

|            |              |                                                                     |
|------------|--------------|---------------------------------------------------------------------|
| <b>DTC</b> | <b>P0116</b> | <b>Engine Coolant Temperature Circuit Range/Performance Problem</b> |
|------------|--------------|---------------------------------------------------------------------|

## CIRCUIT DESCRIPTION

Refer to DTC P0115 on page [DI-79](#).

| DTC No. | DTC Detecting Condition                                                                                                                                                                                                                                                                                                                        | Trouble Area                        |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| P0116   | If the engine coolant temperature was 35°C (95°F) or more but less than 60°C (140°F) when the engine is started, and if conditions (a) and (b) are met:<br>(a) Vehicle has accelerated and decelerated.<br>(b) Engine coolant temperature remains within 3°C (5.4°F) of the initial engine coolant temperature (2 trip detection logic)        | • Engine coolant temperature sensor |
|         | <ul style="list-style-type: none"> <li>• If the engine coolant temperature is more than 60°C (140°F) when the engine is started and the vehicle has accelerated and decelerated</li> <li>• If the engine coolant temperature sensor records a temperature variation below 1°C (1.8°F) successively 6 times (6 trip detection logic)</li> </ul> |                                     |

## MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Examples:

- (1) Upon starting the engine, the ECT is between 35°C (95°F) and 60°C (140°F). If after driving for 250 sec., the ECT still remains within 3°C (5.4°F) of the starting temperature, a DTC will be set (2 trip detection logic).
- (2) Upon starting the engine, the ECT is over 60°C (140°F). If after driving for 250 sec., the ECT still remains within 1°C (1.8°F) of the starting temperature, a DTC will be set (6 trip detection logic).

## MONITOR STRATEGY

|                             |                                                                                                                                                           |                                                                                |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Related DTCs                | P0116                                                                                                                                                     | Engine coolant temperature sensor range check (Stuck)                          |
| Required sensors/components | Main sensors/components                                                                                                                                   | Engine coolant temperature sensor                                              |
|                             | Related sensors/components                                                                                                                                | Intake air temperature sensor, Crankshaft position sensor, Mass air flow meter |
| Frequency of operation      | Continuous                                                                                                                                                |                                                                                |
| Duration                    | 250 sec.                                                                                                                                                  |                                                                                |
| MIL operation               | 2 driving cycles (When temperature is fixed between 35°C (95°F) and 60°C (140°F))<br>6 driving cycles (When temperature is fixed at 60°C (140°F) or more) |                                                                                |
| 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 <a href="#">DI-3</a> )                                      |              |
| <b>Case 1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):</b> |                                                                                                      |              |
| Cumulative idle off period                                                      | 250 sec.                                                                                             | –            |
| Speed increase 30 km/h (19 mph) or more                                         | 10 times                                                                                             | –            |
| Engine coolant temperature                                                      | 35°C (95°F)                                                                                          | 60°C (140°F) |
| Intake air temperature                                                          | –6.7°C (20°F)                                                                                        | –            |
| <b>Case 2 (When temperature is fixed at 60°C (140°F) or more):</b>              |                                                                                                      |              |
| Engine coolant temperature at engine start                                      | 60°C (140°F)                                                                                         | –            |
| Intake air temperature                                                          | –6.7°C (20°F)                                                                                        | –            |
| Stop and go                                                                     | Once or more (Stop for 20 sec. or more and accelerate to more than 70 km/h (43 mph) with in 40 sec.) |              |
| Steady driving and stop *                                                       | Once or more                                                                                         |              |

\*: Vehicle is driven by 65 km/h (40 mph) or more for 30 sec. or more and the vehicle speed reaches 70 km/h (44 mph). The vehicle is decelerated from 65 km/h (40 mph) to 3 km/h (2 mph) or less within 35 sec. and stopped for 10 sec.

## TYPICAL MALFUNCTION THRESHOLDS

| Detection Criteria                                                             | Threshold             |
|--------------------------------------------------------------------------------|-----------------------|
| <b>Case1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):</b> |                       |
| Change of engine coolant temperature value                                     | Less than 3°C (5.4°F) |
| <b>Case2 (When temperature is fixed at 60°C (140°F) or more):</b>              |                       |
| Change of engine coolant temperature value                                     | 1°C (1.8°F) or less   |

## COMPONENT OPERATING RANGE

| Standard Value                                                                 |
|--------------------------------------------------------------------------------|
| Engine coolant temperature changes with the actual engine coolant temperature. |

## INSPECTION PROCEDURE

### HINT:

- If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, ECT sensor circuit may be open or shorted. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- 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, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

**Replace engine coolant temperature sensor.**