



IEEE802.3af, July 2001

IEEE 802.3af DTE Power via MDI Port to Port Cross Regulation

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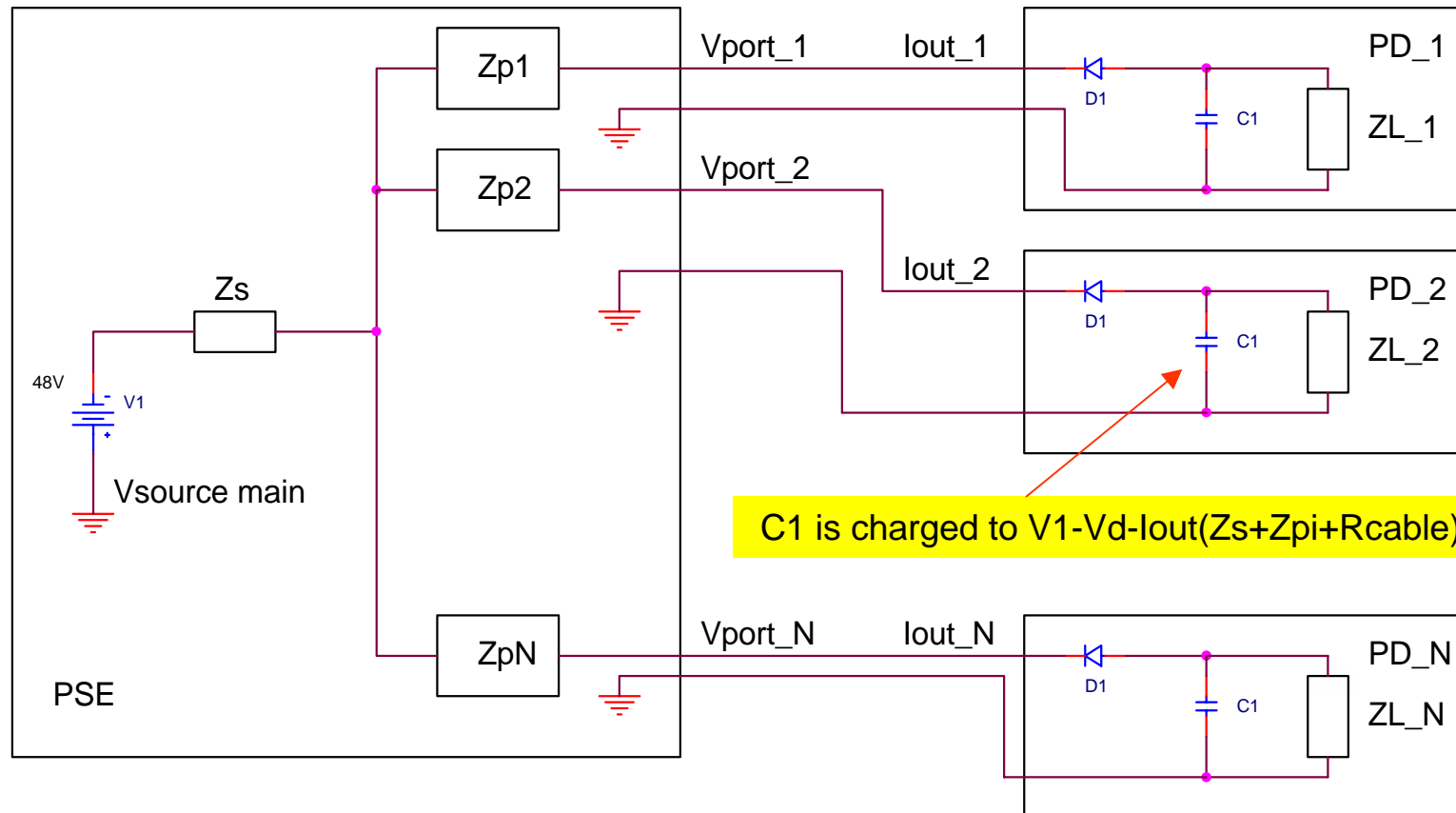
Detailed discussion can be found at "Port to Port Cross Regulation", located at "Document" folder of the 802.3af web site.



