

PSE Current Requirements comments 184, 183 October 2007

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Some of this presentation was covered in the October 11, 2007 Vport ad hoc.
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Agenda

- **ad hoc goal**
- **System ILIM and comment 184**
- **Is the PD a constant power load?**
- **Review PD Current Limits.**
- **Comment 183.**

Creating a PSE Current Requirement

- **Goal: Specify the minimum current a PSE shall provide in order to provide the PD with the current it may draw.**
- **Understand the legacy specification.**
- **Create a simple method to convey legacy and PoE plus requirements.**

Understanding legacy PoE ILIM

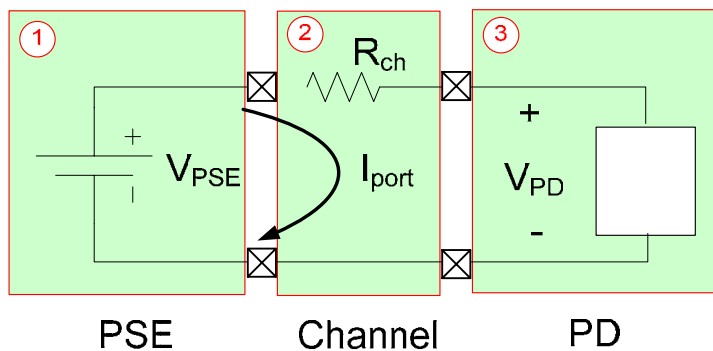


Table 33-10—PD power classification

Class	Usage	Range of maximum power used by the PD
0	Default, Type 1	0.44 W to 12.95 W

Mode	Description	PSE	PD	Table 33-5 PSE	Table 33-12 PD
Average Power	Power (W)	15.4	12.95	Item 14	Item 2
	Voltage (V)	44	37	Item 1	
	Current (mA)	350		Item 4	Item 5
Surge Power	Power (W)	17.6	14.4	33.2.8.4	33.3.5.4
	Voltage (V)	44	36	Item 1	Item 1
	Current (mA)	400		Item 10	Item 4

33.3.5.4 Peak operating current **PD**

At any operating condition the peak current shall not exceed $P_{Port \text{ max}}/V_{Port}$ for more than 50ms max and 5% duty cycle max. Peak current shall not exceed $I_{Port \text{ max}}$.

$$\frac{P_{Port \text{ max}}}{V_{port}} = \frac{12.95W}{36V} = 360mA$$

This formula does not produce the correct result!

Comment 184

CI 33 SC 3.5.4 P 43 L 46 # 184
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Comment Type TR Comment Status X

The value of Iport_max created by the formula-using PD Pport_max-does not match the value provided in table 33-12. For example, class 0 PD power is 12.95 W maximum and ~~12.95W/44V = 294 mA~~, not the 400 mA shown in table 33-12, item 4.

SuggestedRemedy

The PD formula provides approximately the correct answers when the PSE Pport_max values are scaled by 400/350 for the system classified power.

Table 33-12 values should match values created by the formula-rounding appears to have been used.

This should match what is shown on the previous page.

Getting the correct Iport_max

$$I_{port} = \frac{V_{PSE} - \sqrt{V_{PSE}^2 - 4R_{ch}PPD}}{2R_{ch}} = \frac{44 - \sqrt{44^2 - 4 \times 20 \times 12.95}}{2 \times 20} = 350mA$$

$$V_{port_static_min} = V_{pse_min} - R_{ch} \times I_{port} = 44 - 20 \times 0.350 = 37V$$

$$\frac{P_{Port_max}}{V_{port_static_min}} \frac{400}{350} = \frac{12.95W}{37V} \frac{400}{350} = 400mA$$

P_{port_max} is the PD classified power.

$V_{port_static_min}$ is the PD voltage when drawing its classified power when supplied by the minimum static PSE voltage.

PD Power Table 33-12

MAX

4	Peak operating current, Class 0, 3	I _{port}	mA		400	1	See 33.3.5.4
	Peak operating current, Class 1				120	1	
	Peak operating current, Class 2				210	1	
	Peak operating current, Class 4				<u>TBD</u>	2	

$$0.400 \times 36 = 14.4W$$

$$0.120 \times 41.6 = 5.0W$$

$$0.210 \times 39.8 = 8.36W$$

$$\frac{400}{350} \frac{P_{port_max}}{V_{port_static_min}} V_{port_min}$$

This permits a PSE that produces more than V_{port_min} to reduce its current and still provide required PD power levels.

The class1 power is 3.84W and the peak power is 30% larger.
 The class2 power is 6.49W and the peak power is 42% larger.
 The class3 power is 12.95W and the peak power is 11% larger.

Recommended Resolution 184

- In Table 33-12 item 4, change current to power, and Iport to Pport_peak.

