44 Deg C =	1063
56 Deg C =	1063
68 Deg C =	1063
80 Deg C =	1063
92 Deg C =	1063
104 Deg C =	1063
116 Deg C =	1063
128 Deg C =	1063
140 Deg C =	1063
152 Deg C =	1063

For P0128:

DtECTR_CLMinWarmArfl

-40 Deg C =	9551
-28 Deg C =	8740
-16 Deg C =	7929
-4 Deg C =	7118
8 Deg C =	6306
20 Deg C =	5495
32 Deg C =	4684
44 Deg C =	3873
56 Deg C =	3062
68 Deg C =	2251
80 Deg C =	1440
92 Deg C =	1440
104 Deg C =	1440
116 Deg C =	1440
128 Deg C =	1440
140 Deg C =	1440
152 Deg C =	1440

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

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2003 2.2L (L61) Saturn ION ENGINE 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
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for P0327:

DIAGNOSTIC_NOISE_THRESHOLDS

400 rpm =	10
800 rpm =	10
1200 rpm =	15
1600 rpm =	15
2000 rpm =	20
2400 rpm =	20
2800 rpm =	20
3200 rpm =	25
3600 rpm =	25
4000 rpm =	25
4400 rpm =	30
4800 rpm =	30
5200 rpm =	30
5600 rpm =	30
6000 rpm =	30
6400 rpm =	30
6800 rpm =	30

for P0442:

FQEVSLP1

0 Fuel Full % =	0.1297
6.25 Fuel Full % =	0.1297
12.5 Fuel Full % =	0.1297
18.75 Fuel Full % =	0.1297
25 Fuel Full % =	0.1297
31.25 Fuel Full % =	0.1297
37.5 Fuel Full % =	0.1297
43.75 Fuel Full % =	0.053406
50 Fuel Full % =	0.053406
56.25 Fuel Full % =	0.053406
62.5 Fuel Full % =	0.053406
68.75 Fuel Full % =	0.053406
75 Fuel Full % =	0.053406
81.25 Fuel Full % =	0.053406
87.5 Fuel Full % =	0.053406
93.75 Fuel Full % =	0.053406
100 Fuel Full % =	0.053406

for P0420:

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

2003 2.2L (L61) Saturn ION ENGINE 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
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KtCATD_O2Comp

	300 Deg C =	396 Deg C =	492 Deg C =	588 Deg C =	684 Deg C =	780 Deg C =	876 Deg C =	972 Deg C =	1068 Deg C =
0 grams/second air flow =	0.14063	0.09375	0.078125	0.046875	0.046875	0.03125	0.015625	0.015625	0.015625
0.5 grams/second air flow =	0.14063	0.09375	0.078125	0.046875	0.046875	0.03125	0.015625	0.015625	0.015625
1.0 grams/second air flow =	1.0313	0.76563	0.5625	0.40625	0.3125	0.21875	0.17188	0.125	0.09375
1.5 grams/second air flow =	2	1.4844	1.0938	0.8125	0.59375	0.4375	0.32813	0.23438	0.17188
2.0 grams/second air flow =	2	2	1.5469	1.1406	0.84375	0.625	0.45313	0.34375	0.25
2.5 grams/second air flow =	2	2	1.8906	1.3906	1.0313	0.75	0.5625	0.40625	0.29688
3.0 grams/second air flow =	2	2	2	1.5938	1.1719	0.85938	0.64063	0.46875	0.34375
3.5 grams/second air flow =	2	2	2	1.75	1.2969	0.95313	0.70313	0.51563	0.39063
4.0 grams/second air flow =	2	2	2	1.8906	1.3906	1.0313	0.75	0.5625	0.40625
4.5 grams/second air flow =	2	2	2	2	1.4688	1.0781	0.79688	0.59375	0.4375
5.0 grams/second air flow =	2	2	2	2	1.5313	1.1406	0.84375	0.625	0.45313
5.5 grams/second air flow =	2	2	2	2	1.5938	1.1719	0.875	0.64063	0.46875
6.0 grams/second air flow =	2	2	2	2	1.6406	1.2188	0.89063	0.65625	0.48438
6.5 grams/second air flow =	2	2	2	2	1.6875	1.25	0.92188	0.67188	0.5
7.0 grams/second air flow =	2	2	2	2	1.7344	1.2813	0.9375	0.6875	0.51563
7.5 grams/second air flow =	2	2	2	2	1.7656	1.2969	0.95313	0.70313	0.51563
8.0 grams/second air flow =	2	2	2	2	1.7969	1.3281	0.96875	0.71875	0.53125

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

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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
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for P0300: FQMSFCA7 - catalyst damaging misfire verses RPM and OBD Load

