

DTC	P0136	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)
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CIRCUIT DESCRIPTION

Refer to DTC P0130 on page [05-101](#).

DTC No	DTC Detection Condition	Trouble Area
P0136	The following condition (a) or (b) continues for 300 seconds or more: (a) During driving with the engine warmed up, heated oxygen sensor output does not change. (b) Heated oxygen sensor output is very low most of the time.	<ul style="list-style-type: none"> • Open or short in heated oxygen sensor (bank 1 sensor 2) circuit • Heated oxygen sensor (bank 1 sensor 2) • Heated oxygen sensor heater (bank 1 sensor 2) • EFI relay

HINT:

Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

The heated oxygen sensor generates waveform of a voltage between 0 V and 1 V in response to the oxygen concentration in the exhaust gases. When the output voltage of the heated oxygen sensor is 0.5 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air-fuel ratio is LEAN.

If the rear heated oxygen sensor output does not change between RICH and LEAN during "Stop and GO" driving, the ECM interprets this as a malfunction in the rear heated oxygen sensor and sets a DTC. Also, if the sensor output remains at less than 0.05 V for more than 156 seconds when ECM monitored the heated oxygen sensor for 260 seconds while the air fuel feedback is being performed (the detecting condition differs depending on the type of vehicles), the ECM will interpret this as a fault. In either case, the ECM will turn on the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0136	Heated oxygen sensor output voltage (bank 1)
Required sensors/components	Main sensors	Rear heated oxygen sensor
	Related sensors	Mass air flow sensor, vehicle speed sensor
Frequency of operation	Once per drive cycles	
Duration	300 seconds	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" (On page 05-25)	
Case 1:		
Vehicle speed	2 mph (3 km/h)	–
Idle	OFF	
Fuel cut	OFF	
Time after fuel cut ON to OFF	5 seconds	–
Intake air amount per revolution	0.3 g/rev (AT) 0.22 g/rev (MT)	–
Case 2 (Output voltage):		
Time while the following conditions A and B are met	290 seconds (Engine coolant temperature is less than 75°C (167°F)) 240 seconds (Engine coolant temperature is 75°C (167°F) or more)	–
A. Fuel system status	Closed-loop	
B. Idle	OFF	
Deceleration count (The number of times accelerating and decelerating)	30 times	–
Deceleration is counted up when vehicle decelerates	3 mph (5 km/h) / 2 seconds	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
Following conditions are met:	1, 2 and 3
1. Cumulative heated oxygen sensor monitor time	260 seconds or more (AT) 190 seconds or more (MT)
2. Time while heated oxygen sensor voltage is less than 0.05V	156 seconds or more (AT) 114 seconds or more (MT)
3. Maximum heated oxygen sensor rich time (0.45V or more)	Less than 20 seconds
Case 2:	
Number of heated oxygen sensor voltage "switching"	0 times or less
"Switching" is counted when the sensor signal crosses the minimum or maximum voltage	
Minimum voltage	0.4 V or less
Maximum voltage	0.5 V or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	0 to 1 V

MONITOR RESULT (MODE 06 DATA)

