

<b>DTC</b>	<b>P0133</b>	<b>OXYGEN SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)</b>
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<b>DTC</b>	<b>P0153</b>	<b>OXYGEN SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1)</b>
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## CIRCUIT DESCRIPTION

Refer to DTC P0130 on page [05-60](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0133 P0153	Response time for heated oxygen sensor's output voltage to change from rich to lean, or from lean to rich, is 0.9 sec. or more during idling after engine is warmed up (2 trip detection logic)	<ul style="list-style-type: none"> <li>• Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit</li> <li>• Heated oxygen sensor (bank 1, 2 sensor 1)</li> <li>• Heated oxygen sensor heater (bank 1, 2 sensor 1)</li> <li>• EFI relay</li> <li>• Air induction system</li> <li>• Fuel pressure</li> <li>• Injector</li> <li>• ECM</li> </ul>

### HINT:

- Bank 1 refers to the bank that includes cylinder No.1.
- Bank 2 refers to the bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closest to the engine body.

## WIRING DIAGRAM

Refer to DTC P0130 on page [05-60](#) .

## 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" (heated oxygen sensor or another can be distinguished).

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

### HINT:

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

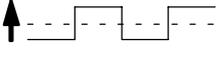
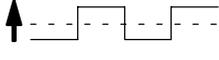
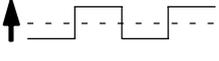
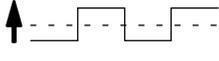
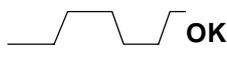
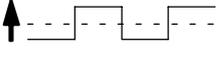
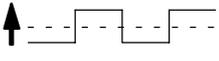
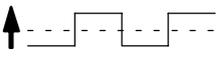
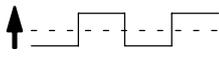
- (1) Connect the hand-held tester to the DLC3 on the vehicle.
- (2) Turn the ignition switch ON.
- (3) Warm up the engine with the engine speed at 2,500 rpm for approx. 90 sec.
- (4) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/ A/F CONTROL".
- (5) Perform "A/F CONTROL" when idle condition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

### Result:

**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 sensor 1 (front sensor) output. And there is about 20 seconds delay 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 0.55 V  <b>OK</b> Less than 0.4V	Injection volume +25 %  -12.5 % Output voltage More than 0.55 V  <b>OK</b> Less than 0.4V	—
Case 2	Injection volume +25 %  -12.5 % Output voltage No reaction  <b>NG</b>	Injection volume +25 %  -12.5 % Output voltage More than 0.55 V  <b>OK</b> Less than 0.4V	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 %  -12.5 % Output voltage More than 0.55 V  <b>OK</b> Less than 0.4V	Injection volume +25 %  -12.5 % Output voltage No reaction  <b>NG</b>	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 %  -12.5 % Output voltage No reaction  <b>NG</b>	Injection volume +25 %  -12.5 % Output voltage No reaction  <b>NG</b>	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 heated oxygen sensor.

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

**NOTICE:**

**If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.**

**HINT:**

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand-held tester or the 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.
- A high heated oxygen sensor (sensor 1) voltage (0.55 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

## 1 CHECK OTHER DTC OUTPUT(BESIDES DTC P0133 AND/OR P0153)

- (a) Read the DTC using the hand-held tester or the OBD II scan tool.

### Result:

Display (DTC output)	Proceed to
Only "P0133 and/or P0153" are output	A
"P0133 or P0153" and other DTCs are output	B

### HINT:

If any other codes besides "P0133 and/or P0153" are output, perform the troubleshoot on that DTC before.

**B**

**GO TO RELEVANT DTC CHART**  
(See page 05-18)

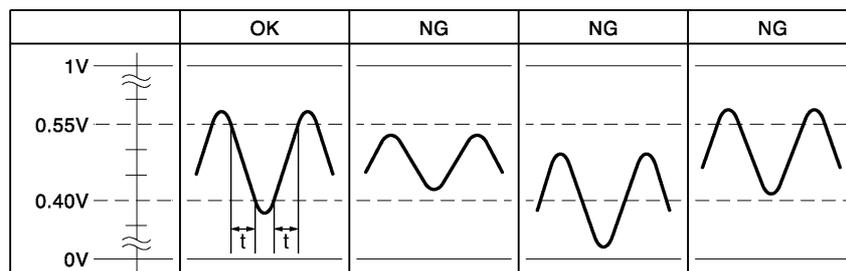
**A**

## 2 READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL(HEATED OXYGEN SENSOR DURING IDLING)

- (a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.  
(b) Read the output voltage of the heated oxygen sensor during idling.

