DI1ID–06

DTC	P0115/22	Water Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

A thermistor built into the water temp. sensor changes the resistance value according to the water temperature.

The structure of the sensor and connection to the engine ECU is the same as in the intake air temp. circuit malfunction shown on page DI–28.

If the engine ECU detects the DTC P0115/22, it operates the fail safe function in which the water temperature is assumed to be 80 °C (176 °F).

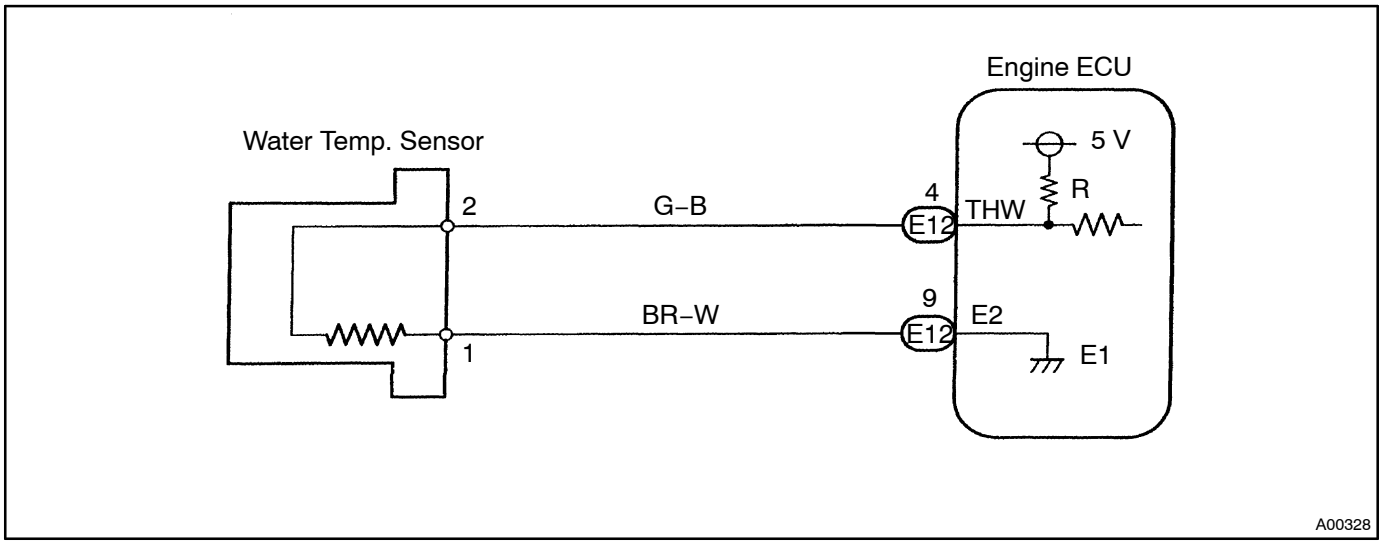
DTC No.	DTC Detection Condition	Trouble Area
P0115/22	Open or short in water temp. sensor circuit 0.5 sec. or more	• Open or short in water temp. sensor circuit • Water temp. sensor • Engine ECU

HINT:

After confirming DTC P0115/22 use the hand –held tester to confirm the water temp. from CURRENT DATA.

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Read freeze frame data using hand –held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air –fuel ratio lean or rich, etc. at the time of the malfunction.
- If DTC "P0105/31" (Vacuum Sensor Circuit Malfunction), "P0110/24" (Intake Air Temp. Circuit Malfunction), "P0115/22" (Water Temp. Circuit Malfunction), "P0120/41" (Throttle Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.

When using hand–held tester

1	**Connect the hand–held tester, and read value of water temperature.**

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.

CHECK:

Read temperature value on the hand–held tester.

