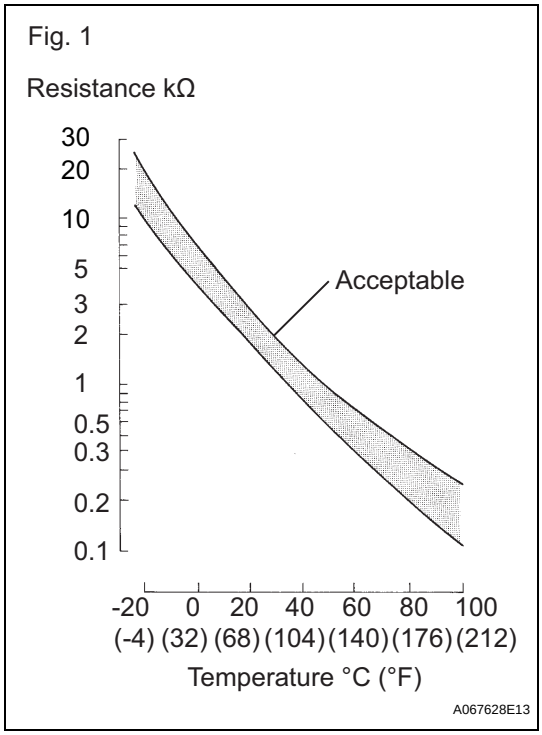
DTC	P0111	Intake Air Temperature Sensor Gradient Too High

DESCRIPTION



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 becomes low, the resistance of the thermistor increases. When the temperature becomes 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 Condition	Trouble Area
P0111	1. The intake air temperature rise becomes larger, from the previous trip warm-up to the following trip.(2 trip detection logic) 2. When the change in the intake air temperature after engine start is less than the threshold value.	Mass air flow meter assembly

MONITOR DESCRIPTION

The ECM performs OBD II monitoring based on the values from the intake air temperature sensor. If there is no change in the sensor value, 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 the ignition is started (short soak or long soak).

MONITOR STRATEGY

Related DTCs	P0111: Intake air temperature sensor rationality (After engine stop) P0111: Intake air temperature sensor rationality (After cold engine start)

Required Sensors / Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors / Components (Sub)	-
Frequency of Operation	Once per driving cycle
Duration	5 hours
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

After engine stop:

Time after engine start	10 seconds or more
Battery voltage	10.5 V or more
ECT sensor	OK
ECT change since engine stopped	Less than 180°C (356°F)
ECT before engine stop	70°C (158°F) or more
Time that MAF is low before engine stop	70 minutes
Accumulated MAF amount before engine stop	3774 g or more
Key-off duration	30 minutes

After cold engine start:

Key-off duration	5 hours
Time after engine start	10 seconds or more
ECT sensor	OK
ECT	70°C (158°F) or more
Accumulated MAF amount	3774 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)

After cold engine start:

IAT change	Less than 1°C (2°F)

WIRING DIAGRAM

Refer to DTC P0110 (See page ES-126).

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 to the ON position.
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(e) Read the 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-504)**

ES

A →

GO TO DTC CHART (See page ES-56)