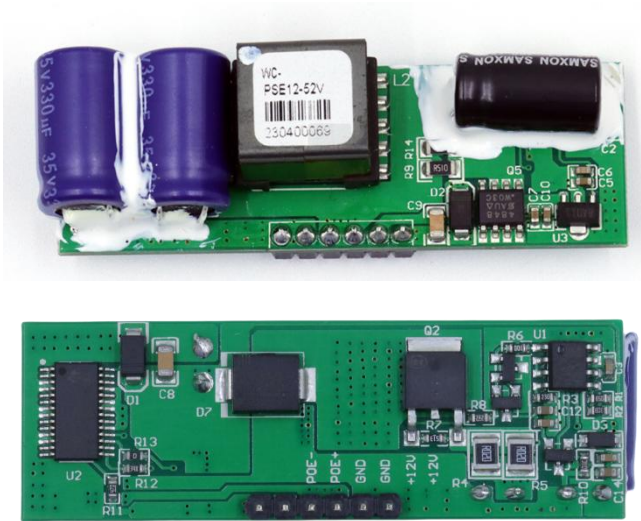


30W 12-48 Power supply module



Product characteristics

- Compliant with IEEE802.3AT standard (backward compatible with AF)
- Wide working voltage range from 12V to 24V
- Under the IEEE 802.3at standard, the output power can reach up to 30W
- Input undervoltage output overcurrent temperature short circuit protection and integration
- The conversion efficiency of the built-in boost module exceeds 90%, solving the installation problem of input voltage for customers
- 1500Vdc isolation voltage (input/output)
- Excellent reliability and circuit protection against overcurrent, short circuit, undervoltage, surge, etc.
- PCBA standard size: 60 * 20 * 15.6mm
- Class 4 IEEE802.3

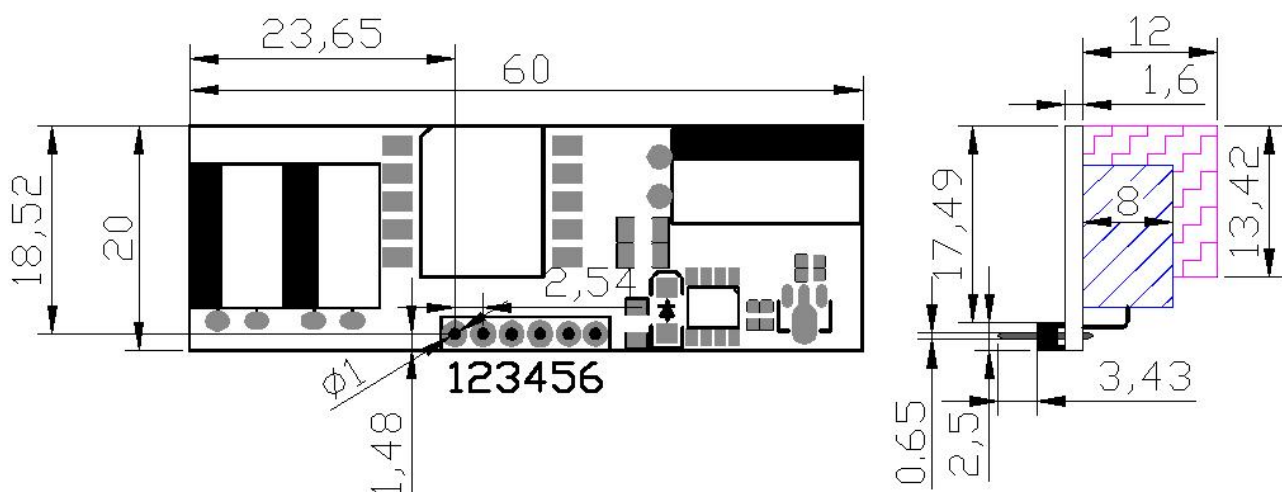
Scope of application

- Outdoor security video surveillance
- Ethernet switches and routers
- High temperature industrial applications
- Business and Public Information Monitor
- PoE Direct System

Describe

- WC-PSE12-52V is a single port low input voltage IEEE802.3at power supply equipment (PSE) that can be flexibly used through Ethernet (POE) applications
- Automatically detect power devices (PDs) with valid signatures, determine power requirements based on classification, and then apply power. Support two event classifications for two types of PD
- WC-PSE12-52V is an independent module that only requires a few external components to provide extensive control and feedback for each power unit (PD) connected to the PSE

Mechanical dimensions



Unit: mm unmarked tolerance: ± 0.5

Port Definition

Pin	Name	describe
1, 2	Vin+	1~2 pin is 12V DC power input positive pole
3, 4	Vin-	3~4 pin is the input negative pole of 12V DC power supply
5	PSE+	This pin is the positive pole of PSE output
6	PSE-	This pin is the negative terminal of PSE output

➤ The input terminal is not preset with a protection diode, so pay attention to the positive and negative polarity!

