



Ford Motor Company

Subsystem Part Specific Specification
Engineering Specification



Research & Vehicle Technology
“Infotainment Systems Product Development”

Feature – Power Charge Port Door

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.3

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Version Date: Dec 27, 2022

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Revision History

| Date | Version | Notes | |
|------------|---------|-----------|--|
| 11/24/2022 | V1.0 | Qiyang Li | Initial releasing |
| 11/30/2022 | V1.1 | Qiyang Li | Add enable/disable PCPD configuration. Delete Speed limit configuration. Replace speed limit condition by gear position. |
| 12/07/2022 | V1.2 | Qiyang Li | Add IVI toast when soft button precondition is not met. Modify Power Charge Port Door Client Signal Missing Handling. |
| 12/27/2022 | V1.3 | | <ol style="list-style-type: none"> 1.7.1 Initializing / Faulty is not used 2.4 unopen/unclose deleted 2.5 the receiving signal has missed for 5 frames. 3.1.3 send for 3 frames(200ms) |
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Commented [LQ(1)]: 状态信号和使能条件信号。



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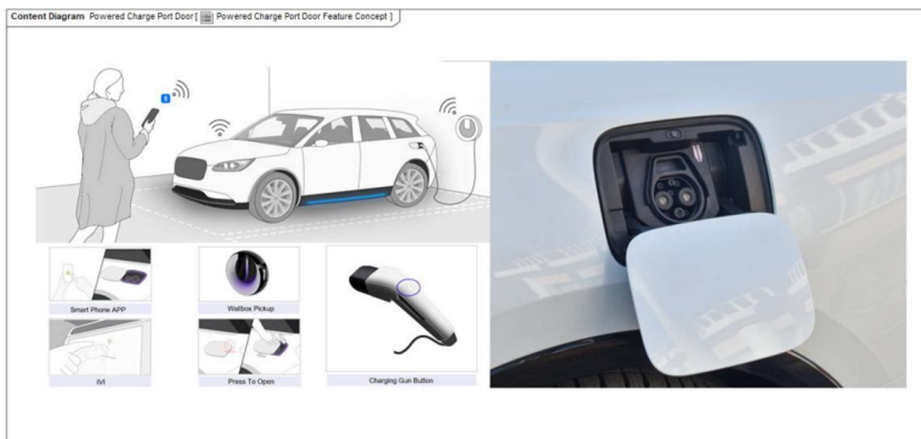
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1 Architectural Design

1.1 Overview

The feature is developed in line with the user experience initiative of "effortless charging - easy on & off", allowing a simplified charging workflow where the charge port door is opened/closed automatically when the user needs to charge or is done with charging, skipping the effort needed to manually open/close, lock/unlock the charge port door.



1.2 PCPD-CLD-REQ-xxxx/A-Power Charge Port Door Client

PCPD Client is responsible for sending open/close request to server.

1.3 PCPD-CLD-REQ-xxxx/A- Power Charge Port Door Server

PCPD Server is responsible for transfer request signals and open/close door.

1.4 Physical Mapping of Classes

The table below shows how the logical classes that make up the PCPD feature may be mapped into physical modules. This mapping example is specific to PCPD architecture and does not necessarily carryover to other carlines or vehicle architectures.

| Logical Class | Physical Module (ECU) |
|-------------------------------|-----------------------|
| Power Charge Port Door Client | APIM |
| Power Charge Port Door Server | BCCM/PCPD |

1.5 Logical Signal Mapping

Each logical name used in this document is mapped to its corresponding CAN signal or LIN signal. Please refer to the following mapping:



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1.6 PCPD-IIR-REQ-xxxx/A-Power Charge Port Door Client _Tx

1.6.1 MD-REQ-xxxx/A- DrPwChrgPort_D_RqMnu

Message Type: Request

CAN signal designed to transmit powered charge port door open/close request from the HMI.

| Name | Literals | Value | Description |
|----------------------|-----------|-------|-------------|
| DrPwChrgPort_D_RqMnu | - | - | |
| | NoRequest | 0x0 | |
| | Close | 0x1 | |
| | Open | 0x2 | |
| | NotUsed_1 | 0x3 | |

1.7 PCPD-IIR-REQ-xxxx/A-Power Charge Port Door Client _Rx

1.7.1 MD-REQ-xxxx/A- DrPwChrgPort_D_Stat

Message Type: Status

CAN signal broad casted for the powered charge port door status display on the IVI.

| Name | Literals | Value | Description |
|---------------------|--------------|-------|-------------|
| DrPwChrgPort_D_Stat | - | - | |
| | Initializing | 0x0 | Not used |
| | Closed | 0x1 | |
| | Closing | 0x2 | |
| | Opened | 0x3 | |
| | Opening | 0x4 | |
| | Stalled | 0x5 | |
| | Faulty | 0x6 | Not used |

