

Test and Measurement Equipment Application Overview

Problem/Solution

A typical test and measurement instrument can experience overcurrent conditions in the secondary side of its internal power transformer, in one of its communication ports (modem, SCSI, ethernet, mouse/keyboard), and through its probes and voltage/current input terminals. A portable unit can also experience overcurrent conditions in its battery packs. Installing PolySwitch devices in series with the variety of loads will help protect each specific load.

Typical Protection Requirements

Telecommunication equipment typically requires overcurrent and overvoltage protection. Overcurrent protection requires the capability to survive 600V or 250V with low current. For the power supply, communication ports, and probes, voltage is typically less than 30V and currents are less than 3A.

Typical Agency Approval Requirements

Power supplies generally fall

under UL1012 and/or UL1310, depending on their classification. These standards describe the overcurrent limiting required by the power supply—8A in 60 seconds and 8A in 5 seconds respectively. UL1950 and FCC Part 68, in North America, and ITUK.21 elsewhere, specifically apply to telecommunication customer premise equipment; these also specify overcurrent and overvoltage safety standards applicable to telecommunication equipment.

Technology Comparison

Bimetallic thermostatic switches, fuses, and ceramic positive temperature coefficient (CPTC) devices have been used to protect motors. The limitations of bimetallic switches include cycling and the potential for contacts to weld shut. The CPTC has a relatively high resistance and power dissipation, which may be of concern in a portable system. In addition, CPTCs are relatively large and can exhibit thermal behavior where undesirable high tempera-



tures can be reached. Moreover, being a ceramic material, they may be vulnerable to cracking as a result of shock or vibration. CPTCs also have a relatively slower time-to-trip, compared to polymeric PTC devices. Fuses can fatigue as well, but most significant is that they are one-use devices that must be replaced after a fault has occurred. PolySwitch devices latch into a high-resistance state when a fault occurs. Once the fault and power to the circuit are removed, the device automatically resets and is ready for normal operation.

Device Selection

For telecommunication applications, the TR600, TRF600, TS600, and TVB series devices are typically used. The TR250 and TS250 series devices are typically used for telecommunication applications elsewhere. For power supply, port, and probe protection, products from radial-leaded and surface-mount families are typically used.

Figure 1. Power Supply Protection