### Heated oxygen sensor output voltage:

Alternates repeatedly between less than 0.4 V and more than 0.55 V, and period of "t" must exist more than 0.9 sec. (See the following table).



N

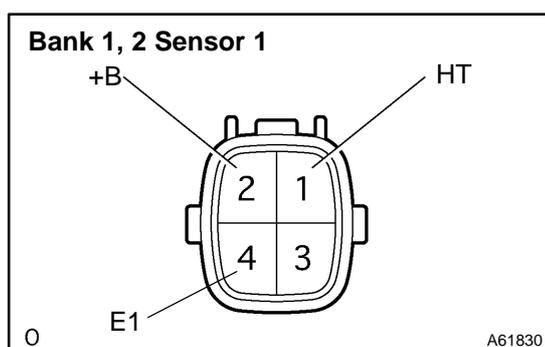
A73686

**OK**

**Go to step 9**

**NG**

## 3 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)



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

### Standard (Bank 1, 2 sensor 1):

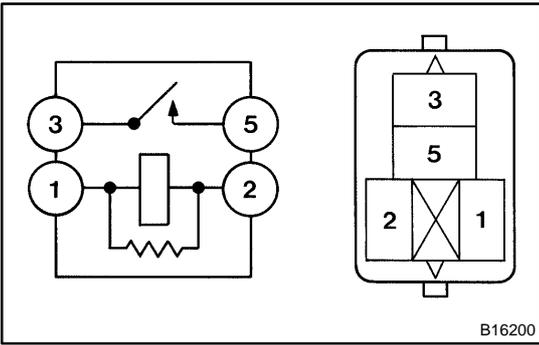
Terminal No.	Resistance
1 (HT) ↔ 2 (+B)	11 - 16 Ω at 20 °C (68 °F)
1 (HT) ↔ 4 (E1)	No Continuity

**NG**

**REPLACE HEATED OXYGEN SENSOR**

**OK**

**4 INSPECT EFI RELAY**



- (a) Remove the EFI relay from the engine room R/B.
- (b) Inspect the EFI relay.

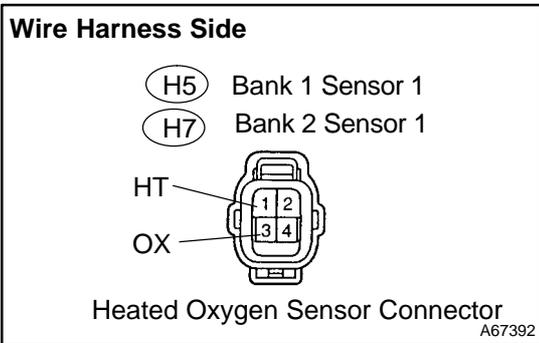
**Standard:**

Terminal No.	Condition	Specified condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Usually	No Continuity
	Apply B+ between Terminals 1 and 2	Continuity

**NG** → **REPLACE EFI RELAY**

**OK**

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



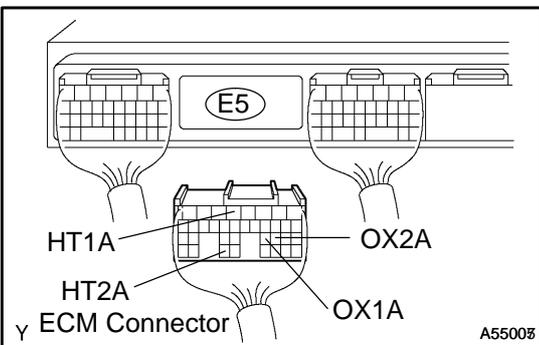
- (a) Disconnect the H5 or H7 heated oxygen sensor connector.
- (b) Disconnect the E5 ECM connector.
- (c) Check the continuity between the wire harness side connectors.