1.7.2 MD-REQ-xxxx/A- DrPwChrgPortPos_Pc_Act

Message Type: Status

CAN signal designed to provide the real-time position of the powered charge port door.

| Name | Literals | Value | Description |
|------------------------|--|-------------------|-------------|
| DrPwChrgPortPos_Pc_Act | Resolution = 1 Unit = percent Offset = 0 | 0-127 (0-100%) | |

**1.7.3 MD-REQ-xxxx/A- DrPwChrgPort_No_Falt**

Message Type: Status

CAN signal to report powered charge port door fault status.

| Name | Literals | Value | Description |
|----------------------|--|--|-------------|
| DrPwChrgPort_No_Falt | - | - | |
| | UnitlessValue12bit_ET Resolution = 1 Unit = unitless Offset = 0 | Minimum value = 0 maximum value = 4095 0 to 4095 | |

1.7.4 MD-REQ-xxxx/A- Delay_Accy

Message Type: Status

| Name | Literals | Value | Description |
|------------|----------|-------|-------------|
| Delay_Accy | - | - | |
| | Off | 0 | |
| | On | 1 | |

1.7.5 MD-REQ-xxxx/A- PlgActv_D_ActlChrg

Message Type: Status

CAN signal published by the HPCM indicating that the charge port door ajar warning is OK to be displayed to the customer.

| Name | Literals | Value | Description |
|--------------------|--------------------------|-------|-------------|
| PlgActv_D_ActlChrg | - | - | |
| | Off_Plug__Disconnected__ | 0x0 | |
| | On_Plug__Connected__ | 0x1 | |
| | NoDataExists | 0x2 | |
| | Faulty | 0x3 | |

1.7.6 MD-REQ-xxxx/A- TrnRng_D_Rq

| Name | Literals | Value | Description |
|-------------|----------|-------|-------------|
| TrnRng_D_Rq | - | - | |
| | Park | 0x0 | |
| | Reverse | 0x1 | |
| | Neutral | 0x2 | |



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|--|----------------------------|-----|--|
| | Drive | 0x3 | |
| | Sport_DriveSport_Mposition | 0x4 | |
| | Low | 0x5 | |
| | Range1_M1_L1 | 0x6 | |
| | Range2_M2_L2 | 0x7 | |
| | Range3_M3_L3 | 0x8 | |
| | Range4 | 0x9 | |
| | Range5 | 0xA | |
| | Range6 | 0xB | |
| | NotUsed_1 | 0xC | |
| | NotUsed_2 | 0xD | |
| | Unknown_Position | 0xE | |
| | Fault | 0xF | |



2 General Requirements

2.1 PCPD-GR-REQ-xxxx/A-Power Charge Port Door Client Power Mode

PCPD setting menu and soft button on 3D car mode shall be available on the HMI only when Ignition_Status='Run/Start' or Ignition_Status=OFF&& Delay_Acc=on.

2.2 PCPD-GR-REQ-xxxx/A-Power Charge Port Door Client Configuration

Power Charge Port Door is a configurable function on infotainment system as below, if it is configured to disable, all the HMI interface and function will be not visible for the user.

| Config Block | Byte | Start Bit | Length | Definition | Default | Operation |
|--------------|------|-----------|--------|------------------------|---------|-----------------------------|
| DE01 | 6 | 6 | 1 | Power Charge Port Door | 0 | 0x0: Enable 0x1: Disable |

2.3 PCPD-GR-REQ-xxxx/A- Power Charge Port Door Client Storage

IVI will not memorize vehicle setting and soft button (3D car mode) status and it will update setting status immediately after receiving the door status signal from PCPD server.

Commented [LQ(2)]: 整车上电启动, 多长时间能从 PCPD 收到返回的状态信号。

2.4 PCPD-GR-REQ-xxxx/A- Power Charge Port Door Vehicle Setting/Soft Button Enable PeCondition

Power Charge Port Door Vehicle Setting/Soft Button will be disabled (grey out) from current status directly (~~unopen/unclose~~, opening/closing, opened/closed, Stalled) if any below precondition is not met:

1. Ignition_Status='Run/Start' or Ignition_Status=OFF&& Delay_Acc=on.
2. Gear position is on P.
3. PlgActv_D_ActlChgr= Off_Plug__Disconnected.

IVI will toast setting disable condition based on below priority (pls refer UE):

High: Ignition_Status='Run/Start' or Ignition_Status=OFF&& Delay_Acc=on.
Middle: Gear position is on P.
Low: PlgActv_D_ActlChgr= Off_Plug__Disconnected.

