

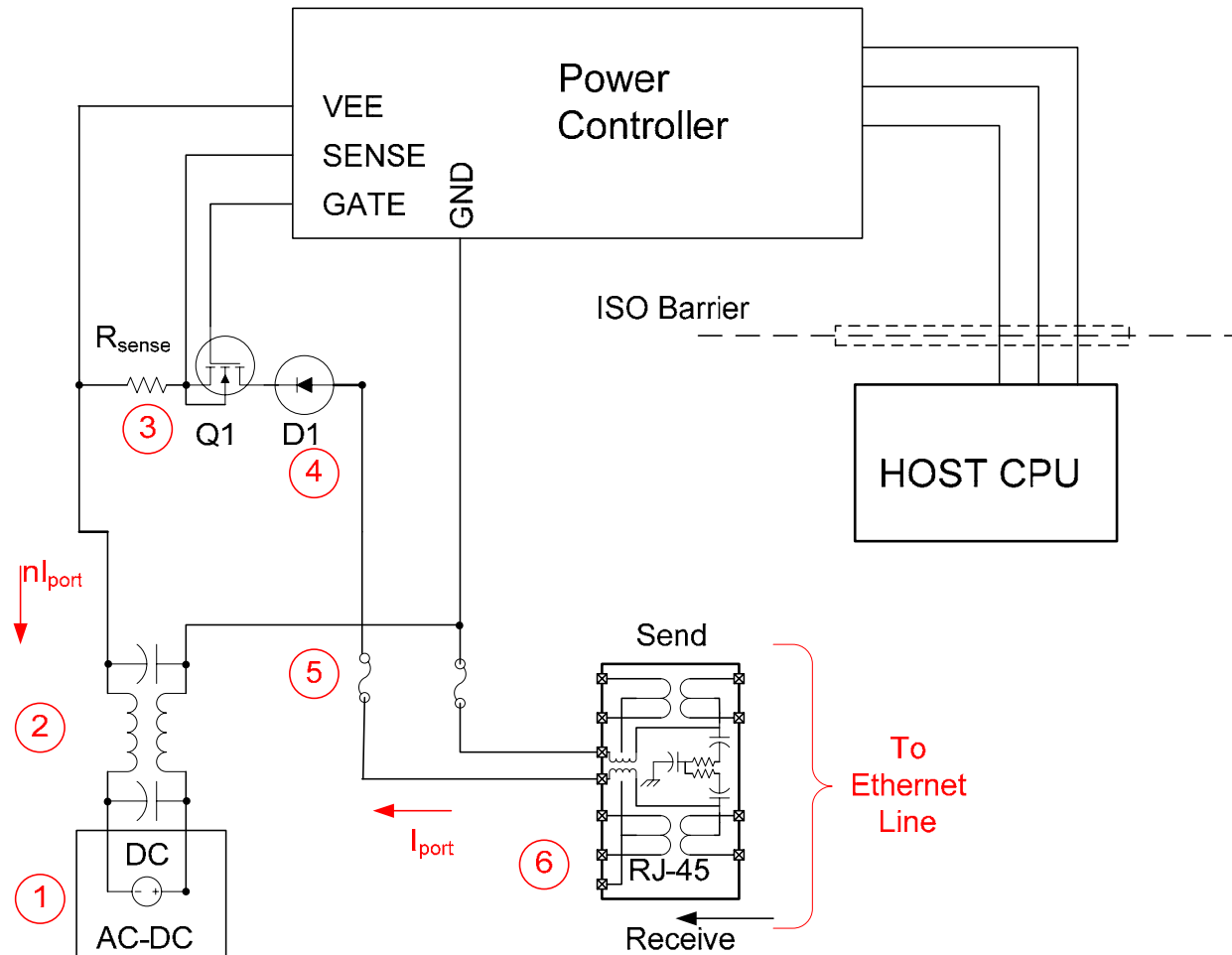
Vport static and transient response

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Agenda

- **Show that there is a wide variation in V_{port} .**
- **Show that transient conditions need to be considered.**

Typical PSE



One port of a multiport PSE.

