# Maximum PSE Voltage

## Revisiting the 50 Volt Maximum

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2025-11-13

# D3.1 Comment

- Comment 28 against D3.1 called the values in Table 189-1 into question, causing further review of the system parameters.

*Cl* **189** *SC* **189.3** *P* **140** *L* **7** # R1-28

Peker, Arkadiy microchip

*Comment Type* **T** *Comment Status* **R** *Power*

It is not clear how some parameters in this table were derived? For example, our calculation based on 4 Ohm cable DC loop resistance and 17 mated connectors (and compensation components ) with 150mOhm resistance provides different values for Vmpd_min and Impse_min.Another issue with cable + connectors resistance for Type 0 and 1.Type 0: (Vmpse_min-Vmpd_min)/Impse_min=(21.6V-16V)/1.1A=5.09 Ohm Type1:(Vmpse_min-Vmpd_min)/Impse_min=(45V-35.5V)/1.76A=5.39 Ohm Should be this values to be equal?

*SuggestedRemedy*

Provide Annex with example of mixing segments power calculation.

*Response* *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

# D3.0 Comment

- Comment 42 against D3.0 suggested that alignment with Four-Pair PoE voltages was preferred, but the comment was rejected.

*Cl* **189** *SC* **189.3** *P* **135** *L* *#* I-42

Peker, Arkadiy microchip

*Comment Type* **T** *Comment Status* **R** *Pwr-limits*

Table 189-1. Type 1 voltage range is too tight for regular commercial power supply

*SuggestedRemedy*

We propose to increase Type 1 voltage range up to 57V. Alsso paragraph 189.6.3 Fault tolerance require MPSE and MPD tolerate 60V. See Slide 4 in presentation

*Response* *Response Status* **C**

REJECT.

The CRG disagrees with the Commenter that raising the voltage to 57V is necessary or appropriate to simplify choke design. Changing the voltage also potentially affects interoperability and regional regulatory compliance. The architecture of a multidrop mixing segment allows an MPoE device to be connected to an existing energized network, which differs from a link segment with one PoE device. MPoE output voltage is limited to 50V to align with regional regulations.

# Background

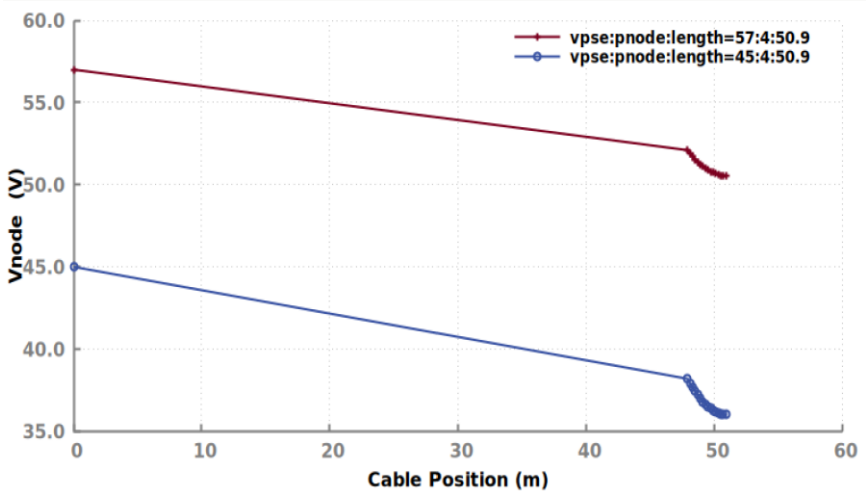
- Type 1 MPSE Maximum Voltage was set to 50 Volts to comply with certain jurisdictional limits on unguarded voltage
  - PoE only energizes above this threshold when the connectors are all fully mated and is below the threshold during detection
  - MPoE allows a hot-add, resulting in the possibility of Maximum MPSE Voltage being present on unguarded contacts

# Reconsidering the Rejection

- Since the comment rejection, additional discussions with potential implementers of MPoE revealed additional support for the commenter's perspective. Two key facts were persuasive for me:
  - The international industrial Ethernet market has only recently, and begrudgingly, adopted 55 V power supplies to enable Four-Pair PoE in cabinets. This was necessary because many industrial switches utilize external isolated PoE power supplies. Mandating a new 48 V power supply in the cabinet will almost certainly kill MPoE adoption.
  - Industrial Ethernet switches have already been placed on the market that operate outside of the IEEE 802.3 PoE standard to allow sub-50 V operation to comply with regulations where required in a subset of the market.

