Backfeed v263

Info (not part of baseline)

Changelog:
v263 Updated detection requirement
v262 Updates per discussion Tuesday morning
v261 Excluded 0 to 10.1V range from the PSE I_{rev} requirement, various rewordings to add clarity.
v260 Removed the 3-pair backfeed requirement altogether, and replaced it by a change to the detection requirement, that now includes 2-pair, 3-pair, and 3-pair + pullup.
v250 Changes:
- Fix typo's in 145.3.2 and 145.3.5
- Fix wrong Table reference in 145.2.10.3a (should be 16, was 20)
- New attempt at describing what reverse current is + simplified requirement

v240 Changes:
- Added general PD requirement to meet detection, pd signature configuration, and classification requirements under 3-pair condition.
- Clarifications to PD signature configurations 145.3.5

v230 Added PSE requirement to limit current to I_{rev}, different level depending on V_{PSE}, PD 3P spec reduced to detection range only.
v220 Changes:
- Replace the construct "are not required" by "may" (both in PD and PSE section)
- Replace "cause current to flow" by "source" (unless the PD is sourcing power, it's impossible for current to be sunk into a negative pair).
- Only allow 3P-backfeed from 21 V and up for PDs, but exclude 3P-after-4P
- Cleanup of PSE requirement (got rid of incomprehensible 'range of potentials')

v212 As presented during the ad-hoc call of May 7

145.2.4 PSE PI

A PSE device may provide power via one or both of the two valid four-conductor connections, named pairsets. A pairset consists of a pair at the positive V_{PSE} and a pair at the negative V_{PSE}. The two conductors associated with a pair each carry the same nominal current in both magnitude and polarity. Figure 145–12, in conjunction with Table 145–3, illustrates the pairsets, which for PSEs are named Alternative A and Alternative B.

PSEs are required to switch the negative pairs, and may switch the positive pairs as defined in 145.4.1.1.1. This may lead to both positive pairs providing current in 2-pair mode.

145.2.10 Power supply output

Add new item to Table 145–16 as follows:

Item	17a
Parameter	Unpowered negative pair reverse current
Symbol	I_{rev}
Unit	A
Min	—
Max	0.0013 (split: when highest $V_{PSE} > 21$ V)
Max	0.0005 (split: when highest $V_{PSE} \leq 21$ V)
PSE Type	3, 4
Additional information	See 145.2.10.3a

Insert new subclause after 145.2.10.3 as follows:

145.2.10.3a Reflected voltage

When a 4-pair capable PSE provides power in 2-pair mode, whereby two pairs are connected to the positive V_{PSE}, and one pair is connected to the negative V_{PSE}, a single-signature PD may reflect a voltage of up to V_{PSE} back onto the unpowered pairset. See 145.3.8.8. This can cause a reverse current to flow, named I_{rev}, defined in Table 145–16. Reverse current is current flowing out of the PSE on a negative pair.

The PSE shall not source a current higher than I_{rev}, as defined in Table 145–16, on a negative pair. This requirement holds only when no power is being sourced into the PSE.

145.3.2 PD PI

. . .

A PD shall meet the requirements of detection (145.3.4), PD signature configuration (145.3.5), and PD classification (145.3.6) in any valid 2-pair configuration, as defined in Table 145-20.

NOTE—this includes configurations with two pairs connected to the same positive potential and one pair connected to the negative potential.

A single-signature PD shall meet all specifications related to current by meeting the specified total current, where total current is the combined current of the two pairs at the same polarity, unless otherwise noted (see 145.3.8.9). A dual-signature PD shall meet all specifications related to current by meeting the specified current on the negative pair of a given Mode, unless otherwise noted (see 145.3.8.9).

. . .

Change the note at the bottom of Table 145–20 as follows:

N denotes a pair connected to negative ~~V_{PD}~~ potential
P denotes a pair connected to positive ~~V_{PD}~~ potential
PSEs are required to switch the negative pairs, ~~but not required to~~ and may switch the positive pairs as defined in 145.4.1.1.1. This may lead to both positive pairs providing current in 2-pair mode.

145.3.4 PD valid and non-valid detection signatures

A PD presents a valid detection signature when it is in DO_DETECTION per Figure 145–25 or Figure 145–27. See 145.3.5.

A PD presents a non-valid detection signature on both pairsets while it is in a state where it does not accept power via the PI per Figure 145–25 or Figure 145–27.

A PD presents a non-valid detection signature when in a mark event state per Figure 145–25 or Figure 145–27.

When a PD presents a valid or non-valid detection signature, it shall present the detection signature at the PI between Positive V_{PD} and Negative V_{PD} of PD Mode A and PD Mode B as defined in 145.3.2.

While a PD presents a valid detection signature on a given Mode, that detection signature shall be valid when presented under the following conditions (see Figure 145-27a):

- with a resistance greater than 45 kΩ across the other Mode
- with a resistance greater than 45 kΩ across the other Mode and one pair connected to the positive potential of the given Mode

¶A single-signature PD that is powered over only one pairset shall present a non-valid detection signature on the unpowered pairset. A dual-signature PD that is powered over only one pairset shall present a valid detection signature on the unpowered pairset.