Electrical characteristics

Absolute maximum rating parameter

No	parameter	Symbol	MIN	MAX	Units
1	DC Voltage	VCC	10.5	26	V
2	DC Voltage Surge 1ms	VSURGE	-0.6	80	V
3	ambient temperature	Tc	-40	80	°C

- Exceeding the above rating may cause permanent damage to the product. Functional operations under these conditions are not recommended

Recommended working conditions

No	parameter	Symbol	MIN	TYP	MAX	Units
1	input voltage	VIN		12	26	V
2	Low Voltage Lock	VLOCK	10	-	-	V
3	working temperature	TOP	-40	25	80	°C

- Applicable only to WC-PSE12-52V maximum operating temperature

General characteristics

No	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detection						
1	I _{DET} Detection current	First detection point, V _{VPWR} - V _{DRAINn} = 0 V	145	160	190	μA
2		2nd detection point, V _{VPWR} - V _{DRAINn} = 0 V	235	270	300	μA
3		High Current detection point, V _{VPWR} - V _{DRAINn} = 0 V	490	540	585	μA
4	Δ _{DET} 2nd-1st detection currents	At V _{VPWR} - V _{DRAINn} = 0 V	98	110	118	μA
5	V _{detect} Open circuit detection voltage	V _{VPWR} - V _{DRAINn}	17.5	19	22	V
6	R _{REJ-LOW} Rejected resistance low range		0.85		15	KΩ
7	R _{REJ-HI} Rejected resistance high range		33		50	KΩ
8	R _{ACCEPT} Accepted resistance range		19	25	26.5	KΩ
9	R _{SHORT} Shorted port threshold				350	KΩ
10	R _{OPEN} Open port threshold		55			KΩ

- The technical parameters are for reference only and do not constitute part of the guarantee of the company's product specifications
 ➤ Output ripple and noise can be reduced by an external filter, see the application instructions

