

TVS Protection for RS-422 Using the PSOT05C

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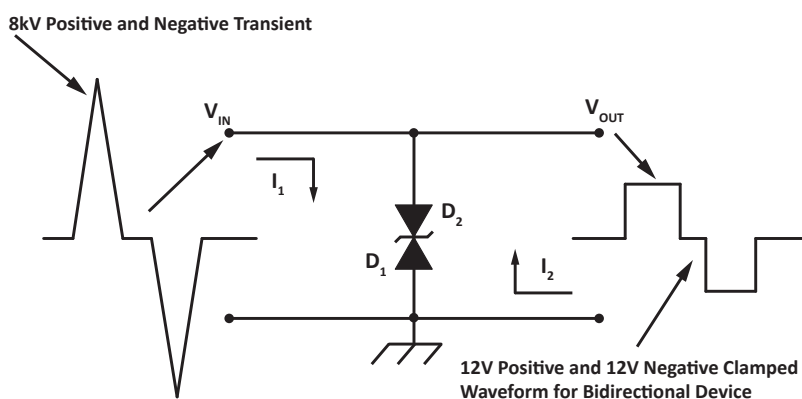
RS-422 (or EIA422) is a communication interface standard that specifies the electrical characteristics of digital signaling. RS-422 provides data transmission via balanced or differential signaling, over terminated or non-terminated transmission lines.

RS-422 can deliver data at rates up to 10Mbps over short distances on a twisted pair. The range can be extended to 1,500 meters at lower data rates. The interface operates between -6 to+6 volts (maximum differential voltage).

RS-422 interface is susceptible to power source fluctuations, inductive switching, electrostatic discharge and other threats, leaving the interface open to risk of electrical damage. ProTek Devices recommends the PSOT05C, a protection device that is compliant with IEC 61000-4-2 ESD protection ($\pm 8\text{kV}$ contact and $\pm 15\text{kV}$ air discharges).

Transient voltage suppression diodes are normally used to protect the RS-422 transceivers from transient voltages. A TVS diode, when working below its breakdown voltage, acts as a huge resistor and a sizeable capacitor in parallel. The value of this capacitance is of interest when we deal with data transmission. An average use of RS-422 is sub- 1Mbps (smaller data rate, larger distance). Figure 1 shows a typical TVS clamping characteristics for bidirectional devices.

Figure 1. Bidirectional Device TVS Clamping Characteristics



The PSOT05C is a dual TVS package that can protect one bidirectional line or two unidirectional lines. The device can handle up to 500 Watts of power for an $8/20\mu\text{s}$ waveshape. The PSOT05C is a 3 pin device (SOT-23 package configuration), which when used for bidirectional surge protection, employs only pin 1 and pin 2. Pin 3 is not connected. A typical RS-422 interface is shown in Figure 2, along with the protection scheme. Each line needs a separate PSOT05C. For longer distances, it is prudent that there is protection on both ends of the channel.

Figure 2. RS-422 Interface Application Using the PSOT05C