OK:

Same as actual water temperature

HINT:

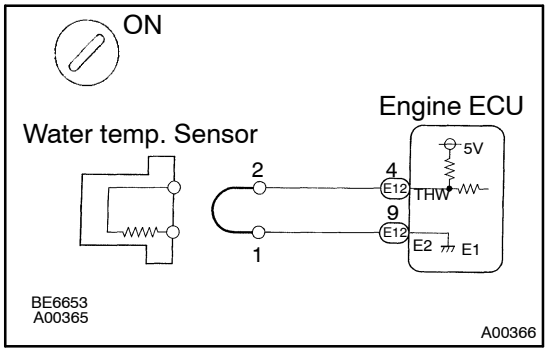
- If there is open circuit, hand–held tester indicates – 40°C (– 40°F).
- If there is short hand– held tester indicates 140°C (284°F) or more.

NG → **–40°C (–40°F) .... Go to step 2.**
140°C (284°F) or more .... Go to step 4.

OK

Check for intermittent problem
(See page DI–4).

2	**Check for open in harness or engine ECU.**



PREPARATION:

(a) Disconnect the water temp. sensor connector.

(b) Connect sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand –held tester.

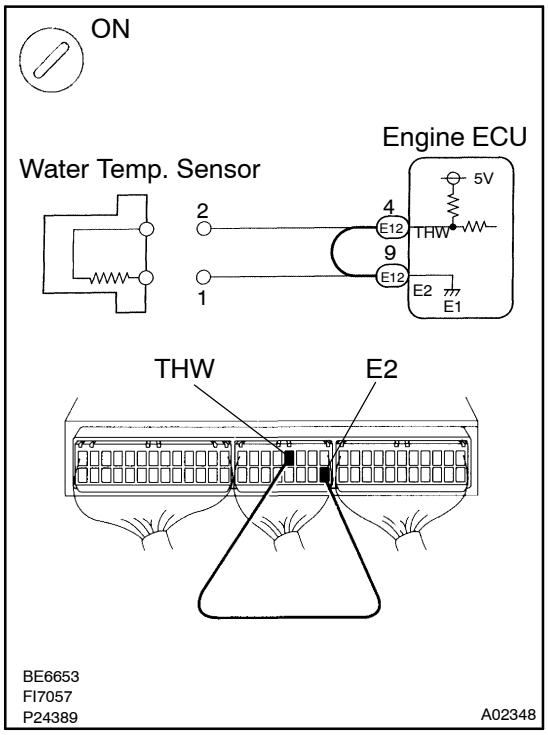
OK:

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

OK → **Confirm good connection at sensor. If OK, replace water temp. sensor.**

NG

3	Check for open in harness or engine ECU.



PREPARATION:

(a) Remove the glove compartment door.

(b) Connect between terminals THW and E2 of engine ECU connector.

HINT:

Water temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the engine ECU connector (See page IN–19).

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand –held tester.

OK:

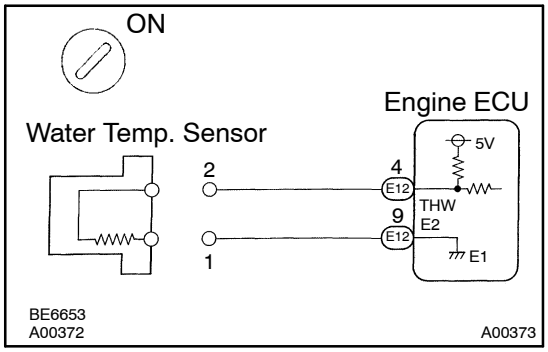
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THW, repair or replace harness.

NG

Confirm good connection at engine ECU.
If OK, replace engine ECU.

4	Check for short in harness or engine ECU.



PREPARATION:

(a) Disconnect the water temp. sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand –held tester.

