

# Dual Signature Classification <sup>v103</sup>

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# Current status

Overview of dual signature classification:  darshan\_05\_0615.pdf

## Highlights:

- ▶ Dual signature PDs can request Class 0-5 on each pairset
- ▶ Total maximum power is  $2 * \text{Class 5} = 90\text{W}$
- ▶ Pairsets can show a different Class

# Mutual identification

Type 1/2 Dual Signature PDs are not guaranteed to be capable of handling 4P power correctly. They can only be 4P powered after a confirmation over LLDP or by checking the detection signature of the unpowered pairset.

Type 3/4 PDs must be able to handle 4P power without damage. Therefore a method is needed to distinguish Type 1/2 from Type 3/4 dual signature PDs for all valid dual signature classes.

## Class codes

<b>Requested pairset power<sup>1</sup></b>	Type 3+4 Class code	Type 1+2 Class code	Different?
4W	1,1,0	1,1,1	Yes
7W	2,2,0	2,2,2	Yes
15.4W	3,3,0	3,3,3	Yes
30W	4,4,0	4,4,4	Yes
45W	4,4,3,3	N/A	N/A

When connected to a dual signature PD, the PSE will issue 3 classification events. By the third event it can determine the Type of the PD. Type 1/2 PDs must be powered over 2P until further methods determine 4P suitability. Type 3/4 PDs may be 4P powered.

<sup>1</sup>All references to power in these tables refer to PSE PI power.

## <30W caveat

Requested pairset power	Type 3+4 Class code	Type 1+2 Class code	Different?
4W	1,1,0	1,1,1	Yes
7W	2,2,0	2,2,2	Yes
15.4W	3,3,0	3,3,3	Yes
30W	4,4,0	4,4,4	Yes
45W	4,4,3,3	N/A	N/A

A PSE with less than 30W power budget is limited to issuing a single classification event. It cannot determine Type of the PD. Two options exist:

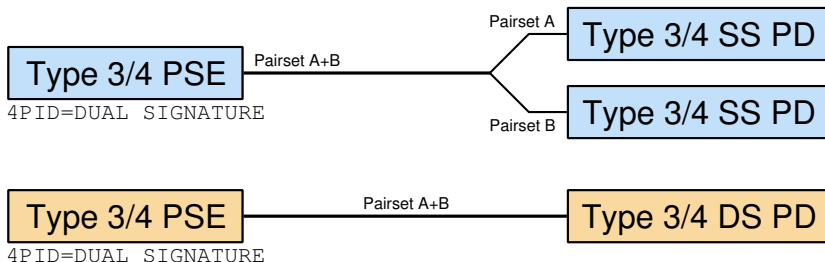
- ▶ Assume the PD is a Type 1/2 dual signature and do not 4P power.
- ▶ Issue 3 events to determine the Type, followed by resetting the PD classification and issuing a single classification event. PD classification can be reset by bringing PI voltage below  $V_{\text{Reset}}$  for  $T_{\text{Reset}}$  and re-issuing a classification event within  $T_{\text{pon}}$ .

## Interpretation by Type 1/2 PSEs

<b>Requested pairset power</b>	Type 3+4 Class code	Type 1+2 PSE result
4W	1,1,0	1 → 4W
7W	2,2,0	2 → 7W
15.4W	3,3,0	3 → 15.4W
30W	4,4,0	4,4 → 30W
45W	4,4,3,3	4,4 → 30W

Type 3/4 dual signature PDs will be treated correctly by Type 1/2 PSEs on the pairset the PSE powers.

## Y cables



A PSE cannot see the difference between a true dual signature PD and two separate single signature PDs attached via a Y cable. The class codes for single and dual signature have different meaning and these have been chosen to ensure correct operation also in this particular case.

## Y cables (SS PD connected via 2P to PSE)

Requested total power	Type 3+4 DS Class code	Type 1-4 SS Class code	Result
4W	1,1,0	1,1,1	4W
7W	2,2,0	2,2,2	7W
15.4W	3,3,0	3,3,3	15.4W
30W	4,4,0	4,4,4	30W
45W	4,4,3,3	4,4,0	30W
60W	N/A	4,4,1	OFF <sup>1</sup>
75W	N/A	4,4,2	OFF <sup>1</sup>
90W	N/A	4,4,3,3	45W/60W <sup>2</sup>

1. This is an invalid dual-signature code. PSE denies power.
2. See note on next page.



## Y cable, Class 8 SS PD

A Class 8, single-signature PD, connected via a Y cable to a Type 3/4 PSE will advertise class code 4,4,3,3.