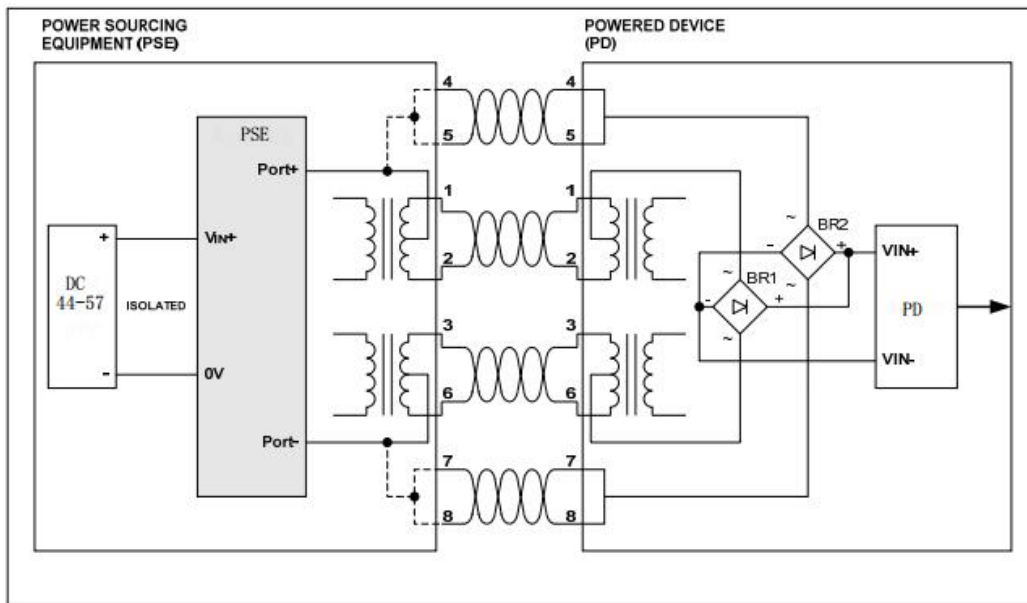
Classification

1	V _{CLASS} Classification voltage	V _{VPWR} - V _{DRAINn} , V _{SENN} ≥ 0 mV , I _{port} ≥ 180 μA,	15.5	18.5	20.5	V
2	C _{CLASS-Lim} Classification current limit	V _{VPWR} - V _{DRAINn} = 0 V	-	70	90	mA
3	I _{CLASS_TH} Classification threshold current	Class 0-1	5	-	8	mA
4		Class 1-2	13	-	16	mA
5		Class 2-3	21	-	25	mA
6		Class 3-4	31	-	35	mA
7		Class 4-overcurrent	45	-	51	mA

8	Maximum Output Power	Input $\geq 30W@Class 4$	25	28	30	W
9	Current Limit	output $\leq 30W@Class 4$	-	600	650	mA
10	Current Limit Cut-Off Time	output $\leq 30W@Class 4$	-	60	70	ms
11	Maintain Power Signature		5	-	10	mA

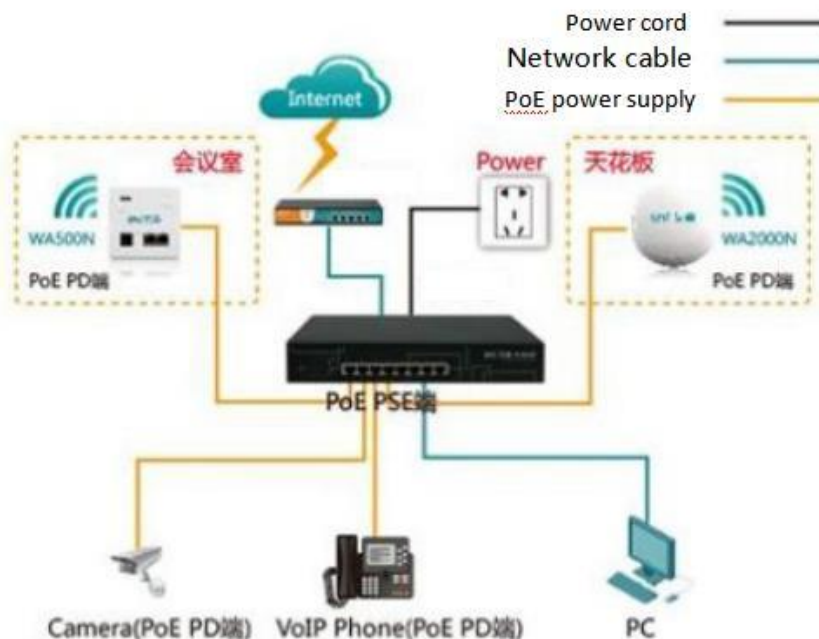
Port Output

- The Port output can be connected directly to the centre-tap of an IEEE802.3at compliant data transformer or to the spare pair connection for 10/100BASE-T applications, as shown in Figure For 1000BASE-T (Gigabit) Ethernet applications all four cable pairs require magnetics, this is explained in more detail in application note



Typical applications

- This module is used in PSE network cable to convert electric energy to DC-DC to the required voltage of equipment without affecting data signal transmission. It conforms to IEEE802.3at standard and is used by all equipment terminals



Signature and Classification

- WC-PSE12-52V will automatically perform signature and classification, as shown in Figure 1 for the timing of Type 1 Power Supply Equipment (PD), and Figure 2 for the timing of Type 2 PD

