

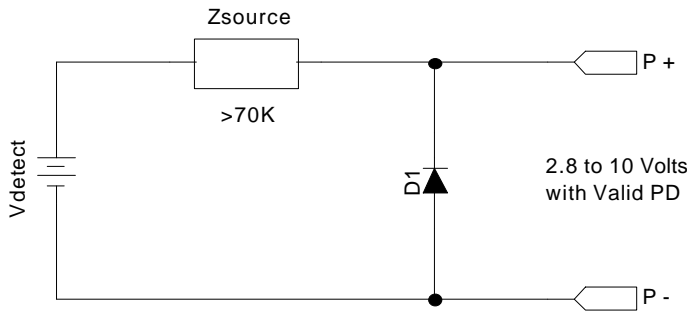
Proposed Power Source Element (PSE) Detection Source Material
for IEEE 802.3 Standard Power over MDI

5/2323/2001 DRAFT

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1. PSE Validation Circuit - Detecting Class 1 PDs

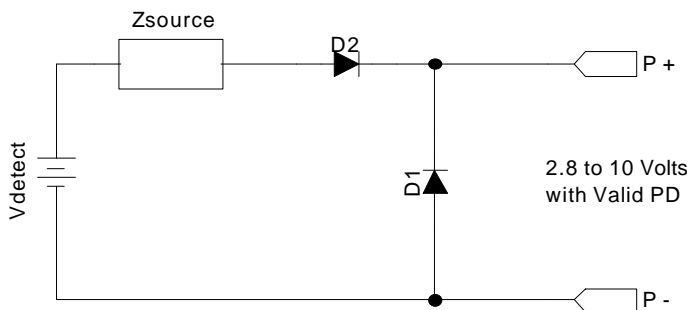
The PSE shall detect the PD signature by probing via the PSE interface. The Thevenin equivalent of the detection circuit is shown below:



[Informative]

The circuit above is a Thevenin equivalent of the probe circuit. Specific PSE implementations may vary. Any circuit that has the above Thevenin equivalent can be used. The PSE requirements are stated for a Thevenin circuit only. They can be transformed via circuit theory into other circuit parameters.

An alternate equivalent of the detection circuit that has no source impedance limitation, but restricts the PSE detection circuit to the first quadrant is shown below:



This document will use the Thevenin circuit to specify the requirements.

Diode D1 protects the PSE against reversed polarities.

The open circuit voltage <30 volts.

The short circuit current shall be less than 5ma.

The PSE shall exhibit one of the equivalent detection circuits in all detection states.

The PSE output capacitance shall be less than 500nF.

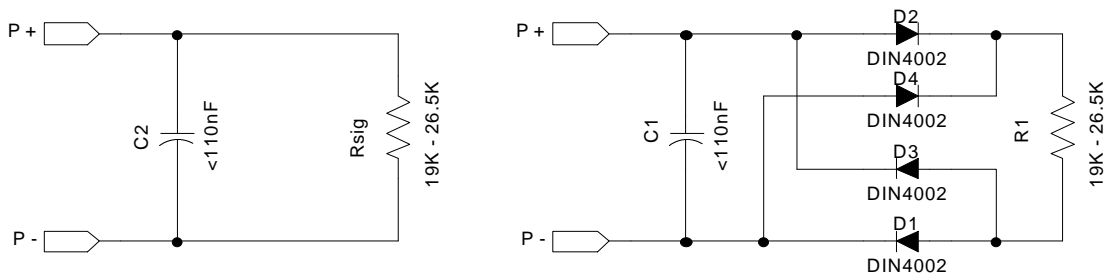
1.1 Detection Probe Requirements

The Detection voltage V_{detect} shall create a voltage of 2.8 to 10 volts with a Valid PD detected.

The PSE shall make at least two measurements separated by at least two volts.

2. PSE Detection of Class I PDs

"Signature Pass" Requirement: The PSE shall detect



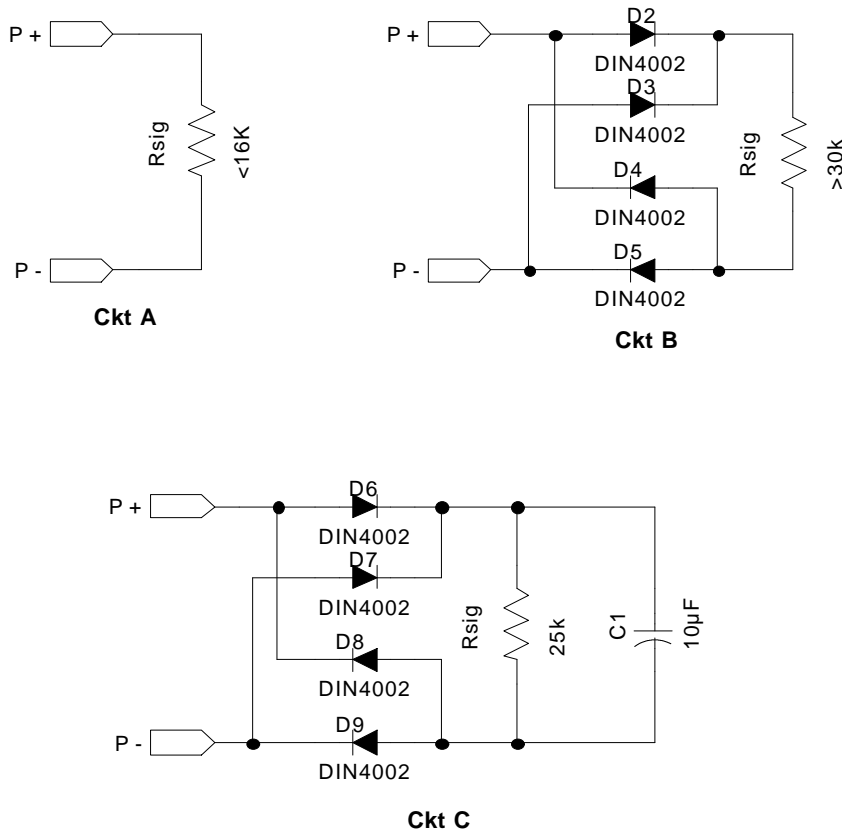
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The signature resistor may be in front of or behind a polarity guard.