# Power Budgeting for Type 1

- Requirement to reach 50m with 16 nodes
  - Assume 50m 20AWG cable @ 65C =~ 4Ω
  - Assume 20cm node separation
  - 16 Nodes at end of mixing segment




| Vpse | Ppse | Pmpd | Ploss | Ipse | Rchan | Vlast | Ilast | vpse | pnode | length |
|---|---|---|---|---|---|---|---|---|---|---|
| 57.000 | -71.417 | 64.000 | -7.417 | -1.253 | 4.000 | 50.529 | 0.079 | 57 | 4 | 50.9 |
| 45.000 | -78.341 | 64.000 | -14.341 | -1.741 | 4.000 | 35.997 | 0.111 | 45 | 4 | 50.9 |

Slide contributed by Michael Paul, Analog Devices

Updated version of https://www.ieee802.org/3/da/public/0525/paul_01_da_20250513_v0.pdf

# Suggested Remedy

To improve adoptability in the market of MPoE, as well as encourage compatibility with existing IEEE 802.3 Four-Pair PoE systems, I suggest that we raise the MPoE $V_{MPSE}$ Max to 57 Volts.

Remedy: Change Table 189-1, 189-5, and 189-9 as shown:

**Table 189–1—System power types**

| | 30 V Max MPSE (Type 0) | ~~50 V~~ Max MPSE (Type 1) | Units |
|---|---|---|---|
| $V_{MPSE}$ max | 30 | ~~50~~ 57 | V |
| $V_{MPSE}$ min | 21.6 | 45 | V |
| $V_{MPD}$ min | 16 | 35.5 | V |
| $I_{MPSE}$ min | 1100 | ~~1760~~ 1750 | mA |
| $P_{MPSE}$ min | 23.76 | ~~79.2~~ 78.75 | W |
| $P_{MPD\_1U}$ max | 1.1 | 4 | W |

NOTE—Multiplying the minimum MPD voltage and current does not yield the required MPSE power because the power calculations for multidrop systems are not linear equations. As power is delivered to each MPD along the mixing segment, the current through the remaining portion of the mixing segment is reduced. In systems with fewer than 16 unit loads, values such as $V_{MPD}$ and the power available to the MPD(s) will rise.

**Table 189–5—MPSE output requirements**

| Item | Parameter | Symbol | Unit | Min | Max | Type | Additional Information |
|---|---|---|---|---|---|---|---|
| 1 | DC output voltage during POWER_ON state | $V_{MPSE}$ | V | 21.6 | 30 | 0 | |
| | | | | 45 | ~~50~~ 57 | 1 | |
| 2 | Continuous output capability in POWER_ON state | $P_{MPSE}$ | W | 23.76 | — | 0 | See 189.4.7 |
| | | | | ~~79.2~~ 78.75 | — | 1 | |

**Table 189–9—MPD power supply limits**

| Item | Parameter | Symbol | Unit | Min | Max | Type | Additional Information |
|---|---|---|---|---|---|---|---|
| 1 | Input voltage[a] | $V_{Port\_MPD}$ | V | 16 | 30 | 0 | |
| | | | | 35.5 | ~~50~~ 57 | 1 | |
| 2 | Unit power | $P_{MPD\_1U}$ | W | — | 1.1 | 0 and 0/1 | 1 unit load |
| | | | | — | 4 | 1 | 1 unit load |
| 3 | Unit loading | $N_{unit}$ | - | 1 | 16 | ALL | See 189.5.5.3 |

# Questions?