Revised Table for improved clarity. No technical changes except what marked in RED.

Table 33–11—PSE output PI electrical requirements for all PD classes, unless otherwise specified

#	Parameter	Symbol	Units	Min	Max	PSE Type	Additional Information
5	Total output current of both pairsets of the same polarity in POWER_UP state as function of the assigned class.						
	Single Signature PD class 0-4.	Iinrush	A	0.4	0.45	All	See 33.2.7.5. See max value definition in figure 33-13.
	Single Signature PD class ~~5-8~~5-6. Dual Signature PD with the same class **per pairset, class** ~~1-5~~1-4.			0.4	0.9	3,4	
	Single Signature PD class **7-8.** Dual Signature PD with the same class **per pairset,** class 5.			0.8	0.9	4	See 33.2.7.5. See max value definition in figure 33-13. See 33.2.7.5.1 for conditions to use lower than Iinrush_min current values.
5a	Output current per pairset in POWER_UP state as function of the assigned class.						
	Dual signature PD class 0-4 with different class over each pairset.		A	0.4	0.45	**3,4**	See 33.2.7.5 See max value definition in figure 33-13.
	Single Signature PD class ~~5-8~~5-6. Dual Signature PD with the same class **per pairset,** class ~~5~~1-4.	Iinrush-2P		0.15	0.6	3,4	
	Single Signature PD class **7-8.** Dual Signature with the same class **per pairset,** class 5.			0.4	0.6	4	See 33.2.7.5. See max value definition in figure 33-13. See 33.2.7.5.1 for conditions to use lower than Iinrush_2P_min current values.

33.2.7.5 Output current in POWER_UP mode

Editor's Note: Timing requirements for 4-pair power to be added to this section.

Editor Notes:

~~1. To verify that in dual signature PD with same class i.e. same load, the PD startup is guaranteed if one of the pairsets has Inrush-2P_minz and the 2nd has the rest of the current. If both pairsets are turned on as the same time, there is no issue at all.~~

~~2.~~1. To update the definition of dual signature PD with the same class signature that it is a single load PD as opposed to dual signature PD with different class that has isolated different loads and hence end to end pair to pair resistance unbalance is zero. This will simplify the spec and make it clearer.

3~~. Table 33-11 item 5a–5d: to verify that PSE is allowed to do inrush limit with 2P mode.~~

Change the text of 33.2.7.5 as follows:

POWER_UP mode occurs on each pairset between the PSE's transition to the POWER_UP state on that pairset and either the expiration of $T_{Inrush-2P}$ or, for Type 1 and Type 2 PSEs that make use of legacy powerup, the conclusion of PD inrush currents on that pairset, (see 33.3.7.3 and legacy_powerup variable in 33.2.4.4).

Type 3 and Type 4 PSEs that apply power to both pairsets when connected to a single-signature PD shall reach POWER_ON state on both pairsets within $T_{Inrush-2P}$ max, starting with the first pairset transitioning into the POWER_UP state. ~~See legacy_powerup variable in section 33.2.4.4 for more information on the POWER_UP to POWER_ON transition.~~

The PSE shall limit ~~the maximum current sourced per pairset (~~Inrush-2P~~)~~ and ~~the total inrush current (~~Iinrush~~)~~ during POWER_UP per the requirements of Table 33-11~~, item 5 or items 5a and item 5b or items 5c and item 5d.~~ The maximum inrush current sourced by the PSE per pairset shall not exceed the per pairset PSE inrush template in Figure 33–13 and Equation (33–5)~~, when operating class 0-4 PDs and Figure 33-13 and equation (33-5a) when operating single-signature PDs with class 5 and above or when operating dual-signature PDs with the same class over each pairset.~~

The minimum value of Iinrush-2P includes the effect of end to end pair to pair resistance unbalance.

Replace Figure 33-13 with the following:

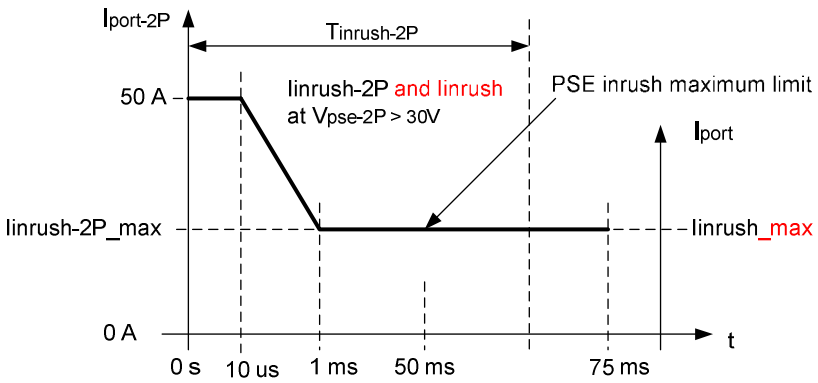

Figure 33-13 – Iinrush-2P and Iinrush current and timing limits, per pairset in POWER_UP

The PSE inrush maximum limit, $I_{PSEIT-2P}$, is defined by the following segments:

Replace equation 33-5 with the following:

$$I_{PSEIT\text{-}2P}(t) = \begin{cases} 50.0 & \text{for } 0 < t < 10.0\times10^{-6} \\ \text{TBD=function of (t, Iinrush-2P\_max)} & \text{for } 10.0\times10^{-6} \le t < 0.001 \\ \text{Iinrush-2P\_max} & 0.001 \le t < 0.075 \end{cases}_{A} \qquad (33\text{–}5)$$

$$I_{PSEIT-2P}(t) = \begin{cases} 50 & for\ \ 0 < t < 10\times10^{-6} \\ y1 + \dfrac{(50 - y1)\times(0.001 - t))}{99\times10^{-5}} & for\ \ 10\times10^{-6} < t < 0.001 \\ y1 & for\ \ 0.001 < t < 0.075 \end{cases} \qquad (33\text{-}5)$$

The variable y1 is the maximum value of Iinrush-2P or Iinrush provide in Table 33-11.

Where *t* is the time in seconds

~~Editor Note: To update the TBD in equation 33-5. Add Equation 33-5a after equation 33-5 to describe the template of figure 33-13 for Iinrush.~~

The minimum inrush requirement is a function of pairset voltage and is as follows:

a) During POWER_UP, for pairset voltages between 0 V and 10 V, the minimum $I_{Inrush\text{-}2P}$ requirement is 5 mA.
b) During POWER_UP, for pairset voltages between 10 V and 30 V, the minimum $I_{Inrush\text{-}2P}$ requirement is 60 mA.

c) During POWER_UP ~~for class 4 and below~~, for pairset voltages above 30 V, the minimum I_{Inrush} and $I_{Inrush\text{-}2P}$ requirement ~~is~~ are ~~as~~ specified in Table 33–11items 5 and 5a.

~~During POWER_UP for class 5 and above, for pairset voltages above 30 V, the minimum $I_{Inrush\text{-}2P}$ and I_{Inrush} requirement are as specified in Table 33–11item 5a and item 5b or as specified in Table 33–11 items 5c and 5d.~~

d) For Type 1 PSE, measurement of minimum $I_{Inrush\text{-}2P}$ requirement to be taken after 1ms to allow startup transients. A Type 2 PSE that uses Single-Event Physical Layer classification, and requires the 1 ms settling time, shall power up a Class 4 PD as if it used Multiple-Event Physical Layer classification.

33.2.7.5.1 Iinrush-2P minimum and Iinrush minimum requirements

~~Type 4 PSEs supporting Class 7 and 8 when implementing Iinrush-2P and Inrush requirements per Table 33-11 items 5a and 5b and when connected to single signature PD through channel resistance of 0.1Ω to 12.5Ω per pairset, shall successfully power up within 50msec without startup oscillations a PD with Cport per pairset as defined in 33.3.7.3 in parallel to a Class 2 load during POWER_UP period in addition to the other requirements of 33.3.7.~~

A Type 4 PSE, when connected to a single signature PD with assigned Class 7 or 8, may optionally implement a minimum Iinrush-2P and Inrush lower than defined in Table 33-11 item 5a and 5 but not less than 0.15A and 0.4A respectively. When Type 4 PSE is connected to a single signature PD with assigned Class 7 or 8 and use lower Iinrush-2P and Inrush than defined in Table 33-11 it shall successfully power up a single-signature PD comprised of a parallel combination of Cport per pairset as defined in 33.3.7.3 and a Class 2 load within Tinrush-2p min without startup oscillations during the POWER_UP period, when connected to the PD through channel resistance of 0.1Ω to 12.5Ω per pairset.

Table 33-18 per D1.5 with editing changes for simplifying the table

Table 33–18—PD power supply limits

Item	Parameter	Symbol	Unit	Min	Max	PD Type	Additional Information
Input Inrush current							
5+5a 5	Single signature PD class 0-40-6. Single Signature PDs Class 5-6 Dual Signature PDs with the same class, class 1-4.	Inrush-PD	A		0.4	1,2 All	Peak value see 33.3.7.3
5c	Single Signature PDs Class 7-8. Dual Signature PDs with the same class, class 5.	Iinrush-PD			0.8	4	
Input Inrush current per pairset							
Was part of 5	Dual signature PDs with different class over each pairset.	Inrush-PD-2P			**0.4**	**3**	Peak value see 33.3.7.3
5b 5a	Single Signature PDs Class 5-6 Dual Signature PDs with the same class.				0.3/ TBD	3,4	
5d	Single Signature PDs Class 7-8. Dual Signature PDs with the same class, class 5.				0.6	4	

33.3.7.3 Input inrush current

Replace first paragraph of Section 33.3.7.3 with the following g:

Inrush current is drawn during the startup period beginning with the application of input voltage at the PI compliant with Vport_PD-2P requirements as defined in Table 33–16a, and ending when CPort has reached a steady state and is charged to 99% of its final value. This period shall be less than TInrush-2P min per Table 33–11. All PDs shall consume maximum of ~~Class 3~~Type 1 power for at least Tdelay-2P min. This allows the PSE to properly complete inrush.

