DTC	P0115/22	ENGINE COOLANT TEMPERATURE CIRCUIT

DTC	P0117/22	ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC	P0118/22	ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

A thermistor is built in the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the ECT.

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

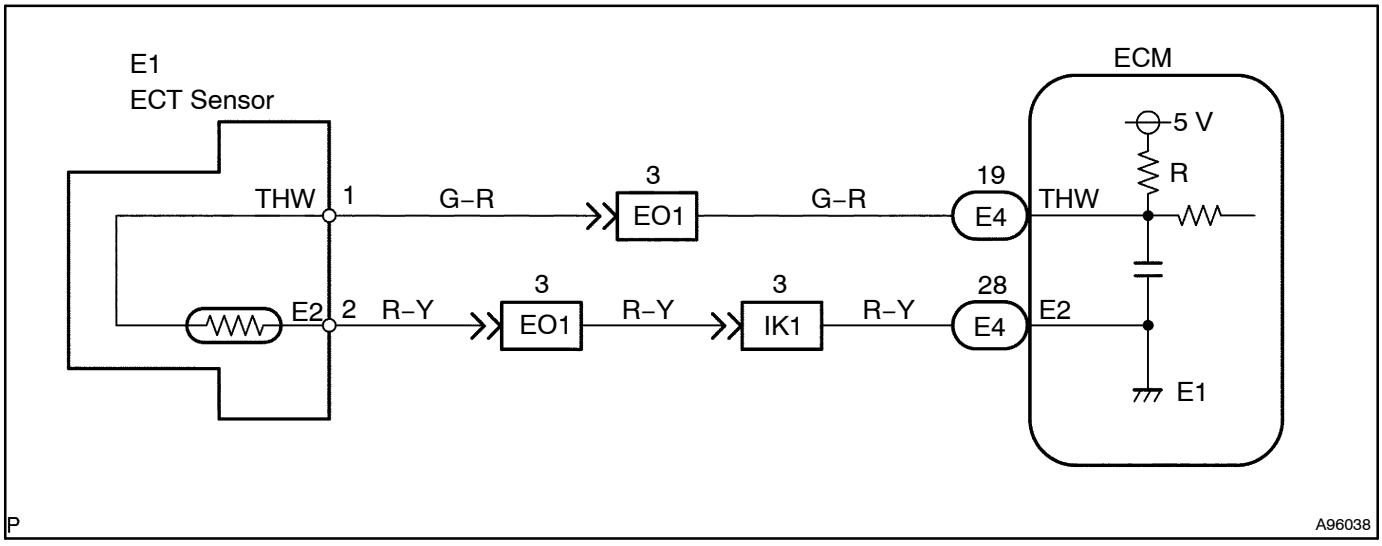
DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115/22	Step 1	Open or short in ECT sensor circuit for 0.5 seconds	• Open or short in ECT sensor circuit • ECT sensor • ECM
P0117/22	Step 4	Short in ECT sensor circuit for 0.5 seconds	Same as DTC No. P0115/22
P0118/22	Step 2	Open in ECT sensor circuit for 0.5 seconds	Same as DTC No. P0115/22

HINT:

After confirming DTC P0115/22, P0117/22 or P0118/22, use the hand–held tester to confirm the ECT from the COOLANT TEMP menu (to reach the COOLANT TEMP menu: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP).

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, 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, and other data from the time the malfunction occurred.

When using hand–held tester:

1	READ VALUE OF DATA LIST (COOLANT TEMPERATURE)

(a) Connect the hand–held tester (with 24 V VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the hand–held tester ON.
(c) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP. Read the values.
Standard: Same value as the actual engine coolant temperature.
Result:

Temperature Display	Proceed to
–40°C (–40°F)	A
140°C (284°F)	B
OK (same as actual engine coolant temperature)	C

HINT:

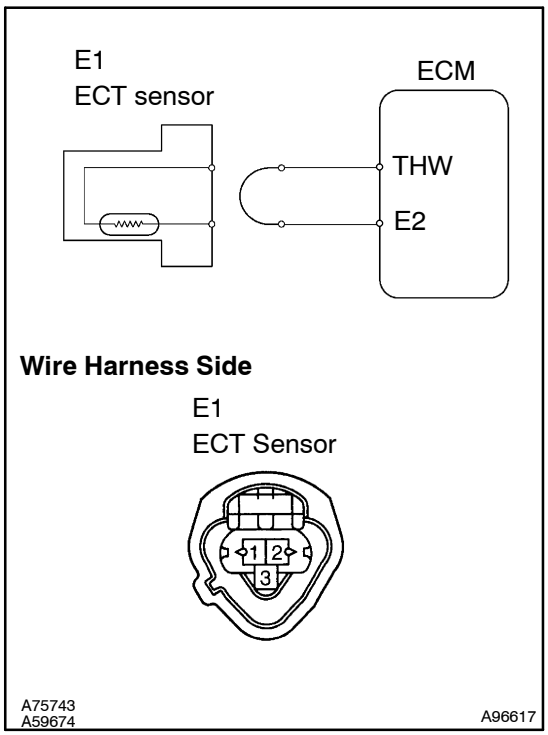
- If there is an open circuit, the hand–held tester indicates –40˚C (–40˚F).
- If there is a short circuit, the hand–held tester indicates 140˚C (284˚F) or more.

