



E2EP2P Runb with Dual Signature PDs.  
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# Objectives

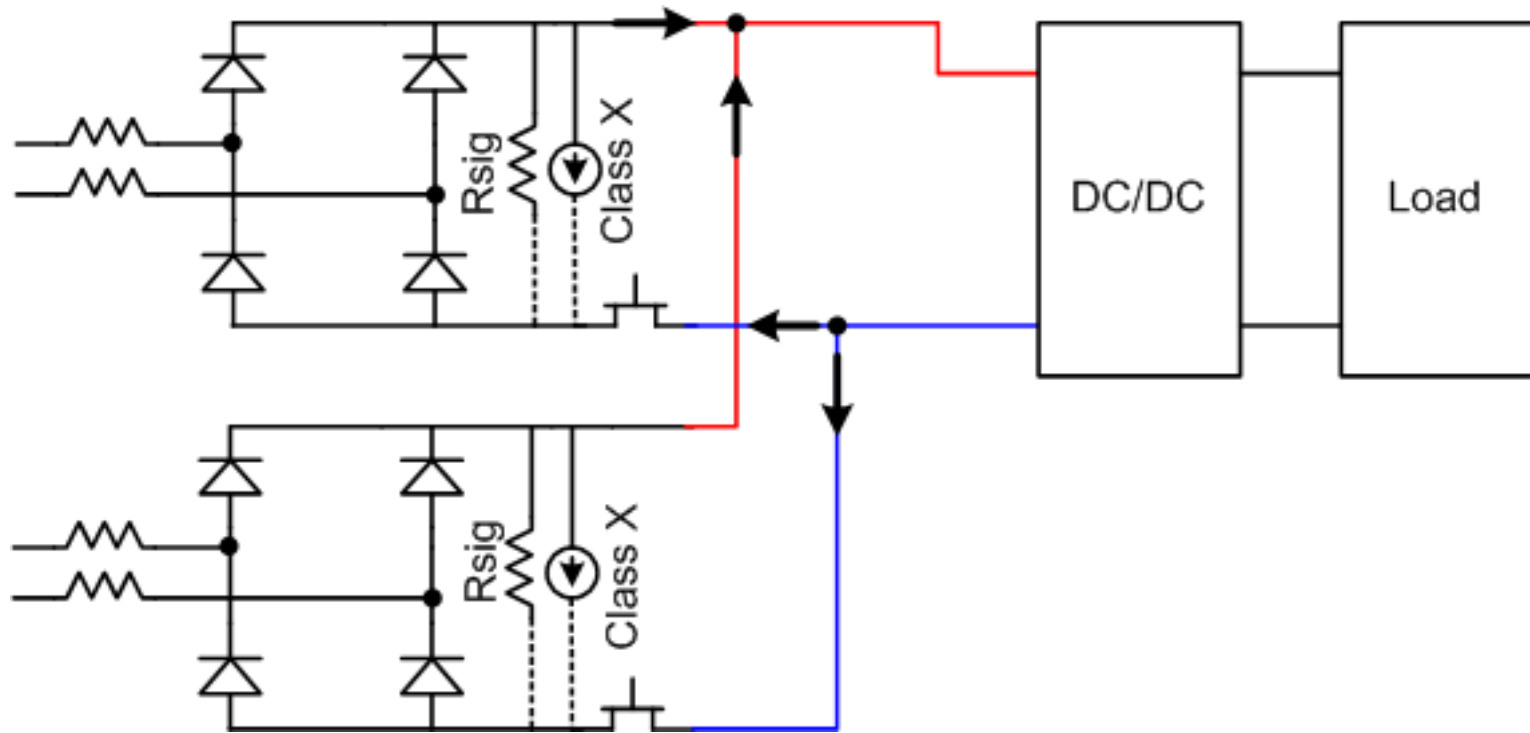
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- To investigate the PSE PI and PD PI P2P Runb requirements for Dual Signature PDs working at the following scenarios:
  - Dual Signature, Single Load (Same Class Signature)<sup>1</sup>.
  - Dual Signature, Dual Load, Same Class Signature.
  - Dual Signature, Dual Load, Different class signature.