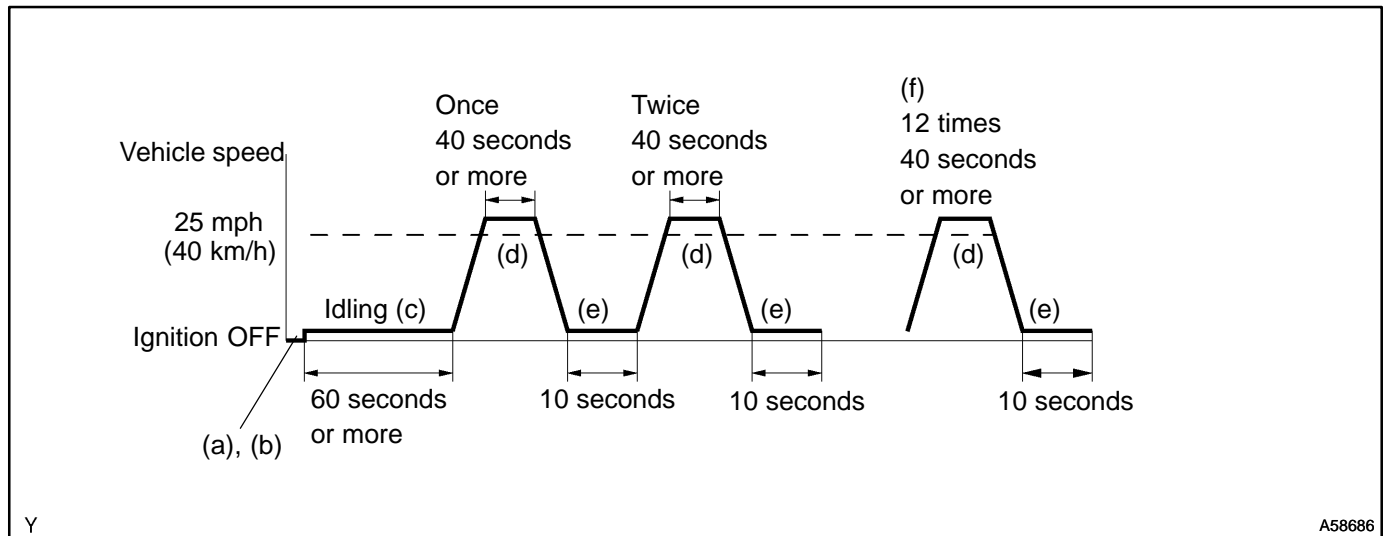
Test ID	Comp ID	Description of test data	Description of test limit	Unit	Conversion factor
\$03	–	Not supported by mode \$06, but by mode \$05	–	–	–

Refer to page 05-27 for detailed information on Checking Monitor Status.

WIRING DIAGRAM

Refer to DTC P0130 on page 05-101.

CONFIRMATION DRIVING PATTERN



- (a) Connect the hand-held tester to the DLC3.
- (b) Switch the hand-held tester from the normal mode to the check mode (See page 05-11).
- (c) Start the engine and let it idle for 60 seconds or more.
- (d) Drive the vehicle at 25 mph (40 km/h) or more for 40 seconds or more.
- (e) Let the engine idle for 10 seconds or more.
- (f) Perform steps (d) and (e) 12 times.

HINT:

If a malfunction exists, the MIL will be illuminated on the multi information display during step (f).

NOTICE:

If the conditions in this test are not strictly followed, a malfunction detection will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from (c) to (f), then perform steps from (c) to (f) again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

Narrowing down the trouble area is possible by performing "A/F CONTROL" ACTIVE TEST (heated oxygen sensor or other trouble areas can be distinguished).

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

HINT:

"A/F CONTROL" is the ACTIVE TEST which changes 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 by running the engine speed at 2,500 rpm for approximately 90 seconds.
- (4) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL".
- (5) Perform "A/F CONTROL" with the engine in an idle condition (press the right or left button).

Result:

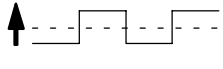
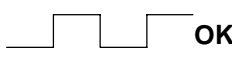
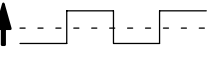
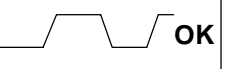
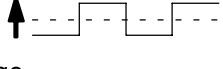
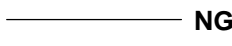
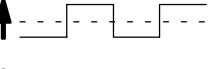

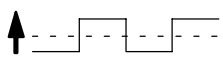

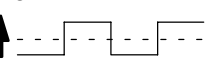

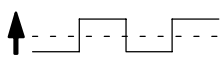

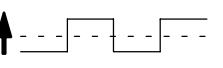

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume

+25 % → rich output: More than 0.5 V,

-12.5 % → lean output: Less than 0.4 V

NOTICE:

There is a delay of few seconds in the sensor 1 (front sensor) output, and there is about 20 seconds delay at maximum in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.5 V Less than 0.4V  OK	Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.5 V Less than 0.4V  OK	—
Case 2	Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG	Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.5 V Less than 0.4V  OK	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.5 V Less than 0.4V  OK	Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG	Sensor 2: rear sensor (sensor 2, heater, sensor 2 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 actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following of A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the heated oxygen sensors.

