

DTC	P0115	Engine Coolant Temperature Circuit
DTC	P0117	Engine Coolant Temperature Circuit Low Input
DTC	P0118	Engine Coolant Temperature Circuit High Input

DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, of which the resistance value varies according to the ECT.

The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the ECT is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	Proceed To	DTC Detection Conditions	Trouble Areas
P0115	Step 1	Open or short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	- Open or short in ECT sensor circuit - ECT sensor - ECM
P0117	Step 4	Short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	- Short in ECT sensor circuit - ECT sensor - ECM
P0118	Step 2	Open in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	- Open in ECT sensor circuit - ECT sensor - ECM

HINT:

When any of these DTCs are set, check the ECT by selecting the following menu items on an intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. If using an OBD II scan tool, refer to the instruction manual.

Temperature Displayed	Malfunctions
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the ECT. The ECT sensor has a thermistor with a resistance that varies according to 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.

These 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 ECT. 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.

Example:

If the sensor voltage output is -40°C (-40°F) for 0.5 seconds or more, the ECM determines that there is an open in the ECT sensor circuit, and sets DTC P0118. Conversely, if the voltage output is more than 140°C (284°F) for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0115: Engine coolant temperature sensor range check (Fluctuating) P0117: Engine coolant temperature sensor range check (Low voltage) P0118: Engine coolant temperature sensor range check (High voltage)
Required Sensors/Components (Main)	Engine Coolant Temperature (ECT) sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

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TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	None
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TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor voltage	Less than 0.14 V, or more than 4.91 V
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P0117:

ECT sensor voltage [Engine coolant temperature]	Less than 0.14 V [More than 140°C (284°F)]
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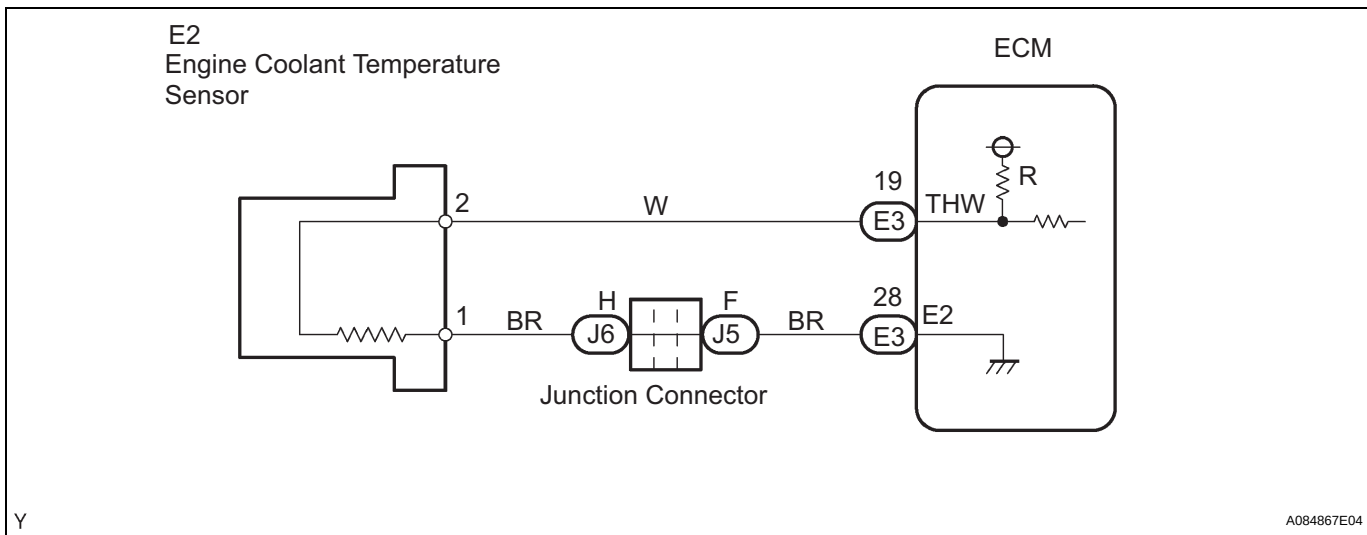
P0118:

