

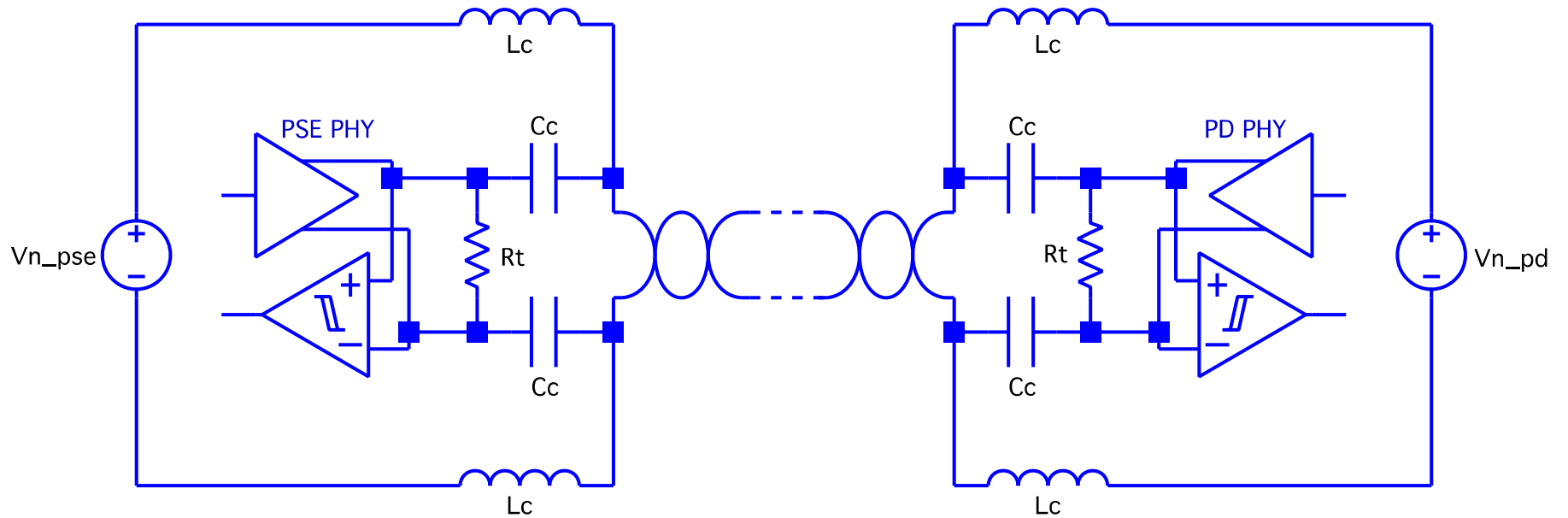
# PoDL - 1000Base-T1 Liaison Report

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# Contribution to the EMC Ad Hoc

- PoDL will add noise to the 1000Base-T1 link
  - Noise originates from the PoDL power supply circuitry
- Most of the noise power will be at low frequencies relative to 1000Base-T1 data frequencies
- Additional filtering will be performed by the coupling network that attaches the PoDL subsystem to the wire

# Simplified PoDL Coupling Network



# Proposed PoDL Noise Limits

- Taken directly from Clause 33 (PoE):