**Notes:**

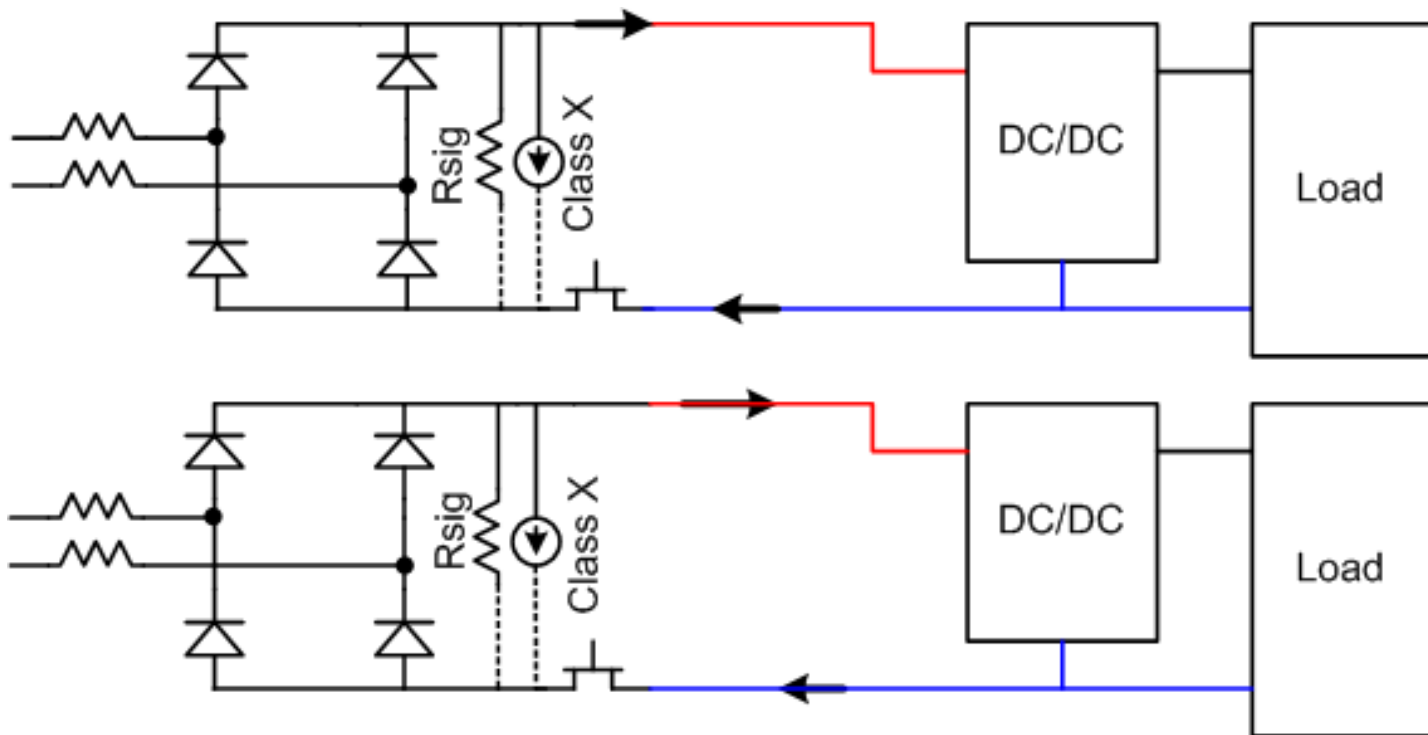
1. Same class, is the only possibility physical possibility

Figure 1: Dual Signature PD, Single Load, Same class



- Positive and Negative Common path.
- Results with Pair to Pair Resistance Unbalance as in Single Signature PD.
- Need to meet all PD PI P2PRunb rules.
- Need to meet all PSE PI P2PRunb rules when connected to DS, SL PDs.

