Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002909M
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: THEFT DETERRENT / KEYLESS ENTRY: SMART KEY SYSTEM (for Start Function): B227111; IG Circuit Short to Ground; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**B227111**	**IG Circuit Short to Ground**

DESCRIPTION

This DTC is stored when a malfunction in the IG drive circuit or IG hold circuit of the certification ECU (smart key ECU assembly) or a malfunction in the IG output circuit between the output terminal of the certification ECU (smart key ECU assembly) and IG relay is detected.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	DTC OUTPUT FROM	PRIORITY	NOTE
B227111	IG Circuit Short to Ground	When either of the following conditions is met (1-trip detection logic*1): • The IG circuit of the certification ECU (smart key ECU assembly) is malfunctioning.*2 • The IG hold circuit of the certification ECU (smart key ECU assembly) is malfunctioning.*3 • There is a malfunction in a circuit outside of the certification ECU (smart key ECU assembly) circuit	• Certification ECU (smart key ECU assembly) • Power distribution box assembly • Wire harness or connector	Power Source Control	A	**DTC Output Confirmation Operation:** Turn the ignition switch to ON.

*1: Only detected while a malfunction is present and the ignition switch is ON.
*2: The IG circuit and IG hold circuit activate the IG relay.
*3: After the IG circuit turns on, even if the certification ECU (smart key ECU assembly) malfunctions, the IG hold circuit will maintain the power source mode in ON.

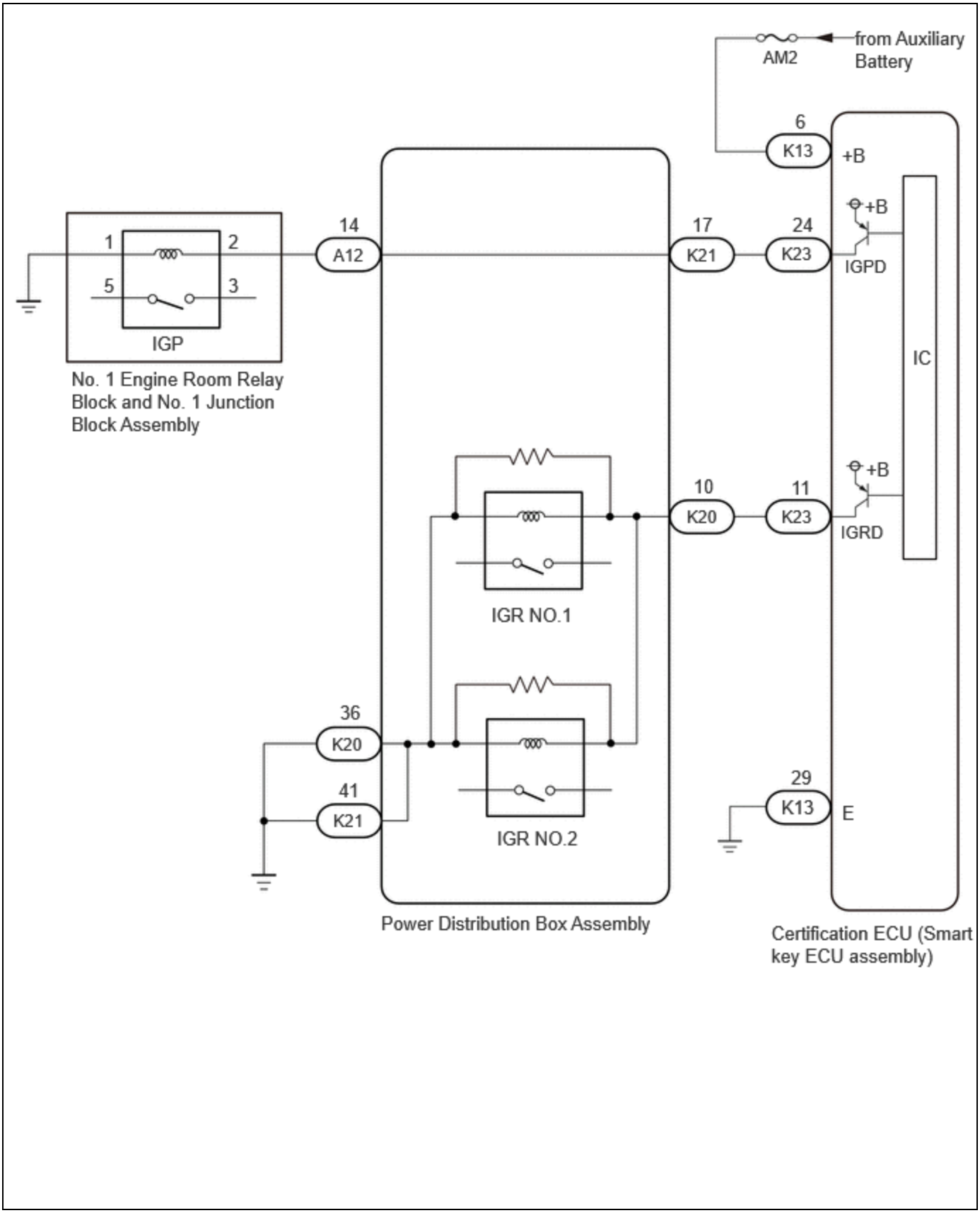
Vehicle Condition and Fail-safe Function when Malfunction Detected

