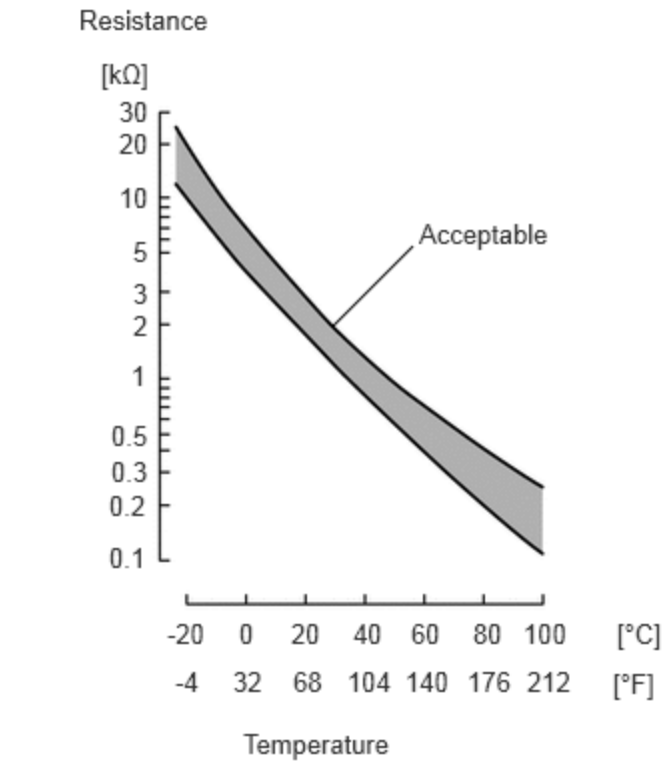
Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BLUU
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P011511; Engine Coolant Temperature Sensor 1 Circuit Short to Ground; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P011511**	**Engine Coolant Temperature Sensor 1 Circuit Short to Ground**

DESCRIPTION

Fig. 1:



A thermistor, whose resistance value varies according to the engine coolant temperature, is built into the engine coolant temperature sensor. The structure of the sensor and its connection to the ECM are the same as those of the intake air temperature sensor.

The thermistor with a resistance that varies according to the temperature of the engine coolant. When the engine coolant temperature is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (see Fig. 1).

The engine coolant temperature sensor is powered by a 5 V supply from the THW terminal of the ECM, via resistor R.

Resistor R and the engine coolant temperature sensor are connected in series. When the resistance value of the engine coolant temperature sensor changes, according to changes in the engine coolant temperature, the voltage at terminal THW also varies.

HINT:

When DTC P011511 is stored, the ECM enters fail-safe mode. During fail-safe mode, the engine coolant temperature is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P011511	Engine Coolant Temperature Sensor 1 Circuit Short to Ground	The engine coolant temperature sensor output voltage is less than 0.142 V for 0.5 seconds or more (1 trip detection logic).	• Short in engine coolant temperature sensor circuit • Engine coolant temperature sensor • ECM	Comes on	Engine	A	SAE Code: P0117

HINT:

When a DTC is output, check the Data List item "Coolant Temperature" using the GTS.

Click here INFO

DTC NO.	COOLANT TEMPERATURE	MALFUNCTION
P011511	Higher than 135°C (275°F)	Short to ground in THW circuit

If the Data List displays a normal value, the normal value may be due to a temporary recovery from the malfunction condition. Check for intermittent problems.

MONITOR DESCRIPTION

The engine coolant temperature sensor is used to monitor the engine coolant temperature. The engine coolant temperature sensor has a thermistor with a resistance that varies according to the temperature of the engine coolant. When the engine coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance decreases. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. If the engine coolant temperature sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the engine coolant temperature sensor circuit, illuminates the MIL and stores a DTC.

Example:

If the engine coolant temperature sensor output voltage is less than 0.142 V for 0.5 seconds or more, the ECM will illuminate the MIL and store this DTC.

