Backfeed in a 4-pair context v102

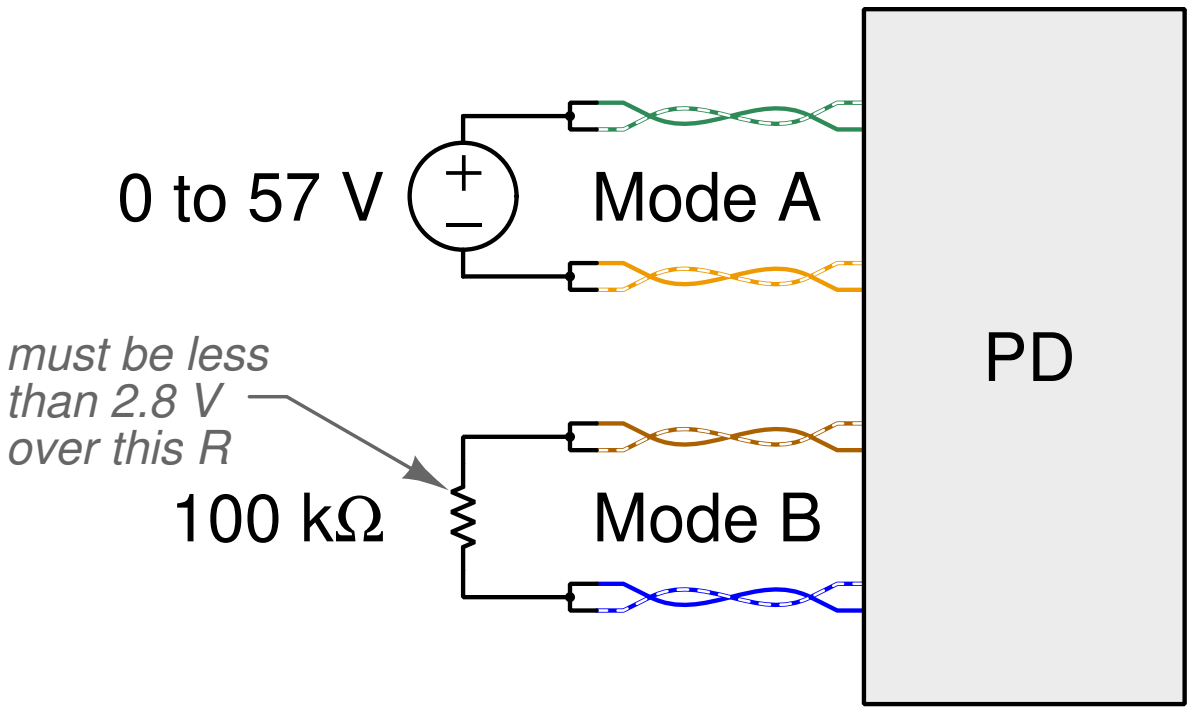
Lennart Yseboodt
Philips Lighting – Research
April 4, 2018

innovation + you

PHILIPS

Backfeed requirement

"When any voltage in the range of 0 V to $V_{Port\_PD\text{-}2P}$ max is applied across the PI at either polarity specified on the conductors of either Mode A or Mode B according to Table 145–20, the voltage measured across the PI for the other Mode with a 100 kΩ load resistor connected across that other Mode shall not exceed V_{bfd} as defined in Table 145–29."



