5V/12V Power Line Protection for Hard Disk Drives (CD-ROM, CD-RW, DVD)
Application Overview

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Problem/Solution

With the proliferation of RAID systems and interchangeable hard drives and backup batteries in laptops, hard disk drives (HDDs) can be affected by many external factors that can damage or destroy the storage devices in these hot plug environments. The manufacturers of HDDs must protect their products from incorrect voltages due to misconnection of the 12V, 5V, and/or 3.3V lines. The variations in the host-computer power supplies may also result in AC ripple or incorrect polarity that can damage the tantalum capacitors on the drives. The use of PolySwitch resettable devices on HDDs provides overcurrent protection, minimizing the chances of problems developing. If a fault does occur, permanent damage to circuitry may be avoided. In addition to HDDs, this type of failure can occur on certain floppy disk, CD-ROM, CD-R, CD-RW, and DVD drives.

Typical Protection Requirements

The connection of a 12V line from the computer power supply instead of a 5V line can cause a high-current inrush that can damage the other components in the circuit. Reverse polarity can also cause damage to tantalum capacitors, causing the capacitors to fail in a short-circuit mode.

Technology Comparison

The circuit designer for a hard disk drive has multiple options available when designing the protection of the circuit. An

option would be to use fuses for this protection; however, these devices are only good for one use and then must be replaced. Another option is not to use any protection on the circuit, which means that if a fault occurs, repair to the circuit may be extensive and economically unfeasible. PolySwitch devices provide resettable overcurrent protection and should not need replacement or repair after an overcurrent situation.

Device Selection

Devices that meet the storage media protection needs are those of the SMD, miniSMD, and microSMD series. Featuring very small footprints and low height, these devices are well suited to the requirement for small components.

Figure 1. Protection for Disk Drives