

[Insert at end of 104.1]

PoDL PSEs and PDs fall into one of two System configurations, Closed Systems and Open Systems. These two System configurations are not interoperable by definition in order to allow Closed Systems to dispense with classification routines. A Closed System PoDL PSE will not power an Open System PoDL PD. Likewise, an Open System PoDL PSE will not power a Closed System PoDL PD. This ensures PDs will not be damaged when inserted into an incompatible System configuration.

Closed Systems are intended for use in engineered applications with PSE and PD class symmetry defined at the system level. For example, the system designer will assure that a 48V Type A, Class 9 PSE will be connected with only 48V Type A, Class 9 or Class 8 PDs as the application may require.

Closed System PSEs and PDs perform detection but do not perform classification.

Closed Systems benefit from optimized detection and lower power up latencies, allowing system vendors to minimize startup delays.

Open Systems are intended for use in plug and play systems with Type and Class discoverable during classification. In such systems, the PSE interrogates PD Type and Class using the Serial Communication Classification Protocols (SCCP). A PSE can use the classification result to determine if the PSE can power the PD based on Type and Class.

Open System PSEs and PDs do not perform detection and do perform classification.

PSE and PD System	Detection Allowed?	PD Detection Signature	Classification Allowed?	Classification Required?
Closed System	Yes	Valid	No	No
Open System	No	Invalid	Yes	Yes

104.4.3.1 Overview

Prior to application of operating voltage at the PI, a **Closed System** PSE performs detection in order to verify that a valid PD is present. An **Open System** PSE communicates with the PD **using SCCP** prior to the application of operating voltage ~~using SCCP~~. A PSE shall perform either detection or classification prior to the application of operating voltage.

After operating voltage has been applied, the PSE monitors the PI for a valid Maintain Full Voltage Signature (MFVS) from the PD. In the event a valid MFVS is not present, the PSE reduces the voltage at the PI to the range of V_{Sleep} . If an external wakeup request is received or if a valid wakeup current signature is detected at the PI, the PSE ~~shall confirm that a valid PD is present by reperforming either~~ detection or classification as appropriate before re-applying operating voltage to the PI.

104.4.4 PSE detection of a PD

Closed System PSEs shall perform detection. Closed System PDs support detection.

Open System PSEs shall not perform detection. Open System PDs do not support detection.

The PSE **performing detection** shall probe the PI as described in 104.4.4.1. The PSE is connected to a PD through the PIs and a link segment.

104.4.5 PSE classification of a PD

The ability for the PSE to query the PD in order to determine the PD type and power class requirements of that PD is called classification. Classification ~~is optional, and~~ is performed using SCCP. ~~Implementation of SCCP by a PSE is also optional.~~

Closed System PSEs shall not perform classification. Closed System PDs do not support classification.

Open System PSEs shall perform classification. Open System PDs support classification.

A PSE with ~~SCCP classification~~ enabled shall complete classification ~~after detection and~~ prior to application of full operating voltage at the PI in a time less than T_{Class} as specified in Table 104-3. If classification is not completed before the T_{Class} timer expires, a new ~~detection classification~~ cycle shall be completed before any subsequent application of full operating voltage.

104.4.6.4 Inrush Time

The specification for T_{inrush} in Table 104–5 applies to the PSE power up time allowed for a PD after completion of ~~either detection or classification, as appropriate.~~ If full operating voltage is applied within $T_{inrush\ min}$, the PSE shall enter the POWER_ON state. If full operating voltage is not applied within $T_{inrush\ max}$, a new detection ~~or classification cycle, as appropriate,~~ shall be initiated after a delay of $T_{restart}$ before any subsequent application of full operating voltage. If full operating voltage is applied within the range of T_{inrush} , the PSE may enter the POWER_ON state or begin a new detection ~~or classification cycle,~~ ~~as appropriate,~~ after a delay of $T_{restart}$.

104.5 Powered Device (PD)

A PD is the portion of a device that is either drawing power or requesting power by participating in ~~either~~ the PD detection ~~or the PD classification~~ algorithm. A device that is capable of becoming a PD may or may not have the ability to draw power from an alternate power source and, if doing so, may or may not require power from the PI.

104.5.3.1 Overview

~~Closed System PDs implement detection with the following requirements.~~ A falling-edge of the Closed System PD input voltage through V_{sig_enable} enables a constant voltage signature, as defined in 104.5.4. When the input voltage rises through ~~the~~ $V_{sig_disable}$ the Closed System PD disables its constant-voltage signature. A Closed System PD requests detection and wakeup while the constant voltage signature is enabled by presenting a valid wakeup current signature.

~~SCCP may also be used for communication with the PD by the PSE when the constant-voltage signature is enabled.~~ Open System PDs use SCCP for communication with the PSE and do not provide the constant-voltage detection signature. An Open System PD requests classification and wakeup by presenting a valid wakeup current signature.

104.5.4 PD signature

Closed System PDs shall provide a valid detection signature. Closed System PSEs probe for a valid detection signature.

Open System PDs shall provide an invalid detection signature. Open System PSEs do not probe for a detection signature.

A Closed System PD shall present a valid detection signature when V_{PD} is less than V_{sig_enable} . When V_{PD} is greater than $V_{sig_disable}$ a Closed System PD shall remove the current draw of the detection signature.

104.5.5 PD classification and mutual identification between the PSE and PD

An **Open System** PD is classified by the PSE based on SCCP information provided by the PD.

Closed System PDs shall not support classification. Closed System PSEs do not perform classification.

Open System PDs shall support classification. Open System PSEs perform classification.

104.5.6.2 Input current

During operation in the DISCONNECT and PD_SLEEP states, the PD shall not draw current in excess of $I_{\text{sleep_PD}}$ as specified in Table 104–9. A PD that requires ~~detection and~~ power-up shall draw current in the range of $I_{\text{Wakeup_PD}}$ for at least $T_{\text{Wakeup_PD}}$ when $V_{\text{sleep_PD min}} < V_{\text{PD}} < V_{\text{sleep max}}$ as specified in Table 104–5 and Table 104–9, respectively.

104.7 Serial communication classification protocol (SCCP)

~~Implementation of SCCP by the PSE and PD is optional.~~ Open System PSEs and PDs are required to perform SCCP. Closed System PSEs and PDs are not allowed to perform SCCP. The PSE acts as a master during the SCCP exchange, controlling the PD that acts as the slave device.