

Circuit Protection of Computer Subsystems and Peripherals using PolyZen Devices

Although typical computer power supplies provide regulated lines at 5V +/- 5%, and 12V +/-5%, the voltage at these lines may, under certain circumstances, exceed 5.25V, and 12.6V respectively, resulting in damage to the system or unprotected peripherals.

Inductively generated voltage spikes can easily exceed 8V and damage unprotected peripherals. Voltage spikes can occur when there is inductance in the power bus, generating a rapid change in current. This change can result from a hot disconnect of a peripheral, an internal system shutdown, or other internal power fluctuations.

Inductance can be designed in with magnetics, but can also be generated by long cables and other power bus artifacts. The more inductance in the power bus the worse the voltage spike is likely to be. In short, computer electronics can be exposed to voltages well in excess of the bus voltage, and require protection to prevent premature failure.

The PolyZen component incorporates a stable Zener diode for precise voltage clamping and a resistively non-linear, polymer PTC (positive temperature coefficient) layer. The PTC layer responds to either diode heating or overcurrent events by transitioning from a low to high resistance state, also known as “tripping.” In the event of sustained high power conditions, the tripped PTC element limits current and generates voltage drop to help protect both the Zener and the follow on electronics—effectively increasing the diode's power handling capability.

PolyZen ZEN056V130A24LS: This RoHS-compliant device is designed to protect devices on the 5V computer bus, providing Vz at 100mA between 5.5 and 5.75V. The device helps protect sensitive follow-on electronics—such as flash memory and other 6V capable silicon—from inductive voltage spikes, incorrect power supplies, dirty power and other transients.

PolyZen ZEN132V130A24LS: This version is designed to protect devices on the 12V computer bus, providing Vz at 100mA of 13.2V at a minimum, in case a 12V +/- 10% supply is used.

The PolyZen device is especially effective at helping to clamp and smooth inductive voltage spikes. In response to an inductive spike the Zener diode element helps shunt current to ground until the voltage is reduced to the normal operating range. In the case of an incorrect voltage power supply, the device helps clamp the voltage, shunt excess power to ground, and eventually lock out the incorrect supply.

Because of the potential for very high currents on computer bus applications, care should be taken to assure appropriate protection. I_{FLT} max, and V_{OUT} Peak should both be reviewed for the application being selected to ensure that the device offers the desired level of protection.

Benefits:

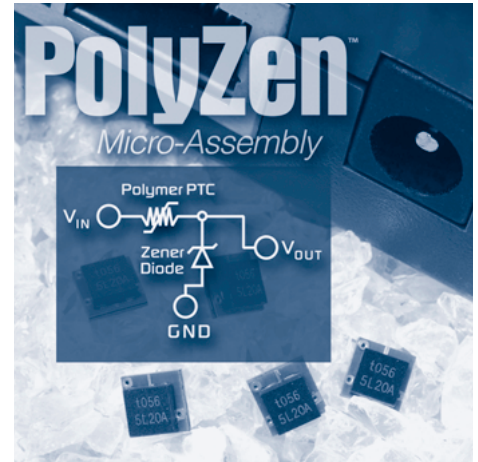
- Helps shield downstream electronics from overvoltage and reverse bias
- Trip events shut out overvoltage and reverse bias sources
- Analog nature of trip events minimize upstream inductive spikes
- Helps reduce design costs with single component placement and minimal heat sinking requirements

Features:

- Overvoltage transient suppression
- Stable VZ vs. fault current
- Time delayed, overvoltage trip
- Time delayed, reverse bias trip
- Power handling on the order of 100 watt
- Integrated device construction
- RoHS compliant

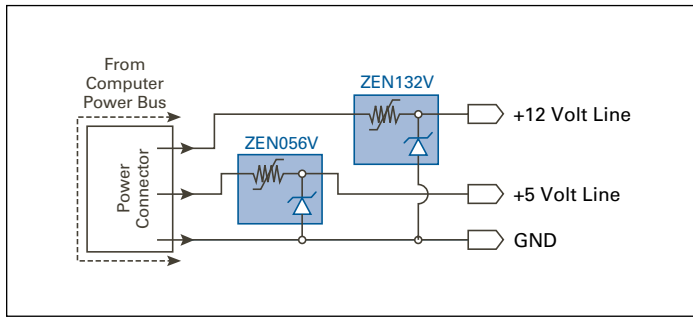
Applications:

- Hard disk drive—5V & 12V bus protection
- Flash memory—5V bus protection
- USB—5V bus protection
- DVD drive—5V & 12V bus protection
- Zip drive—5V & 12V bus protection
- PCI card—5V & 12V bus protection
- PCI express card—5V & 12V bus protection

