Control Port Protection - RS485 & RS422 Solutions

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RS-422 standard is intended for point-to-point communication applications. The RS-485 standard applies to multi-point applications that incorporate master/salve architecture. Both standards are contention safe and thermally protected and provide for short-circuit protection.

The short circuit protection for RS-422 is defined as a current greater than 150mA between point A and B or against the ground. The short circuit protection for RS-485 is defined as a current greater than 150mA against the ground or a current greater than 250mA between point A and B.

A transient pulse generated by ESD, switching or tertiary lightning can be a significant threat to MOS-based driver ICs. Each standard presents a different protection strategy due to the difference in their common-mode ranges. The RS-422 ground potential between devices is +/- 7 Volts (maximum) and the maximum voltage range at the receiver input for RS-485 is from -7 Volts to +12 Volts.

The Stand-Off Voltage (V_{WM}) of a TVS devices rests within the maximum common-mode voltage range and only conducts when an over-voltage transient occurs. Once connected, the TVS device, having low impedance, will clamp the voltage to a lower level, which protects the driver circuitry. A typical RS-485 connection is shown in Figure 1. ProTek's PSM712 (SOT-23 Package configuration) provides both ESD and secondary lightning protection to the circuit.

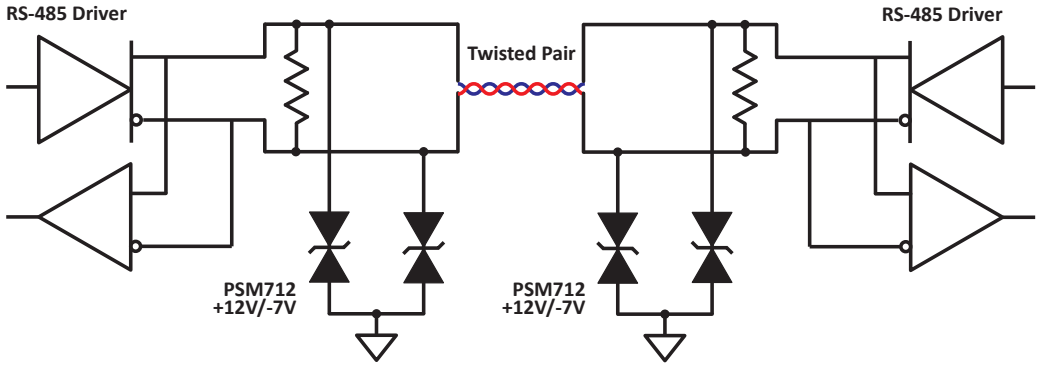

Figure 1. RS-485 ESD & Secondary Lightning Protection using PSM712

High-Speed Data Protection

Many of today's chips can achieve data transfer speeds of 25Mbps or higher. TVS devices, such as ProTek's PLCDA12C-6 or PSLC12C, feature rectifier diodes in series with TVS diodes as shown in Figure 2. This configuration has a total capacitance of 10pF, which is ideal for high-speed RS-485 and RS-422 connections, where signal integrity and low insertion loss are a necessity. Both devices are available in small surface mount packages (SOIC-8 and SOT-143), taking up less board space.

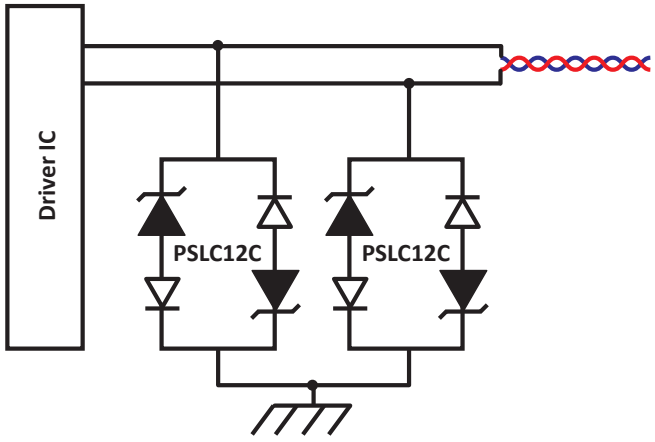

Figure 2. High-Speed RS-485 ESD Protection using PSLC12C

Primary & Secondary Lightning Protection

Specifically designed for the RS-485 standard, ProTek's 485ELC is a low capacitance, two-stage module that provides primary and secondary lightning protection. The first stage diverts the transient current through the ground terminal return path and the second stage clamps the voltage to a safe level without interruption of service.

COMPANY INFORMATION

COMPANY PROFILE

ProTek Devices, based in Tempe, Arizona USA, is a manufacturer of Transient Voltage Suppression (TVS) products designed specifically for the protection of electronic systems from the effects of lightning, Electrostatic Discharge (ESD), Nuclear Electromagnetic Pulse (NEMP), inductive switching and EMI/RFI. With over 25 years of engineering and manufacturing experience, ProTek designs TVS devices that provide application specific protection solutions for all electronic equipment/systems.

ProTek Devices Analog Products Division, also manufactures analog interface, control, RF and power management products.

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