ECT sensor voltage [Engine coolant temperature]	More than 4.91 V [Less than -40°C (-40°F)]
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COMPONENT OPERATING RANGE

ECT sensor voltage [Engine coolant temperature]	0.14 to 4.91 V [-40 to 140°C (-40 to 284°F)]
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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

- Read freeze frame data using an intelligent tester or OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

1**READ VALUE OF INTELLIGENT TESTER OR OBD II SCAN TOOL (ENGINE COOLANT TEMPERATURE)**

- Connect an intelligent tester or OBD II scan tool to the DLC3.
- Turn the ignition switch to ON.
- Turn the tester or scan tool ON.
- On the tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.
- Read the value displayed on the tester.
- If using an OBD II scan tool, refer to the instruction manual.

Standard:

Between 80°C and 97°C (176°F and 207°F) with warm engine.

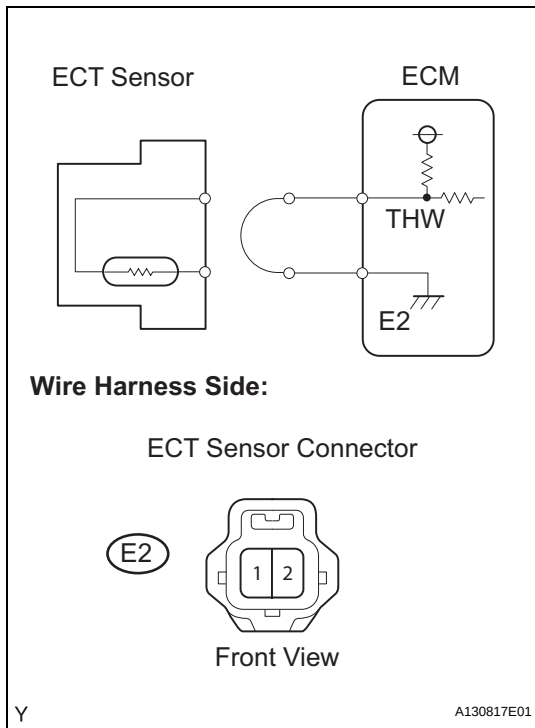
Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Between 80°C and 97°C (176°F and 207°F)	C

HINT:

- If there is an open circuit, the intelligent tester or OBD II scan tool indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester or OBD II scan tool indicates 140°C (284°F) or higher.

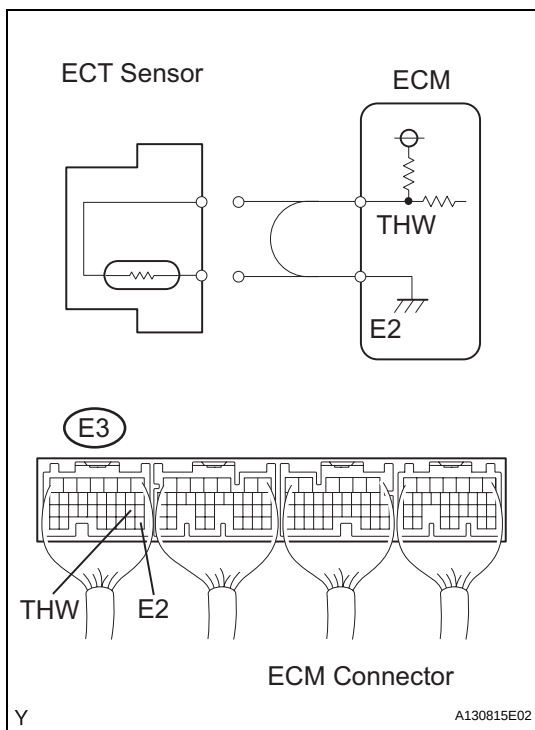
B**Go to step 4****C****CHECK FOR INTERMITTENT PROBLEMS****A****ES**

2**READ VALUE OF INTELLIGENT TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN WIRE HARNESS)**

- Confirm connector connecting condition.
- Disconnect the E2 Engine Coolant Temperature (ECT) sensor connector.
- Connect terminals 1 and 2 of the ECT sensor connector on the wire harness side.
- Connect the intelligent tester or OBD II scan tool to the DLC3.
- Turn the ignition switch to ON.
- Turn the tester or scan tool ON.
- On the tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.
- Read the value displayed on the tester.
- If using an OBD II scan tool, refer to the instruction manual.

