

<b>DTC</b>	<b>P0115</b>	<b>Engine Coolant Temperature Circuit</b>
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<b>DTC</b>	<b>P0117</b>	<b>Engine Coolant Temperature Circuit Low Input</b>
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<b>DTC</b>	<b>P0118</b>	<b>Engine Coolant Temperature Circuit High Input</b>
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## CIRCUIT DESCRIPTION

A thermistor is built in the Engine Coolant Temperature (ECT) sensor and changes the voltage value according to the engine coolant temperature.

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

**HINT:**

If the ECM detects the DTC "P0115, P0117 or P0118", it operates the fail-safe function in which the ECT is assumed to be 80°C (176°F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 sec.	<ul style="list-style-type: none"> <li>• Open or short in engine coolant temperature sensor circuit</li> <li>• Engine coolant temperature sensor</li> <li>• ECM</li> </ul>
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec.	
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec.	

**HINT:**

After confirming DTC "P0115, P0117 or P0118", use the OBD II scan tool or the hand-held tester to confirm the engine coolant temperature from the DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL.

Displayed Temperature	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

## 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 voltage 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 voltage drops. The voltage varies as output voltage from the sensor changes.

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.

**Example:**

When the ECM calculates that the ECT is less than  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ), or more than  $140^{\circ}\text{C}$  ( $284^{\circ}\text{F}$ ), and if either the condition continues for 0.5 sec. or more, the ECM will set a DTC.

**MONITOR STRATEGY**

Related DTCs	P0115	Engine coolant temperature sensor range check (Fluttering)
	P0117	Engine coolant temperature sensor range check (Low voltage)
	P0118	Engine coolant temperature sensor range check (High voltage)
Required sensors/components	Engine coolant temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

**TYPICAL ENABLING CONDITIONS**

The monitor will run whenever this DTC is not present	See page <a href="#">DI-437</a>
The typical enabling condition is not available	–