The detection window is wider than the PD window to allow loop interface variations and provide margins.

C represents the PD and cable load capacitance.

"Signature Fail" requirement: The PSE shall not detect



~~In addition to the above circuits, the PSE shall not detect another PSE.~~

[Informative]

Circuits A and B represent signatures out of range.
Circuit C is a Big Cap load.

3. PSE Validation Circuit - Detecting Classes II-V PDs (OPTIONAL)

~~(TBD) A PSE shall deliver no more than XX mA into a short circuit across its terminals.~~

~~A PSE shall deliver no more than VV volts under open circuit conditions at its terminals.~~

4. PSE Detection of Class II-V PDs (OPTIONAL)

PSE detection of class II-V PDs shall be optional.

A PSE that is not intended to detect class II-V PDs shall classify such PDs as Class I, after a successful Class I detection, as described in sections 1 and 2.

A successful detection of Class II-V PDs requires both of the following, in ~~either order~~ the order shown

1. ~~A successful~~ Class I detection, as described in sections 1 and 2, shall be attempted
2. A successful Class II-V classification, as described in this section.

A PSE may classify a Class II-V PD either by applying voltage and measuring current or by applying current and measuring voltage.

Class definitions are as follows.

<u>Class I</u>	<u>PD will draw between 0 and 15 W</u>
<u>Class II</u>	<u>PD will draw between 4 and 7 W [Are lower bounds useful??]</u>
<u>Class III</u>	<u>PD will draw between 0 and 4 W</u>
<u>Class IV</u>	<u>PD will draw between 7 and 15 W</u>
<u>Class V</u>	<u>Reserved for future use</u>

If the applied voltage method is used, the PSE shall classify the PD as shown below. $V_{PDdetect}$ shall be 20 volts ± 1 volt and $I_{PDdetect}$ shall be limited to be less than 10 ma.

PD Classifications – Measured Current Method ($V_{PDdetect} = 20 \text{ volts } \pm 1 \text{ volt}$)						
Measured Classification Current $I_{PDdetect}$	Less Than 1.5 ma	1.5 ma to 3.5 ma	3.5 ma to 5.5 ma	5.5 ma to 7.5 ma	7.5 ma to 9.5 ma	Greater Than 9.5 ma
Classification	(Eliminates Class II-V. Classify as Class I provided detection in section 2 is successful <u>(change?)</u>)	Class II	Class III	Class IV	Class V	(Not defined; Reserved for future use)

If the applied current method is used the PSE shall classify the PD as shown in the table below. $V_{PDdetect}$ shall be limited to be less than 30 volts (or below the UVLO voltage with margin – TBD), and $I_{PDdetect}$ shall be limited to be less than 10 ma. A PD shall be classified as Class II, III, IV, or V only if (a) the currents and voltages are met for both columns above a given class, and (b) detection in section 2 is also successful (change).

PD Classifications – Measured Voltage Method									
Classification Current $I_{PDdetect}$	1 to 2 ma	1 to 2 ma	3 to 4 ma	3 to 4 ma	5 to 6 ma	5 to 6 ma	7 to 8 ma	7 to 8 ma	9 to 10 ma
Measured Classification Voltage $V_{PDdetect}$	> 21 volts	< 19 volts	> 21 volts	< 19 volts	> 21 volts	< 19 volts	> 21 volts	< 19 volts	> 21 volts

Classification	(Eliminate s Class II- V. Classify as Class I provided detection in section 2 is successful (change?))	Class II	Class III	Class IV	Class V
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5. Test Timing

The PSE shall tolerate up to 110nF of load capacitance in the detection states (Power off).

The PSE shall not detect loads with greater than 10uF of capacitance.

[Informative]

Whenever the test voltage is changed, the PSE must wait for the interface to settle.

Constraining the settling time, allows the PSE to not detect Big cap loads.

The PSE shall control the Rise and Fall time when switching between detection voltages to be greater than 10us.

The PSE shall complete basic Class I detection of a valid Class I signature in less than 500ms.

The PSE, if doing Class II-V classification, shall complete classification in less than 200 ms from the completion of Class I detection.

The PSE shall turn on power after a valid detection or classification in less than 50ms.