MONITOR STRATEGY

Related DTCs	P0117: Engine coolant temperature sensor range check (low voltage)
Required Sensors/Components (Main)	Engine coolant temperature sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate

Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not stored	None
Both of the following conditions are met	-
Auxiliary battery voltage	8 V or higher
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Engine coolant temperature sensor voltage [Engine coolant temperature]	Less than 0.142 V [Higher than 135°C (275°F)]

CONFIRMATION DRIVING PATTERN

HINT:

- After repair has been completed, clear the DTC and then check that the vehicle has returned to normal by performing the following All Readiness check procedure.

  Click here INFO
- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.

  Click here INFO

1. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
2. Turn the ignition switch off and wait for at least 30 seconds.
3. Turn the ignition switch to ON [A].
4. Wait 0.5 seconds or more [B].
5. Enter the following menus: Powertrain / Engine / Trouble Codes [C].
6. Read the pending DTCs.

   HINT:

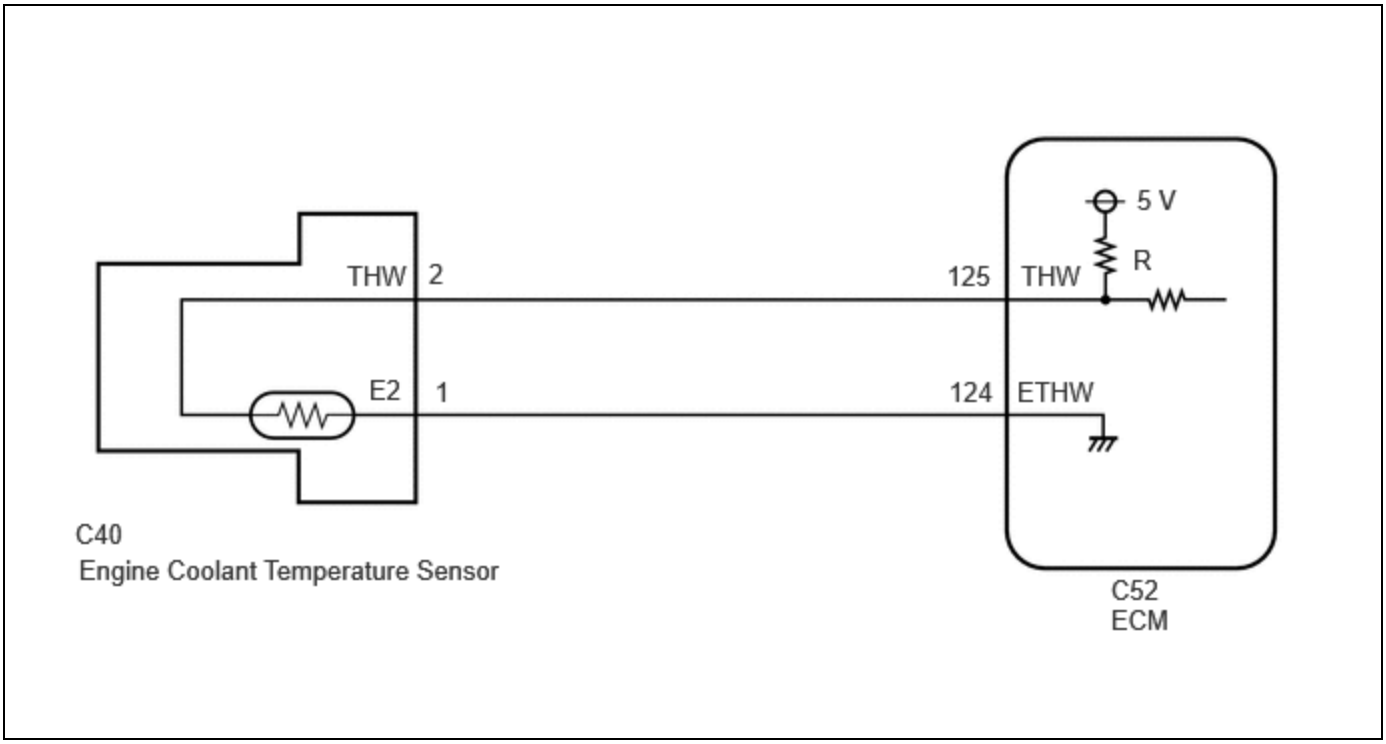
   - If a pending DTC is output, the system is malfunctioning.
   - If a pending DTC is not output, perform the following procedure.
7. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
8. Input the DTC: P011511.
9. Check the DTC judgment result.