**Standard (Check for open):**

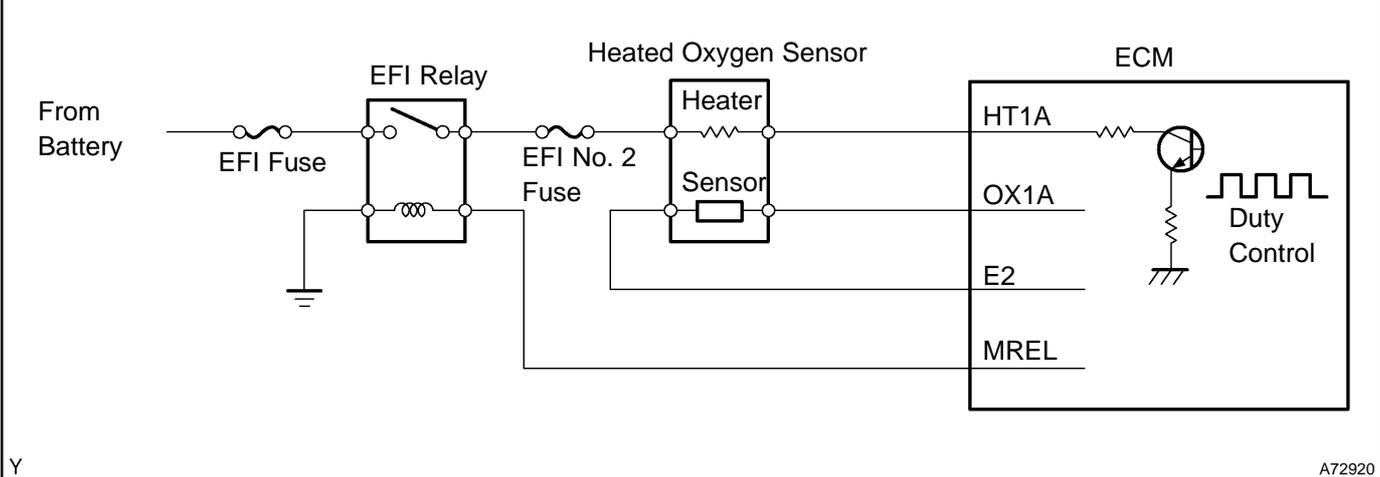
Symbols (Terminal No.)	Specified condition
OX (H5-3) ↔ OX1A (E5-23)	Continuity
HT (H5-1) ↔ HT1A (E5-4)	
OX (H7-3) ↔ OX2A (E5-22)	
HT (H7-1) ↔ HT2A (E5-33)	

**Standard (Check for short):**

Symbols (Terminal No.)	Specified condition
OX (H5-3) or OX1A (E5-23) ↔ Body ground	No continuity
HT (H5-1) or HT1A (E5-4) ↔ Body ground	
OX (H7-3) or OX2A (E5-22) ↔ Body ground	
HT (H7-1) or HT2A (E5-33) ↔ Body ground	



**Reference (Bank 1 Sensor 1 System Drawing)**



**NG** REPAIR OR REPLACE HARNESS OR CONNECTOR

**OK**

**6 CHECK AIR INDUCTION SYSTEM**

(a) Check the vacuum leaks in air induction system.

**NG** REPAIR OR REPLACE AIR INDUCTION SYSTEM

**OK**

**7 CHECK FUEL PRESSURE (See page 11-5)**

(a) Check the fuel pressure (high or low pressure).

**NG** REPAIR OR REPLACE FUEL SYSTEM

**OK**

**8 INSPECT FUEL INJECTOR ASSY(INJECTION AND VOLUME) (See page 11-7)**

**NG** REPLACE FUEL INJECTOR ASSY

**OK**

**REPLACE HEATED OXYGEN SENSOR**

**9 PERFORM CONFIRMATION DRIVING PATTERN (See page 05-60)**

**GO**

**10 READ OUTPUT DTC(DTC P0133 AND/OR P0153 ARE OUTPUT AGAIN)**

(a) Read the DTC using the hand-held tester or the OBD II scan tool.

**Result:**

Display (DTC output)	Proceed to
"P0133 and/or P0153" are output again	A
"P0133 and/or P0153" are not output again	B

**B** CHECK FOR INTERMITTENT PROBLEMS (See page 05-5)

**A**

**REPLACE HEATED OXYGEN SENSOR**