2.5 PCPD-GR-REQ-xxxx/A- Power Charge Port Door Client Signal Missing Handling

1. Vehicle setting and soft button (3D car mode) should grey out if the receiving signal has missed for 5 frames.
2. All the toast and warning will disappear if the receiving signal is missing.

Commented [LQ(3)]: 状态信号和使能条件信号。

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3 Functional Definition

3.1 PCPD-FUN-REQ-XXXX/A-Open/Close Power Charge Port Door

3.1.1 Use Cases

3.1.1.1 PCPD-UC-REQ-XXXX/A-User open/close PCPD by vehicle setting menu

| | |
|-----------------------------|---|
| Actors | User |
| Pre-conditions | Infotainment System is on. All the Vehicle setting (include soft button on 3D car mode) enabled preconditions are met. |
| Scenario Description | Users open/close PCPD via setting menu/soft button (press time need to reach 1s). |
| Post-conditions | PCPD will be opened/close |
| Interfaces | CAN, HMI, LIN |

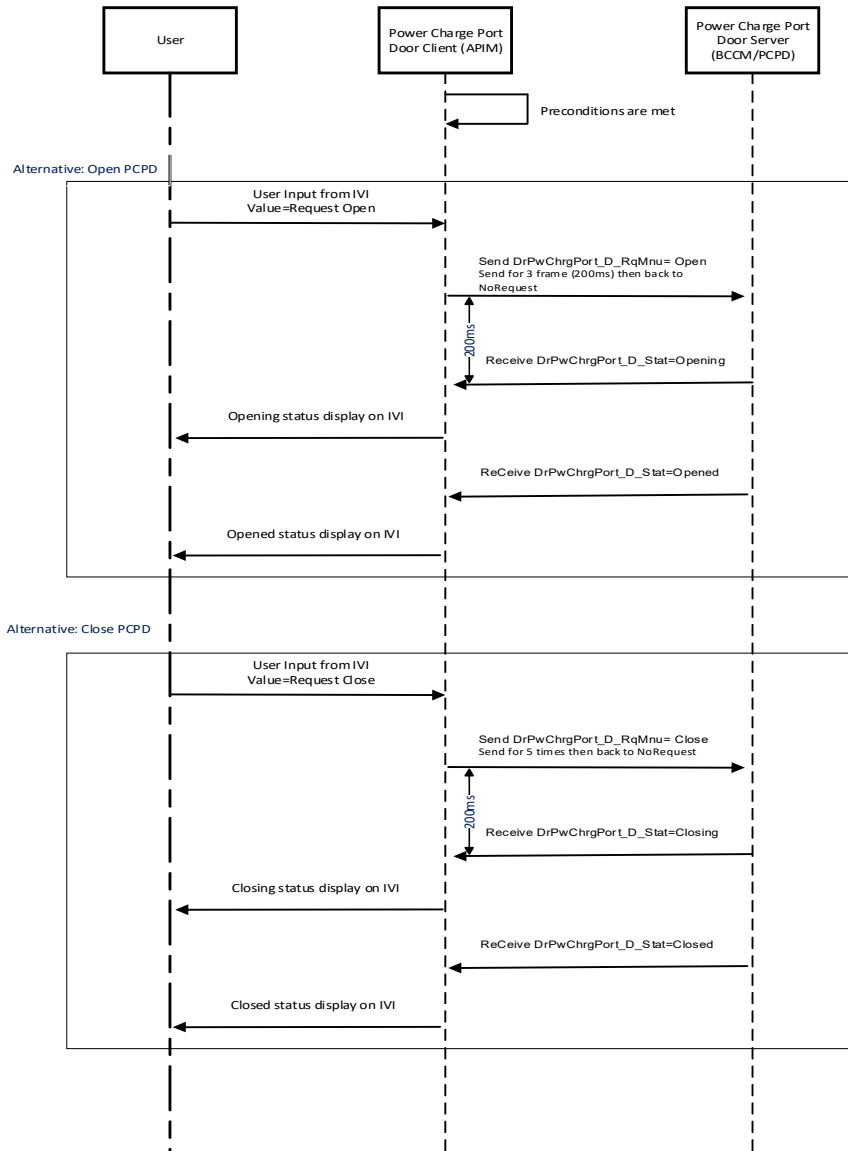
3.1.2 Requirements

3.1.2.1 PCPD-SR-REQ-XXXX/A- T_PCPD Server Rsp

| Name | Description | Units | Range | Resolution | Default |
|-------------------|---|-------|--------|------------|---------|
| T_PCPD Server_Rsp | Maximum time the PCPD Server shall take to respond to the PCPD Setting Client. Maximum time defined as the default value | msec | 0-1000 | 10 | 200 |

