DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0115 (see page ES-89).

DTC No.	DTC Detection Condition	Trouble Area
P0116	When one of following conditions is met (2 trip detection logic): • When cold engine is started and engine is warmed up, ECT sensor value does not change • When warmed up engine is started, driving does not change ECT sensor value • After a warmed up engine is started, if the ECT sensor value does not change when the engine is stopped and then the next cold engine start is performed, it is determined that a malfunction has occurred.	• Thermostat • Engine Coolant Temperature (ECT) sensor

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MONITOR DESCRIPTION

- When a cold engine start is performed and then the engine is warmed up, if the ECT sensor value does not change, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.
- When a warmed up engine is started, if the ECT sensor value does not change during driving, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.
- After a warmed up engine is started, if the ECT sensor value does not change when the engine is stopped and then the next cold engine start is performed, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0116: Engine coolant temperature (ECT) sensor cold start monitor P0116: ECT sensor hot start monitor P0116: ECT sensor soak monitor
Required Sensors/Components (Main)	ECT sensor
Required Sensors/Components (Related)	None
Frequency of Operation	Once per driving cycle
Duration	180 seconds or more
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Engine Coolant Temperature (ECT) sensor cold start monitor:

This monitor will run whenever these DTCs are not present	P0100 to P0103: Mass air flow (MAF) meter P0110 to P0113: Intake air temperature (IAT) sensor
Battery voltage	10.5 V or more
Time after engine start	1 seconds or more
ECT at engine start	Less than 60°C (140°F)
IAT sensor circuit	OK
Soak time	5 hours or more
Accumulated MAF	900 g or more
Engine	Running
Fuel cut	OFF
Difference between ECT at engine start and IAT	Less than 40°C (72°F)

ECT sensor hot start monitor:

This monitor will run whenever these DTCs are not present	P0100 to P0103: MAF meter P0110 to P0113: IAT sensor
Battery voltage	10.5 V or more
MAF meter circuit	OK
ECT at engine start	Less than 60°C (140°F)
ECT at engine start	60 to 150°C (140 to 302°F)
Engine load change	10 times or more
Accumulated MAF	3,000 g or more

ECT sensor soak monitor:

This monitor will run whenever these DTCs are not present	P0100 to P0103: MAF meter P0110 to P0113: IAT sensor
Battery voltage	10.5 V or more
Engine	Running
Soak time	5 hours or more
Either (a) or (b) condition is met	-
(a) ECT	60°C (140°F) or more
(b) Accumulated MAF	5,000 g or more

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TYPICAL MALFUNCTION THRESHOLDS

Engine Coolant Temperature (ECT) sensor cold start monitor:

ECT sensor value change	Less than 5°C (9°F)

ECT sensor hot start monitor:

ECT sensor value change	Less than 5°C (9°F)

ECT sensor soak monitor:

Difference between current ECT sensor value and previous ECT sensor value when engine stopped	Less than 5°C (9°F)

COMPONENT OPERATING RANGE

Engine coolant temperature	ECT sensor value changes in accordance with actual ECT

WIRING DIAGRAM

Refer to DTC P0115 (see page ES-90).

HINT:

- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTC.

Result

Display (DTC output)	Proceed to
P0116	A
P0116 and other DTCs	B

B → **GO TO DTC CHART**

A

2 INSPECT THERMOSTAT

(a) Remove the thermostat (see page CO-12).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

NG → **REPLACE THERMOSTAT**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR