

## DTC P0133:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5]

id0102h4702400

### Note

- To determine the malfunctioning part, proceed with the diagnostics from "Function Inspection Using M-MDS".

### Details On DTCs

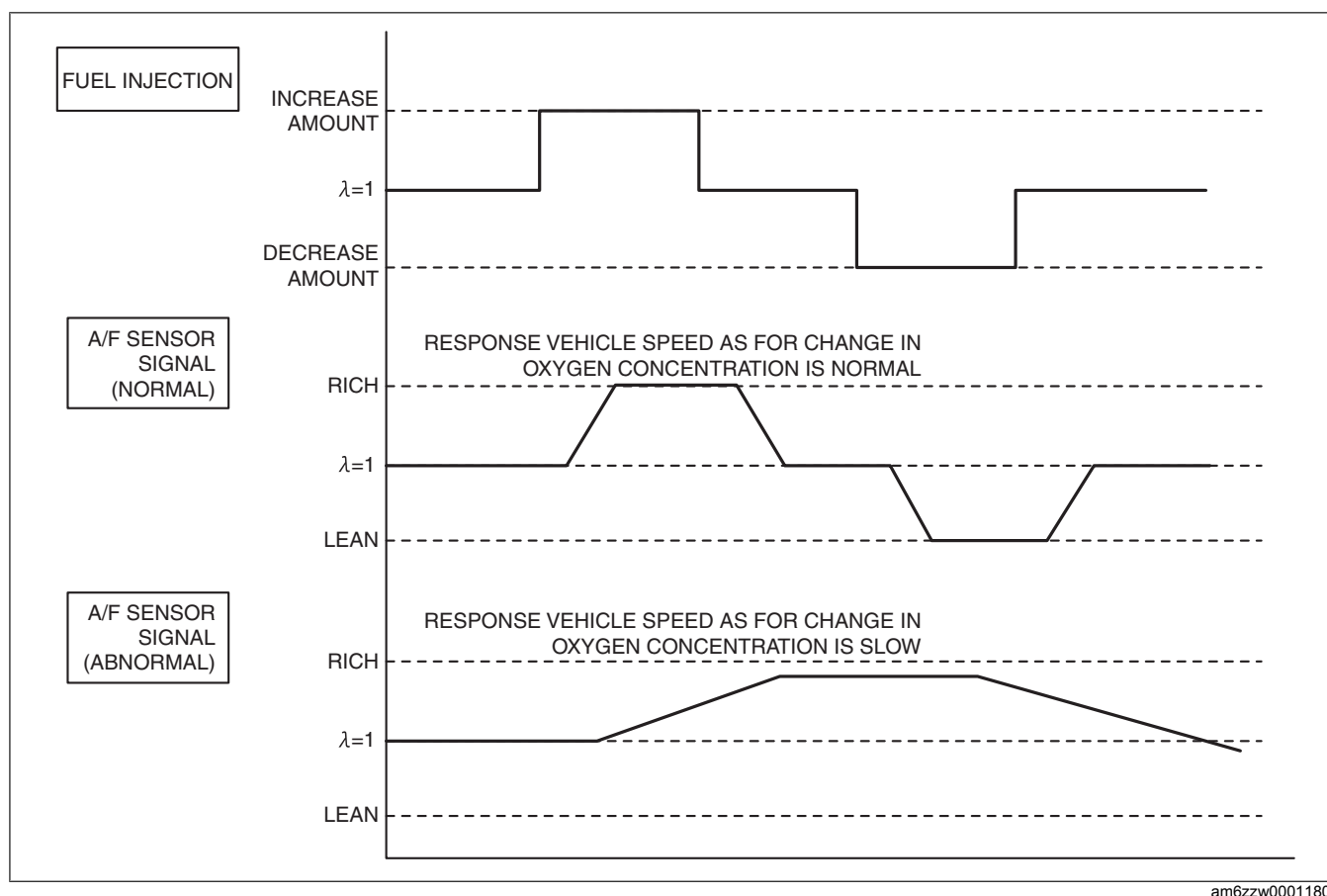
DESCRIPTION	A/F sensor circuit slow response	
<b>DETECTION CONDITION</b>	Determination conditions	• The response speed of the A/F sensor input signal when the air/fuel ratio is fluctuated is slow.
	Preconditions	• Engine speed: Within specified range • Charging efficiency: Within specified range • Engine coolant temperature: Specified value or more • Mass airflow: Within specified range • The following DTCs are not detected: <ul style="list-style-type: none"><li>— A/F sensor heater: P0031:00, P0032:00</li><li>— ECT sensor No.1: P0117:00, P0118:00</li><li>— VSS signal: P0500:00</li><li>— Misfire: P0300:00, P0301:00, P0302:00, P0303:00, P0304:00</li><li>— Fuel injection correction: P0171:00, P0172:00, P2096:00, P2097:00</li></ul>
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• A/F sensor
<b>FAIL-SAFE FUNCTION</b>	• Not applicable	
<b>VEHICLE STATUS WHEN DTCs ARE OUTPUT</b>	• Illuminates check engine light.	
<b>POSSIBLE CAUSE</b>	• A/F sensor signal malfunction <ul style="list-style-type: none"><li>— A/F sensor connector or terminals malfunction</li><li>— A/F sensor loose</li><li>— Exhaust system leakage</li></ul> • A/F sensor deterioration • PCM malfunction	

### System Wiring Diagram

- Not applicable

### Function Explanation (DTC Detection Outline)

- The PCM detects the oxygen concentration in the exhaust gas based on the A/F sensor signal. By intentionally increasing/decreasing the fuel injection amount, the PCM controls the oxygen concentration in the exhaust gas to rich or lean and monitors the response speed of the A/F sensor to sudden changes in the oxygen concentration. If the response speed of the signal input from the A/F sensor is slow while switching repeatedly between rich and lean, the PCM determines an A/F sensor malfunction and stores a DTC.



