

Backplane and RAID

Application Overview

Problem/Solution

In today's plug-and-play architecture, OEMs design their products to be field-serviceable and field-replaceable in order to maximize the "up time" of their products.

The drive for reliability also means that in power backplane applications, dual redundant power supplies are often used. Products such as telecommunication circuits for wide area networks, disk drives in Redundant Array of Integrated Discs (RAID) systems, and multiple server platforms are becoming "mission critical" items for businesses.

Typical Protection Requirements

In order to maximize the usage of mission critical systems, it is undesirable to shut down a system in order to make repairs. As such, boards or disk drives that are replaced in the field are often done with live power on the back-

plane. In order to minimize the safety risks, some sort of circuit protection is often used. Also, since one or more power supplies are used to power several boards or drives, incorrect insertion of a board can result in a short circuit delivering damaging current to a device long before the power supply folds back. Options available to the designer include conventional fuses, protected power switches, or resettable PPTC devices. Conventional fuses operate only once and then must be replaced. Silicon switches are effective, but their cost can be prohibitive. The PPTC device offers resettability for low cost. When the PPTC is tripped, it goes into a high-impedance state, limiting the current. Upon removal of the fault and interruption of current through the PPTC, it will reset, allowing normal operation to resume.

Typical Agency Approval Requirements

Most OEMs comply with the "240VA" requirement of IEC60950. The Safety Requirement Clause 1.2.8.7 - "Hazardous Energy Level" states that power must not exceed 240VA. In a 12V system current must be limited to 20A. Clause 2.1.5 - "Energy hazards in operator access areas" states that, "There shall be no energy hazard in OPERATOR ACCESS AREAS." Compliance options include: 1) Provide protection circuit on the power distribution backplane. 2) Declare all inside areas as "Service Access only," although IT people want open access to the equipment. (This method may be difficult to enforce.) 3) Use "Safety Interlocks" as per clause 2.8 which can be expensive, and requires power to be significantly reduced to gain access.

Device Selection

The PolySwitch resettable device for this application depends on the voltage and current requirements. Telecommunication applications typically use TR and TS series devices. Server boards that draw high current at low voltage can select from the RGE series of leaded components; if necessary, these devices can be used in parallel to increase current rating (see fundamentals section). The smaller miniSMD, microSMD, and SMD devices offer surface-mount options.

Figure 1. Typical Schematic