Standard:**140°C (284°F) or higher**

- Reconnect the ECT sensor connector.

OK**REPLACE ENGINE COOLANT TEMPERATURE SENSOR****NG****3****READ VALUE OF INTELLIGENT TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN ECM)**

- Disconnect the E2 ECT sensor connector.
- Connect terminals THW and E2 of the E3 ECM connector.
HINT:
Before checking, do visual and contact pressure checks on the ECM connector.
- Connect the intelligent tester or OBD II scan tool to the DLC3.
- Turn the ignition switch to ON.
- Turn the tester or scan tool ON.
- On the tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.
- Read the value displayed on the tester.
- If using an OBD II scan tool, refer to the instruction manual.

Standard:**140°C (284°F) or higher**

- Reconnect the ECT sensor connector.

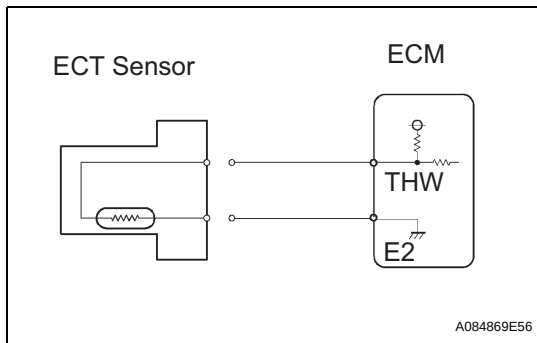
OK**REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

REPLACE ECM

4

READ VALUE OF INTELLIGENT TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN WIRE HARNESS)



- (a) Disconnect the E2 ECT sensor connector.
- (b) Connect the intelligent tester or OBD II scan tool to the DLC3.
- (c) Turn the ignition switch to ON.
- (d) Turn the tester or scan tool ON.
- (e) On the tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.
- (f) Read the value displayed on the tester.
- (g) If using an OBD II scan tool, refer to the instruction manual.

Standard:**-40°C (-40°F)**

- (h) Reconnect the ECT sensor connector.

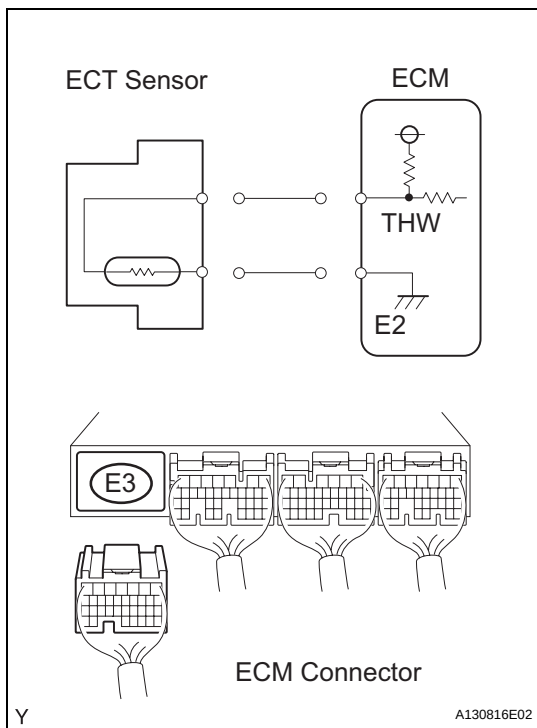
OK

REPLACE ENGINE COOLANT
TEMPERATURE SENSOR

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5

READ VALUE OF INTELLIGENT TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN ECM)



- (a) Disconnect the E3 ECM connector.
- (b) Connect the intelligent tester or OBD II scan tool to the DLC3.
- (c) Turn the ignition switch to ON.
- (d) Turn the tester or scan tool ON.
- (e) On the tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.
- (f) Read the value displayed on the tester.
- (g) If using an OBD II scan tool, refer to the instruction manual.

Standard:**-40°C (-40°F)**

- (h) Reconnect the ECM connector.

OK

REPAIR OR REPLACE HARNESS OR
CONNECTOR

NG

REPLACE ECM