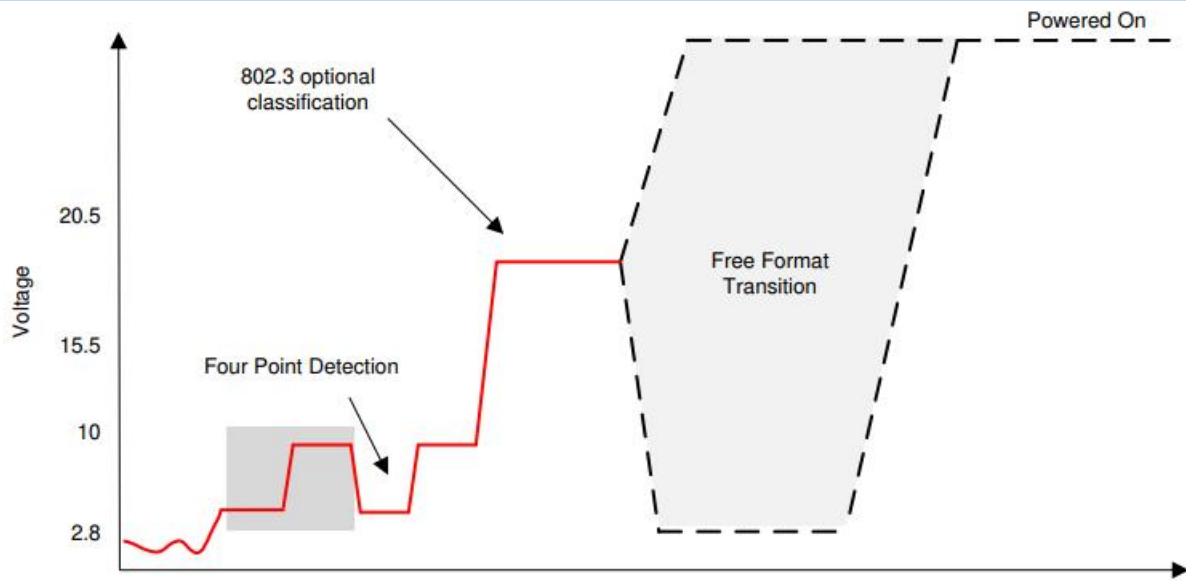


Figure 1 802.3af and classification

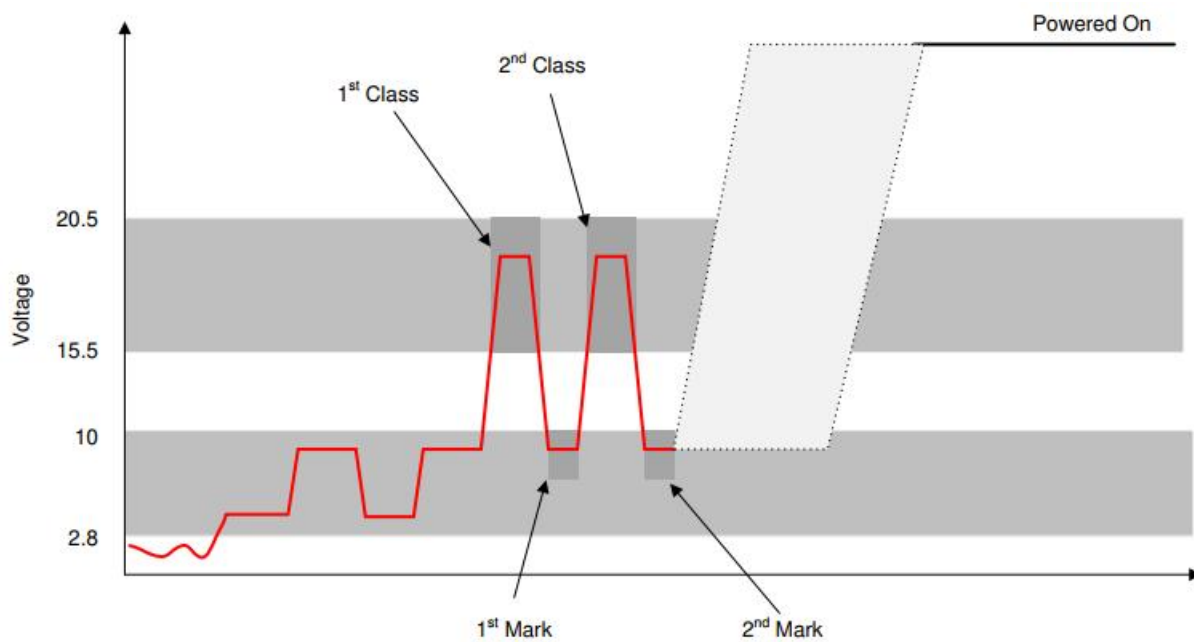


Figure 2 P802.3at and Classification

Power Classification

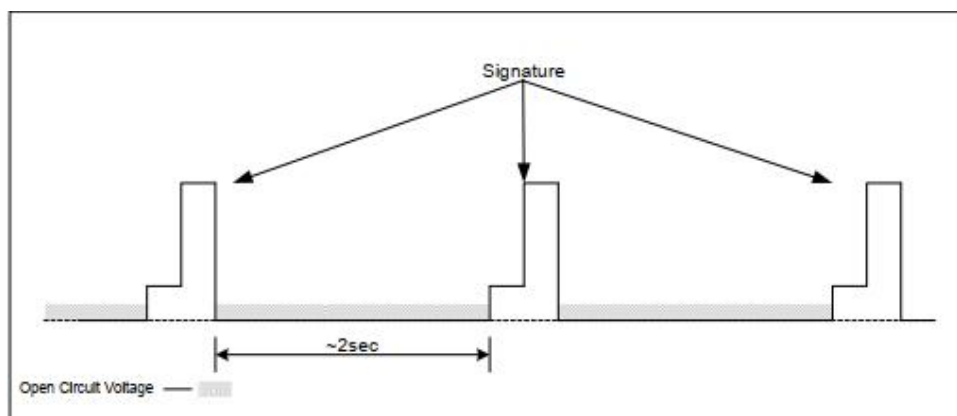
- The IEEE802.3at separates the power handling into two basic categories "Type 1" and "Type 2". In simple terms Type 1 handles power requirements up to 15.4W and is comparable with the IEEE802.3af specification. Type 2 handles the power levels above this, which is commonly referred to as POE+

Define criteria	Cable requirements	Grading parameters	Power Supply Characteristics
IEEE802.3af (PoE)	CAT5 cable	The maximum power required for Class 0 devices is 0~12.95W	1. The DC voltage range is 38 to 57V, with a typical value of 38V 2. The typical working current is 10~350mA; Typical output power: 15.4W 3. Overload detection current is 350~500mA 4. Provide 4-level power requests for PD devices, ranging from 3.84 to 12.95W
		The maximum power required for Class 1 equipment is 0~3.84W	
		The maximum power required for Class 2 devices is 3.85W~6.49W	
		The maximum power required for Class 3 devices is 6.5W~12.95W	
IEEE802.3at (PoE Plus)	CAT5 cable or CAT6 cable	The maximum power required for Class 4 devices is 13W~25.5W	1. The DC voltage range is 44 to 57V, with a typical value of 48V 2. The typical working current is 10~600mA; Typical output power: 30W 3. Level 4 supported by electrical equipment
IEEE802.3bt	CAT6 cable	The maximum power required for Class 3 devices is 50W~60W	1. The DC voltage range is 48 to 57V, with a typical value of 50V 2. The typical working current is 600~1250mA; Typical output power: 60W