Objectives

- Specify the single port load regulation requirements
- Closing the requirement for disconnect detection by sensing the current
- **Strategy**
- Present the reason for the need to be tolerant to current transients
- Description of the need to handle Port to Port Cross Regulation

Port to Port Cross Regulation During Normal Feeding Mode



Problem definition:

1. Load changes at port N affects port M output voltage through a common main power source
2. Variations in port M output voltage generates positive and/or negative current transients

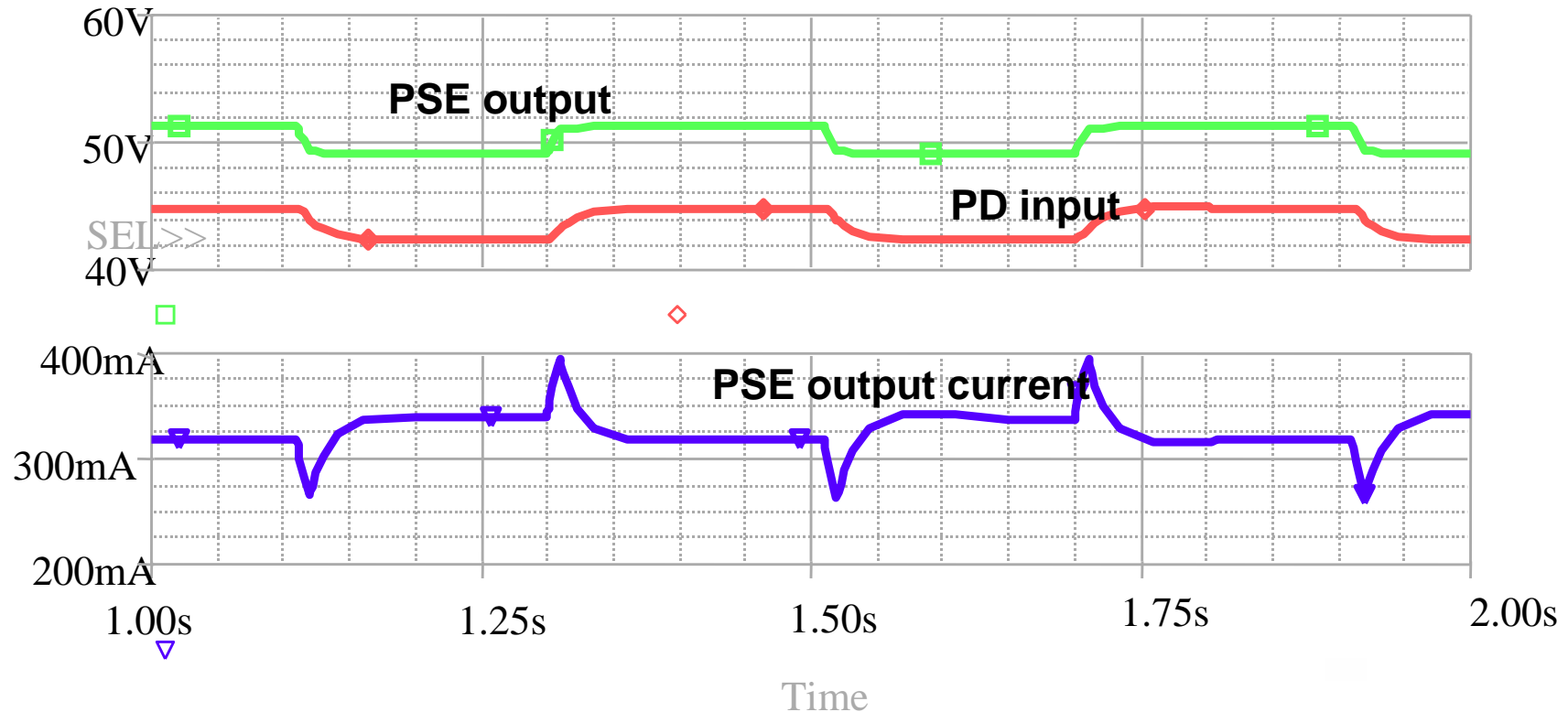


System Parameters affected by Port to Port Cross-Regulation.

