

Minimum PD Voltage ^{v110}

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D0.4 definition

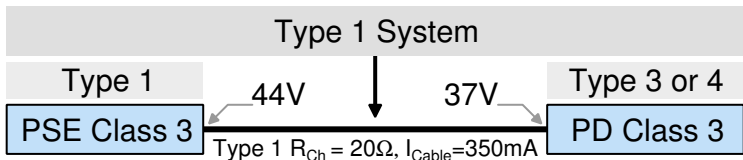
Item	Parameter	Symbol	Unit	Min	Max	PD Type	Add. Info
1	Input voltage per pair-set	$V_{\text{Port_PD-2P}}$	V	37.0 42.5 40.0	57.0 57.0 57.0	1 2,3 4	See 33.3.7.1,Table 33-1

This is the current (D0.4) definition of minimum and maximum voltage a PD can expect at the PD PI during normal operation. The voltages are defined per PD Type.

33.3.7.1 Input voltage

The PD shall turn on at a voltage less than or equal to V_{On} . After the PD turns on, the PD shall stay on over the entire $V_{\text{Port_PD-2P}}$ range. The PD shall turn off at a voltage less than $V_{\text{Port_PD-2P}}$ minimum and greater than or equal to V_{Off} .

Type 3 & 4



A Type 3 or 4 PD in Class 3 (native, or power demoted) will interoperate with Type 1 PSEs. Such a combination is a 'Type 1 System' with maximum loop resistance R_{Ch} of 20Ω .

Such PD will see a minimum of $44V - 350mA \cdot 20\Omega = 37V$ at the PI.

The minimum voltage for Type 3 and 4 PD is 37V. This is a very wide operating range to enforce on all PDs, especially on PDs in high power classes where such a low voltage cannot occur.

PD Type vs System Type & Class

$V_{Port_PD-2P}(\min)$ is not determined by the PD Type alone, but rather by the System Type and the PD Class. Sorting this on PD Class and assuming worst case parameters results in:

Class	PSE Type	System Type	V_{PSE}	R_{Ch}	I_{Con}	V_{PD}
1	1	1	44	20 Ω	91 mA	42.1 V
2	1	1	44	20 Ω	160 mA	40.8 V
3	1	1	44	20 Ω	350 mA	37.0 V
4	2	2	50	12.5 Ω	600 mA	42.5 V
5	3	3	50	6.25 Ω	900 mA	44.3 V
6	3	3	50	6.25 Ω	1200 mA	42.5 V
7	4	4	52	6.25 Ω	1442 mA	42.9 V
8	4	4	52	6.25 Ω	1731 mA	41.1 V

$$V_{PD} = V_{PSE} - R_{Ch} \cdot I_{Con}$$

Proposed solution (Table 33-18)

Item	Parameter	Symbol	Unit	Min	Max	PD Type	Add. Info
1	Input voltage per pair-set, Class 1	V_{Port_PD-2P}	V	42.1	57.0	1,3,4	See 33.3.7.1, Table 33-1
	Input voltage per pair-set, Class 2			40.8		1,3,4	
	Input voltage per pair-set, Class 0,3			37.0		1,3,4	
	Input voltage per pair-set, Class 4			42.5		2,3,4	
	Input voltage per pair-set, Class 5			44.3		3,4	
	Input voltage per pair-set, Class 6			42.5		3,4	
	Input voltage per pair-set, Class 7			42.9		4	
	Input voltage per pair-set, Class 8			41.1		4	

Summary

- ▶ $V_{\text{Port_PD-2P}}(\text{min})$ voltage should be specified per PD Class rather than Type, under worst case conditions:
 - ▶ Lowest possible PSE Type
 - ▶ $V_{\text{PSE}} = V_{\text{Port_PSE-2P}}(\text{min})$
 - ▶ $R_{\text{Chan}} = R_{\text{Ch}}$
 - ▶ $I_{\text{Port}} = I_{\text{Con}}(\text{max})$
- ▶ A similar construction is already in use for $P_{\text{Class_PD}}$ and $P_{\text{Peak_PD}}$
- ▶ This fixes the problem in D0.4 (see comment #103 / D0.4) with incorrect minimum voltage for Type 3 & 4



Alternate solution, $V_{\text{Port_PD-2P}}$

We can set apart the parameters that depend on Class in a different table format (less verbosity).

Item	Parameter	Class	Symbol	Unit	Min	Max	Add. Info
		1			42.1		
		2			40.8		
		0,3			37.0		
1	Input voltage per pair-set	4	$V_{\text{Port_PD-2P}}$	V	42.5	57	See 33.3.7.1, Table 33-1
		5			44.3		
		6			42.5		
		7			42.9		
		8			41.1		

$P_{\text{Class_PD}}$ and $P_{\text{Peak_PD}}$ will also fit this table format.