		The maximum power required for Class 4 devices is 60W~90W	1. The DC voltage range is 48 to 57V, with a typical value of 52V 2. The typical working current is 1250~1800mA; Typical output power: 90W

PoE corresponding power diagram

Signature Detection

- To ensure that power is not supplied to devices that have not enabled PoE, the port output first checks for a valid PoE signature. PD should present a nominal 25k Ω (19k Ω to 26.5 k Ω) signature resistance; If a valid signature is not seen, the connection will be disconnected. Please wait for approximately 2 seconds and then try again. Please refer to the following text



output characteristic

Output Characteristic

Maintain Power Signature

- After successful completion of a valid signature (and classification), the module applies the main power supply to the port output. Once the main power supply is applied, the module continuously monitors the PD, and if the extracted current is below the detection threshold, the power is eliminated. If the output current of the module port is $\geq 10\text{mA}$, the output will remain on. If the output current of the port is $\leq 5\text{mA}$, the output will be turned off

Output Current Limits

- The module has over-current limit protection. If the output of the port continues to exceed the current limit, the output will be belching protection, and it will recover automatically after the output demand current is normal

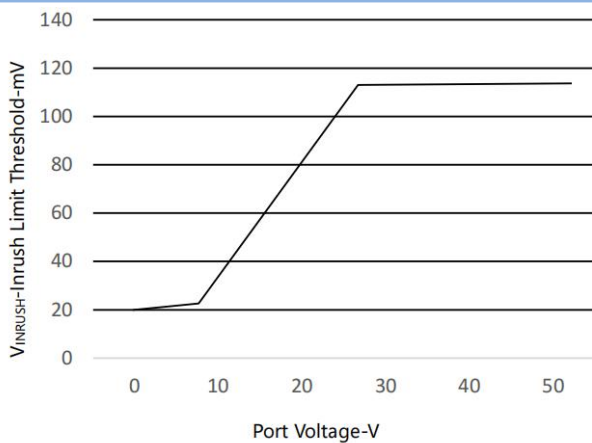
Input Protection

- The WC-PSE12-52V has built-in Transorb diode across its input, to protect the module from transients from the power supply

