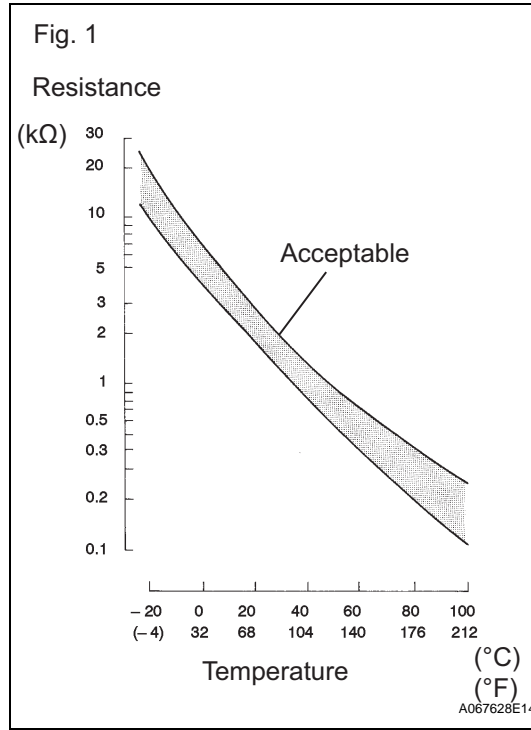


<b>DTC</b>	<b>P0111</b>	<b>Intake Air Temperature Sensor Gradient Too High</b>
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**DESCRIPTION**



**ES**

The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (See Fig. 1).

The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R. Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

DTC No.	DTC Detection Conditions	Trouble Areas
P0111	When either of following conditions met (2 trip detection logic): <ul style="list-style-type: none"> <li>The intake air temperature rise is large, from the previous trip warm-up to the following trip.</li> <li>When the change in the intake air temperature after engine start is less than the threshold value.</li> </ul>	Mass air flow meter

**MONITOR DESCRIPTION**

The ECM performs OBD II monitoring based on the values from the intake air temperature sensor. If there is no change of the sensor value within the normal range, the ECM will not be able to perform OBD II monitoring or will misdiagnose that there is a malfunction in the sensor. The ECM detects the stuck intake air temperature sensor value by performing monitoring after the ignition switch is turned OFF or START.

**MONITOR STRATEGY**

Related DTCs	P0111: Intake air temperature sensor rationality (After engine stop) P0111: Intake air temperature sensor rationality (After cold engine start)
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Required Sensors/Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors/Components (Sub)	Engine Coolant Temperature (ECT) sensor and Mass Air Flow (MAF) meter
Frequency of Operation	Once per driving cycle
Duration	10 seconds or more
MIL Operation	2 driving cycles
Sequence of Operation	None

## TYPICAL ENABLING CONDITIONS

### All:

Monitor runs whenever following DTCs are not present	-
Battery voltage	10.5 V or more

### After engine stop:

Time after engine start	10 seconds or more
ECT sensor circuit	OK
ECT in previous driving cycle	80°C (176°F) or more
Accumulated MAF amount in previous driving cycle	7,000 g or more
ECT when 30 minutes elapsed after engine stop	20°C (68°F) or more

### After cold engine start:

Key-off duration	5 hours
Time after engine start	10 seconds or more
ECT sensor circuit	OK
ECT	70°C (158°F) or more
Accumulated MAF amount	7,000 g or more
One of the following conditions 1 or 2 is met:	-
1. Duration while engine load is low	120 seconds or more
2. Duration while engine load is high	10 seconds or more

## TYPICAL MALFUNCTION THRESHOLDS

### After engine stop:

IAT change	Less than 1°C (2°F)
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### After cold engine start:

IAT change	Less than 1°C (2°F)
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## WIRING DIAGRAM

Refer to DTC P0110 (See page [ES-102](#)).

## INSPECTION PROCEDURE

**1**

**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0111)**

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Turn the tester ON.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED  
OBD II / DTC INFO / CURRENT CODES.
- (e) Read DTCs.

**Result**

Display (DTC Output)	Proceed To
P0111 and other DTCs	A
P0111	B

**HINT:**

If any DTCs other than P0111 are output, troubleshoot those DTCs first.

**B**

**REPLACE MASS AIR FLOW METER (See page [ES-409](#))**

**A**

**GO TO DTC CHART (See page [ES-57](#))**