Ripple and Noise

IEEE 802.3at Task Force

Anoop Vetteth

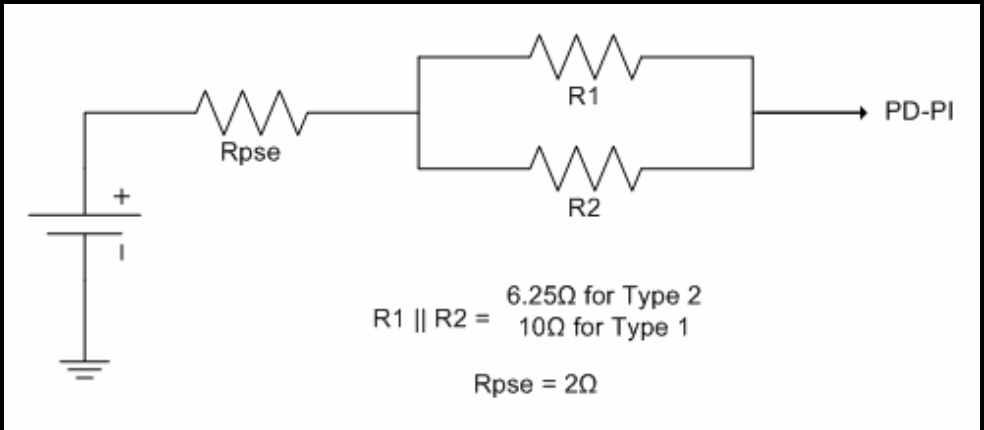
Ripple Specification in the Draft

The specification for ripple and noise in Table 33-17 shall be for the common-mode and/or differential pair-to-pair noise at the PD PI generated by the PD circuitry.

Table 33-17 Item 10

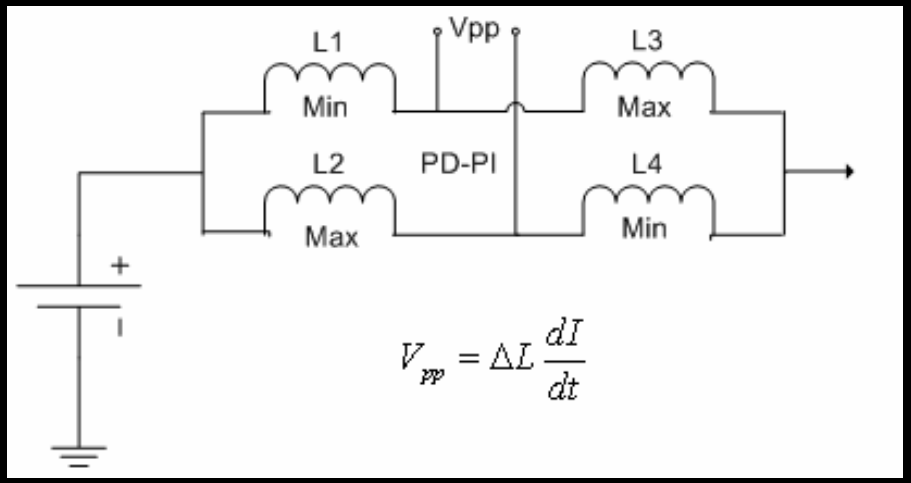
Ripple and Noise	Unit	Max Value
<500 Hz	Vpp	0.5
500Hz to 150 KHz		0.2
150kHz to 500 kHz		0.15
500kHz to 1MHz		0.1

Common Mode – Worst Case



Ripple and Noise	Vpp V	Ipp (Type 1) mA	Ipp (Type 2) mA
<500 Hz	0.5	42	61
500Hz to 150 KHz	0.2	17	24
150kHz to 500 kHz	0.15	12.5	18
500kHz to 1MHz	0.1	8	12

Differential Mode – Worst Case



OCL(max) = 1.4mH

ΔL(max) = 3% of 0.7mH

= 0.021mH

di/dt(max) = 15mA/us

Vpp(max) = 0.021mH x 15mA/us = 0.315V

0.315V > Permissible Vpp for 500Hz to 1MHz

Permissible max Vpp for any freq = 0.1V

Margin to account for di/dt caused by transient at PSE = 50%

di/dt(max) for ripple current = 0.1V x 50% / 0.021mH = 2.4mA/us

Recommendations

- Change Vpp in Table 33-17 to Ipp as shown in table on slide 3 of this presentation
- Maximum permissible transient current for a PD is 2.4mA/us

Section 33.3.7.4 (Peak Operating Power)

- Definition of Iport in case of ripple current is incorrect

$$I_{port} = \sqrt{(I_{port\_dc})^2 + (I_{port\_ac})^2}$$

Equation 33-6

- Ripple current does not draw any additional average power from the PSE
- Add following equation to 33.2.9.5:

$$P_{port\_PSE} = \left(\frac{V_{PSE} - \sqrt{V_{PSE}^2 - 4(R_{ch})(P_{PD\_Class} + (R_{ch} I_{port\_ac}^2))}}{2(R_{ch})} \right) \times V_{PSE}$$