- **Summary of PSE and PD power supplies port requirements.**
- **Includes all last decisions from November 2001.**
- **Includes last comments received by Dec, 27 2001.**
- **Updats since November 2001 is marked with red color.**
- **Follows Tables 5,12 in Draft 3**

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PSE Output Port Electrical requirements for all classes unless otherwise is specified - Table 5

Item	Parameter	Sym	Unit	Min	Max	Notes
1	Output voltage	Vport	Vdc	44	57	Inclusive of line, load, temperature variations.
2	a) Load Regulation			44	57	From 0.44W to 15.4W load step. Load rate of change 35mA/us max Voltage transients as a result of the load changes are limited to 3.5V/1uS max.
	b) PSE power supply output impedance	Zout	Ω		0.3	a) From DC to 100KHz at l5.4W load. b) **Note that it is not a requirement for PSE output port. It is a requirement for PSE power supply output.** c) In a multi-port system, the requirement should be met for a single port loaded with 15.4W while all other ports are disconnected. d) See TBD setup in order to extract the PSE power supply output impedance out of port output impedance measurements.
3	**Feeding through data pairs**					
	Ripple and noise, f < 500Hz.		Vpp		0.5	Common Mode and / or Differential noise Pair to Pair values. a) ~~Applicable when feeding through signal carrying pairs.~~ From 0.44W to 15.4W at operating Vport. b) The limits meant to ensure data integrity. To meet EMI standards, lower values may be needed.
	Ripple and noise, 20KHz - 150kHz.		Vpp		0.2	
	Ripple and noise, 150KHz-500KHz.		Vpp		0.15	
	Ripple and noise, 500KHz-1MHz.		Vpp		0.05	
	Ripple and noise, 1MHz-30MHz.		Vpp		0.05	
	Ripple and noise, 30MHz-100MHz.		Vpp		0.05	
4	Output current - Normal Powering Mode at PSE min output voltage.	Iport	mAdc	10	350	a) Iport_max ~~current~~ for ~~PSE output voltage higher than~~ Vport>44V is Iport_max=15.4/Vport [ADC] ~~must be less than 350mAdc~~. Iport_max must be guaranteed by PSE in order to ensure 15.4W min output power. b) Ripple current content (Iac) superimposed on the dc current level (Idc) is allowed if the total current (Irms) is 350mA max for a total output power of 15.4W. For Vport>44V, Irms max = 15.4/Vport [Arms]. c) The PSE should support the following ac current wave form parameters: Ip=0.4A for 50mSec and 5% duty cycle. For Vport>44V, Ip=17.6/Vport [Ap] The Rms, DC and ripple current are bounded by the following equation: $Irms^2 = Idc^2 + Iac^2$
5	Output current range - Startup Mode	Iinrush	mA	400	450	For duration of 50ms min, Duty cycle = 5% min.
6	a) Power Removal mode1 b) Power Removal mode2	I_{MIN1} I_{MIN2}	mA mA	0 5	5 *10*	must remove power for t > T_{PMDO} may or may not remove power for t > T_{PMDO}
7	PD Power Maintanance Request Drop Out timelimit	T_{PMDO}	mSec	300	400	The PSE will not remove power if the PD maintenance signal is absent for less than 300ms duration. If an absence of power maintenance signal has been detected, the PSE shall remove power within T_{PMDO1} . T_{PMDO1} =100ms max. $T_{PMDO1} + T_{PMDO}$ = 400ms max.
8	Overload Current detection range	Icut	mA	350	400	After time duration of Tovld the PSE shall disconnect the power from the port.
9	Overload time limit	Tovld	ms	50	70	If 350mA < Iovld <400mA for 50ms < Tovld < 70ms the PSE ~~may~~ shall disconnect the power from the port.
10	Output current – at short circuit ~~load~~ condition	I_{LIM}	mA	400	450	Max. value of the port current during short circuit ~~load~~ condition. The power must be disconnected from the port within T_{LIM}
11	Short circuit ~~load~~ duration	T_{LIM}	ms	50	70	If fault condition is detected, the power will be disconnected from the port within $T_{LIM.}$
12	Turn on rise time	T_{RISE}	uS	15		From 10% to 90% of Vport
13	Turn Off time	Toff	mSec		500	From Vport to 2.8Vdc.
14	Continuous Average Output Power	Pport	Watts	15.4		Over the range of output voltage. Averaged over 1sec.