OLD	NEW
400	14.4
120	5.0
210	8.36
TBD	$\frac{400}{350} \frac{P_{port_max}}{V_{port_static_min}} V_{port_min}$

- In section 33.3.5.4 replace “At any operating”, to “For up to 50 ms with 5% duty cycle the current for class 0 – 3, may exceed Pport/Vport or the current for class 4 may exceed Pport/Vport_static. Peak current for any class shall not exceed

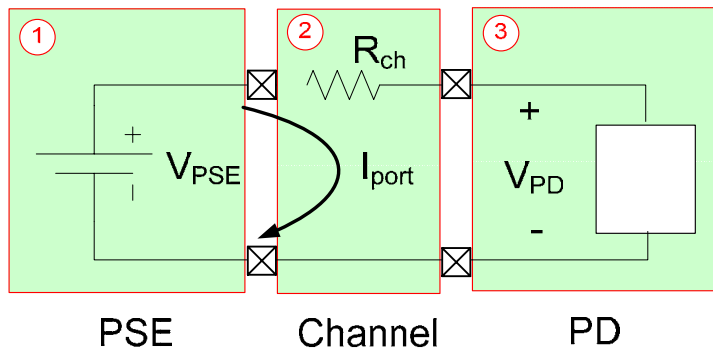
$$\frac{P_{Port_peak}}{V_{port}}$$

Pport_max is the classified power.

Vport_static_min = Vpse_min – Rch x Iport

Vport_min is the PD MDI voltage at Pport_peak.

Constant Power PD?



33.2.8.4

The PSE shall support the following AC current waveform parameters:

- a) $I_{peak} = 0.4A$ minimum for 50ms minimum and 5% duty cycle minimum.
- b) For $V_{Port} > 44V$, $I_{peak} = 17.6 W/V_{Port}$.

$$\frac{17.6W}{V_{port}} = \frac{17.6W}{57.0V} = 309mA$$

Mode	Description	PSE	PD	Table 33-5 PSE	Table 33-12 PD
Average Power	Power (W)	14.19	12.95	Item 14	Item 2
	Voltage (V)	57	52.0	Item 1	
	Current (mA)	249		Item 4	Item 5
Surge Power	Power (W)	???	14.4	33.2.8.4	33.3.5.4
	Voltage (V)	57	51.4	Item 1	Item 1
	Current (mA)	???	280	Item 10	33.3.5.4

$$I_{peak} = \left(\frac{57 - \sqrt{57^2 - 4 \times 20 \times 14.4}}{2 \times 20} \right) = 280mA$$

Peak PD power for class-3. 14.4W = 400mA x 36V

Comment 183

CI 33 SC 2.8.4 P 26 L 36 # 183
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Comment Type TR *Comment Status* X

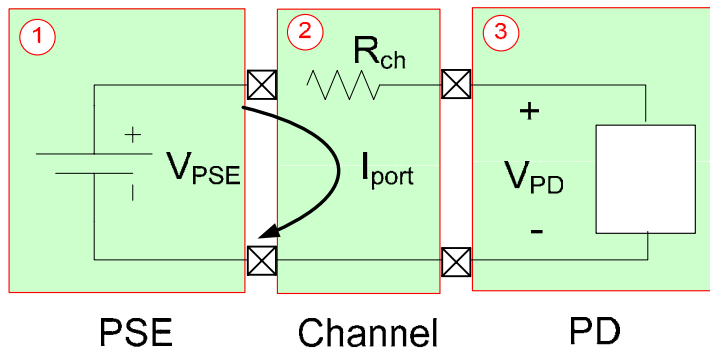
The statements are not clear: is "a" or "b" required?
Option "b" has no time or duty cycle constraint provided. These comments also apply to the new section 33.2.8.4a.

Suggested Remedy

Allow options "a" or "b."
Have one statement for duty cycle and time that applies to both "a" and "b".

The same comments apply to section 33.2.8.4a and table 33-12.

System View with Correct Text



$0.400 \times 36 = 14.4W$
See slide 6.

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Surge Power	Power (W)	16.0	14.4	33.2.8.4	33.3.5.4
	Voltage (V)	57	51.4	Item 1	Item 1
	Current (mA)	280		Item 10	33.3.5.4

$0.280 \times 57 = 16.0W$

$$I_{peak} = \left(\frac{57 - \sqrt{57^2 - 4 \times 20 \times 14.4}}{2 \times 20} \right) = 280mA$$

Recommend Resolution 183

- 33.2.8.4
- “The PSE shall support the following AC current waveform parameters:
a) $I_{peak} = 0.4A$ minimum for 50ms minimum and 5% duty cycle minimum.

OR

b) For $V_{port} > 44V$, ~~$I_{peak} = 17.6W/V_{port}$.~~

Where $P_{PD_port_peak}$ is the PD peak power and R_{ch} is the channel resistance.

$$I_{peak} = \left(\frac{V_{PSE} - \sqrt{V_{PSE}^2 - 4R_{ch}P_{PD_port_peak}}}{2R_{ch}} \right)$$

- All present; Y: ? N: ? A: ?