3.1.3 Sequence Diagrams

3.1.3.1 PCPD-SD-REQ-XXXX/A- Open/Close Power Charge Port Door



Open/Close Power Charge Port Door



3.2 PCPD-FUN-REQ-XXXX/A-Power Charge Port Door Stalled

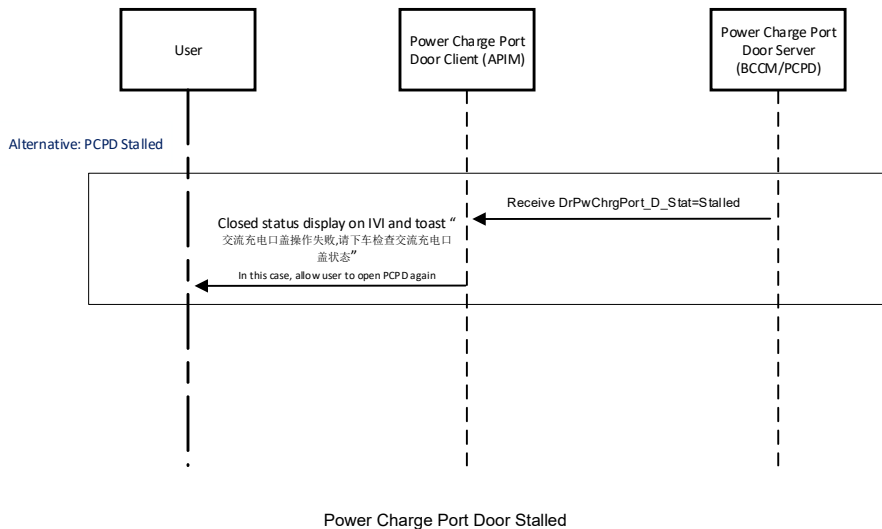
3.2.1 Use Cases

3.2.1.1 PCPD-UC-REQ-376836/A- Power Charge Port Door Stalled

| | |
|----------------------|---|
| Actors | User |
| Pre-conditions | Infotainment System is on. All the Vehicle setting (include soft button on 3D car mode) enabled preconditions are met. |
| Scenario Description | Users open/close PCPD via setting menu/soft button (press time need to reach 1s). |
| Post-conditions | PCPD is stalled in the progress of opening and closing |
| Interfaces | CAN, HMI, LIN |

3.2.2 Sequence Diagrams

3.2.2.1.1 PCPD-SD-REQ-XXXX/A- Power Charge Port Door Stalled





3.3 PCPD-FUN-REQ-XXXX/A-Power Charge Port Door Failure mode

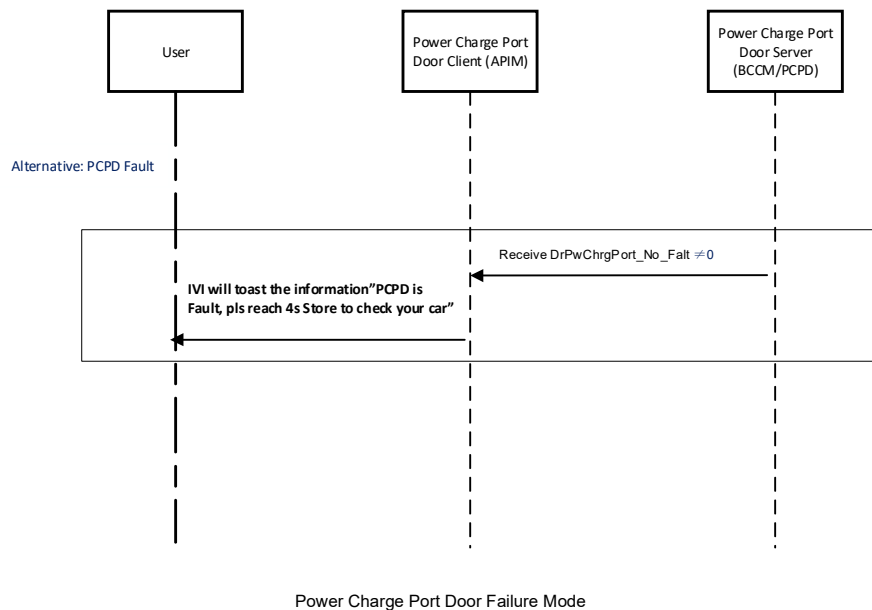
3.3.1 Use Cases

3.3.1.1 PCPD-UC-REQ-XXXX/A- Power Charge Port Door Fault

| | |
|----------------------|-------------------------------------|
| Actors | User |
| Pre-conditions | Infotainment System is on. |
| Scenario Description | PCPD Server is on Failure mode. |
| Post-conditions | APIM will be toast to infor driver. |
| Interfaces | CAN, HMI, LIN |

3.3.2 Sequence Diagrams

3.3.2.1.1 PCPD-SD-REQ-XXXX/A- Power Charge Port Door Fault





4 Appendix: Reference Documents

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