Major Voltage Drop Sources

1) AC-DC Power Supply

- Tolerance
- Load
- Transient response

2) CM Choke & PCB

3) Rsense & MOSFET

- Value, internal/external

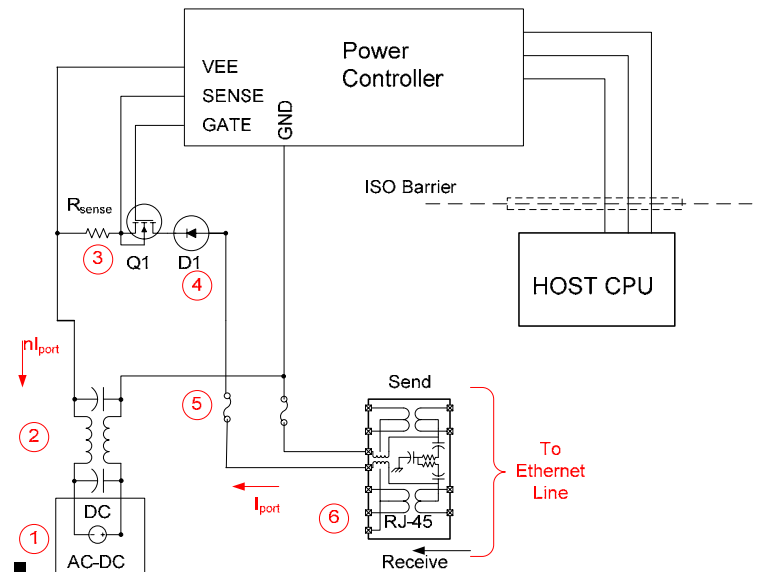
4) Pass diode

- Presence & type

5) Fuses

- Presence & type

6) PHY Transformer



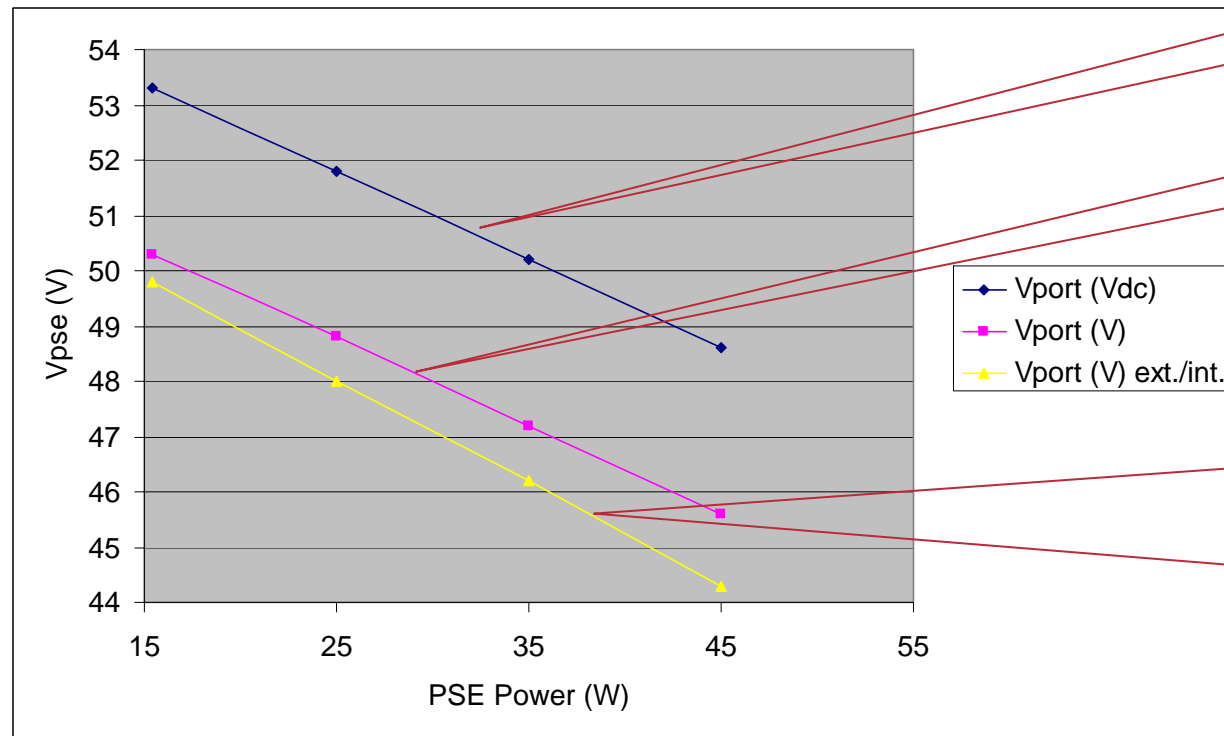
Considerations

- **Multiple system designs use the same power supply.**
- **Systems have different:**
 - Circuit topology**
 - Circuit elements**
- **Systems need to work under all loading conditions.**
 - < 0.5 W to PoEplus per port**
 - 1 to n ports**

Main Parameters

- **AC-DC**
 - $\pm 1\%$ tolerance**