- Max peak current and its duration during normal powering mode
- Zero current duration allowed without disconnecting the port
- Max. Value of PD input capacitor



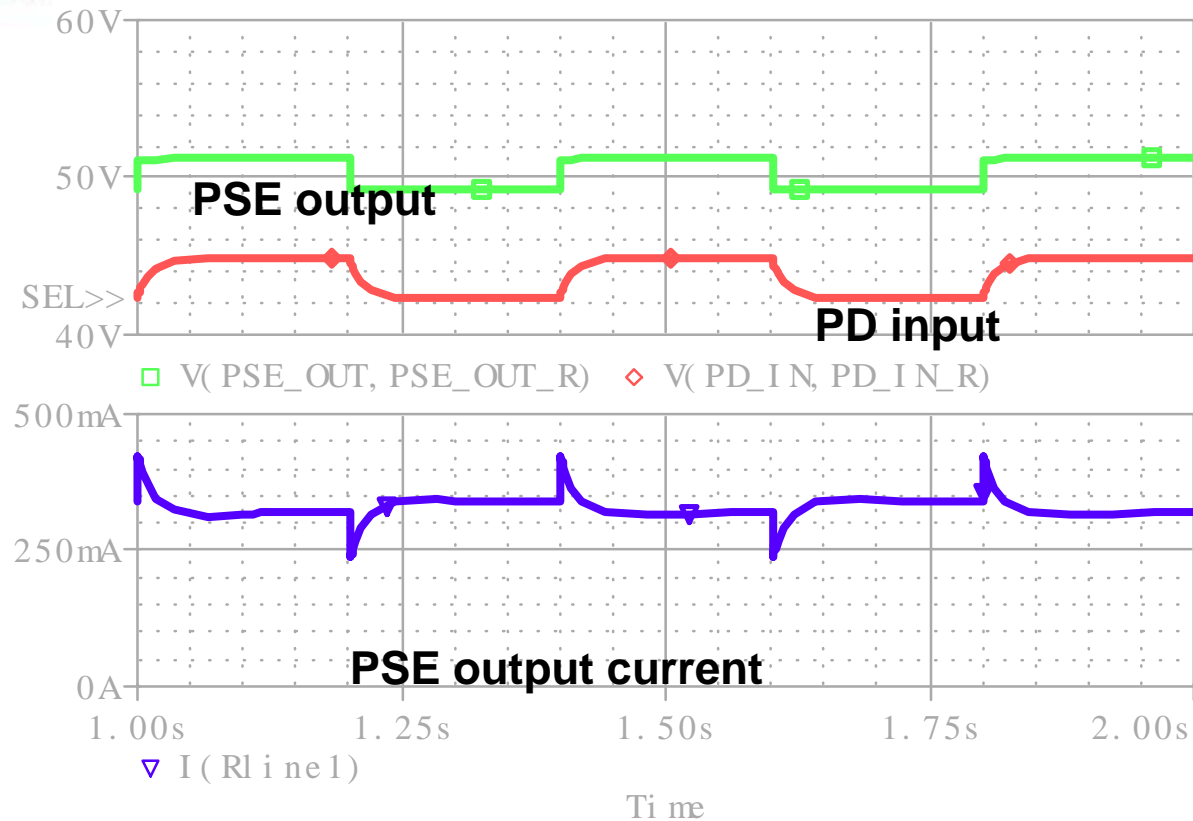
Simulations Results - 1



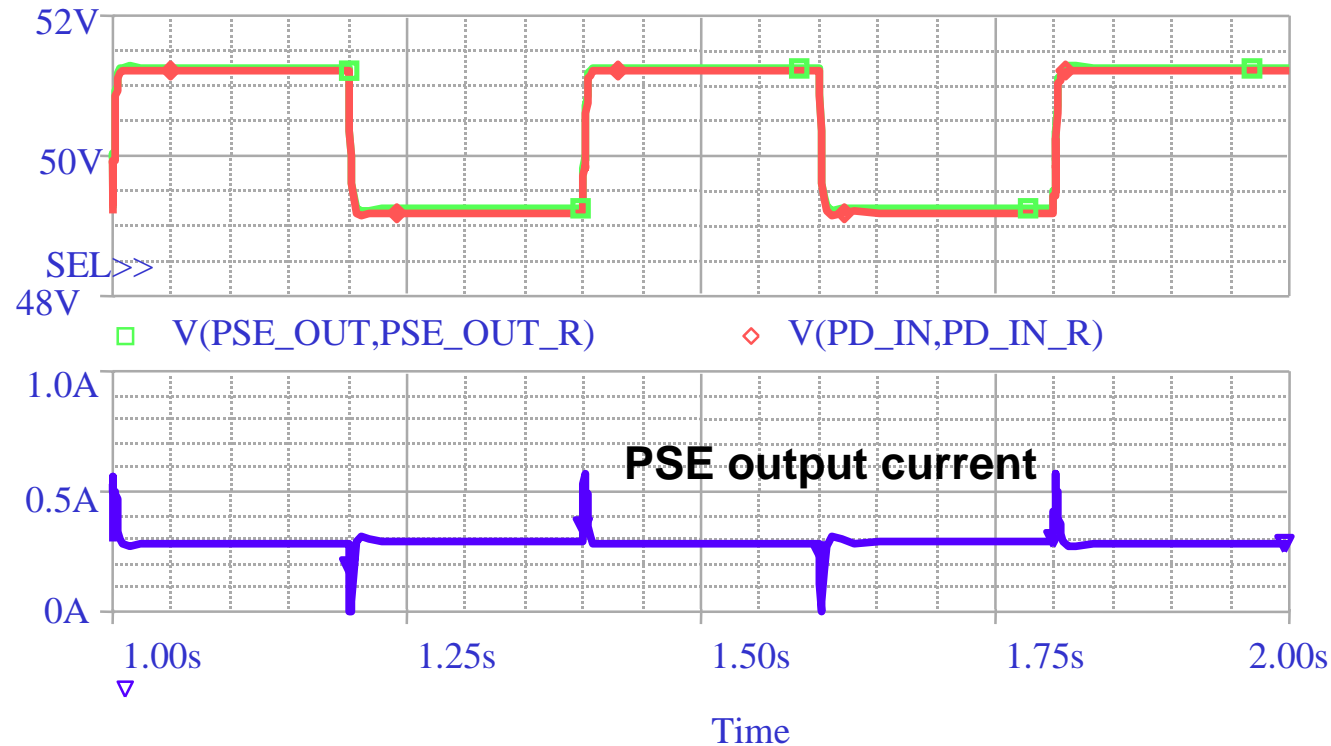
- PSE output $dV/dT = 2V/10mSec$, PD Input capacitor=470uF, Cable length=100m.
- PD at full load condition
- Requirement: Continuous operation under the above conditions



Simulations Results - 2



- PSE output $dV/dT = 2V/1mSec$, PD Input capacitor=470uF, Cable length=100m.
- PD at full load condition
- No change compared to previous conditions