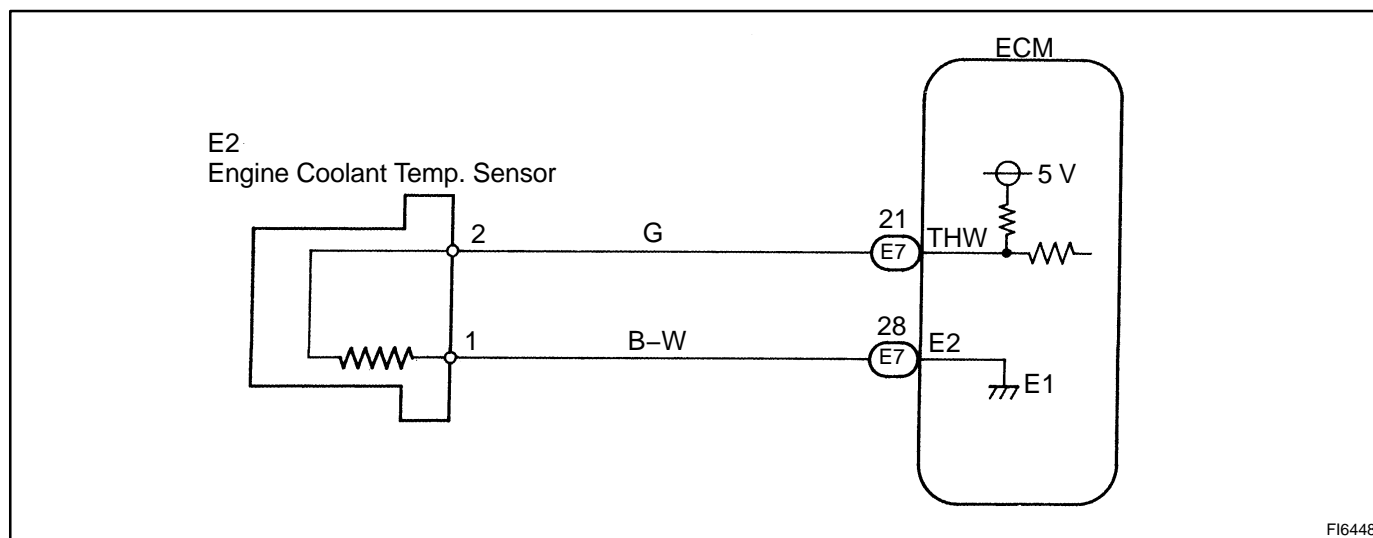
**TYPICAL MALFUNCTION THRESHOLDS**

Detection Criteria	Threshold
<b>P0115:</b>	
Engine coolant temperature sensor voltage (Coolant temperature)	Less than 0.14 V, or more than 4.91 V (More than $140^{\circ}\text{C}$ ( $284^{\circ}\text{F}$ ), or less than $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ))
<b>P0117:</b>	
Engine coolant temperature sensor voltage (Coolant temperature)	Less than 0.14 V (More than $140^{\circ}\text{C}$ ( $284^{\circ}\text{F}$ ))
<b>P0118:</b>	
Engine coolant temperature sensor voltage (Coolant temperature)	More than 4.91 V (Less than $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ))

**COMPONENT OPERATING RANGE**

Parameter	Standard Value
Engine coolant temperature sensor voltage	0.14 V ( $140^{\circ}\text{C}$ ( $284^{\circ}\text{F}$ )) to 4.91 V ( $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ))

## WIRING DIAGRAM



## INSPECTION PROCEDURE

### HINT:

- If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand-held tester. 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.

1	Connect hand-held tester, and read value of engine coolant temperature.
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**PREPARATION:**

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

**CHECK:**

Read the temperature value on the the hand-held tester.

**OK:**

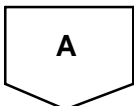
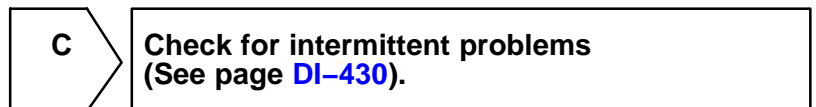
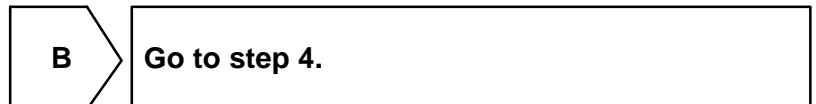
Same value as actual engine coolant temperature.

**RESULT:**

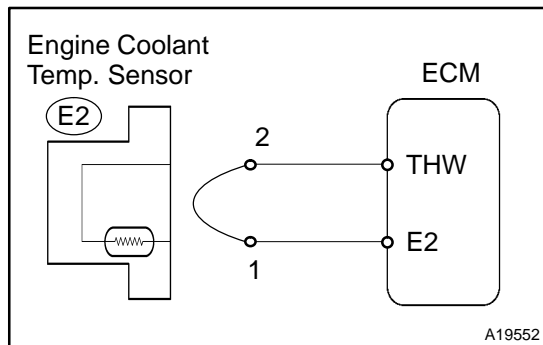
Displayed Temperature	Proceed to
-40°C (-40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

**HINT:**

- If there is an open circuit, hand-held tester indicates -40°C (-40°F).
- If there is a short circuit, hand-held tester indicates 140°C (284°F) or more.



## 2 Check for open in harness or ECM.



### PREPARATION:

- Disconnect the E2 engine coolant temperature (ECT) sensor connector.
- Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.
- Turn the ignition switch ON.
- When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

### CHECK:

Read the temperature value on the hand-held tester.