VEHICLE CONDITION WHEN MALFUNCTION DETECTED	FAIL-SAFE FUNCTION WHEN MALFUNCTION DETECTED
The ignition switch cannot be turned to ON (the hybrid control system cannot be started).	The power source mode cannot be changed to ON.

Related Data List and Active Test Items

DTC NO.	DATA LIST AND ACTIVE TEST
B227111	**Power Source Control** • IGP Relay Circuit (Outside) Monitor • IGR Relay Circuit (Outside) Monitor

WIRING DIAGRAM



CAUTION / NOTICE / HINT

NOTICE:

- When using the GTS with the ignition switch off, perform lock and unlock operations using the door control switch of the multiplex network master switch assembly at intervals of 1.5 seconds or less until

communication between the GTS and the vehicle begins, and then select the vehicle model manually.

Then select Model Code "KEY REGIST" under manual mode and enter the following menus: Body Electrical / Smart Key(CAN). While using the GTS, periodically perform lock and unlock operations using the door control switch of the multiplex network master switch assembly at intervals of 1.5 seconds or less to maintain communication between the GTS and the vehicle.

- The smart key system (for Start Function) uses the LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting. Troubleshoot the smart key system (for Start Function) after confirming that the communication systems are functioning properly.

  Click here INFO
- Before replacing the certification ECU (smart key ECU assembly), refer to Registration.

  Click here INFO
- After repair, confirm that no DTCs are output by performing "DTC Output Confirmation Operation".

PROCEDURE

1.	**CHECK HARNESS AND CONNECTOR (POWER SOURCE)**

Pre-procedure1

(a) Disconnect the K13 certification ECU (smart key ECU assembly) connector.

Procedure1

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

EWD INFO

Click Location & Routing(K13)
Click Connector(K13)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
K13-6 (+B) - Body ground	Ignition switch off	11 to 14 V	V

Post-procedure1

(c) None

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR IN CIRCUIT CONNECTED TO POWER SOURCE**

OK ▼

2.	**CHECK HARNESS AND CONNECTOR (GROUND)**

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

Standard Resistance:

EWD INFO

Click Location & Routing(K13)
Click Connector(K13)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
K13-29 (E) - Body ground	Always	Below 1 Ω	Ω

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

OK ▼

3.	**CHECK HARNESS AND CONNECTOR (POWER DISTRIBUTION BOX ASSEMBLY - CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) AND BODY GROUND)**

Pre-procedure1

(a) Disconnect the K23 certification ECU (smart key ECU assembly) connector.