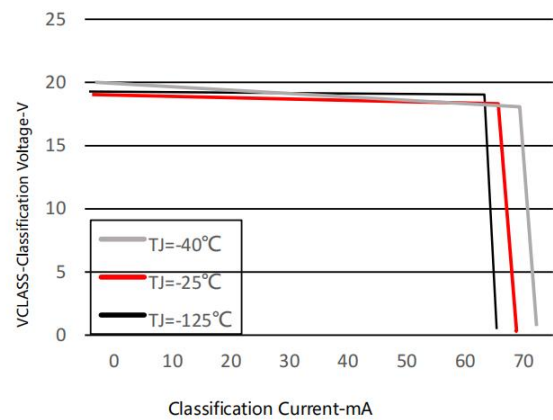
Short circuit protection

- In addition to over-current protection, WC-PSE12-52V also has built-in input under voltage, over temperature, soft start and output short-circuit protection

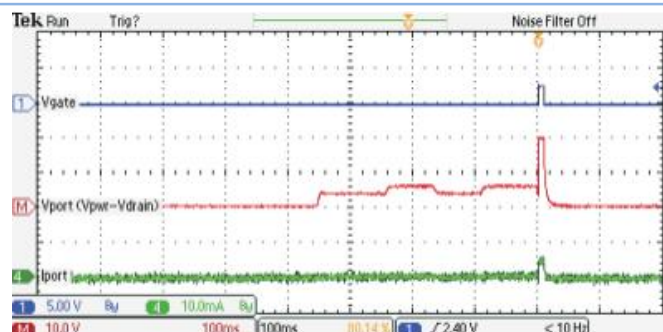
Typical Characteristics



Inrush Current Limit Threshold vs Port Voltage

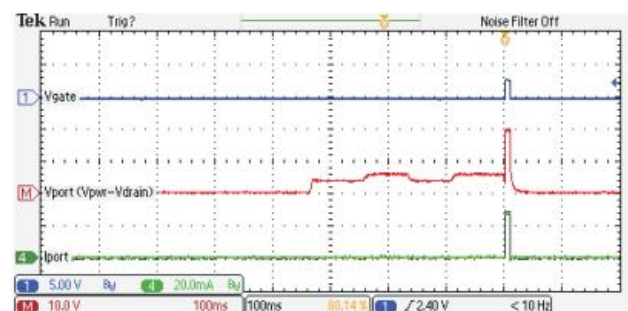


Classification Voltage vs Port Classification Current



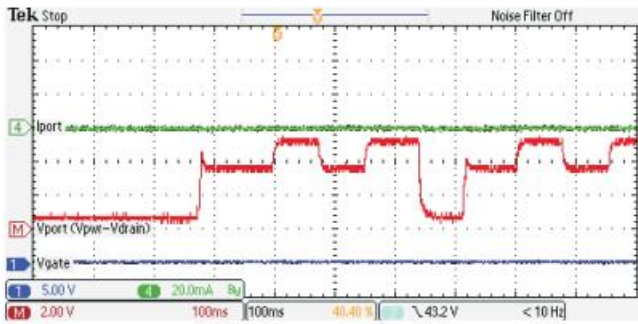
Valid PD Detection (25 k Ω and 0.1 μF) and CLASS