	1000 rpm =	2000 rpm =	3000 rpm =	4000 rpm =	5000 rpm =	6000 rpm =	7000 rpm =	8000 rpm =
0 OBD Load Percent =	133	100	100	80	26	26	26	200
25 OBD Load Percent =	100	100	100	66	20	26	26	200
50 OBD Load Percent =	100	100	66	50	24	26	26	200
75 OBD Load Percent =	75	66	44	20	24	26	26	200
100 OBD Load Percent =	60	44	25	20	24	26	26	200

General Motors Misfire Diagnostic Probability Of Derection
CARB 96-05 TABLE #1: Continuous Single (25% Misfire)
2003 GMX 357 2.2L Aisin Transmission

% LOAD													
90 - 100													
75 - 90	*	*	97 (79)	100 (79)	100 (79)	100 (81)	99 (84)	99 (84)	100 (91)	100 (91)	100 (91)	100 (91)	100 (91)
60 - 75	*	*	100	100	100	100	100	100	100	100	100	100	100
45 - 60	*	100 (57)	100	98	97	100	100	100	99	100	100	100	100
30 - 45	99 (43)	100	98	99	100	100	98	100	100	100	98	95	
15 - 30	99	95	94	100	100	99	99 [23.9]	100 [23]	100 [23.5]	100 [25.5]	99 [26.3]	95 [29.7]	
0 - 15	97 [11.8]	94 [11.8]	99 [13.3]	99 [13.3]	99 [13.7]	100 [13.7]	*	*	*	*	*	*	*
RPM	500 - 1000	1000 - 1500	1500 - 2000	2000 - 2500	2500 - 3000	3000 - 3500	3500 - 4000	4000 - 4500	4500 - 5000	5000 - 5500	5500 - 6000	6000 - 6500	

Key:

Numbers in () are the maximum engine load at that speed

Numbers in [] are the minimum required engine load at that speed

* Indicates windows that are not required, or windows at which engine cannot operate

General Motors Misfire Diagnostic Probability Of Detection
CARB 96-05 TABLE #2: Random Cylinder Misfire (2%)
2003 GMX 357 2.2L Aisin Transmission

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

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2003 2.2L (L61) Saturn ION ENGINE 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
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% LOAD	()	()	()	()	()	()	()	()	()	()	()	()	()
75 - 100	*	*	*	100 (82)	100 (82)	100 (84)	100 (86)	100 (86)	98 (96.5)	100 (96)	100 (92)	100 (98)	
60 - 75	*	*	100 (73)	100	100	100	100	100	99	100	99	95	
45 - 60	*	*	100	100	100	100	100	100	100	100	100	100	
30 - 45	100 (33)	100 (42)	98	98	98	100	100	100	100	100	96	96	
15 - 30	100	99	100	99	92	100	100	100 [16.5]	95 [17.6]	69 [18]	65 [18.4]	42 [20]	
0 - 15	100 [11.8]	96 [11.4]	98 [13.3]	97 [13.5]	94 [13.7]	94 [13.7]	100 [13.7]	*	*	*	*	*	
RPM	500 - 1000	1000 - 1500	1500 - 2000	2000 - 2500	2500 - 3000	3000 - 3500	3500 - 4000	4000 - 4500	4500 - 5000	5000 - 5500	5500 - 6000	6000 - 6500	

Key:

Numbers in () are the maximum engine load at that speed

Numbers in [] are the minimum required engine load at that speed

* Indicates windows that are not required, or windows at which engine cannot operate

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

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2003 2.2L (L61) Saturn ION ENGINE 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
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General Motors Misfire Diagnostic Probability Of Detection
CARB 96-05 TABLE #3: Opposing (Paired) Cylinder Misfire (50%)
2003 GMX 357 2.2L Aisin Transmission

% LOAD	1	2	3	4	5	6	7	8	9	10	11	12
75 - 100	*	96 (73)	99 (77)	100 (81)	100 (87)	100 (87)	100 (91)	100 (91)	100 (93)	100 (93)	100 (87)	*
60 - 75	*	97	98	100	100	99	100	100	100	100	97	*
45 - 60	*	99	99	100	100	100	100	100	100	100	100	91 (57) [49]
30 - 45	100 (41)	100	100	100	100	100	100 [35]	100 [35]	98 [37]	100 [41]	100 [43]	*
15 - 30	100 [23]	100 [23]	99 [23.3]	100 [26]	97 [28.5]	99 [28.5]	*	*	*	*	*	*
0 - 15	*	*	*	*	*	*	*	*	*	*	*	*
RPM	500 - 1000	1000 - 1500	1500 - 2000	2000 - 2500	2500 - 3000	3000 - 3500	3500 - 4000	4000 - 4500	4500 - 5000	5000 - 5500	5500 - 6000	6000 - 6500

Key:

Numbers in () are the maximum engine load at that speed

Numbers in [] are the minimum required engine load at that speed

* Indicates windows that are not required, or windows at which engine cannot operate

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

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