(b) Disconnect the K20 and K21 power distribution box assembly connectors.

Procedure1

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

Standard Resistance:

EWD INFO

Click Location & Routing(K21,K23,K20)
Click Connector(K21)
Click Connector(K23)
Click Connector(K20)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
K21-17 - K23-24 (IGPD)	Always	Below 1 Ω	Ω
K20-10 - K23-11 (IGRD)	Always	Below 1 Ω	Ω
K21-17 or K23-24 (IGPD) - Other terminals and body ground	Always	10 kΩ or higher	kΩ
K20-10 or K23-11 (IGRD) - Other terminals and body ground	Always	10 kΩ or higher	kΩ

Post-procedure1

(d) None

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

OK

4.	**CHECK POWER DISTRIBUTION BOX ASSEMBLY**

Pre-procedure1

(a) Disconnect the A12 power distribution box assembly connector.

Procedure1

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

Standard Resistance:

EWD INFO

Click Location & Routing(K21,A12)
Click Connector(K21)
Click Connector(A12)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
K21-17 - A12-14	Always	Below 1 Ω	Ω
K21-17 or A12-14 - Other terminals	Always	10 kΩ or higher	kΩ

Post-procedure1

(c) None

NG **REPLACE POWER DISTRIBUTION BOX ASSEMBLY**
INFO

OK

5.	**CHECK HARNESS AND CONNECTOR (POWER DISTRIBUTION BOX ASSEMBLY - IGP RELAY)**

Pre-procedure1

(a) Remove the IGP relay from the No. 1 engine room relay block and No. 1 junction block assembly.

Procedure1

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

Standard Resistance:

EWD INFO

Click Location & Routing(A12)
Click Connector(A12)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
A12-14 - IGP relay terminal 2	Always	Below 1 Ω	Ω
A12-14 or - Other terminals and body ground	Always	10 kΩ or higher	kΩ

Post-procedure1

(c) None

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

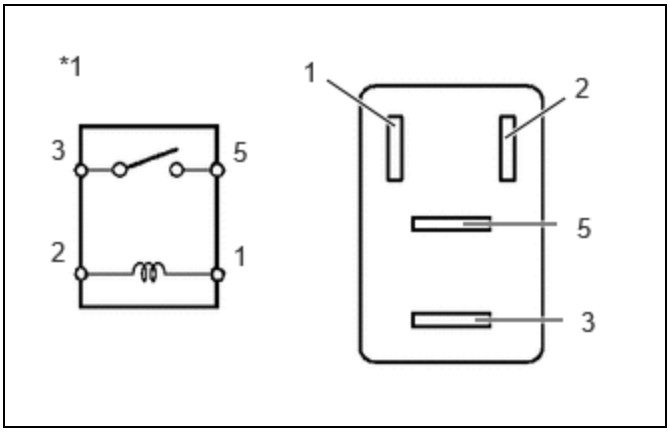
OK ▼

6.	**INSPECT IGP RELAY**

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

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
3 - 5	Auxiliary battery voltage applied between terminals 1 and 2	Below 1 Ω	Ω
3 - 5	Auxiliary battery voltage not applied between terminals 1 and 2	10 kΩ or higher	kΩ



*1	IGP Relay

Result:

PROCEED TO
OK
NG

NG ▶ **REPLACE IGP RELAY**

OK ▼

7.	CHECK POWER DISTRIBUTION BOX ASSEMBLY

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

Standard Resistance:

EWD INFO

Click Location & Routing(K20,K21)
Click Connector(K20)
Click Connector(K21)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
K20-10 - K20-36	Always	20 Ω or higher	Ω

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
K20-10 - K21-41	Always	20 Ω or higher	Ω
K20-10 or K20-36 - Other terminals	Always	10 kΩ or higher	kΩ
K20-10 or K21-41 - Other terminals	Always	10 kΩ or higher	kΩ

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)** INFO

NG ▶ **REPLACE POWER DISTRIBUTION BOX ASSEMBLY** INFO