   HINT:

   - If the judgment result is NORMAL, the system is normal.
   - If the judgment result is ABNORMAL, the system is malfunctioning.
   - [A] to [C]: Normal judgment procedure.

     The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.
   - When clearing the permanent DTCs, do not disconnect the cable from the auxiliary battery terminal or attempt to clear the DTCs during this procedure, as doing so will clear the universal trip and normal judgment histories.

WIRING DIAGRAM



CAUTION / NOTICE / HINT

NOTICE:

- Vehicle Control History may be stored in the hybrid vehicle control ECU if the engine is malfunctioning. Certain vehicle condition information is recorded when Vehicle Control History is stored. Reading the vehicle conditions recorded in both the freeze frame data and Vehicle Control History can be useful for troubleshooting.

  for HEV Model: Click here INFO

  for PHEV Model: Click here INFO

  (Select Powertrain in Health Check and then check the time stamp data.)
- If any "Engine Malfunction" Vehicle Control History item has been stored in the hybrid vehicle control ECU, make sure to clear it. However, as all Vehicle Control History items are cleared simultaneously, if any Vehicle Control History items other than "Engine Malfunction" are stored, make sure to perform any troubleshooting for them before clearing Vehicle Control History.

  for HEV Model: Click here INFO

  for PHEV Model: Click here INFO

HINT:

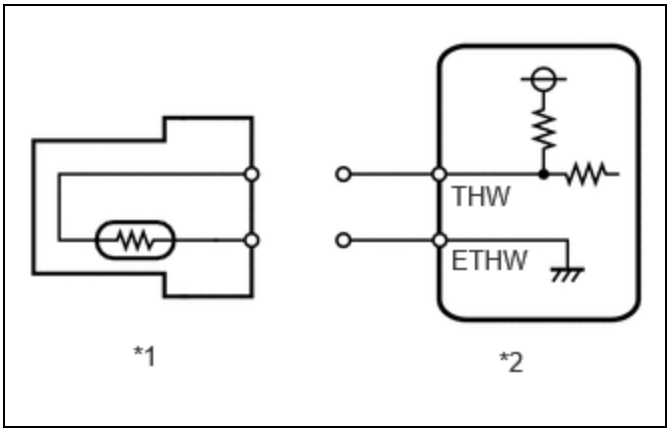
If DTC P011511 is stored, check that the engine does not overheat (DTC P011511 may be stored due to engine overheating).

PROCEDURE

1.	**READ VALUE USING GTS (CHECK FOR SHORT IN WIRE HARNESS)**

Pre-procedure1

(a) Disconnect the engine coolant temperature sensor connector.



*1	Engine Coolant Temperature Sensor
*2	ECM

Procedure1

(b) According to the display on the GTS, read the Data List.

Powertrain > Engine > Data List

TESTER DISPLAY
Coolant Temperature

RESULT	PROCEED TO
The value of Coolant Temperature is -40 °C	A
None of the above conditions are met	B

HINT:

-40°C=-40°F

Post-procedure1

(c) None

A ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

B ▼

2.	**CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)**

Pre-procedure1

(a) Disconnect the engine coolant temperature sensor connector.

(b) Disconnect the ECM connector.

Procedure1

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(C40,C52)
Click Connector(C40)
Click Connector(C52)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
C40-2 (THW) or C52-125 (THW) - Body ground and other terminals	Always	10 kΩ or higher	kΩ

Post-procedure1

(d) None

OK ▶ **REPLACE ECM**

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**