 - 45 mohm output resistance**
 - $\pm 1.5\text{V}$ transient response**
 - CM choke + PCB, 20 mohm to 50 mohm**
- **Port**
 - R_{sense} + MOSFET 0.5 ohm $\pm 1\%$**
 - Diode 0.2 to 0.5-V**
 - Fuse 2x0.2 to 2x0.5-ohm**
 - Transformer and choke 0.4 to 0.7-ohm**
 - 50 ports**

Vpse vs PSE Power



Static port voltage

Transient port voltage

Transient port voltage. After moving from internal to external MOSFETs.

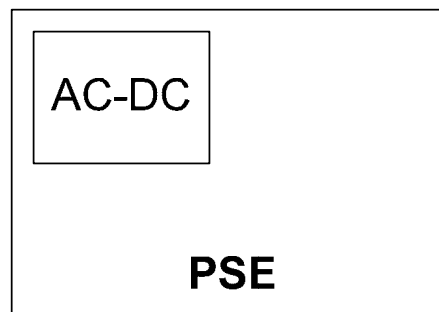
Set maximum Vport at 57V the determine Vpse min.

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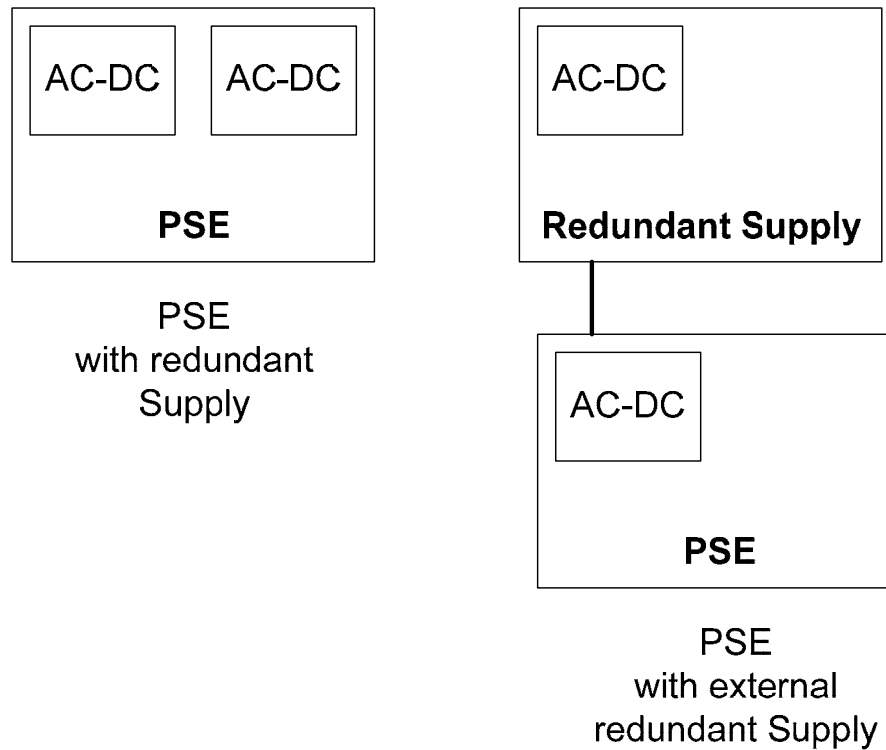
Prevalence of PoE requires fault tolerance

