

## Bourns® Multifuse® PPTC Thermistors for Power over Ethernet (PoE) Protection

### Introduction:

In September 2003, the IEEE published the IEEE 802.3AF standard that defines the specifications to deliver power over standard Ethernet cables. The Power over Ethernet (PoE) standard has facilitated the global development of technology that allows IP telephones, wireless LAN access points, webcams, credit card scanners and many other appliances to receive power as well as data over existing LAN cabling without needing to modify the existing Ethernet infrastructure. Such devices in remote locations may be powered and managed with PoE, eliminating the expense of supplying them with higher-cost 110/220 AC power.

### The PoE Architecture:

The IEEE 803.3AF Ethernet specification standard defines the voltage and current requirements of powered Ethernet equipment delivering up to 48 volts of DC power to PoE-compliant devices over eight-wire Category 5 and 6 cabling. There are two types of architecture. One is called mid-span (See Figure 1), which involves running power over unused wire pairs in a LAN cable. Mid-span products are built into patch panel-like devices that can add PoE to existing LAN infrastructures. In these installations the mid-span hub is the power sourcing equipment, while the IP phones, webcams and WiFi access points are the powered devices. The other increasingly popular version of 802.3AF is called end-span. It runs DC power signals over the same wire pairs used for data transmission.

Industry experts say end-span devices are becoming popular because they are usually built into new switches with PoE, which users buy for IP telephony or WLAN rollouts.

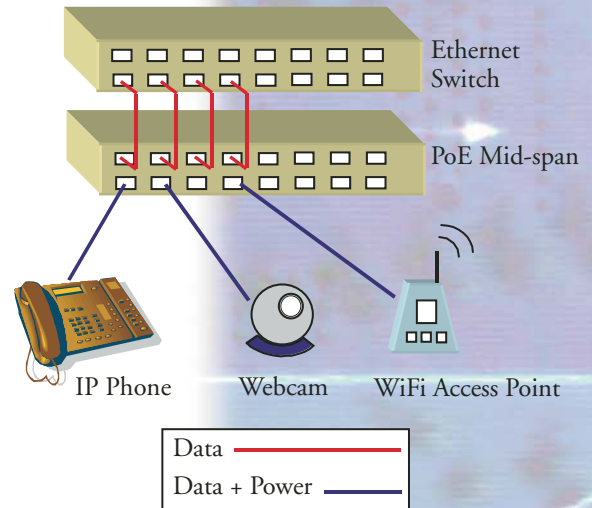
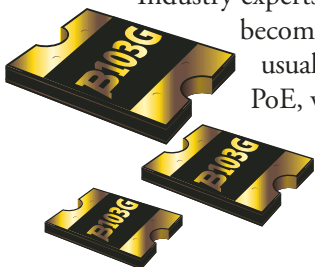


Figure 1. PoE Mid-span Switch Installation

### Electrical Requirements:

The addition of power into a LAN results in the requirement for a power management circuit between the power source and the output of the powered Ethernet devices. Typically, designers choose to back up the power management circuit with a solid state Bourns® Multifuse® resettable PPTC. The Bourns® Multifuse® PPTC will deactivate any port that is not protected by the power management circuit due to a temporary or permanent fault and thereby prevent any further system failures.

An overcurrent condition is detected when the current drawn from the power sourcing equipment (PSE) at the power interface (PI) is greater than the overload current limit for any duration greater than the overload time limit.

### Bourns® Multifuse® MF-SMDF050:

The Bourns® Multifuse® Model MF-SMDF050 is an ideal current limiting PPTC resettable fuse for PoE

applications. With a maximum operating voltage of 57 V, the MF-SMDF050 is suitable for the full voltage range of the PoE circuit, 44 V to 57 V. The MF-SMDF050 has an operating current of 500 mA at room temperature and 360 mA at 70 °C, which is an excellent fit for the 350 mA output current as specified in IEEE 802.3AF.

Being a resettable PPTC fuse, the MF-SMDF050 has an obvious benefit of being resettable which is useful in the area of port protection. The fact that a PPTC resets itself automatically once the fault clears substantially reduces the need for costly service calls for service technicians.

The MF-SMDF050 has been designed with a symmetrical design, making it ideal for high volume surface mount production runs. With a maximum package height of 1.09 mm and a 2018 footprint, the MF-SMDF050 is suitable for the densely packed telecom circuits that are now commonplace.

## **Conclusion:**

As the IEEE 802.3AF standard for power over Ethernet is one of the first truly global power providing standards, its applications are vast. The technology is not just limited to powering wireless LANs or providing back-up power capabilities to IP phones, but may be used to provide power to many other devices, which cannot be powered by regular power sources for physical or financial reasons. As many companies begin powering such devices as credit card scanners, mobile phone and PDA chargers, security cameras and security card scanners remotely over the network, the IEEE 802.3AF standard makes it possible. When power is being transmitted to remote devices, there will always be a need to limit it within an accepted safety level. The Bourns® Multifuse® Model MF-SMDF050 is an ideal current limiting PPTC resettable fuse for such applications, designed specifically for Power over Ethernet installations.



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