0 Classification

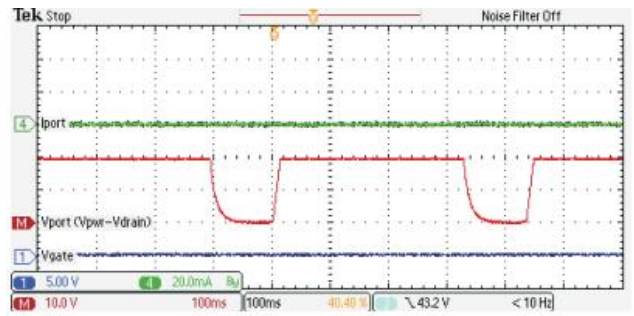


Valid PD Detection (25 k Ω and 0.1 μF) and CLASS

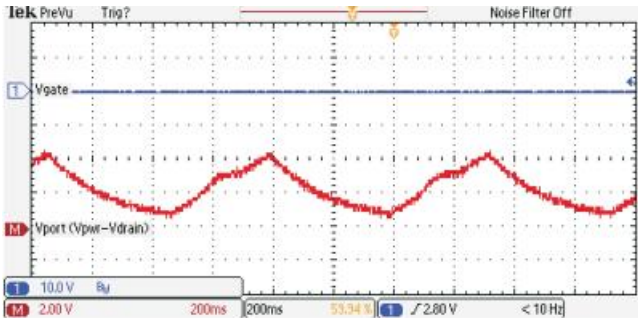
3 Classification



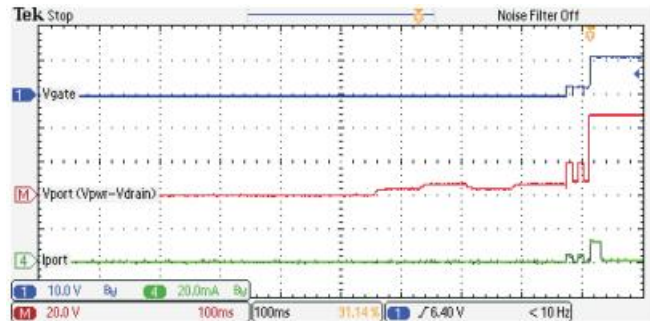
Detection with Invalid PD (15 kΩ and 0.1 μF)



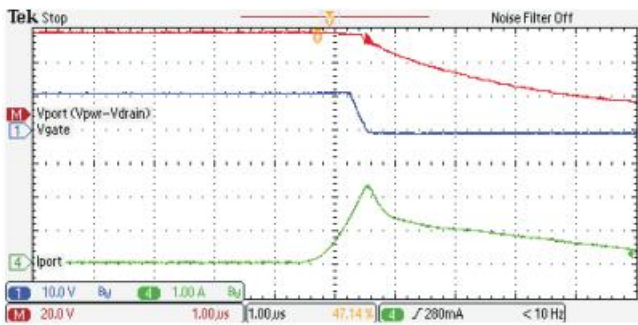
Detection with Invalid PD (open circuit)



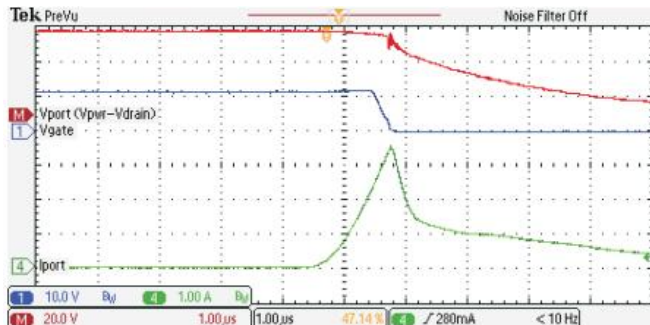
Detection with Invalid PD (25 kΩ and 10 μF)



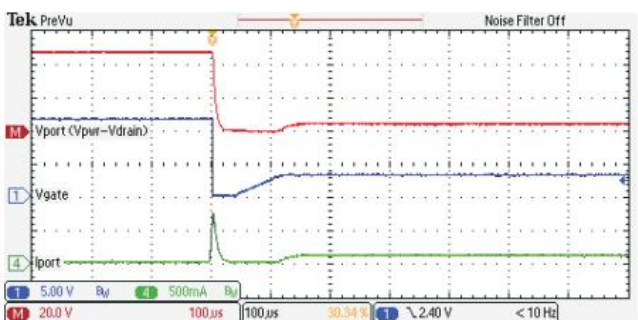
Event Class and Startup with Valid PD



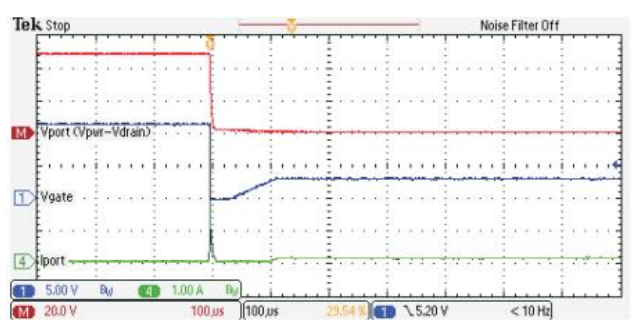
Rapid Response to a 1-Ω Short: 802.3af Mode



Rapid Response to a 1-Ω Short: PoE+ Mode



Response to a 50-Ω Load: 802.3af Mode



Response to a 25-Ω Load: PoE+ Mode