PD Input Port Electrical requirements - Table 12

All parameters are defined for Input Voltage > 30V unless otherwise is specified.

Item	Parameter	Sym	Unit	Min	Max	Notes
1	Input voltage	V_{PORT}	Vdc	36	57	Inclusive of line, load, temperature variations.
2	Input average Power	P_{PORT}	Watts	$P_{PORT}1$	12.95	Averaged over 1sec. $P_{PORT}1 = V_{PORT} \bullet I_{PORT}$. measured when the PD is fed by 44V to 57V with 20Ω in series. I_{PORT} =10mA min for C_{port} < 180uF. I_{PORT} = 10mA • C_{port} [uF] /180 for C_{port} > 180uF. The minimum power is provided only for ease of reference, the minimum PD current draw (Table 12, item item 5a) and the V_{PORT} are the governing values.
3	a) Port Capacitance During Operation	C_{port}	uF	5	See note	PD max input capacitor value and its circuitry will be design in such a way that when a PD is connected to a PSE through series resistance of 0.1Ω to 20Ω and PSE voltage is changed from 44V to 57V, the peak current will be 0.4A max for a max duration of 50ms
	b) PD power supply input impedance from DC to f>fbw	Zin	Ω	30		a) Measured at the PD DC/DC converter input (and not at PD port) at load equivalent to P=12.95W at PD power supply input. b) For P< 12.95W the max PD power supply input impedanc e will be limit to Zin=30x12.95/P. c) The PD power supply input impedance is not including any circuitry between PD input to PD DC/DC converter input (EMI filter or PD power supply input capacitor effect etc.) d) Fbw is the crossover frequency of the DC/DC converter transfer function. e) See TBD setup in order to extract the PD power supply input impedance out of PD port input impedance measurements.
4	**Feeding through data pairs**					
	Ripple and noise, f < 500Hz.		Vpp		0.50	Common mode and/or differential noise pair to pair values. a) For all operating input voltage range as defined by item 1, and from 0.44W to max PD input power as defined by the PD class according to Table 9. ~~Applicable when feeding through signal carrying pairs.~~ b) The limits meant to ensure data integrity. To meet EMI standards, lower values may be needed.
	Ripple and noise, 20KHz - 150kHz.		Vpp		0.20	
	Ripple and noise, 150KHz-500KHz.		Vpp		0.15	
	Ripple and noise, 500KHz-1MHz.		Vpp		0.05	
	Ripple and noise, 1MHz-30MHz.		Vpp		0.05	
	Ripple and noise, 30MHz-100MHz.		Vpp		0.05	
5	a) Input current- Normal Powering Mode at PD min input voltage.	Iport	mAdc	10	350	a) Max current for PD input voltage ~~of 36V~~ higher than 37V will be equal to 12.95W/Vport for Vport>37V. b) Ripple current content (Iac) superimposed on the dc current level (Idc) is allowed if the total current (Irms) is 350mA max for a total input power of 12.95W. For Vport>37V, Irms max=12.95/Vport [Arms] c) The ac current wave form parameters is limited to the following numbers: Ip=0.4A max for 50mSec max and 5% duty cycle max. For Vport>37V, Ip=14.4/Vport [Ap] The Rms, DC and ripple current are bounded by the following equation: $Irms^2 = Idc^2 + Iac^2$.
	b) Input current range - Startup Mode	Iinrush	mA	10	400	a) Iinrush is limited by the PSE for a `duration of 50ms if C_{port} < 180uF as specified in table 5 item5. b) Iinrush must be limited by the PD if C_{port} > 180uF to the max limit as specified. c) 10mA minimum current must be maintained when measured when the PD is fed by 44V to 57V with 20Ω in series.
6	a) PD Power supply turn on voltage	Von	Vdc		42	The PD will turn on at voltage <=42V and turn off at voltage >=30V when it is fed by a 44V-57V voltage source connected through 20 ohm series resistor. The PD should turn on and off without startup oscillation and within the 1st trial at any load value.
	b) PD power supply turn off voltage	Voff	Vdc	30		