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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HYBRID / BATTERY CONTROL: PLUG-IN CHARGE CONTROL SYSTEM (for PHEV Model): P0D4C1C; Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Voltage Out of Range; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P0D4C1C**	**Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Voltage Out of Range**

DTC SUMMARY

MALFUNCTION DESCRIPTION

The charging voltage (VCHG) sensor built into the electric vehicle charger assembly monitors the output voltage of the secondary side high voltage circuit of the electric vehicle charger assembly, and the electric vehicle charger assembly transmits the charging voltage (VCHG) to the plugin charge control ECU assembly.

The plugin charge control ECU compares the charging voltage (VCHG) with the HV battery voltage (VB) from the battery ECU, and stores a DTC when there is a difference between them.

The cause of this malfunction may be one of the following:

Electric vehicle charger assembly internal VCHG sensor circuit malfunction

- Charging voltage (VCHG) sensor malfunction

Battery ECU assembly internal VB sensor circuit malfunction

- Battery voltage (VB) sensor malfunction

Battery Local Bus communication malfunction

- Battery ECU assembly - Plugin charge control ECU assembly

Charging Local Bus communication malfunction

- Electric vehicle charger assembly - Plugin charge control ECU assembly

DESCRIPTION

The electric vehicle charger assembly sends charging voltage sensor signals to the plugin charge control ECU assembly via CAN communication.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P0D4C1C	Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Voltage Out of Range	The difference between the charging voltage (VCHG) and the HV battery voltage (VB) is large during plug-in charging.	• Battery ECU assembly • Electric vehicle charger assembly	Comes on	Master Warning: Comes on	Plug-in Control	B	SAE Code: P0D4D

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
		(1 trip detection logic)						

MONITOR DESCRIPTION

The plug-in charge control ECU assembly monitors the voltage during plug-in charging, and when there is a difference in the comparison of the charging voltage (VCHG) and the HV battery voltage (VB), it judges that there is a malfunction and illuminates the MIL and stores a DTC.

MONITOR STRATEGY

Related DTCs	P0D4D: Battery Charger Hybrid/EV Battery Output Voltage Sensor Circuit Range/Performance)
Required sensors/components	Battery ECU assembly Electric vehicle charger assembly
Frequency of operation	-
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not stored	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Plug-in charge control ECU	DTC P0D4C1C is not detected

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 2 minutes or more.

3. Connect the electric vehicle charger cable assembly, plug-in charge the vehicle for 30 seconds or more. [*1]
4. Disconnect the electric vehicle charger cable assembly and wait for 10 seconds or more. [*2]

HINT:

[*1] to [*2]: Normal judgment procedure.

The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.

5. Enter the following menus: Powertrain / Plug-in Control / Utility / All Readiness.
6. Check the DTC judgment result.

HINT:

- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows INCOMPLETE or N/A, perform the normal judgment procedure again.

PROCEDURE

1.	**CHECK DTC OUTPUT (HV BATTERY, PLUG-IN CONTROL, HYBRID CONTROL)**

Pre-procedure1

(a) Enter the following menus:

Powertrain > Hybrid Control > Trouble Codes
Powertrain > HV Battery > Trouble Codes
Powertrain > Plug-in Control > Trouble Codes

Procedure1

(b) Check for DTCs.

RESULT	PROCEED TO
P0D4C1C only is output, or DTCs except the ones in the table below are also output.	A
DTCs of HV Battery System in the tables below are output.	B
DTCs of Plug-in Charge Control System in the tables below are output.	C
DTCs of Hybrid Control System in the tables below are output.	D

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
Microcomputer malfunction	Hybrid Battery System	P060A47	Hybrid/EV Battery Energy Control Module Monitoring Processor Watchdog / Safety MCU Failure
		P060B16	Hybrid/EV Battery Energy Control Module A/D Processing Circuit Voltage Below Threshold
		P060B49	Hybrid/EV Battery Energy Control Module A/D Processing Internal Electronic Failure

