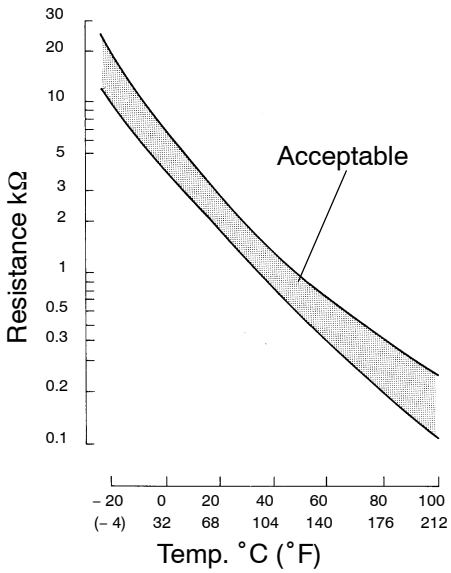
DTC	22	WATER TEMPERATURE SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

(fig. 1)



The water temperature sensor senses the coolant temperature. A thermistor built into the sensor changes the resistance value according to the coolant temperature. The lower the coolant temperature, the greater the thermistor resistance value, and the higher the coolant temperature, the lower the thermistor resistance value (See Fig. 1).

The water temperature sensor is connected to the ECM (See below).

5 V power source voltage in the ECM is applied to the water temperature sensor from terminal THW via a resistor R. That is, the resistor R and the water temperature sensor are connected in series. When the resistance value of the water temperature sensor changes in accordance with changes in the coolant temperature, potential at terminal THW also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

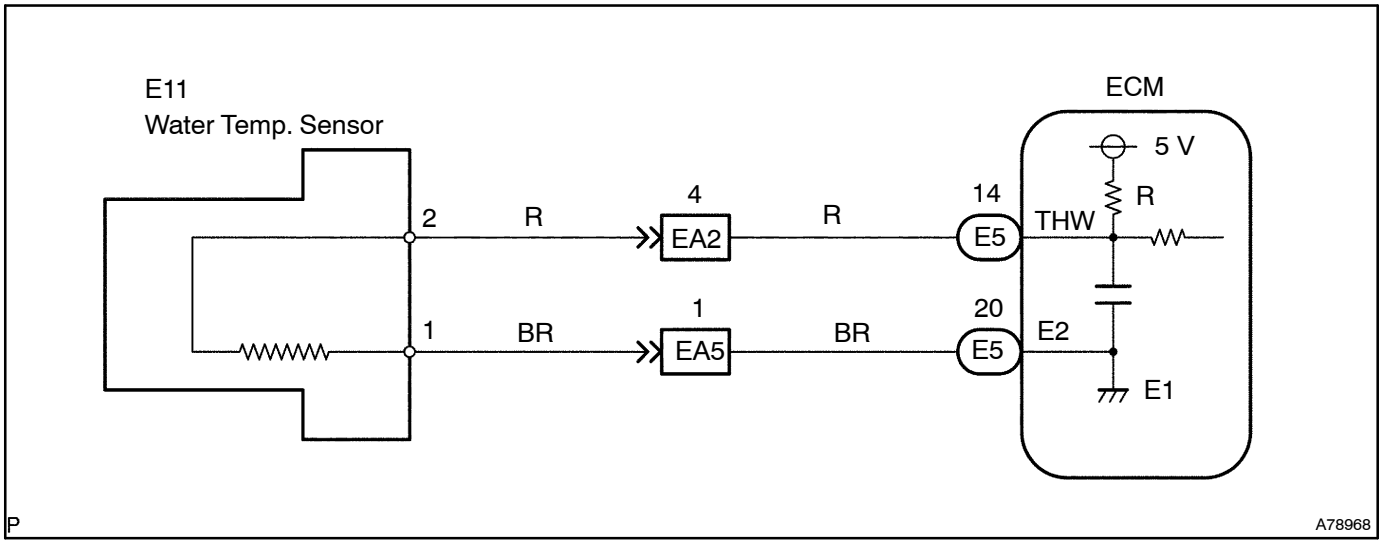
DTC No.	DTC Detection Condition	Trouble Area
22	Open or short in water temp. sensor circuit for 0.5 sec. or more	• Open or short in water temp. sensor circuit • Water temp. sensor • ECM

HINT:

After confirming DTC 22, use the hand–held tester to confirm the water temperature from the CURRENT DATA.

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs 22, 24 and 39 are output simultaneously, terminal E2 (sensor ground) may be open.
- Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

When using hand–held tester:

1	READ VALUE OF HAND–HELD TESTER

(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) Read the temperature value displayed on the hand–held tester.

Standard: The same as the actual water temperature.

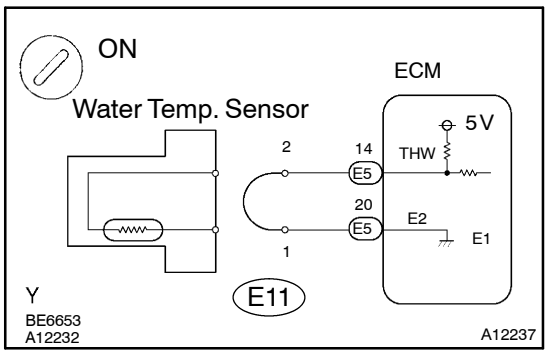
- If there is an open circuit, the hand–held tester indicates –40°C (–40°F). Proceed to A.
- If there is a short circuit, the hand–held tester indicates 140°C (284°F) or more. Proceed to B.