For displaying the graph indication, enter "ACTIVE TEST / A/F CONTROL / USER DATA", then select "O2S B1S1 and O2S B1S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. 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 OTHER DTC OUTPUT(IN ADDITION TO DTC P0136)

- Connect the hand-held tester or the OBD II scan tool to the DLC3.
- Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
- Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
- Read the DTCs.

Result:

Display (DTC output)	Proceed to
P0136	A
P0136 and other DTCs	B

HINT:

If any other codes besides P0136 are output, perform the troubleshooting for those DTCs first.

B

GO TO RELEVANT DTC CHART
(See page 05-35)

A

2 READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL(OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

- Connect the hand-held tester or the OBD II scan tool to the DLC3.
- Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.
- Select the item "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2".
- After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
- Read the output voltage of the heated oxygen sensor (sensor 2) when the engine rpm is suddenly increased.

HINT:

Quickly accelerate the engine to 4,000 rpm 3 times by using the accelerator pedal.

Standard:

The output voltage of heated oxygen sensor (sensor 2): Alternates from 0.4 V or less to 0.5 V or more.

OK

Go to step 6

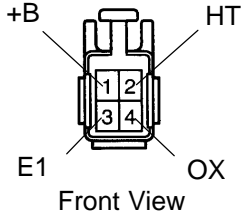
NG

3 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)

Component Side:

H8 Heated Oxygen Sensor

Bank 1,
Sensor 2



A84555

- (a) Disconnect the H8 heated oxygen sensor connector.
- (b) Measure the resistance between the terminals of the heated oxygen sensor connector.

Standard:

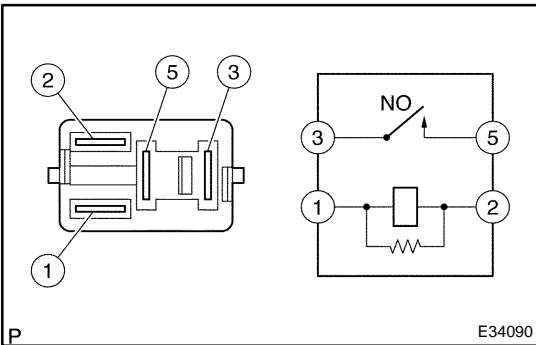
Tester Connection	Specified Condition
HT (H8-2) - +B (H8-1)	5 to 10 Ω at 20 °C (68 °F)
HT (H8-2) - E1 (H8-3)	10 kΩ or higher

- (c) Reconnect the heated oxygen sensor connector.

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

4 INSPECT EFI RELAY



P

E34090

- (a) Remove the EFI relay from the engine room R/B.
- (b) Check for continuity in the EFI relay.

Standard:

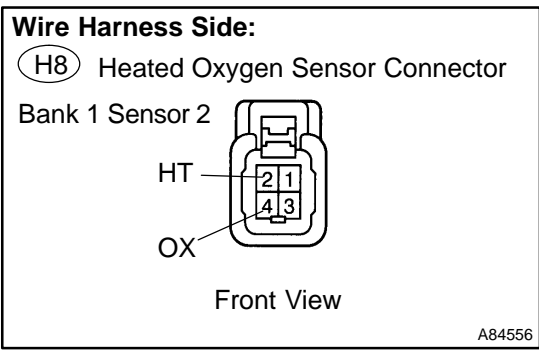
Tester Connection	Specified Condition
1 - 2	Continuity
3 - 5	No continuity
	Continuity (Apply battery voltage to terminals 1 and 2)

- (c) Reinstall the EFI relay.