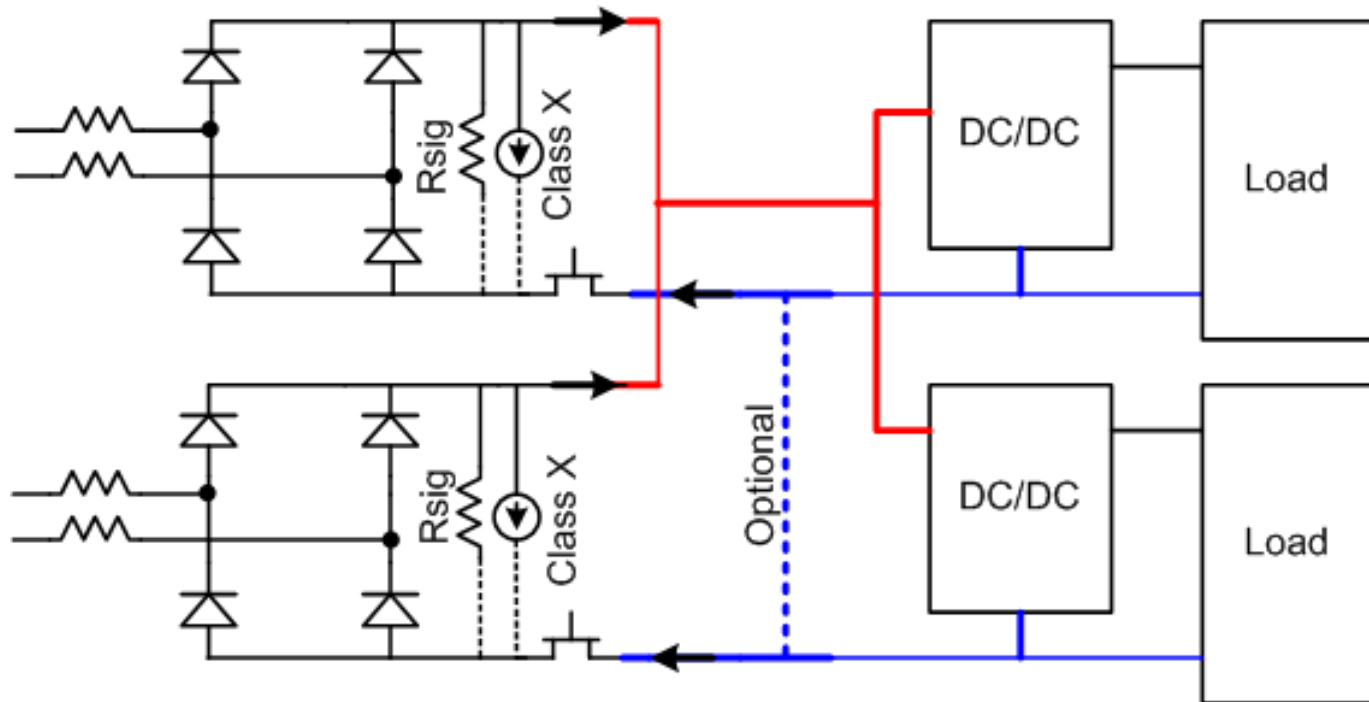
## Figure 2a: Dual Signature PD, Dual Load, Same class



- Positive and Negative looks Isolated.
- If both class are the same, it doesn't mean that the power is the same...It just mean that the maximum power per pairset is the same.
  - That is why we agree that same class means DS PD with the same load requirement over each pairset and the rest is implementation specifics i.e. Figure 1=Figure 2a.
- Due to isolation, results with No Pair to Pair Resistance Unbalance requirements .. See Figure 2b too.

## Figure 2b: Dual Signature PD, Dual Load (DS, DL), Same class

- But what if there is a common path?

