

DTC	P2237	Oxygen Sensor Pumping Current Circuit / Open (for A/F sensor) (Bank 1 Sensor 1)
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DTC	P2238	Oxygen Sensor Pumping Current Circuit / Low (for A/F sensor) (Bank 1 Sensor 1)
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DTC	P2239	Oxygen Sensor Pumping Current Circuit / High (for A/F sensor) (Bank 1 Sensor 1)
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CIRCUIT DESCRIPTION

HINT:

This DTC is related to A/F sensor, although the caption is oxygen sensor.

Refer to DTC P2195 and P2196 on page [DI-421](#).

DTC No.	DTC Detection Condition	Trouble Area
P2237	A/F sensor circuit (bank 1 sensor 1)	HINT: Main trouble area • Open or short in A/F sensor circuit
	Condition (a) and (b) continues for 5.0 sec. or more: (a) AF+ \leq 0.5 V (b) AF+ > 4.5 V	• Open or short in A/F sensor circuit • A/F sensor
	Condition (a) and (b) continues for 5.0 sec. or more: (a) (AF+) – (AF-) \leq 0.1 V (b) (AF+) – (AF-) > 0.8 V	• A/F sensor heater • EFI main relay
P2238	A/F sensor circuit low (bank 1 sensor 1)	HINT: Main trouble area • Open in A/F sensor circuit
	Condition (a) continues for 5.0 sec. or more: (a) AF+ \leq 0.5 V	• Open in A/F sensor circuit • A/F sensor
	Condition (a) continues for 5.0 sec. or more: (a) (AF+) – (AF-) \leq 0.1 V	• A/F sensor heater • EFI main relay
P2239	A/F sensor circuit high (bank 1 sensor 1)	HINT: Main trouble area • Short in A/F sensor circuit
	Condition (a) continues for 5.0 sec. or more: (a) AF+ > 4.5 V	• Short in A/F sensor circuit • A/F sensor
	Condition (a) continues for 5.0 sec. or more: (a) (AF+ – AF-) > 0.8 V	• A/F sensor heater • EFI main relay

WIRING DIAGRAM

Refer to DTC P0134 on page [DI-278](#).

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (A/F sensor, heated oxygen sensor or another can be distinguished).

Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

"A/F CONTROL" is an ACTIVE TEST which change the injection volume to -12.5 % or +25 %.

- (1) Connect the hand-held tester to the DLC3 on the vehicle.
- (2) Turn the ignition switch ON.
- (3) Warm up the engine with the engine speed at 2,500 rpm for approx. 90 sec.
- (4) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/ A/F CONTROL".
- (5) Perform "A/F CONTROL" when idle condition (press the ← or → button).

Result:

A/F sensor reacts in synchronizing with increase and decrease of injection volume

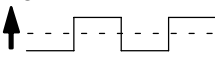
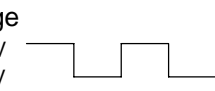
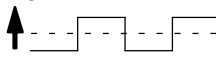
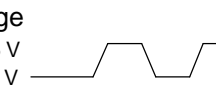
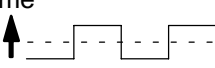

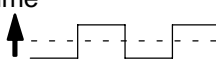
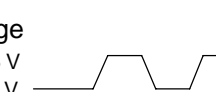
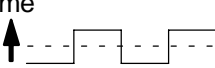
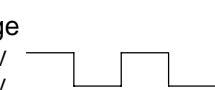
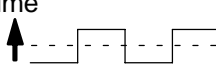



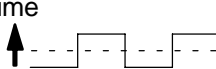

(+25 % → rich output: Less than 3.0 V, -12.5 % → lean output: More than 3.35 V)

Heated oxygen sensor reacts in synchronizing with increase and decrease of injection volume

(+25 % → rich output: More than 0.55 V, -12.5 % → lean output: Less than 0.4 V)

NOTICE:

However, there is a few second delay in the A/F sensor output. And there is about 20 seconds delay in the heated oxygen sensor.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspect trouble area
Case 1	Injection volume +25 % ↑ -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK	Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.55 V Less than 0.4 V  OK	—
Case 2	Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG	Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.55 V Less than 0.4 V  OK	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % ↑ -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK	Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG	Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG	Extremely rich or lean of the actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc)

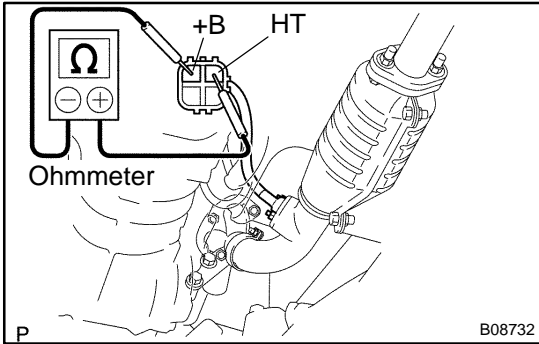
The following procedure of A/F CONTROL enable that to check its output (show its graph indication) of A/F sensor and heated oxygen sensor.

To display the graph indication. Select and push the "YES or NO" button 2 data "AFS B1S1 and O2S B1S2" or "AFS B2S1 and O2S B2S2" and press button "4" after selecting "ACTIVE TEST/ A/F CONTROL/USER DATA".

HINT:

Read frame freeze data using the hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1 Check resistance of A/F sensor heater.



PREPARATION:

Disconnect the sensor connector.

CHECK:

Using an ohmmeter, measure the resistance between terminals +B and HT.

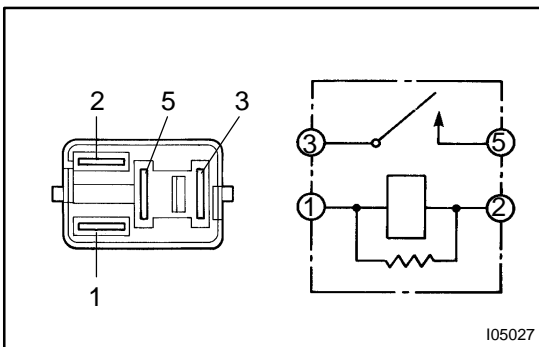
OK:

at 20°C (68°F)	0.8 – 1.4 Ω
at 800°C (1,472°F)	1.8 – 3.2 Ω

NG Replace A/F sensor.

OK

2 Check EFI main relay (Marking: EFI).



PREPARATION:

Remove the EFI main relay from RB No. 2.

CHECK:

Inspect the EFI main relay.

OK:

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

NG Replace EFI main relay

OK

3	Check for open and short in harness and connector between ECM and A/F sensor (See page IN-28).
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Repair or replace harness or connector.



Replace A/F sensor.