NG → **REPLACE EFI RELAY**

OK

5 CHECK HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR - ECM)



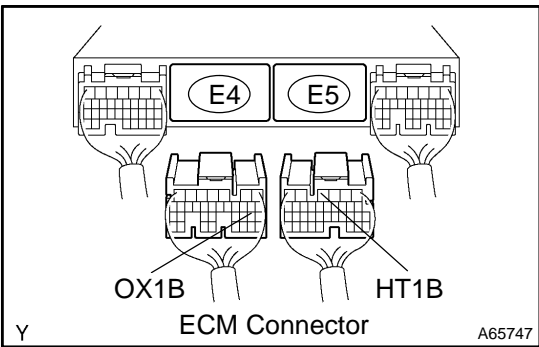
- (a) Disconnect the H8 heated oxygen sensor connector.
- (b) Disconnect the E4 and E5 ECM connector.
- (c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

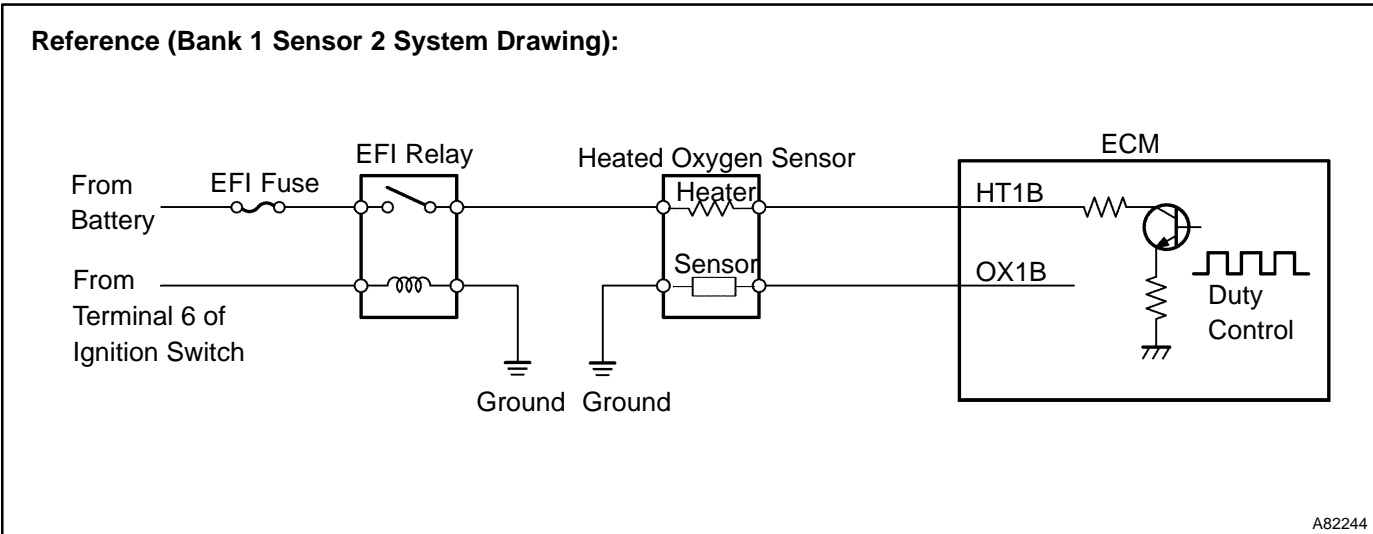
Tester Connection	Specified Condition
HT (H8-2) - HT1B (E5-4)	Below 1 Ω
OX (H8-4) - OX1B (E4-21)	

Standard (Check for short):

Tester Connection	Specified Condition
HT (H8-2) or HT1B (E5-4) - Body ground	10 kΩ or higher
OX (H8-4) or OX1B (E4-21) - Body ground	



- (d) Reconnect the ECM connector.
- (e) Reconnect the heated oxygen sensor connector.



NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR

6 | PERFORM CONFIRMATION DRIVING PATTERN

HINT:

Clear all DTCs prior to performing the confirmation driving pattern.

GO

7 | READ OUTPUT DTC(DTC P0136 IS OUTPUT AGAIN)

- (a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
- (b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
- (c) Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
- (d) Read the DTCs.

Result:

Display (DTC output)	Proceed to
P0136	A
No output	B

B **CHECK FOR INTERMITTENT PROBLEMS**
(See page 05-41)

A

REPLACE HEATED OXYGEN SENSOR