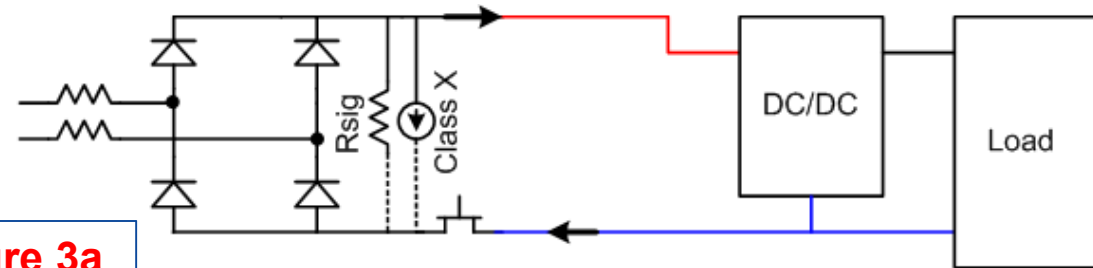


- In this case, there is P2P<sub>Runb</sub> effect on positive pairs and optionally on negative pairs pending implementation.
- By definition Figure 2b = Figure 1 i.e. single load.
- PSE cannot distinguish between Fig 2a, Figure 2b or Figure 1 (unless cost is added..). Therefore they will be treated as the same as Figure 1.

## Figure 3a/3b: Dual Signature PD, Dual Load, Different class

- In this case there are different loads represented by different class over each pairset.

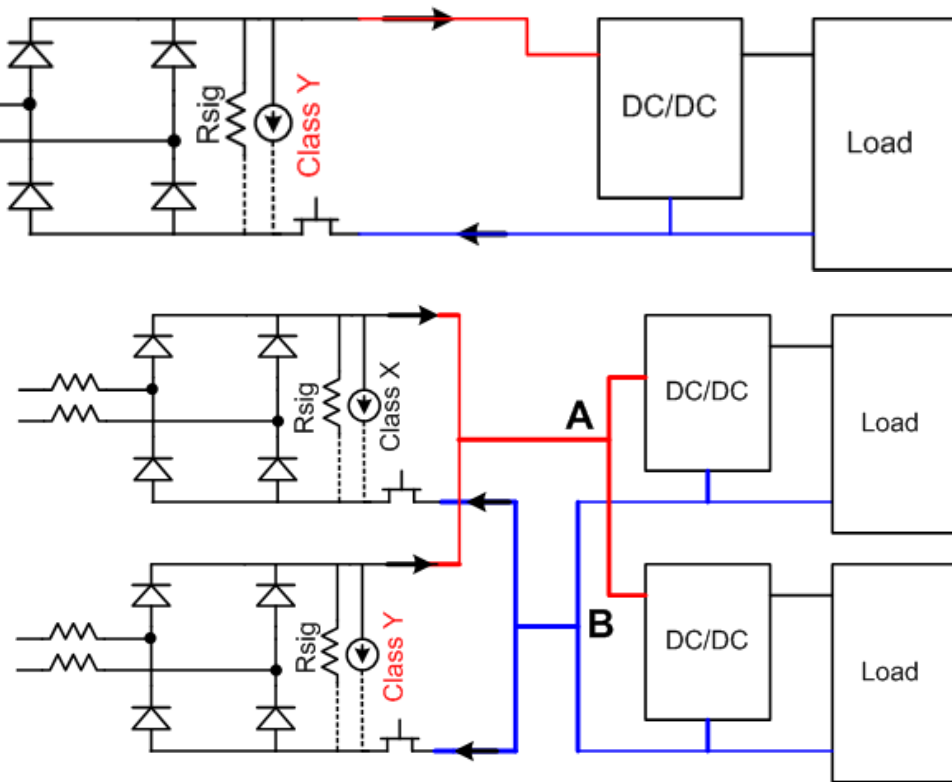
Figure 3a



- It results with isolated currents so no P2P Runb effect.

- Is this entirely true? See Fig 3c.