- **Power supplies are one of the least reliable system components.**
- **Existing systems provide methods to provide redundant power supplies.**

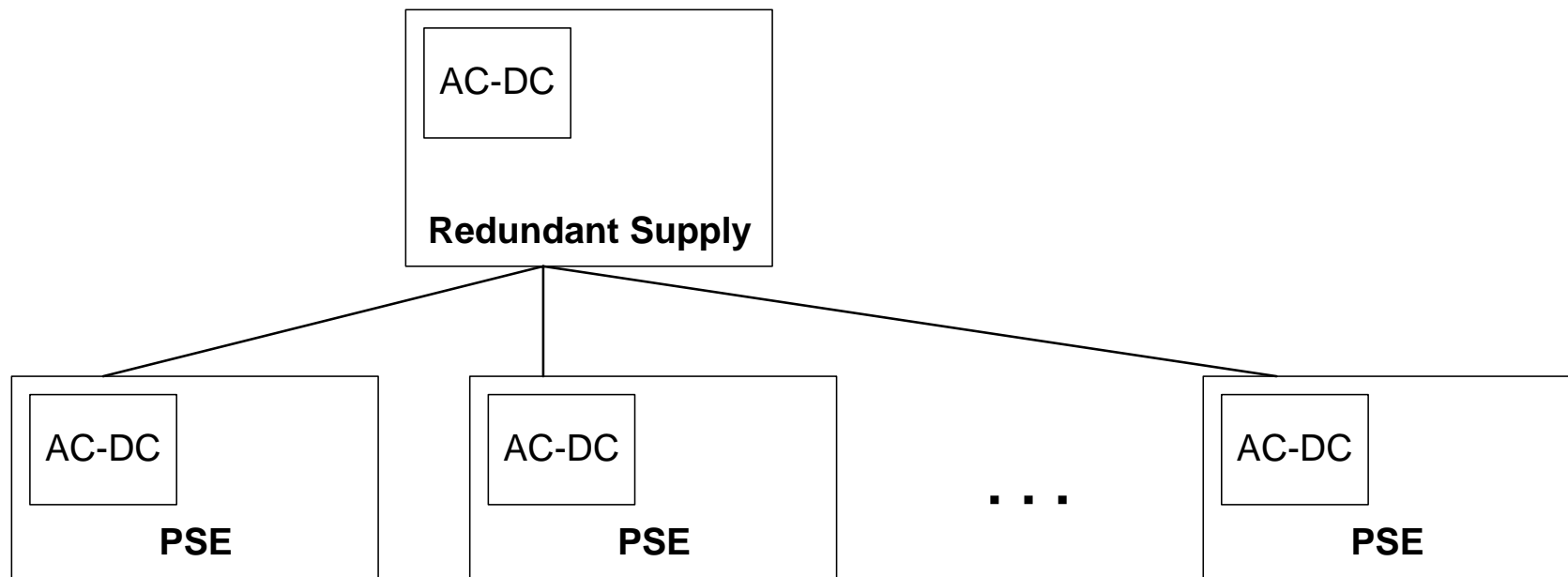


PSE

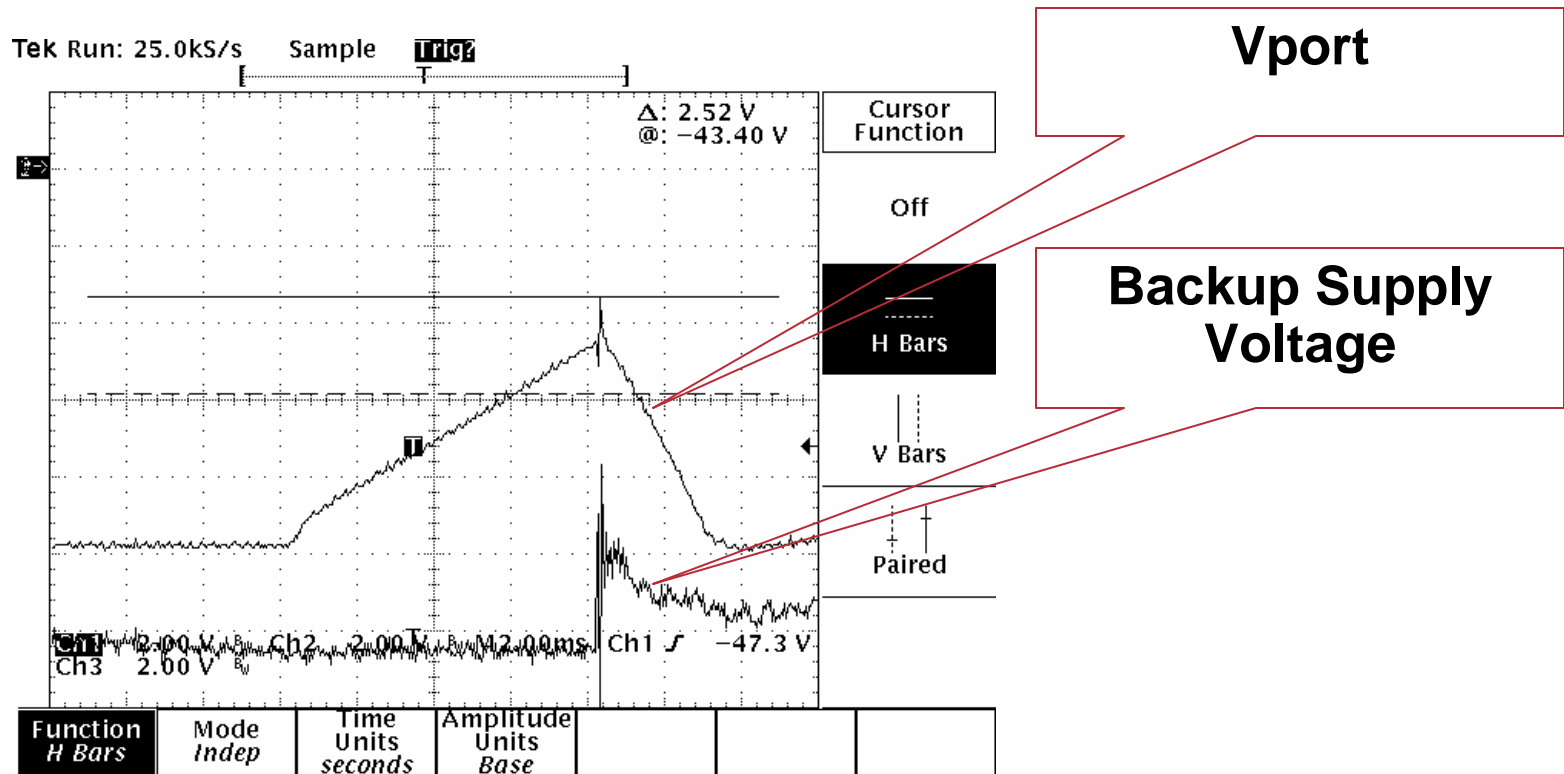
Redundant Power Supply



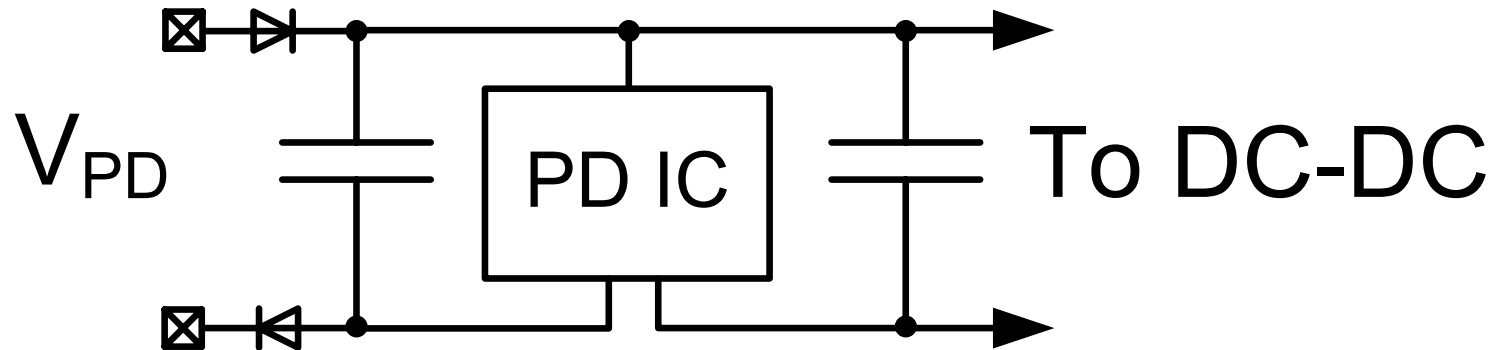
Support 1 out of n power supply failures



System Example, 1 out of n redundant.



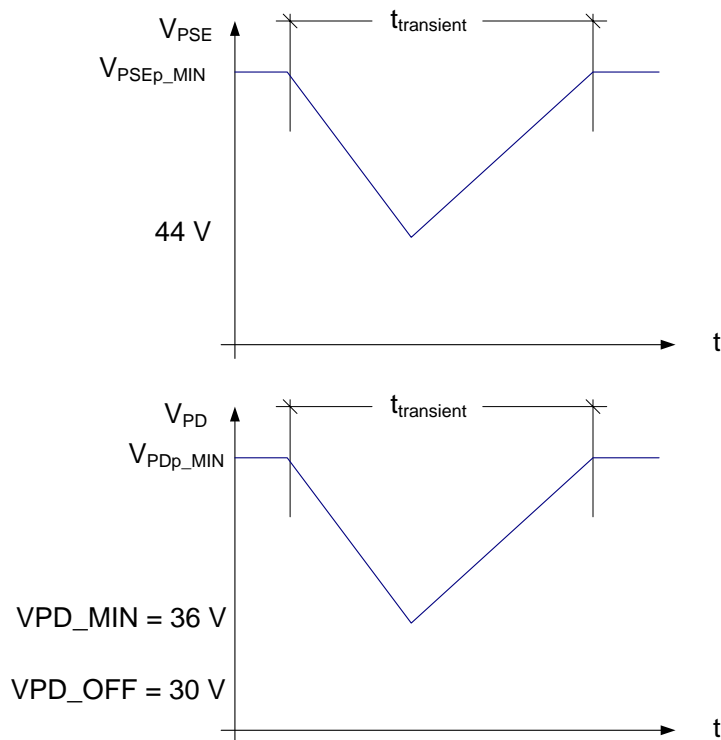
PD View of Supply transient



$V_{PD} > 2 V_D + V_{cap}$ then DC-DC must operate at V_{PD} .

$V_{PD} < 2 V_D + V_{cap}$ then DC-DC must operate at V_{cap} .

$$VPD < 2 V_D + V_{cap}$$



$$\text{Energy} = \frac{1}{2} C V^2$$

$$(\text{Power} \times \text{time}) = \text{Energy}$$

$$P < E/t$$

$$P < 1/2CV^2/t$$

Concerns with supporting a transient Vport

- **PD Capacitor size.**
- **Slew rate on the MDI.**
- **Cable current.**

PSE limits to I_{LIM}

Conclusion

- **Vport is affected by component and load variation.**
- **Vport is affected by transient response.**

Load change

Redundant supply take over

Questions ...

... or comments

Proposed task force motion

Propose that the Task Force add the following objective:

Define a static and a transient Vport for the PSE and PD.

P: Fred Schindler S: name

(All present) Y:n N:n A:n

(802.3 voters) Y:n N:n A:n