### OK:

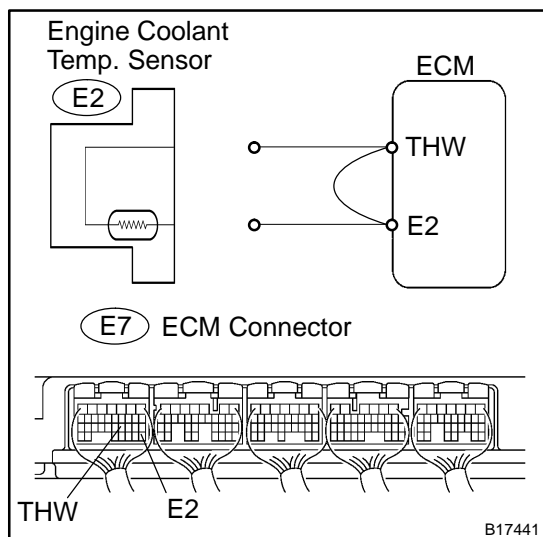
**Standard: Temperature value: 140°C (284°F) or more**

OK

**Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.**

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## 3 Check for open in harness or ECM.



### PREPARATION:

- Disconnect the E2 engine coolant temperature sensor connector.
  - Connect terminals THW and E2 of the E7 ECM connector.
- HINT:  
Before checking, do a visual and contact pressure checks for the ECM connector.
- Turn the ignition switch ON.
  - When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

### CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

### OK:

**Standard: Temperature value: 140°C (284°F) or more**

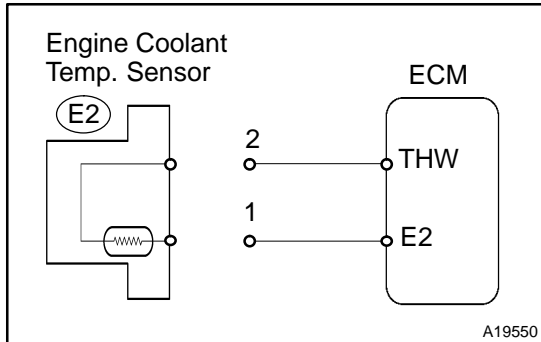
OK

**Repair or replace harness or connector.**

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Confirm good connection at ECM. If OK, replace ECM (See page [SF-82](#)).

#### 4 Check for short in harness and ECM.



##### PREPARATION:

- Disconnect the E2 engine coolant temperature sensor connector.
- Turn the ignition switch ON.
- When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

##### CHECK:

Read the temperature value on the hand-held tester.

##### OK:

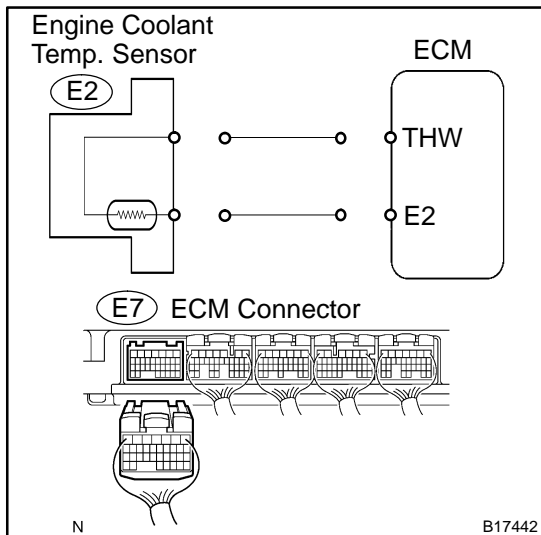
Standard: Temperature value:  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ )

OK

Replace engine coolant temperature sensor.

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#### 5 Check for short in harness or ECM.



##### PREPARATION:

- Disconnect the E7 ECM connector.
- Turn the ignition switch ON.
- When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

##### CHECK:

Read the temperature value on the hand-held tester.

##### OK:

Standard: Temperature value:  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ )

OK

Repair or replace harness or connector.

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Replace ECM (See page [SF-82](#)).