

# P0117 Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage

## Circuit Description

The engine coolant temperature (ECT) sensor is a variable resistor that measures the temperature of the engine coolant. The engine control module (ECM) supplies 5 volts to the ECT signal circuit and supplies a ground to the low reference circuit. If the ECM detects a low ECT signal voltage, which is a high temperature indication, this DTC sets. The following table illustrates the difference between temperature, resistance, and voltage:

ECT	ECT Resistance	ECT Signal Voltage
Cold	High	High
Warm	Low	Low

## DTC Descriptor

This diagnostic procedure supports the following DTC: DTC P0117 Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage

## Conditions for Running the DTC

- The ignition is ON or the engine is operating.
- DTC P0117 runs continuously once the above condition is met.

## Conditions for Setting the DTC

The ECM detects that the engine coolant temperature is more than 140°C (284°F) for more than 3 seconds.

## Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.

- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

## Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 4 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

## Diagnostic Aids

- Use the J 35616-C Connector Test Adapter Kit for any test that requires probing the ECM harness connector or a component harness connector.
- The lower connector of the ECM is connector C1 and the upper connector of the ECM is connector C2. Refer to Engine Controls Component Views.
- An overheating condition may cause this DTC to set.
- After starting the engine, the ECT should rise steadily to about 90°C (194°F) then stabilize when the thermostat opens.
- Use the Temperature vs Resistance table in order to test the ECT sensor at various temperature levels in order to evaluate the possibility of a skewed sensor. A skewed sensor could result in a driveability condition. If the engine has sat overnight, the engine coolant temperature and the intake air temperature values should display within a few degrees. If the temperatures are not within 3°C (5°F), refer to Temperature vs Resistance - Engine Coolant Temperature (ECT) Sensor.
- For an intermittent condition, refer to Intermittent Conditions.

## Test Description

The numbers below refer to the step numbers in the diagnostic table.

2. This step determines that a condition exists. If the temperature is more than the specified value, test for a condition in the circuits of the ECT sensor.
4. This step isolates the condition. If the temperature is less than the specified value, the ECM and the signal circuit of the ECT sensor are OK.

## DTC P0117

Step	Action	Values	Yes	No
<b>Schematic Reference: Engine Controls Schematics on page 6-1196</b> <b>Connector End View Reference: Engine Control Module (ECM) Connector End Views on page 6-1220 or Engine Controls Connector End Views on page 6-1223</b>				
1	Did you perform the Diagnostic System Check–Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check -Engine Controls
2	1. Turn ON the ignition, with the engine OFF. 2. Observe the ECT parameter with a scan tool. Is the temperature more than the specified value?	140°C (284°F)	Go to Step 4	Go to Step 3
3	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 4	Go to Diagnostic Aids

Step	Action	Values	Yes	No
4	<ol style="list-style-type: none"> <li>1. Disconnect the engine coolant temperature (ECT) sensor.</li> <li>2. Turn ON the ignition, with the engine OFF.</li> <li>3. Observe the ECT parameter with a scan tool.</li> </ol> Is the temperature less than the specified value?	-39°C (-38°F)	Go to Step 6	Go to Step 5
5	<ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> <li>2. Disconnect the engine control module (ECM).</li> <li>3. Test the signal circuit of the ECT sensor for a short to ground. Refer to Circuit Testing and Wiring Repairs on page 8-1189 in Wiring Systems.</li> </ol> Did you find and correct the condition?	—	Go to Step 8	Go to Step 7
6	Replace the ECT sensor. Refer to Engine Coolant Temperature (ECT) Sensor Replacement. Did you complete the replacement?	—	Go to Step 8	—
7	Replace the ECM. Refer to Engine Control Module (ECM) Replacement. Did you complete the replacement?	—	Go to Step 8	—
8	<ol style="list-style-type: none"> <li>1. Clear the DTCs with a scan tool.</li> <li>2. Turn OFF the ignition for 30 seconds.</li> <li>3. Start the engine.</li> <li>4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records.</li> </ol> Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 9
9	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List	System OK