MALFUNCTION CONTENT	SYSTEM	RELEVANT DTC	
		P0E2D00	Hybrid/EV Battery Energy Control Module Hybrid/EV Battery Monitor Performance
	Plug-in Charge Control System	P060B49	Plug-in Control Module A/D Processing Internal Electronic Failure
		P06881F	DC Quick Charging Control Module Power Relay Sense Circuit Intermittent
		P1C1F49	Hybrid/EV Battery Charger Control Module A/D Processing Internal Electronic Failure
Communication system malfunction	Hybrid Battery System	P060687	Hybrid/EV Battery Energy Control Module Processor to Monitoring Processor Missing Message
		P060A87	Hybrid/EV Battery Energy Control Module Processor from Monitoring Processor Missing Message
	Plug-in Charge Control System	P0E5E87	Plug-in Control Module Processor from Hybrid/EV Battery Charger Control Module Processor Missing Message
		U01BB87	Lost Communication with Battery Charger Control Module "B" Missing Message
		U117B87	Lost Communication with Hybrid/EV Battery Energy Control Module "A" (ch2) Missing Message
Sensor and actuator circuit malfunction	Hybrid Battery System	P1A001C	Hybrid Battery Stack 2 Cell Voltage Detection Voltage Out of Range
		P301A1C	Hybrid Battery Stack 1 Cell Voltage Detection Voltage Out of Range
	Hybrid Control System	P1C2D62	Hybrid/EV Battery "A" Voltage Sensor/Boosting Converter Voltage Sensor "A" Signal Compare Failure
	Plug-in Charge Control System	P0D4C12	Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Circuit Short to Auxiliary Battery
		P0D4C14	Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Sensor Circuit Short to Ground or Open
		P1C2617	Hybrid/EV Battery Charger Hybrid/EV Battery Input Voltage Circuit Voltage Above Threshold

HINT:

- P0D4C1C may be output as a result of the malfunction indicated by the DTCs above.

  a. The chart above is listed in inspection order of priority.
  b. Check DTCs that are output at the same time by following the listed order. (The main cause of the malfunction can be determined without performing unnecessary inspections.)

Post-procedure1

(c) None

B ▶ **GO TO DTC CHART (HYBRID BATTERY SYSTEM)**

C ▶ **GO TO DTC CHART (PLUG-IN CHARGE CONTROL SYSTEM)**

D GO TO DTC CHART (HYBRID CONTROL SYSTEM)

A

2.	**CLEAR DTC**

Pre-procedure1

(a) Using the GTS, read the Freeze Frame Data of DTC P0D4C1C and note them down.

Powertrain > Plug-in Control > DTC(P0D4C1C) > Freeze Frame Data

TESTER DISPLAY
HV/EV Battery Total Voltage
Charging Voltage for Hybrid/EV Battery

Powertrain > HV Battery > DTC(P0D4C1C) > Freeze Frame Data

TESTER DISPLAY
VL-Voltage before Boosting

Procedure1

(b) Clear the DTCs and freeze frame data.

Powertrain > Plug-in Control > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off and wait for 2 minutes or more.

NEXT

3.	**CHECK DTC OUTPUT (P0D4C1C)**

(a) Operate the Air Conditioning System for 1 minute during plug-in AC charging.

(b) Check for DTCs.

Powertrain > Plug-in Control > Trouble Codes

RESULT	PROCEED TO
P0D4C1C is output	A
P0D4C1C is not output	B

B ▶ **CHECK FOR INTERMITTENT PROBLEMS**

A ▼

4.	**CHECK FREEZE FRAME DATA (P0D4C1C)**

Pre-procedure1

(a) Using the GTS, read the Freeze Frame Data of DTC P0D4C1C.

Powertrain > Plug-in Control > DTC(P0D4C1C) > Freeze Frame Data

TESTER DISPLAY
HV/EV Battery Total Voltage
Charging Voltage for Hybrid/EV Battery

Powertrain > HV Battery > DTC(P0D4C1C) > Freeze Frame Data

TESTER DISPLAY
VL-Voltage before Boosting

Procedure1

(b) Check the status of both items.

OK:

MEASUREMENT ITEM	CONDITION	SPECIFIED CONDITION
Difference between "HV/EV Battery Total Voltage" and "Charging Voltage for Hybrid/EV Battery"	SMR connecting	Less than 33 V
Difference between "HV/EV Battery Total Voltage" and "VL-Voltage before Boosting"	SMR connecting	Less than 50 V

HINT:

Even if all the sensors are normal, not all values are equal.

RESULT	PROCEED TO
Both of Specified Condition are not met	A
Other than above	B

Post-procedure1

(c) None

A ▶ **REPLACE BATTERY ECU ASSEMBLY**

B ▶ **REPLACE ELECTRIC VEHICLE CHARGER ASSEMBLY**