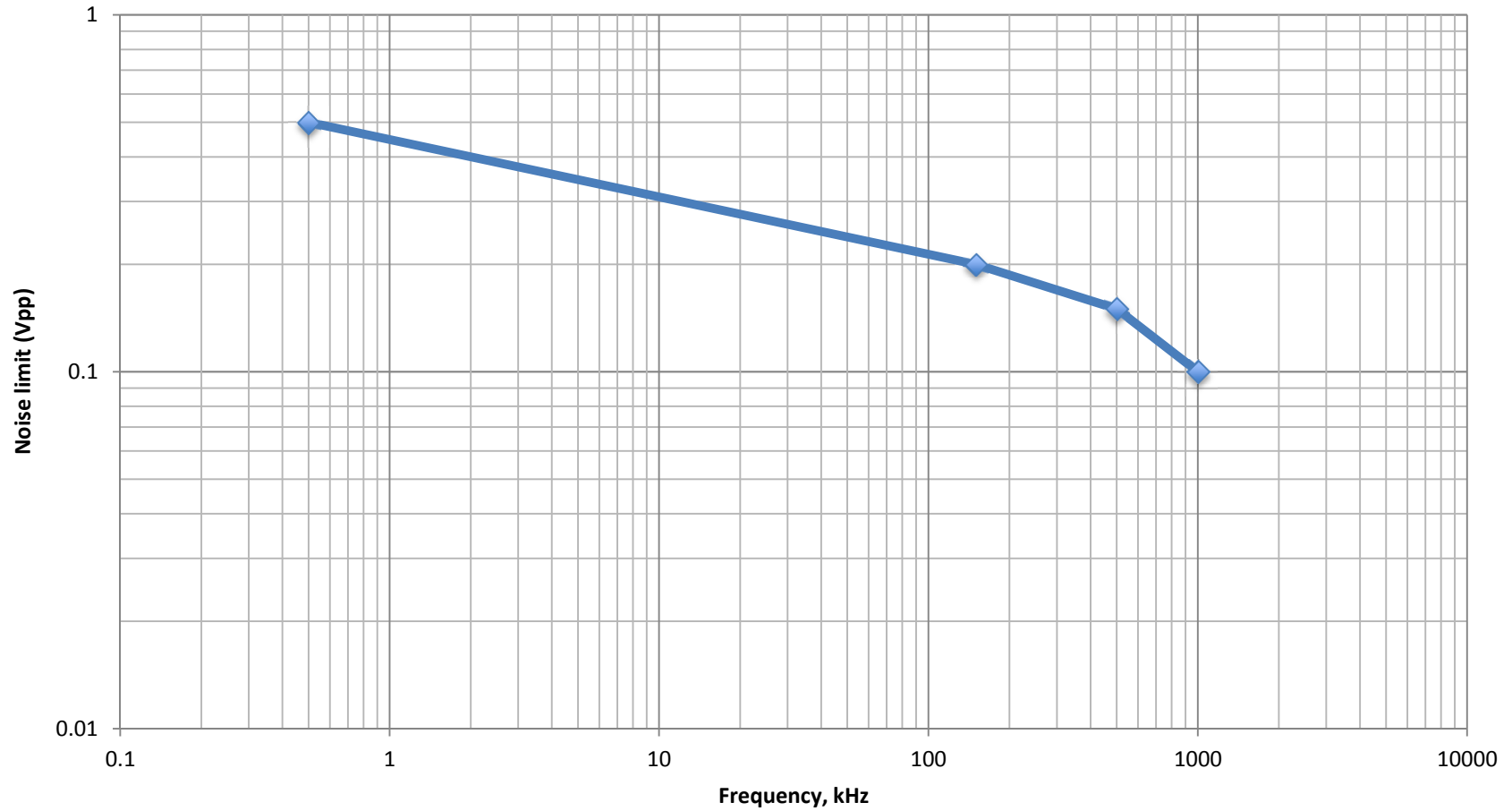
**Table 33–11—PSE output PI electrical requirements for all PD classes, unless otherwise specified**

| Item | Parameter  | Symbol          | Unit     | Min  | Max                         | PSE Type | Additional information |
|------|--|-----------------|----------|------|-----------------------------|----------|------------------------|
| 1    | Output voltage in the POWER_ON state                   | $V_{Port\_PSE}$ | V        | 44.0 | 57.0                        | 1        | See 33.2.7.1.          |
|      |  |                 |          | 50.0 | 57.0                        | 2        |                        |
| 2    | Voltage transient below $V_{Port\_PSE\ min}$           | $K_{Tran\_lo}$  | %        |      | 7.6                         | 2        | See 33.2.7.2.          |
| 3    | Power feeding ripple and noise:                        |                 |          |      |                             |          |                        |
|      | $f < 500\ Hz$  |                 |          |      | 0.500                       | 1, 2     | See 33.2.7.3.          |
|      | 500 Hz to 150 kHz                                      |                 | $V_{PP}$ |      | 0.200                       |          |                        |
|      | 150 kHz to 500 kHz                                     |                 |          |      | 0.150                       |          |                        |
|      | 500 kHz to 1 MHz                                       |                 |          |      | 0.100                       |          |                        |
| 4    | Continuous output current capability in POWER_ON state | $I_{Con}$       |          | A    | $P_{Class} / V_{Port\_PSE}$ |          | 1, 2                   |

# Notes for 33-11

- 33.2.7.3 Power feeding ripple and noise
  - The specification for power feeding ripple and noise in Table 33–11 shall be met for common-mode and/or pair-to-pair noise values for power outputs from (IHold max × VPort\_PSE min) to PType min for PSEs at static operating VPort\_PSE. The limits are meant to preserve data integrity. To meet EMI standards, lower values may be needed. For higher frequencies, see 33.4.4 and 33.4.5.
- 33.4.4, 33.4.5 are not directly applicable to PoDL

# Noise Limit Curve



# Notes

- Noise is specified as  $V_{pp}$  in PoE/PoDL
  - Source impedance is very low at low frequencies so spec is voltage, not power
  - Crest factor is fairly low since power supply output is typically a filtered pulse train
- Noise is specified at the output of the PoDL subsystem before the coupling network
- Clause 33 PoE spec effectively stops at 1MHz
  - Reasonable to assume that noise will continue with similar amplitude to ~10MHz
  - Coupling network should provide significant attenuation at 10MHz and beyond

# Direct Vbat Connection

- Previous slides assume PoDL power is provided by a dedicated voltage regulator in the PSE
- Some systems may connect directly to Vbat without a regulator at the PSE end
  - Low frequency noise (below 150kHz) may be substantially higher in this case
  - The PoDL group will attempt to gather better data on this case for the next ad hoc meeting



# Next Steps: Noise

- Calculate required coupling network cutoff frequencies to ensure data integrity
- If inductor values are reasonable, no further work is required
- If inductor values are unreasonable with the proposed noise limits, please propose new limits to 802.3bu
- 802.3bu will evaluate feasibility of lower noise limits as required