A	Go to step 2
B	Go to step 4

OK

CHECK FOR INTERMITTENT PROBLEMS

2 READ VALUE OF HAND–HELD TESTER

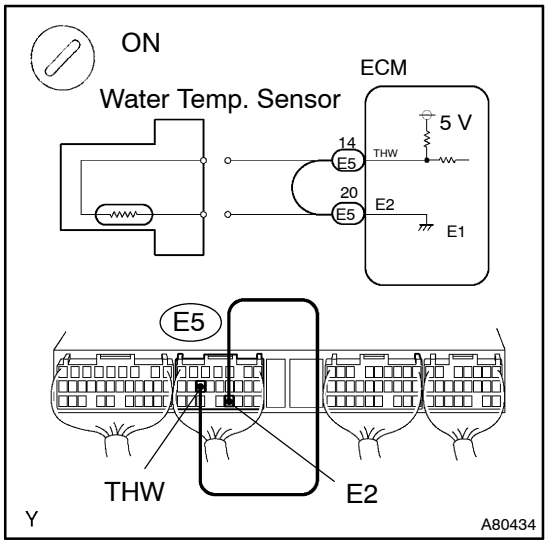


(a) Connect the hand–held tester to the DLC3.
(b) Connect the E11 sensor wire harness terminals together.
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
Standard: 140˚C (284˚F) or more

OK	**REPLACE WATER TEMPERATURE SENSOR**

NG

3 READ VALUE OF HAND–HELD TESTER



(a) Connect the hand–held tester to the DLC3.
(b) Connect terminals THW and E2 of the E5 ECM connector.

The water temperature sensor connector is disconnected. Before checking, perform a visual and contact pressure check for the ECM connector (See page 05–20).

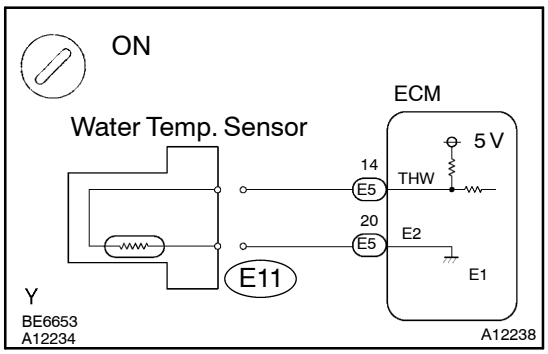
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
Standard: 140˚C (284˚F) or more

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

REPLACE ECM

4 READ VALUE OF HAND–HELD TESTER

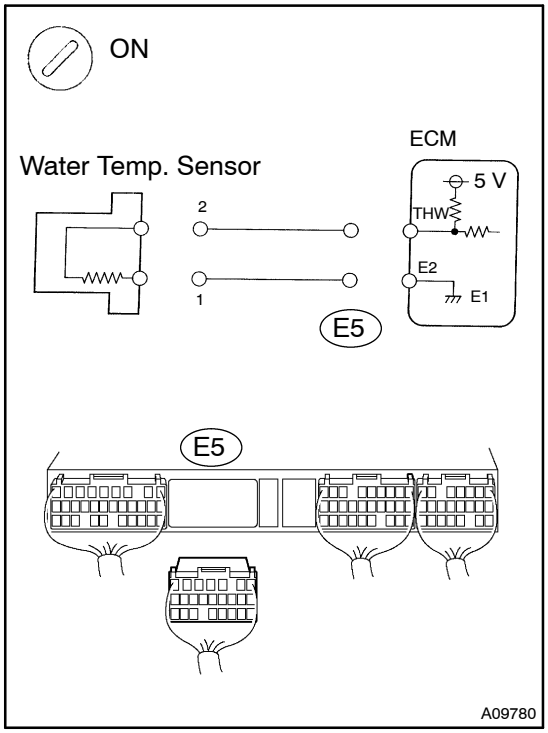


(a) Connect the hand–held tester to the DLC3.
(b) Disconnect the E11 water tempeature sensor connector.
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
Standard: –40˚C (–40˚F)

OK → **REPLACE WATER TEMPERATURE SENSOR**

NG

5 READ VALUE OF HAND–HELD TESTER



(a) Disconnect the E5 connector from the ECM.
(b) The water temperature sensor connector is disconnected.
(c) Turn the ignition switch ON.
Standard: –40˚C (–40˚F)

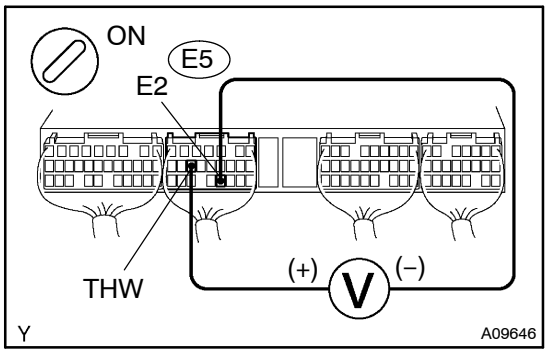
OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

CHECK AND REPLACE ECM (See page 01–27)

When not using hand–held tester:

1	CHECK ECM



(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals THW and E2 of the ECM connector.
Voltage:

Water Temp. °C (°F)	Voltage
20 (68) (Engine is cool)	0.2 – 3.8 V
80 (176) (Engine is hot)	0.1 – 1.5 V

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

2	CHECK WATER TEMPERATURE SENSOR (See page 16–22)

NG → REPLACE WATER TEMPERATURE SENSOR

OK

3	CHECK WIRE HARNESS (ECM ⇔ WATER TEMPERATURE SENSOR) (See page 01–27)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE ECM (See page 01–27)