Typical malfunction thresholds

Delay of rear oxygen sensor response > 655 – 827 ms (According to Calculated MAF)

MODE $06 Data

Self diagnostic test item	Test value		Description	Scaling
	TID	CID		
Three-way catalyst Function (P0420)	$02	$00	Response time	*8.19/256 msec
	$02	$10	Counter of secondary HO2S voltage change	*1/256 times

OBD System Description - Misfire Monitor

SYSW011101011 (03(01)

System Description / Monitoring Procedure

ECM (PCM) measures the angle speed of the crankshaft based on the pulse signal from the CKP sensor and CMP sensor for each cylinder. If it detects a large change in the angle speed of the crankshaft, it concludes occurrence of a misfire. When the number of misfire is counted by the ECM (PCM) beyond the DTC detecting condition, it determines the cylinder where the misfire occurred and outputs it as DTC.

DTC Description / Detecting Condition / Confirmation Procedure
P0300, P0301, P0302, P0303, P0304

Refer to "DTC P0300 / P0301 / P0302 / P0303 / P0304: Random Misfire (Misfire Detected at 2 or More Cylinders) / Cylinder 1 Misfire / Cylinder 2 Misfire / Cylinder 3 Misfire / Cylinder 4 Misfire Detected".

Misfire Monitor

Operation

DTCs	P0300, P0301, P0302, P0303, P0304
Monitor execution	Continuous
Sensors / components OK	MAP sensor, TP sensor, ECT sensor, CKP sensor, CMP sensor, VSS, IAT sensor
Monitoring Duration	200 rev. (phase 1) / 1000 rev. (phase 2)

Enable conditions

Parameter	Minimum	Maximum
Engine coolant temp.	–10 (14) °C (°F)	
Intake air temp.		70 (158) °C (°F)
Engine speed		4500 rpm
Barometric pressure	560 mmHg	
Fuel level	15%	
Engine speed change		165 rpm / 33 ms
MAP change		9.77 mmHg / firing
Time from engine start	5 s	
Time from fuel shut off	3 s	
Time from switching of AC, PSS, radiator fan or electric load	8 rev.	

Typical malfunction thresholds

Phase 1: Catalyst damage > 8 – 50% (According to Engine Speed and MAP)
Phase 2: FTP emission threshold > 2.5% or 2.75%

OBD System Description - EVAP Control System Monitor

SYSW011101012 (03(01)

System Description / Monitoring Procedure

To monitor the EVAP control system, a fuel tank pressure sensor and an EVAP canister air (vent) valve are added to the system.

The monitoring system measures pressure change of closed EVAP system circuit under the depressurized condition. The system also measures pressure change of closed circuit to compensate evaporative pressure with the normal range pressure, if necessary.

EVAP System Monitoring System (ORVR)

IWSW01111043-01

Rev2

MODE $06 Data

Self diagnostic test item	Test value		Description	Scaling
	TID	CID		
EVAP Control System (P0440 / P0455)	$04	$00	Differential rising pressure	*125/256/256 – 62.5 mmHg
	$04	$10	Tank pressure	*125/256/256 – 62.5 mmHg
	$04	$11	Tank pressure	*125/256/256 – 62.5 mmHg
	$04	$20	Tank pressure	*125/256/256 – 62.5 mmHg
	$04	$30	Differential pressure	*125/256/256 – 62.5 mmHg
	$04	$40	Differential pressure	*125/256/256 – 62.5 mmHg
	$04	$41	Change of fuel level	*50/256/256 L

OBD System Description - Fuel System Monitor

System Description / Monitoring Procedure

The fuel system is equipped with fuel trim circuitry which includes short-term and long-term fuel trim. Short-term fuel trim is instantaneous feedback adjustment to maintain air-fuel ratio at its theoretical value. Long-term fuel trim is more gradual adjustment than short-term fuel trim to compensate continuous deviation from central value of the short-term fuel trim due to changing of the usage environment and aging of the engine.

The ECM monitors continuously the short-term and long-term fuel trim values whether the values are out of the specification limit.

DTC Description / Detecting Condition / Confirmation Procedure
P0171, P0172
Refer to "DTC P0171 / P0172: Fuel System Too Lean / Rich".

Fuel System Monitor

Operation

DTCs	P0171, P0172
Monitor execution	Continuous
Sensors / components OK	IAT, ECT, MAP, VSS, Fuel level sensor, BARO, Primary / Secondary HO2S, Primary / Secondary HO2S heater
Monitoring Duration	30 s

Enable conditions

Parameter	Minimum	Maximum
Intake air temp.	–10 (14) °C (°F)	70 (158) °C (°F)
Barometric pressure	560 mmHg	
Fuel level	15%	
Time from engine start	200 s	
Primary HO2S heater operation	84 s	
Vehicle speed over 32 km/h	50 s	
Closed loop operation	60 s	
Fuel system status	Closed loop mode	
EGR system	Normal	
EVAP control system	Normal	

Typical malfunction thresholds

P0171: Long + short term > 30 – 35%, short term > 20%
P0172: Long + short term < –34 – –30%, short term < –20%

OBD System Description - Oxygen Sensor Monitor

System Description / Monitoring Procedure
HO2S–1 (Primary HO2S)
For a HO2S–1, the system monitors maximum and minimum voltage, lean-to-rich and rich-to-lean response rates, and switching cycles during monitoring conditions once per driving cycle. The sensor is also monitored for activity continuously.