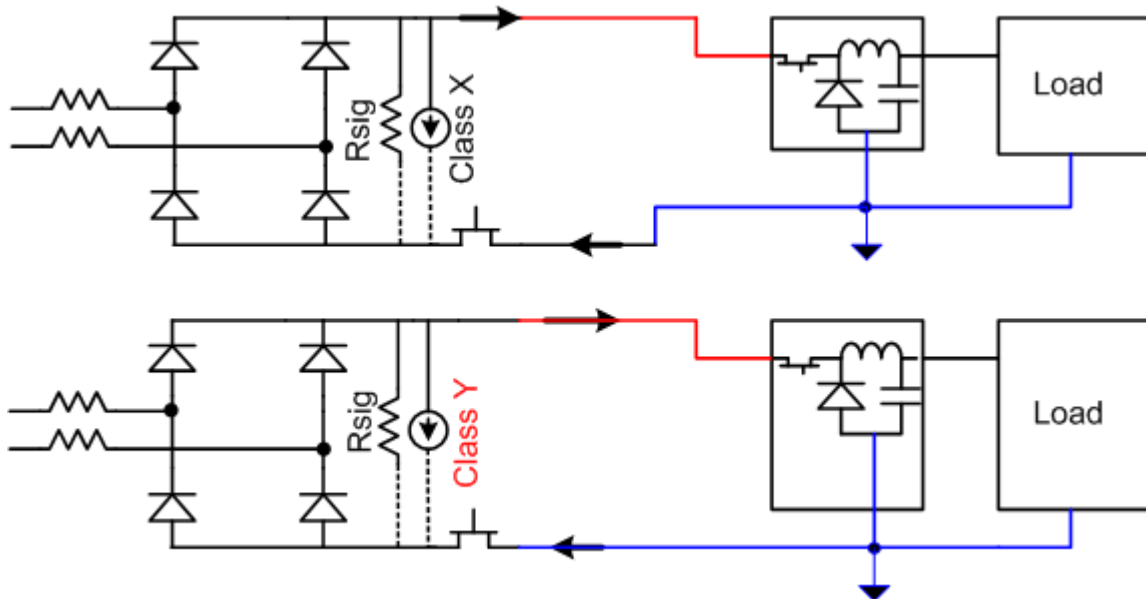
Figure 3b



- Figure 3b doesn't make sense due to the fact that it behaves like single load at points a and b and has different classes.

## Figure 3c: Dual Signature PD, Dual Load, Different class

- What if the two DC/DC are not isolated and
- What if there is common path at the DC/DC outputs? Typically the “PD system GND” is located at DC/DC output negative leads.
- The positive rail is well “isolated” so no P2PRunb effects
- The negative rails do have P2PRunb effect.
- We cannot impose isolated implementation due to cost.
- As a result, we need to treat this case as P2PRunb sensitive too.



Is this a problem? No.

From PSE point of view, it is dual different load so Pclass per pairset applies.

PD will need to meet  $I_{cont-2P\_unb}$  per pair set only\*.

\*On positive and negative rails although only the P2PRunb is on positive or negative but not both. We could find implementations that has the P2PRunb effect on positive rails but not both (otherwise it became Figure 3b).

# Conclusions

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- Dual Signature, Dual load, Same class PDs must be identical (behavior wise) to Dual Signature, Single load PD.
  - I believe we already agree on this.
- Dual Signature, Single load PD cannot use different classes.
  - We already agree on this.
- For all DS PDs with single load or same class, we need to meet:
  - $I_{cont-2P\_unb}$  and
  - $I_{con} = P_{class\_PD} / V_{port\_PD}$ .
- DS PDs with different classes. They have to be isolated only on positive or negative rails. Pclass per pair set applies. Need to meet  $I_{cont-2P\_unb}$  per pair.



# Summary – PD Dual Signature P2PRunb requirements

#	Load	Class	PD PI 33.7.10	PSE PI Eq-33-4a, Eq-334b, PSE Vdiff, Annex 33B	Icon-2P_unb Table 33-11.	Icon	Pclass
1	Single Load	Same	YES	YES	YES	YES	Pclass
2	Dual Load	Same	YES	YES	YES	YES	Pclass
3	Dual Load	Different	NO	YES	YES	YES	Pclass-2P <sup>1</sup>

## Notes

1. **Pclass-2P** is used for describing PSE Pclass when supporting Dual Signature, Dual Load, Different class PDs

**Pclass** is used for:

- Single Signature PD
- Dual Signature PD dual load/Single load ,same class.
- Type 1 and Type 2 PSEs

See equations 33-3 and 33-a in future D1.3

# Proposal

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- To follow the summary Table when addressing Dual Signature PDs in D1.3.

# Discussion

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# THANK YOU