PHILIPS

Purpose of backfeed specification

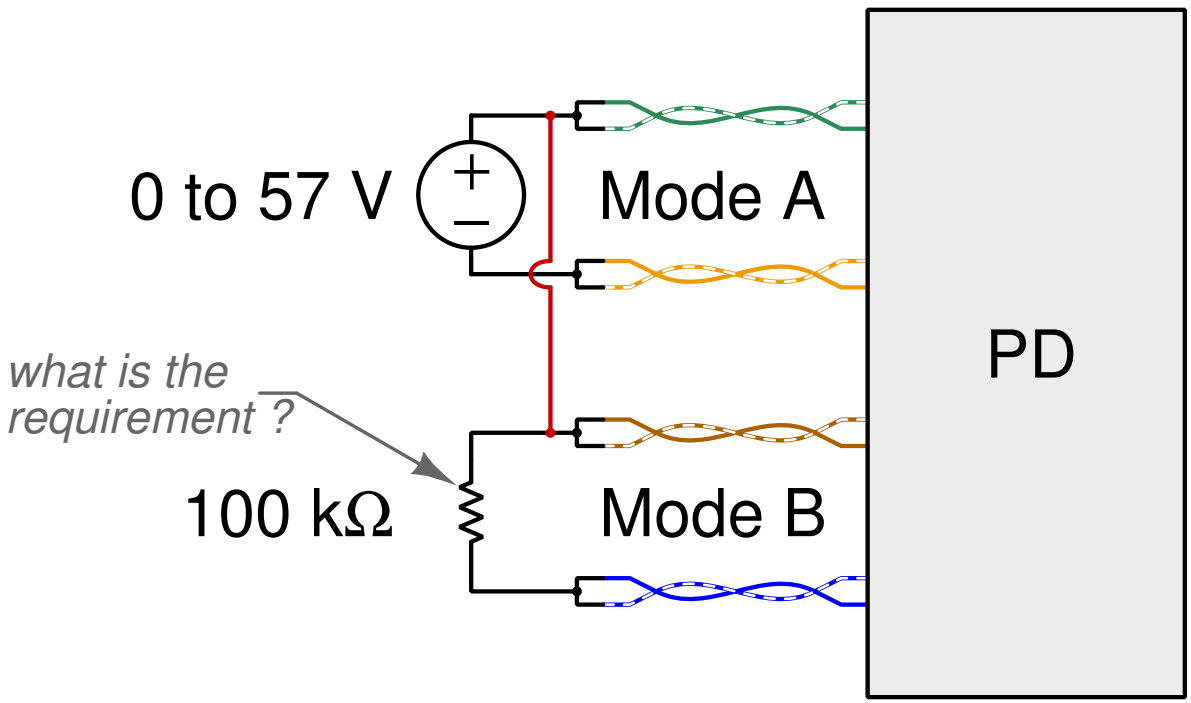
The purpose of the backfeed specification historically is to prevent a PD, powered in 2-pair mode, from producing a voltage / power level on the unpowered Mode, which is also connected to the PSE and potentially damaging the PSE.

But how does the backfeed specification translate to 3-pair and 4-pair situations ?

PHILIPS

4-pair backfeed

A 4-pair capable PSE typically ties the positive lines together at the PSE end. Even in “2-pair” mode, there are two pairs connected to the positive V_{PSE}. **Does the backfeed requirement still apply? Should it?**



PHILIPS

Ambiguity current text

The current text is ambiguous as to whether the condition of two positive pairs is one where backfeeding is limited to V_{bfd}. The intent of the text did not anticipate more than 2 pairs being powered (as this is old text), but it does not clearly exclude it, since connecting one pair of a Mode to a supply rail does not constitute “applying a voltage”.

We must choose to either include or exclude this configuration from the backfeed spec and change the requirement accordingly.

PHILIPS

Reasons to **include** 2×positive in backfeed

- How sure are we there are no issues with allowing 3P backfeed?
- Prevent rectifier designs that are OK for single-signature but are incompatible with dual-signature (confusion, design fails)

PHILIPS

Reasons to **exclude** 2×positive in backfeed

- Severely complicates active bridge design
- Existing devices already exhibit backfeeding under these conditions, PSEs will need to deal with it anyway
- Backfeed is only possible under 3-pair conditions, which means a PD connected to a 4-pair PSE which is capable of handling the backfeed

PHILIPS

Text change for **inclusion**

Change 145.3.8.8 as follows:

When any voltage in the range of 0 V to $V_{Port\_PD\text{-}2P}$ max is applied ~~across the PI at either polarity specified on the conductors of either Mode A or Mode B according to Table 145–20~~ per any of the valid 2-pair configurations listed in Table 145–20, the voltage measured ~~across the PI for~~ on the other Mode with ~~a~~ any ~~100 kΩ load resistor~~ resistance of 0 to 100 kΩ connected across that other Mode shall not exceed V_{bfd} as defined in Table 145–29.

PHILIPS

Text change for **exclusion**

Change 145.3.8.8 as follows:

When any voltage in the range of 0 V to $V_{Port\_PD\text{-}2P}$ max is applied ~~across the PI at either polarity specified on the conductors of either Mode A or Mode B according to Table 145–20~~ per any of the valid 2-pair configurations with one and only one pair connected to positive V_{PSE} listed in Table 145–20, the voltage measured ~~across the PI for~~ on the other Mode with ~~a~~ any ~~100 kΩ load resistor~~ resistance of 0 to 100 kΩ connected across that other Mode shall not exceed V_{bfd} as defined in Table 145–29.

PHILIPS

Recommendation

Without strong indication of technical issues caused by 3-pair backfeeding, there is no reason to impose a hard to meet requirement on the PD. As such, we should adopt the “exclusion” baseline on slide 9.

PHILIPS


PHILIPS