Enable conditions

Parameter	Minimum	Maximum
Intake air temp.	–10 (14) °C (°F)	70 (158) °C (°F)
Barometric pressure	560 mmHg	
Fuel level	15%	
Vehicle speed		2 km/h
Primary HO2S heater operation	84 s	
Vehicle speed over 32 km/h	50 s	
Closed loop operation	60 s	
Fuel system status	Idle with closed loop mode	
Fuel system	Normal	

Typical malfunction thresholds

P0131: Min. voltage > 0.3 V	
P0132: Max voltage < 0.6 V	

Secondary HO2S Circuit Monitor

Operation

DTCs	P0136
Monitor execution	Once per driving cycle
Sensors / components OK	ECT, IAT, MAP, Fuel level sensor, BARO sensor, Primary HO2S, Secondary HO2S heater
Monitoring Duration	Min. 12 min

Enable conditions

Parameter	Minimum	Maximum
Intake air temp.	–10 (14) °C (°F)	70 (158) °C (°F)
Barometric pressure	560 mmHg	
Fuel level	15%	
Engine speed	1000 rpm	
After Fuel cut duration	8.4 s	
Driving counter	5 times (2 ↔ 32 km/h)	
Heater operative time	60 s	
Fuel system status	Closed loop mode	
MAP	Steady state value	

Typical malfunction thresholds

Maximum voltage < 0.49 V, Minimum voltage > 0.41 V

MODE $06 Data

Self diagnostic test item	Test value TID	CID	Description	Scaling
O2S 1 circuit low volt (P0131)	$06	$00	Minimum voltage	*5/256/256 V
O2S 1 circuit high volt (P0132)	$06	$01	Maximum voltage	*5/256/256 V
Slow response (P0133)	$06	$02	Min switch time for rich to lean	*8.19/256 msec
	$06	$03	Min switch time for lean to rich	*8.19/256 msec
	$06	$04	Mean period of feed back	*32.76/256 msec
No activity detect (P0134)	$07	$00	Count of irregular volt detected	*1/256 times
	$07	$01	Count of irregular volt detected	*1/256 times
O2S 2 circuit volt (P0136)	$09	$00	Minimum terminal voltage	*5/256/256 V
	$09	$01	Maximum voltage	*5/256/256 V
	$09	$02	Time of irregular volt detected	*1.049/256 S

OBD System Description - HO2S Heater Monitor

System Description / Monitoring Procedure
For both HO2S–1 and –2 heaters, the system monitors proper current and loaded voltage.

DTC Description / Detecting Condition / Confirmation Procedure
P0135
Refer to "DTC P0135: Heated Oxygen Sensor (HO2S) Heater Circuit Malfunction (Sensor-1)".
P0141
Refer to "DTC P0141: Heated Oxygen Sensor (HO2S) Heater Circuit Malfunction (Sensor-2)".

Primary HO2S Heater Monitor

Operation

DTCs	P0135
Monitor execution	Continuous
Monitoring Duration	5 s

Enable conditions

Parameter	Minimum	Maximum
Phase 1 (Heater resistance)		
Heater control	Off	
Phase 2 (Circuit continuity)		
Heater control	On	

Typical malfunction thresholds

Phase 1: Resistor voltage < 2.5 V	
Phase 2: Resistor voltage > 0.488 V	

Secondary HO2S Heater Monitor

Operation

DTCs	P0141
Monitor execution	Continuous
Monitoring Duration	5 s

Enable conditions

Parameter	Minimum	Maximum
Phase 1 (Heater resistance)		
Heater control	Off	
Phase 2 (Circuit continuity)		
Heater control	On	

Typical malfunction thresholds

Phase 1: Resistor voltage < 2.5 V	
Phase 2: Resistor voltage > 0.488 V	

MODE $06 Data

Self diagnostic test item (related DTC)	TID	CID	Description	Scaling
O2S 1 heater circuit malfunction (P0135)	$0B	$00	Heater voltage at heater on	*5/256/256 V
	$0B	$10	Heater voltage at heater off	*5/256/256 V
	$0B	$20	Heater voltage at heater on	*5/256/256 V
	$0B	$21	Heater voltage at heater off	*5/256/256 V
O2S 2 heater circuit malfunction (P0141)	$0C	$00	Heater voltage at heater on	*5/256/256 V
	$0C	$10	Heater voltage at heater off	*5/256/256 V
	$0C	$20	Heater voltage at heater on	*5/256/256 V
	$0C	$21	Heater voltage at heater off	*5/256/256 V

OBD System Description - Comprehensive Component (Engine Input) Monitor