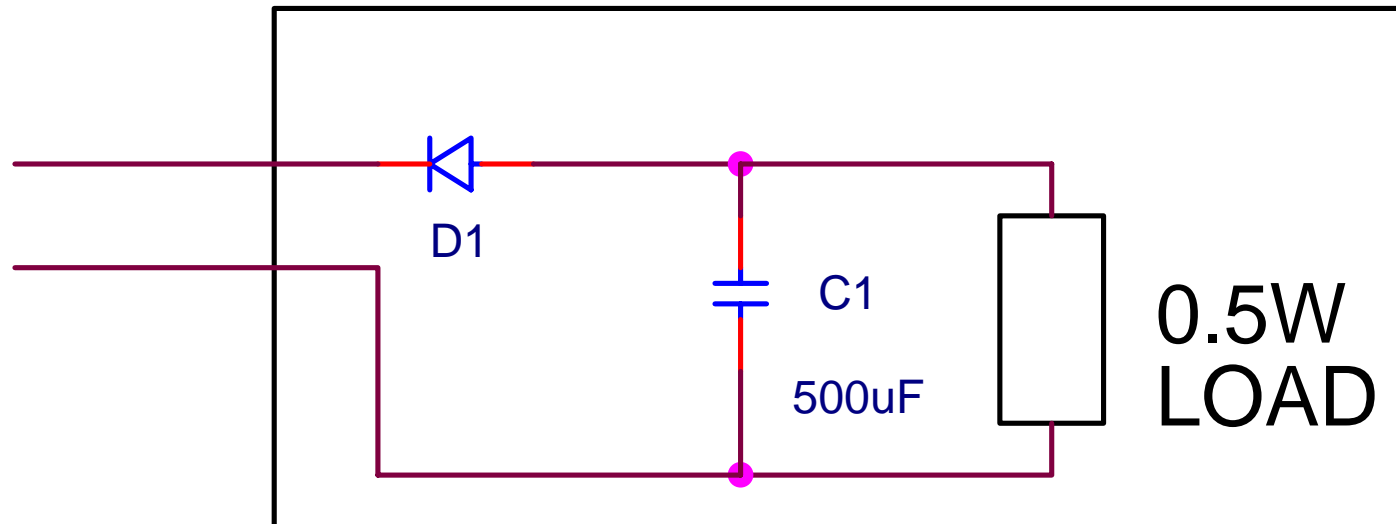
- PSE output $dV/dT = 2V/1mSec$, PD Input capacitor=470uF, Cable length=1m.
- PD at full load condition
- Sensitive to cable length

Simulations Results - 4



- PSE output $dV/dT = 2V/1\text{mSec}$, PD Input capacitor=470uF, Cable length=1m.
- PD at min load condition
- Sensitive to cable length

PD Load setup definition



- Required to test negative current transients at worst case conditions.