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–10)

A

2 READ VALUE OF DATA LIST (CHECK FOR OPEN IN WIRE HARNESS)

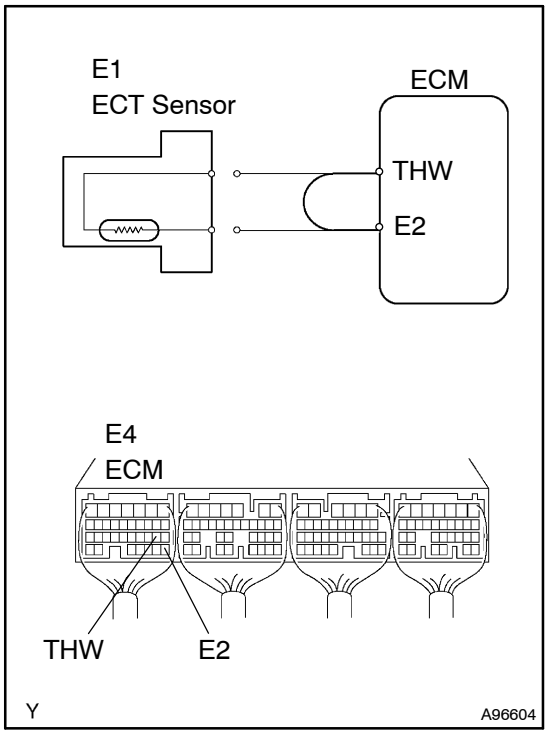


(a) Disconnect the E1 ECT sensor connector.
(b) Connect terminals 1 and 2 of the ECT sensor wire harness side connector.
(c) Turn the ignition switch ON.
(d) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP. Read the values.
Standard: 140°C (284°F) or more

OK → **CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

NG

3 READ VALUE OF DATA LIST (CHECK FOR OPEN IN ECM)



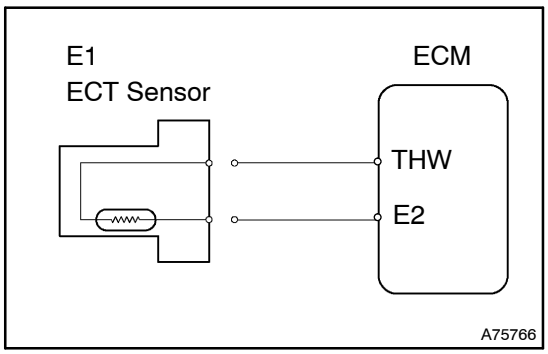
(a) Disconnect the E1 ECT sensor connector.
(b) Connect terminals THW and E2 of the E4 ECM connector.
HINT:
Before checking, perform a visual and contact pressure check for the ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP. Read the values.
Standard: 140°C (284°F) or more

NG → **CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10–10)**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

4	READ VALUE OF DATA LIST (CHECK FOR SHORT IN WIRE HARNESS)

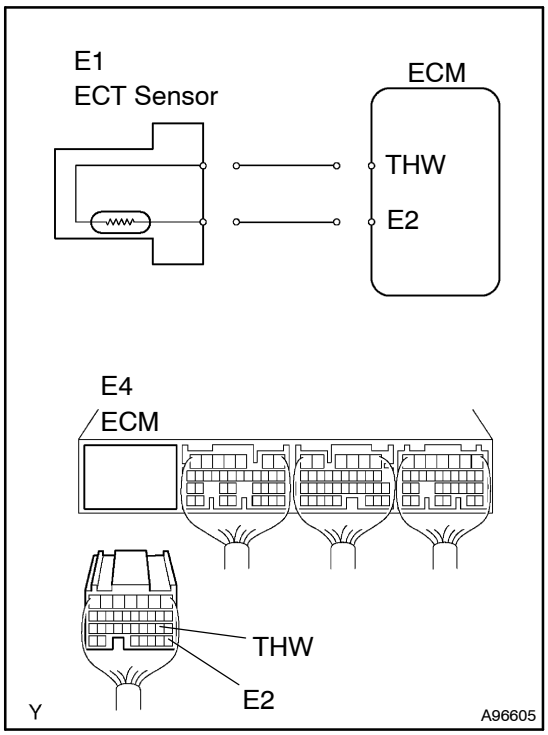


(a) Disconnect the E1 ECT sensor connector.
(b) Turn the ignition switch ON.
(c) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP. Read the values.
Standard: –40°C (–40°F)

OK	REPLACE ENGINE COOLANT TEMPERATURE SENSOR

NG

5	READ VALUE OF DATA LIST (CHECK FOR SHORT IN ECM)



(a) Disconnect the E4 ECM connector.
(b) Turn the ignition switch ON.
(c) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP. Read the values.
Standard: –40°C (–40°F)