Add new Figure 145–27a as follows:

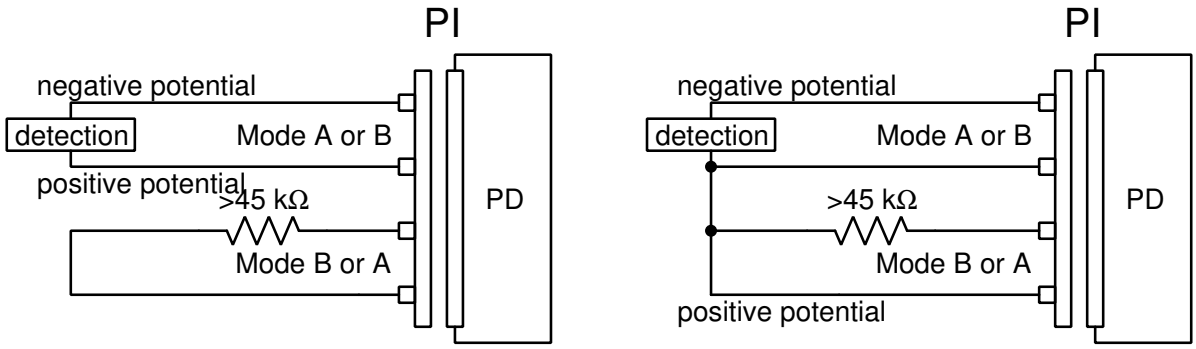


Figure 145–27a — Detection signature requirements connection configurations

145.3.5 PD signature configurations

A single-signature PD shall present a valid detection signature, as defined in Table 145–21, on a given Mode when no voltage or current is applied ~~to~~ across the other Mode, and shall not present a valid detection signature on the given Mode when any voltage in the range of 3.7 V to 57 V is applied ~~to~~ across the other Mode or any current greater than 124 µA is ~~applied to~~ drawn from the negative pair of the other Mode. These requirements apply to both Mode A and Mode B.

NOTE—A valid detection signature meets every requirement in Table 145–21 across all specified conditions. A failure under any allowed condition is considered "not a valid signature."

A dual-signature PD shall present a valid detection signature, as defined in Table 145–21, on a given Mode, regardless of any voltage between 0 V and 57 V applied to the other Mode. This requirement applies to both Mode A and Mode B.

These requirements allow the PD to be correctly identified by a PSE performing connection check as defined in 145.2.7.

145.3.8 PD power

Change item 18 such that:

- ***Parameter: Reflected voltage***
- ***Symbol: V_{refl}***

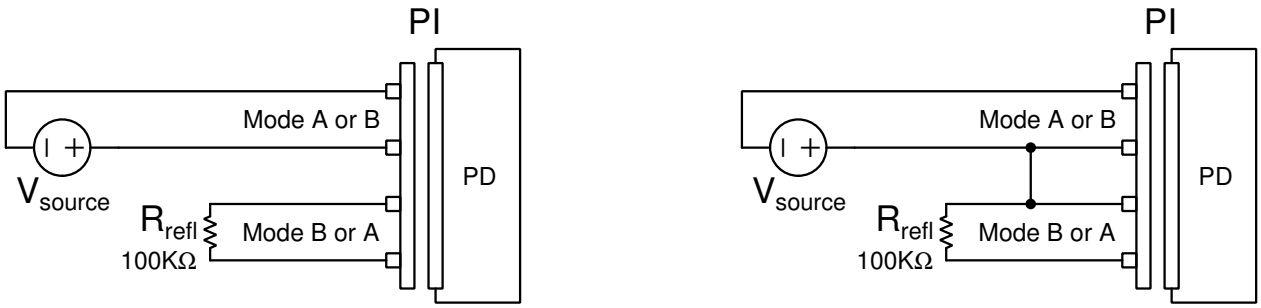
145.3.8.8 ~~Backfeed~~ Reflected voltage

Replace the contents of 145.3.8.8 as follows:

For a single-signature PD, when any voltage in the range of 0 V to $V_{Port\_PD\text{-}2P}$ max is applied per any of the valid 2-pair configurations, defined in Table 145–20, that have only a single pair connected to positive V_{PSE} (see Figure 145–29a), the voltage on the Mode not connected to the voltage source, with a 100 kΩ resistor connected across that Mode, shall not exceed V_{refl} as defined in Table 145–29.

For a dual-signature PD, when any voltage in the range of 0 V to $V_{Port\_PD\text{-}2P}$ max is applied per any of the valid 2-pair configurations, defined in Table 145–20, including those with two pairs connected to positive V_{PSE} (see Figure 145–29a), the voltage on the Mode with at least one pair not connected to the voltage source, with a 100 kΩ resistor connected across that Mode, shall not exceed V_{refl} as defined in Table 145–29.

Update PICS to reflect changes.



One positive pair connected

Two positive pairs connected

Figure 145–29a — Reflected voltage requirements