Editor's Note: This paragraph has changed as a result of MR1277. Do not change this paragraph without consulting the request of MR1277.

Change second, third and fourth paragraph of Section 33.3.7.3 as follows:

Tdelay-2P for each pairset starts when VPD-2P crosses the PD power supply turn on voltage, VOn_PD. This delay is required so that the Type 2, Type 3 and Type 4 PD do~~es~~ not enter a high power state before the PSE has had time to switch current limits on each pairset from IInrush-2P to ILIM-2P.

Input inrush current at startup Iinrush-PD and Iinrush-PD-2P ~~is~~are limited by the PSE if CPort per pairset < 180 µF for:

a) single-signature PDs assigned Class 0-6 or
b) dual-signature PDs assigned class 1-5.

and if CPort per pairset < 360uF for single-signature PDs assigned Class 7-8, as specified in Table 33–11.
If CPort per pairset is larger~~≥ 180 µF~~, input inrush current shall be limited by the PD so that IInrush_PD and Iinrush-PD-2P max is satisfied.

~~For Type 3 and 4 PDs operating class 1–5 dual signature PDs:~~
~~Input inrush current at startup is limited by the PSE if CPort per pairset< 180 µF, as specified in Table 33–11.~~

~~If CPort per pairset ≥180 µF, input inrush current shall be limited by the PD so that IInrush_PD and Iinrush-PD-2P-max is satisfied.~~

~~For Type 4 PDs operating class 7 and 8 single signature PDs:~~
~~Input inrush current at startup is limited by the PSE if CPort per pairset < 360 µF, as specified in Table 33–11.~~
~~If CPort per pairset ≥360 µF, input inrush current shall be limited by the PD so that IInrush_PD and Iinrush-PD-2P-max is satisfied.~~

Insert the following note at the end of section 33.3.7.3 as follows:

NOTE— PDs may be subjected to PSE POWER_ON current limits during inrush when the PD input voltages reaches 99% of steady state or after Tinrush-2p min. See 33.2.7.4 for details.

CPort in Table 33–18 is the total PD input capacitance during POWER_UP and POWER_ON states that a PSE encounters when operating one or both pairsets, when connected to a single-signature PD. When PSE is connected to dual-signature PDs, CPort value requirements are specified in 33.3.7.6.

********** END OF BASELINE TEXT **********

126 ## Annex A: D1.5 : Table 33-11 for reference.

#	Parameter	Symbol	Units	Min	Max	PSE Type	Additional Information
5	Output current in POWER_UP state	Iinrush	A	0.4	0.45	All	For Class 0-4 single signature PDs. For dual sig-nature PDs with different class over each pairset, this requirement applies over each pairset. See 33.2.7.5. See max value definition in Figure 33– 13.
5a	Output current in POWER_UP state	Iinrush	A	0.4	0.9	3,4	For ≥ class 5 single signatures PD. For dual signature PD with the same class per pairset. Total current for both pairsets. See 33.2.7.5. See max value definition in Figure 33-13.
5b	Output current per pairset in POWER_UP state	Iinrush-2P	A	0.150	0.6	3,4	For ≥ class 5 single signatures PD. For dual signature PD with the same class per pairset. See 33.2.7.5. See max value definition in Figure 33-13.
5c	Output current in POWER_UP state	Iinrush	A	0.8	0.9	4	For class 7 and 8 PDs For dual signature PD with the same class per pairset. Total current for both pairsets See 33.2.7.5. See max value definition in Figure 33-13.
5d	Output current per pairset in POWER_UP state	Iinrush-2P	A	0.4	0.6	4	For class 7 and 8 For dual signature PD with the same class per pairset. See 33.2.7.5. See max value definition in Figure 33-13

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Table 33-18 per D1.5 with Typo corrections

Item	Parameter	Symbol	Unit	Min	Max	PD Type	Additional Information
5	Input Inrush current	Iinrush-PD	A		0.4	~~1,2.~~ All	Peak value see 33.3.7.3 For single signature PD class 0-4.
	Input Inrush current per pairset	Inrush-PD-2P			0.4	All	For dual signature PDs with different class over each pairset, this requirement applies over each pairset.
5a	Total Inrush current	Iinrush-PD			0.4	3,4	Peak value see 33.3.7.3 Single Signature PDs Class 5-6 Dual Signature PDs with the same class.
5b	~~Total inrush current~~ Input Inrush current per pairset	Iinrush-PD_2P			0.3/ TBD	3,4	Peak value see 33.3.7.3 Single Signature PDs Class 5-6 Dual Signature PDs with the same class.
5c	Total Inrush current	Iinrush-PD			0.8	4	Peak value see 33.3.7.3 Single Signature PDs Class 7-8. Dual Signature PDs with the same class.
5d	Input Inrush current per pairset	Iinrush-PD_2P			0.6	4	Peak value see 33.3.7.3 Single Signature PDs Class 7-8. Dual Signature PDs with the same class.