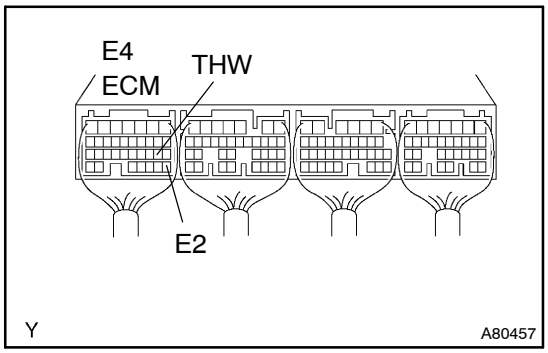
NG	REPLACE ECM (See page 10–10)

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

When not using hand–held tester:

1 CHECK ECM (THW VOLTAGE)



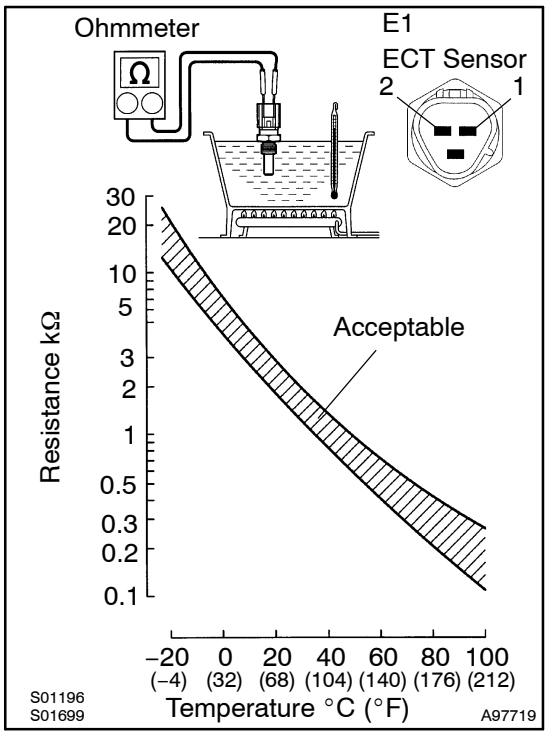
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connector.
Standard:

Tester Connection	Condition	Specified Condition
E4–19 (THW) – E4–28 (E2)	20°C (68°F)	0.2 to 3.8 V
E4–19 (THW) – E4–28 (E2)	80°C (176°F)	0.1 to 1.5 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 10–10)**

NG

2 INSPECT ENGINE COOLANT TEMPERATURE SENSOR



(a) Remove the ECT sensor.
(b) Measure the resistance between the terminals.
Standard:

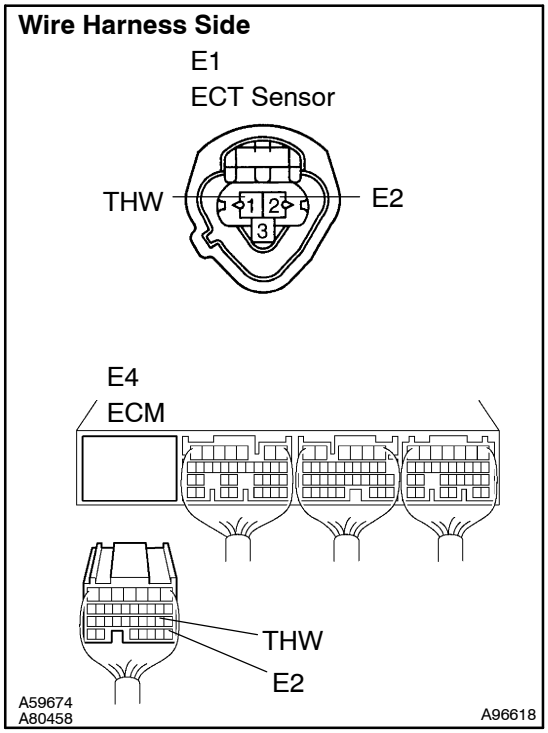
Tester Connection	Condition	Specified Condition
1 – 2	20°C (68°F)	2.21 to 2.69 kΩ
1 – 2	80°C (176°F)	0.29 to 0.354 kΩ

NOTICE:
If checking the ECT sensor in water, be careful not to allow water to contact the terminals. After checking, dry the sensor.
HINT:
Alternate procedure: Connect an ohmmeter to the installed ECT sensor and read the resistance. Use an infrared thermometer to measure the engine coolant temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the ECT (warm up or allow to cool down) and repeat the test.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

3 CHECK WIRE HARNESS (ECM – ECT SENSOR)



(a) Disconnect the E1 ECT sensor connector.
(b) Disconnect the E4 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
E1–1 (THW) – E4–19 (THW) E1–2 (E2) – E4–28 (E2)	Below 1 Ω
E4–19 (THW) – E4–28 (E2)	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10–10)