- **Summary of PSE and PD power supplies port requirements.**
- **Includes all last decisions from September 2001.**
- **Includes proposal for missing numbers and definitions**
- **Updats since September 2001 is marked with red color.**
- **Follows Tables 5,10 in Draft 1.2**

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PSE Output Port Electrical requirements - Table 5

Item	Parameter	Sym	Unit	Min	Max	Notes
1	Port 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) Settling Time~~		~~mSec~~		~~See note~~	~~From system point of view, I don't see a reason to specify short Settling Time (ms range) due to the fact that the PSE port output voltage allowed to changed between 44V to 57V and at the far end we have the DC/DC converter that should handle these variations.~~ ~~According to the above assumptions we can loosen the requirements.~~ ~~Max settling time = 1000ms max for 1% of the steady state value.~~
	c) PSE power supply output impedance	Zout	Ω		0.3	From DC to 100KHz at I5.4W load. ~~For P<15.4W, Zout max = 0.3x15.4/ P.~~ **Note that it is not a requirement for PSE output port. It is a requirement for PSE power supply output.**
3a	**Feeding through data pairs**					
	Ripple and noise, f < 500Hz.		Vpp		0.5	Common Mode / Differential Noise values. 1. Applicable when feeding through signal carrying pairs. 2. 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	
3b	**Feeding through non-data pairs**					
	Ripple and noise, 0 < f < 500Hz.		Vpp		0.5	Common Mode / Differential Noise values. 1. Applicable when feeding through Non-signal carrying pairs. 2. The limits meant to ensure data integrity. To meet EMI standards, lower values may be needed.
	Ripple and noise, 20KHz - 150kHz.		Vpp		0.5	
	Ripple and noise, 150KHz-500KHz.		Vpp		0.25	
	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	~~Port Capacitance During Detection~~	~~C_{port}~~	~~nF~~		~~530~~	Moved to Detection related tables.
5	Output current- Normal Powering Mode at PSE min output voltage.	Iport	mAdc	10	350	1. Max current for PSE output voltage higher than 44V *must be less than 350mAdc* 2. 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. 3. The PSE should support the following ac current wave form parameters: Ip=0.4A for 50mSec and 5% duty cycle. The Rms, DC and ripple current are bounded by the following equation: $Irms^2 = Idc^2 + Iac^2$
6	Output current range - Startup Mode	Iinrush	mA	400	450	For duration of 50ms min, Duty cycle = 5% min.
7	a) Power Removal mode1	I_{MIN1}	mA	0	5	must remove power for $t > T_{UDL}$
	b) Power Removal mode2	I_{MIN2}	mA	5	*10*	may or may not remove power for $t > T_{UDL}$
8	Under load time limit	T_{UDL}	mSec	300	400	The PSE will not remove power if the total current is less than 10mA for less than 300ms duration. If an Under Load condition has been detected, the PSE shall remove power within 400ms max.
9	Overload Current detection range	Icut	mA	350	400	A definition for Over Load conditions in which after time duration of Tovld the **PSE ~~may~~ disconnec**t the power from the port.
10	Overload time limit	Tovld	ms	50	70	If 350mA < Iovld <400mA for 50ms < Tovld < 70ms the PSE will disconnect the port.
11	Output current – at short load condition	I_{LIM}	mA	400	450	Max. value of the port current during short load condition. The power **must be disconnected** from the port within T_{LIM}
12	Short load duration	T_{LIM}	ms	~~50~~	70	If fault condition is detected, the power will be disconnected from the port within $T_{LIM.}$
~~13~~	~~Turn on time after successful detection~~	~~T_{ON}~~	~~mSec~~		~~400~~	~~After successful detection and (optional) classification~~
14	Turn on rise time	T_{RISE}	uS	15		From 10% to 90% of Vport
15	Turn Off time	Toff	mSec		500	From Vport to 2.8Vdc.
16	Continuous Average Output Power	Pport	Watts	15.4		Over the range of output voltage. Averaged over 1sec.
	Isolation					
17	Port to Port		Vacrms	See Section TBD		ENV A
18	Port to Port		Vacrms			ENV B
19	Port to chassis ground, PHY circuits		Vacrms			ENV A,B

PD Input Port Electrical requirements - Table 10

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	a) Input average Power	P_{PORT}	Watts	$P_{PORT}1$	12.95	Averaged over 1sec. $P_{PORT}1 = V_{PORT} \bullet I_{PORT}$. $P_{PORT}1$, V_{PORT}, I_{PORT} are 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 $C_{port > 180uF}$,
	~~b) Input average Power~~	~~P_{PORT}~~	~~Watts~~	~~$P_{PORT}1$~~	~~12.95~~	~~Averaged over 1sec.~~ ~~$P_{PORT}1 = Vport \bullet 10mA \bullet C_{port}$ [uF] /180 for $C_{port > 180uF}$,~~ ~~Measured when the PD is fed by 44V to 57V with 20Ω in series.~~
3	~~a) Port Capacitance During Detection~~	~~C_{port}~~	~~nF~~	~~50~~	~~110~~	
	b) Port Capacitance During Operation	C_{port}	uF	5	~~570~~ See note	PD max input capacitor value and its circuitry will be design in such away 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
	c) PD power supply input impedance from DC to f>fbw	Zin	Ω	30		**Measured at the PD DC/DC converter input** (and not at PD port) at load equivalent to 12.95W at PD power supply input. For P< 12.95W the max PD power supply input impedance will be limit to Zin=30x12.95/P 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.) Fbw is the crossover frequency of the DC/DC converter transfer function.
4	**Feeding through data pairs**					
	Ripple and noise, f < 500Hz.		Vpp		0.50	Common Mode / Differential Noise values. 1. Applicable when feeding through signal carrying pairs. 2. 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	1. Max current for PD input voltage higher than 37V will be equal to 12.95W/Vport for Vport>37V. 2. 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. 3. The ac current wave form parameters is limited to the following numbers: Ip=0.4A max for 50mSec max and 5% duty cycle max. The Rms, DC and ripple current are bounded by the following equation: $Irms^2 = Idc^2 + Iac^2$.
	b) Input current range - Startup Mode	Iinrush1	mA		400	Limited by the PSE for a `duration of 50ms if C_{port} < 180uF. Must be limited by the PD if C_{port} > 180uF. 10mA minimum current must be maintained when measured when the PD is fed by 44V to 57V with 20Ω in series.
	~~c) Input current range - Startup Mode~~	~~Iinrush2~~	~~mA~~		~~400~~	~~For duration of 50ms max if C_{port} > 180uF~~
6	a) PD Power supply turn on voltage	Von	Vdc	~~38~~	44	The PD will turn on at voltage <=44V 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 ~~between~~ value.
	b) PD power supply turn off voltage	Voff	Vdc	30	~~35~~	