

Overcurrent protection for Power over Ethernet (PoE)

Transmitting both power and data over a single cable is an ingenious and simple idea – a “plug & play” solution. IEEE is working on a new standard called PoE++, which will define powering devices with up to 60 watts. As the amount of current increases, so does the danger of fire. Thus it is essential to protect electronics from overcurrents, and SCHURTER offers just the right fuses to provide this protection.

Data networks based on the Ethernet standard are in widespread use around the world. Just a few examples of devices tied into these networks include sensors, IP phones, card readers, remote-controlled webcams, point of sales (POS) terminals and small hubs and servers. Since the Ethernet standard was introduced, data rates have continually increased and today are reaching speeds up to 100 Gigabits per second. Twisted pair cables guarantee secure data transmission even over long distances. Ethernet cable is also increasingly being used to supply devices with power in addition to data over a single cable. This eliminates separate power cables and power supplies making devices standalone without the need for connection to the wall outlet or grid. There is also no need for a certified technician that might otherwise be required to install mains power. Ethernet power is less than 50V and lines can be up to 100 meters long. This makes it possible to install loads where power cables are not desirable or permitted. In addition, thanks to smart power management, this type of power transmission can save electricity by turning off devices that are in use.



IP phones – simple to connect and supply with power using Ethernet cable (Source: shutterstock)

Standard IEEE 802.3

The standard for combining the transmission of data and power has been around since 2003. There are two different types of standards:

IEEE 802.3af-2003 limits the power consumption of a powered device (PD) to 12.95 W or 360 mA. Here the power sourcing equipment (PSE) must supply 15.4 W or 400 mA. The input voltage is at least 44 VDC and a maximum of 57 VDC (see Fig. 1).

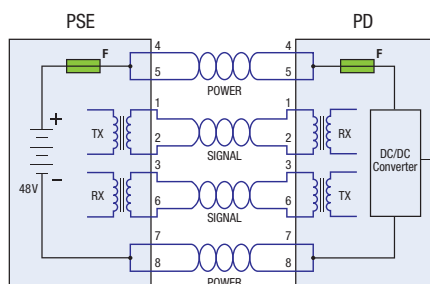


Fig. 1: Standard configuration of PoE and PoE+: two separate conductor pairs for power and signals. Chip fuses (F) protect the electronics simply and securely from overcurrents (Source: SCHURTER AG)

With IEEE 802.3at-2009, a PSE can supply 30 W or 600 mA and a PD can consume up to 21.9 W of power. Here the power is fed over all four cable pairs. The input voltage is at least 50 VDC and a maximum of 57 VDC (see Fig. 2).

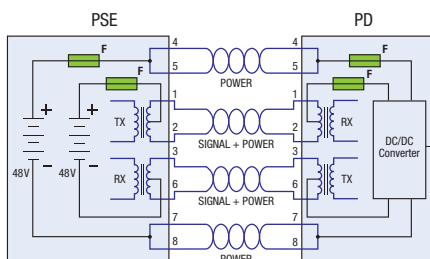


Fig. 2: Maximum power with PoE++ is up to 90 W over four conductor pairs: 2x power + signal and 2x power (Source: SCHURTER AG)

IEEE is working on a new standard called PoE++. It specifies power up to 60 W with expansion capability up to 90 W.

More power, however, also means higher risk due to the associated temperature rise. Suitable components must therefore be selected with great care.

Overcurrent protection

The higher the current, the faster malfunctions can lead to fires. Suitable devices to protect against overcurrents must be installed in both PSEs and PDs (see Figs. 1 and 2).

The simplest, most cost-effective and reliable solution for protection against overcurrent is a chip fuse. Midget fuse is a known standard for UL & CSA size 10x38mm. This would not be the appropriate term to use to describe small. In addition, chip fuses take very little space. The USF 0603 chip fuse from SCHURTER is the ideal fuse for PoE applications. This thin-film USF 0603 fuse measures just 1.6 mm long, 0.8 mm wide and only 0.6 mm high. It offers overcurrent protection with super-quick-acting characteristics in a range of rated currents from 500 mA to 5 A. Rated voltage is between 32 and 63 VDC. It stands out due to a breaking capacity of 50 A at 32 V over the entire range of rated currents. Even today, such breaking capacity is unmatched in fuses of this size. Further, its voltage drop of a low 65 mV makes it unique. In addition, thanks to a design using planar technology, it has no impedance discontinuity and thereby guarantees better signal quality and higher data rates. The USF 0603 has a permissible ambient temperature of 90 °C and is approved to UL 248-1. Very legible lettering enables the visual identification of the rated current. It is supplied in packaging well suited for automated production according to EIA-RS481 and IEC 60286-3 with either 5000 or 15,000 units per roll.

Additional fuses suited for overcurrent protection in PoE applications on offer: the USFF 1206 and USF 1206 (see Table 1). All fuses mentioned are approved to CURus.



The tiny USF 1206 chip fuse protects electronic circuits simply and securely (Source: SCHURTER AG)



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Secondary Protection			
	USF 0603	USF 1206	USFF 1206
Rated Voltage	32 VAC 32-63 VDC	32-125 VAC 63-125 VDC	125 VAC 63 VDC
Rated current	0.5-5 A	0.375-4 A	0.05-0.25 A
Breaking Capacity	50 A	50-600 A	100 A
Characteristic	Super-Quick-Acting FF	Super-Quick-Acting FF	Super-Quick-Acting FF
Dimension [mm]	1.6x0.8	3.2x1.6	3.2x1.6
Approvals	CURus	CURus	CURus

Table 1: Midget fuses are ideal for overcurrent protection. SCHURTER offers fuses suited for every PoE application

Close to the customer

SCHURTER is your expert partner when it comes to circuit protection. SCHURTER supports its customers with extensive knowledge. And in cases where standard products are not exactly what you need, SCHURTER is happy to work out a customized solution.

Company

SCHURTER continues to be a progressive innovator and manufacturer of electronic and electrical components worldwide. Our products ensure safe and clean supply of power, while making equipment easy to use. We offer a broad range of standard products including circuit protection, connectors, EMC products, switches and input systems, as well as electronic manufacturing services. Moreover, SCHURTER is ready to work with our customers to meet their application specific requirements, not covered in our standard range. You can rely on SCHURTER's global network of companies and partners to guarantee a high level of local service and product delivery.

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