

5 Misconceptions About Circuit Protection Devices

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In my work, I speak with lots of engineers about using circuit protection devices and find that there are still a lot of misconceptions about the technology and their applications. Here are the top five:

1. **They are too expensive.** While this may have been true at one time, they are less expensive than they used to be. With competition and economies of scales, prices have come down significantly in the past few years. The real question, however, is not how much the devices cost, but how much it will cost not to have them as part of your design. Using circuit protection devices can help prevent catastrophic failures that not only damage equipment, but your company's reputation as well.
2. **They are too large.** Manufacturers are constantly working on new technologies to reduce the size of their circuit protection devices. For example, our TVS diodes and SESD devices are now available in 0201 packages, which are very small, measuring a mere 0.6 mm x 0.3 mm x 0.3 mm. This allows them to be used in applications where space is at a premium, including mobile phones and tablets.
3. **Polymeric positive temperature coefficient (PPTC) devices have high resistances and cause excessive voltage drop.** PPTC devices do have higher resistances than some other technologies, like silicon devices, but manufacturers have lowered the resistance of these devices in recent

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years. Also, note that the resistance depends on the operating current of the PPTC device. High-current PPTC devices have very low resistances, so there are many options if low resistance is a priority. Our microSMD and nanoSMD device series, for example, offer device resistances between 15 and 30 milliohms.

4. **The resistance of a PPTC device goes up each time it is tripped.** Not true. The resistance of a PPTC device does increase the first time it is tripped, but then remains stable for many trip events. TE Circuit Protection includes this one-time resistance increase in our specs. After many trip events, (up to hundreds or thousands, depending on the device used, and the current and voltage level), a PPTC device will wear out and the resistance will remain high. That is why they are used as protection devices, not switches.
5. **PPTC device specifications must be significantly derated when operating at high temperatures, and that the higher current devices will react very slowly at lower temperatures.** While this is true, it is not usually a problem. Many devices that PPTC devices protect, like motor windings, solenoids, transformers, and circuit boards, will be damaged much faster at high temperatures than at low temperatures. So, even if the PPTC device takes longer to trip, it still helps to prevent damage. For applications that absolutely require a short time to trip, TE Circuit Protection offers the RHEF device series; these devices do not need to be derated as much as some other devices.

For more information visit www.circuitprotection.com [1].

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