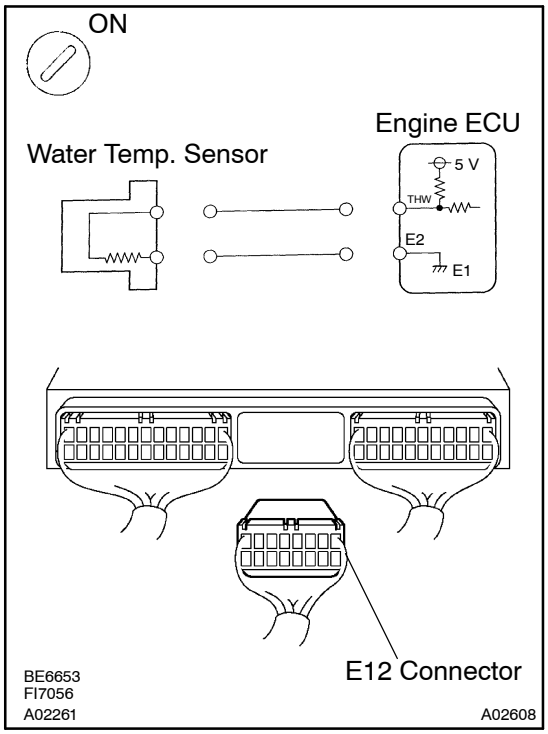
OK:

Temperature value: – 40°C (– 40°F)

OK	Replace water temp. sensor.

NG

5	Check for short in harness or engine ECU.



PREPARATION:

(a) Remove the glove compartment door.

(b) Disconnect the E12 connector of engine ECU.

HINT:

Water temp. sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand–held tester.

OK:

Temperature value: – 40°C (– 40°F)

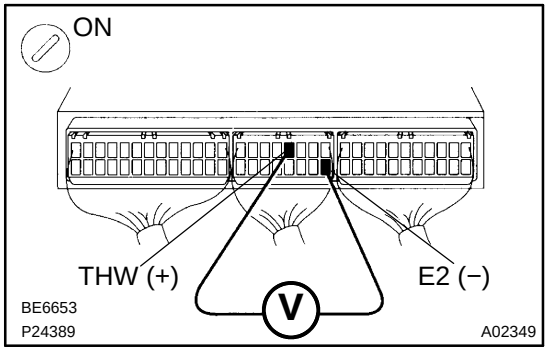
OK → **Repair or replace harness or connector.**

NG

Check and replace engine ECU (See page IN–19).

When not using hand−held tester

1	Check voltage between terminals THW and E2 of engine ECU connector.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals THW and E2 of engine ECU connecter.

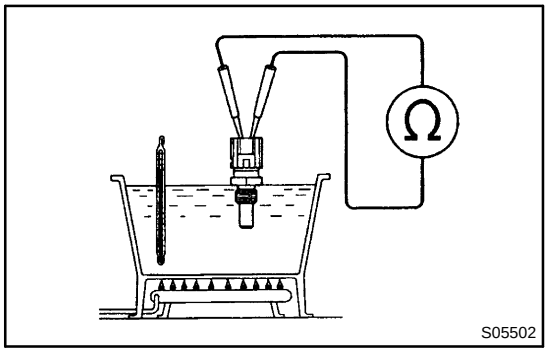
OK:

Water Temperature	Voltage
20˚C (68˚F) (Engine is cool)	0.5 − 3.4 V
80˚C (176˚F) (Engine is hot)	0.2 − 1.0 V

OK	Check for intermittent problems (See page DI−4).

NG

2	Check water temp. sensor.



PREPARATION:

Disconnect the water temp. sensor connecter.

CHECK:

Measure resistance between terminals.

OK:

Resistance is within Acceptable Zone on chart.

Water Temperature	Resistance
20˚C (68˚F) (Engine is cool)	2 − 3 kΩ
80˚C (176˚F) (Engine is hot)	0.2 − 0.4 kΩ

NG	Replace water temp. sensor.

OK

3	**Check for open and short in harness and connector between engine ECU and water temp. sensor (See page IN−19).**

NG → **Repair or replace harness or connector.**

OK

Check and replace engine ECU (See page IN−19).