### Repeatability Verification Procedure

1. Warm up the engine to allow the engine coolant temperature to reach **80 °C {176 °F} or more**.
2. Start the engine and leave it idling for **1 min**.
3. Shift to 3rd gear and drive the vehicle for **10 min** at an engine speed of **1,500 rpm or more** and a vehicle speed of **50 km/h {31 mph} or more**.

#### Note

- Match the engine coolant temperature in the recorded FREEZE FRAME DATA (Mode 2)/snapshot data, the vehicle speed, and engine speed values to the best extent possible while driving the vehicle.
4. Try to reproduce the malfunction by driving the vehicle for **5 min** based on the values in the FREEZE FRAME DATA (Mode 2)/snapshot data.

### PID Item/Simulation Item Used In Diagnosis

#### PID/DATA monitor item table

Item	Definition	Unit/ Condi tion	Condition/Specification (Reference)
O2S11	A/F sensor	$\mu\text{A}$	<ul style="list-style-type: none"> <li>• Idle (after warm up): Approx. <math>-39 \mu\text{A}</math></li> <li>• Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA</li> </ul>

### Function Inspection Using M-MDS

STEP	INSPECTION	RESULT S	ACTION
1	<b>PURPOSE: VERIFY RELATED SERVICE INFORMATION AVAILABILITY</b> <ul style="list-style-type: none"> <li>• Verify related Service Information availability.</li> <li>• Is any related Service Information available?</li> </ul>	Yes	Perform repair or diagnosis according to the available Service Information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
2	<b>PURPOSE: IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA (MODE 2)</b> • Is the DTC P0133:00 on FREEZE FRAME DATA (Mode 2)?	Yes	Go to the next step.
		No	Go to the troubleshooting procedure for DTC on FREEZE FRAME DATA (Mode 2). (See DTC TABLE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
3	<b>PURPOSE: RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION</b> • Has the FREEZE FRAME DATA (Mode 2)/ snapshot data been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA (Mode 2)/ snapshot data on the repair order, then go to the next step.  <b>Note</b> • Recording can be facilitated using the screen capture function of the PC.
4	<b>PURPOSE: VERIFY IF DIAGNOSTIC RESULT IS AFFECTED BY DTC OCCURRING FROM A/F SENSOR UNIT</b> • Switch the ignition off, then ON (engine off). • Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the PENDING CODE/DTC P0131:00, P0132:00, P0134:00, P2237:00, P2243:00 or P2251:00 also present?	Yes	Go to the applicable DTC inspection. (See DTC P0131:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P0132:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P0134:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P2237:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P2243:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See DTC P2251:00 [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
5	<b>PURPOSE: VERIFY DTC</b> • Retrieve the PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
6	<b>PURPOSE: VERIFY A/F SENSOR</b> • Start the engine and idle it. • Access the O2S11 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the O2S11 PID value normal?	Yes	Go to the next step.
		No	Go to the troubleshooting procedure to perform the procedure from Step 1.

## Troubleshooting Diagnostic Procedure

### Intention of troubleshooting procedure

- Step 1—4
  - Perform an inspection of the A/F sensor signal related parts.
- Step 5—6
  - Verify that the primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	<b>PURPOSE: INSPECT A/F SENSOR CONNECTOR CONDITION</b> • Switch the ignition off. • Disconnect the A/F sensor connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the connector and/or terminals, then go to Step 5.
		No	Go to the next step.
2	<b>PURPOSE: INSPECT INSTALLATION OF A/F SENSOR</b> • Inspect installation of A/F sensor. • Is the A/F sensor installed securely?	Yes	Go to the next step.
		No	Retighten the A/F sensor, then go to Step 5. (See AIR FUEL RATIO (A/F) SENSOR REMOVAL/ INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)

STEP	INSPECTION	RESULTS	ACTION
3	<b>PURPOSE: VERIFY IF MALFUNCTION RELATED TO EMISSION SYSTEM AFFECTS A/F SENSOR SIGNAL</b> <ul style="list-style-type: none"> <li>Inspect for exhaust gas leakage from the exhaust system. (between A/F sensor and HO2S)</li> <li>Is there any malfunction?</li> </ul>	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 5.
		No	Go to the next step.
4	<b>PURPOSE: DETERMINE INTEGRITY OF A/F SENSOR</b> <ul style="list-style-type: none"> <li>Reconnect all disconnected connectors.</li> <li>Inspect the A/F sensor. (See AIR FUEL RATIO (A/F) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)</li> <li>Is there any malfunction?</li> </ul>	Yes	Replace the A/F sensor, then go to the next step. (See AIR FUEL RATIO (A/F) SENSOR REMOVAL/ INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
5	<b>PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION</b> <ul style="list-style-type: none"> <li>Always reconnect all disconnected connectors.</li> <li>Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)</li> <li>Implement the repeatability verification procedure. (See Repeatability Verification Procedure.)</li> <li>Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)</li> <li>Is the PENDING CODE for this DTC present?</li> </ul>	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) Go to the next step.
		No	Go to the next step.
6	<b>PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION</b> <ul style="list-style-type: none"> <li>Is any other DTC or pending code stored?</li> </ul>	Yes	Go to the applicable DTC inspection. (See DTC TABLE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	DTC troubleshooting completed.