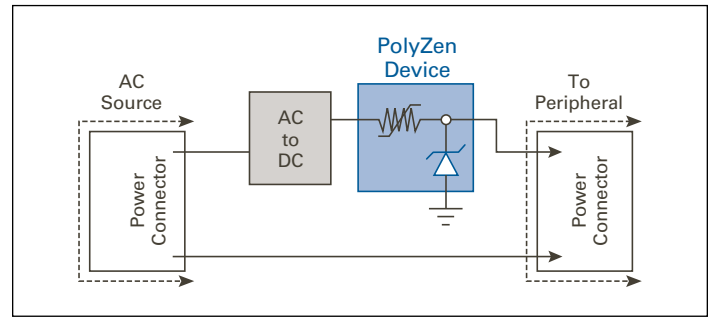


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Typical Circuit—Computer Peripherals



Computer Peripheral/Subsystem Power Conditioning (AC to DC converter output)

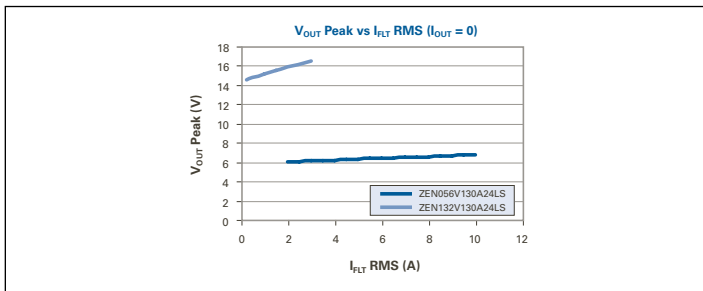


Electrical Characteristics (Performance ratings @ 25°C unless otherwise specified)

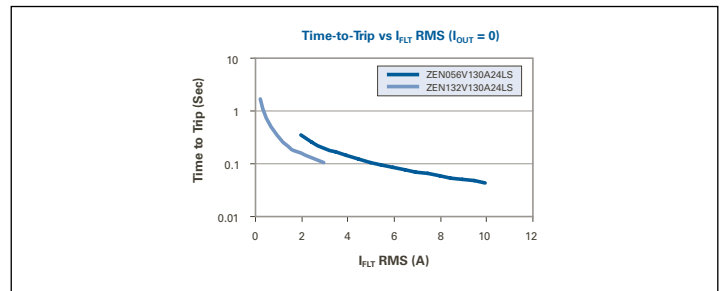
Part Number	V _{Typ} (V)	I _{zt} (A)	I _{HOLD} @ 20°C (A)	R _{Typ} (Ω)	R _{1Max} (Ω)	V _{INT} Max @ 3A (V)	I _{FLT} Max @ 16V (A)	Power Dissipation (W)
ZEN056V130A24LS	5.6	0.1	1.3	0.12	0.16	24	+10 / -40	0.7
ZEN132V130A24LS	13.4	0.1	1.3	0.12	0.16	24	+3 / -40	0.7

For specification terms and definitions, go to www.circuitprotection.com/polyzen/

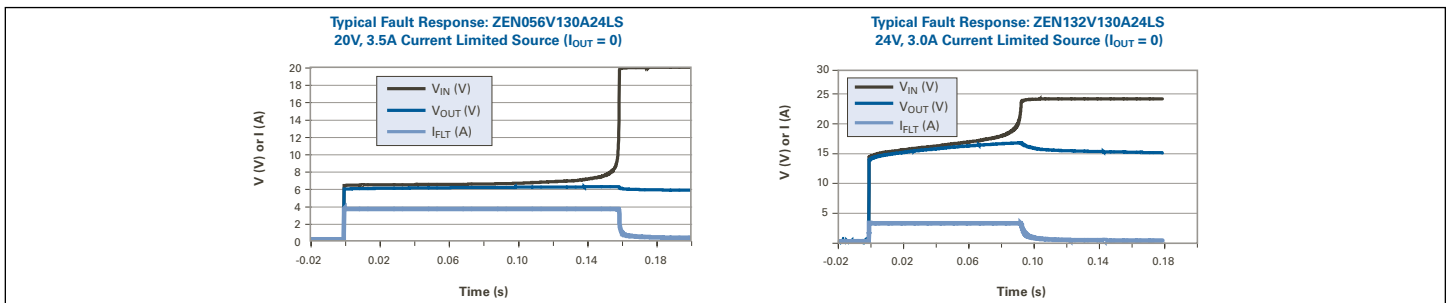
V_{Peak} vs I_{FLT}



Time-to-Trip



Typical Overvoltage Response



Summary

Computer electronics can be exposed to voltages well in excess of the bus voltage, and require protection to prevent premature failure. Voltage spikes can result from a hot disconnect of a peripheral, an internal system shutdown, or other internal power fluctuations. Raychem Circuit Protection's PolyZen device provides coordinated protection with a component that protects like a Zener diode, but is capable of withstanding the high power fault conditions that can occur in computer electronics.



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