### **PSE**

The PSE will interpret this as a dual signature PD requesting Class 5 power on that pairset. If such power is available, the PSE will produce 4 classification events and allocate 45W for that pairset.

### **PD**

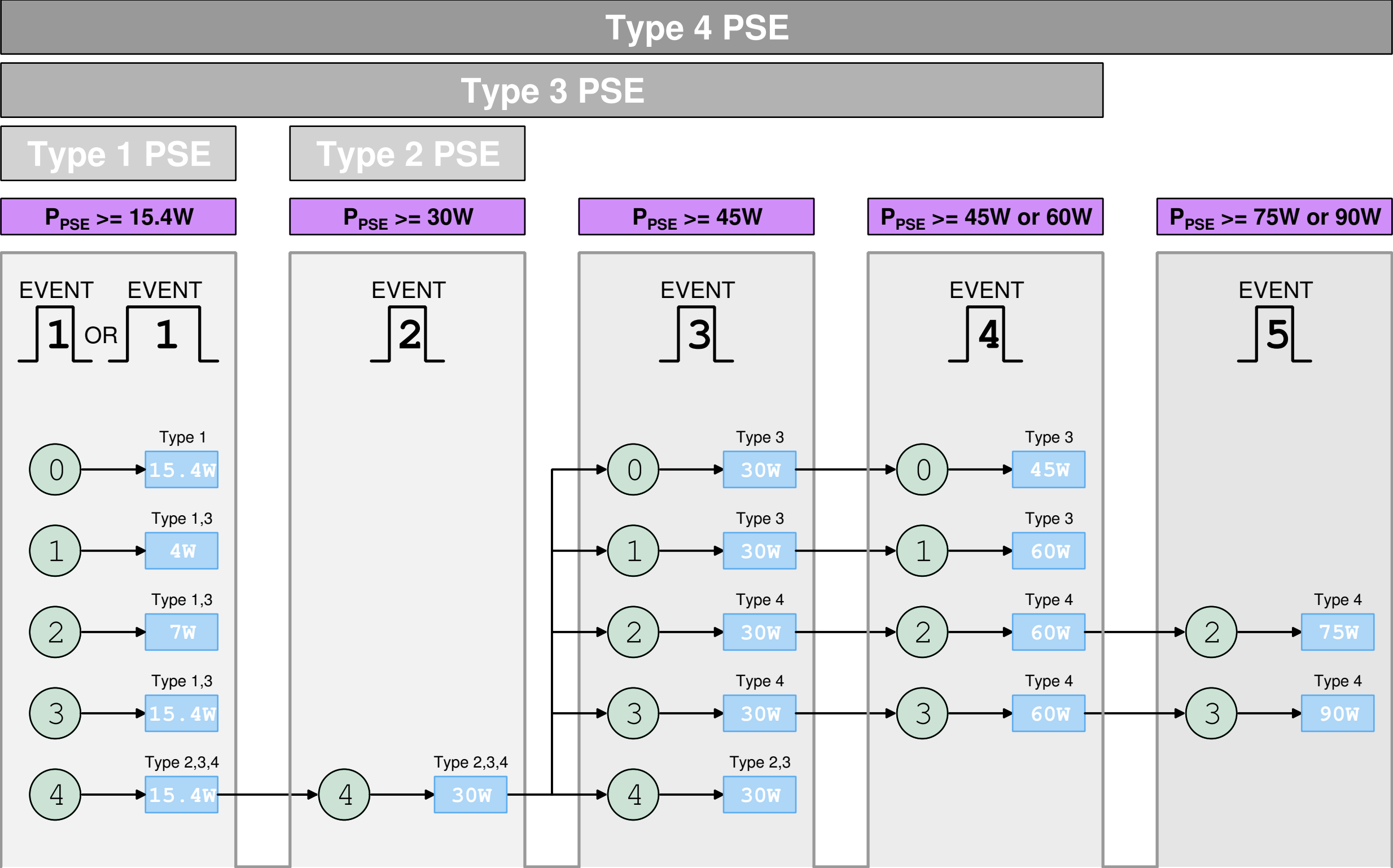
The PD will see 4 events and assume that 60W (it saw 4 events) is available. Power will be delivered over 2P. This is OK because the PD is Class 8 and capable of 45W per pairset, but there is significant chance of motorboating.

# Conclusion

- ▶ Full mutual ID for dual signature PDs
- ▶ Full class range available (classes 0,1,2,3,4,5) for each pairset
- ▶ Method to determine Type even with <30W budget
- ▶ Class codes chosen to prevent damage with Y cables in single signature PDs



Single Signature PDs scheme



Dual Signature PDs scheme