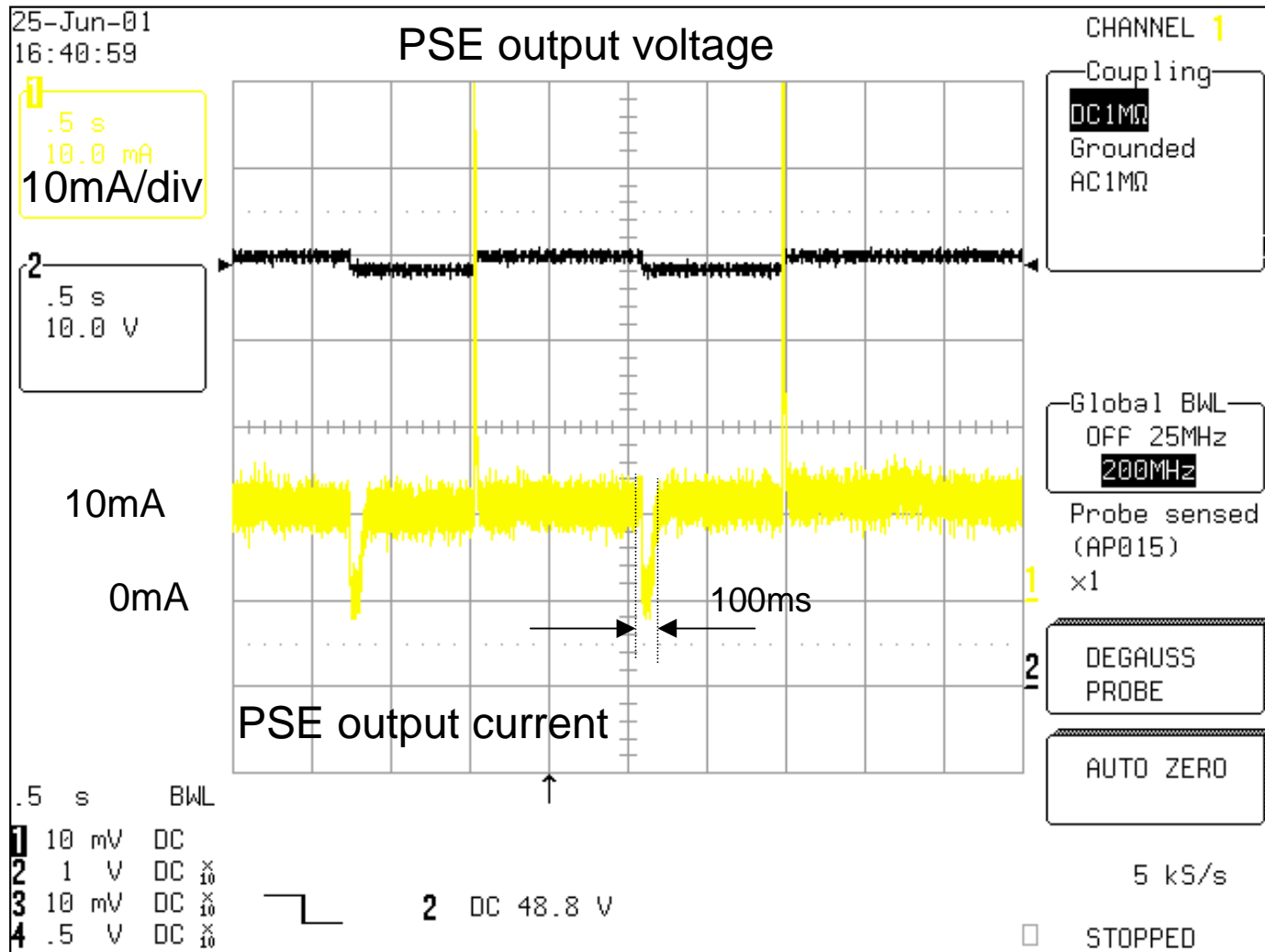


- Test # 1 Results
- Test # 1 measures the load regulation results of real system.
- Load changes from 200Watts to 5Watts and from 5Watts to 200Watts changes PSE main power supply by 200mVp max. and settling time to steady state was 20mS max.

- Test # 2 Results
- Test # 2 measures the peak to peak voltage changes required to generate negative current transients with 100ms max time duration.
- The max drop voltage allowed generating zero current for 100ms max. was 1.5V.



Lab Results



Port to Port Cross Regulation. Yair Darshan, PowerD sine. Rev-000

Detailed discussion can be found at "Port to Port Cross Regulation", located at "Document" folder of the 802.3af web site.



Conclusions

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- PSE output port load regulation must be defined
 - max dV/dT need to be defined.

- PSE need to maintain continuous operation under positive or negative current transient
 - PSE will turn off the port if $I_{out} < 10\text{mA}$ for $T_{undl} > T_{d2}$
 - For each 500 μF , 10mA minimum load is required. (20mA@1000 μF)

 - PSE will turn off the port if $I_{out} > I_p$ for $T_{ovld} > T_{d1}$
 - Limitations on PD input capacitor.
 - Option A: PD input capacitor need to be limited + dV/dT must specified
 - Option B: PSE manufacture will specify max PD input capacitor supported by its hardware. (*)

- (*) Similar to the total power sum of all ports operating simultaneously.



Suggested Requirements for 802.3af

Option 1:

- 1-1 PSE output port line/load/cross regulation : +1V max. settling time to steady state < 50ms.
-1V max. settling time to steady state < 100ms.
- 1-2 PSE will disconnect the port if the current is below 10mA from time duration > 100ms.
- 1-3 PSE will not disconnect the port during positive current transient for a time duration < 50ms
- 1.4 For each 500uF at PD input, min current required to be 10mA. (for 1000uF, 20mA is required)

Option 2:

- 2-1 PSE output port line/load/cross regulation : +2V max. settling time to steady state < 50ms.
-2V max. settling time to steady state < 200ms.
- 2-2 PSE will disconnect the port if the current is below 10mA from time duration > 200ms.
- 2-3 PSE will not disconnect the port during positive current transient for a time duration < 50ms
- 2.4 For each 500uF at PD input, min current required to be 10mA. (for 1000uF, 20mA is required etc.)

Both for options 1,2 (relevant for positive transient).

- 3. PSE vendor should specify the max. load capacitance supported by each port **or** PD input cap max value must be limited.
If PD input cap max value will be limited, than PSE output voltage rate of change should be limited to 0.1V/ms.