Protecting LVDS Interfaces

By: Sudesh Nayak

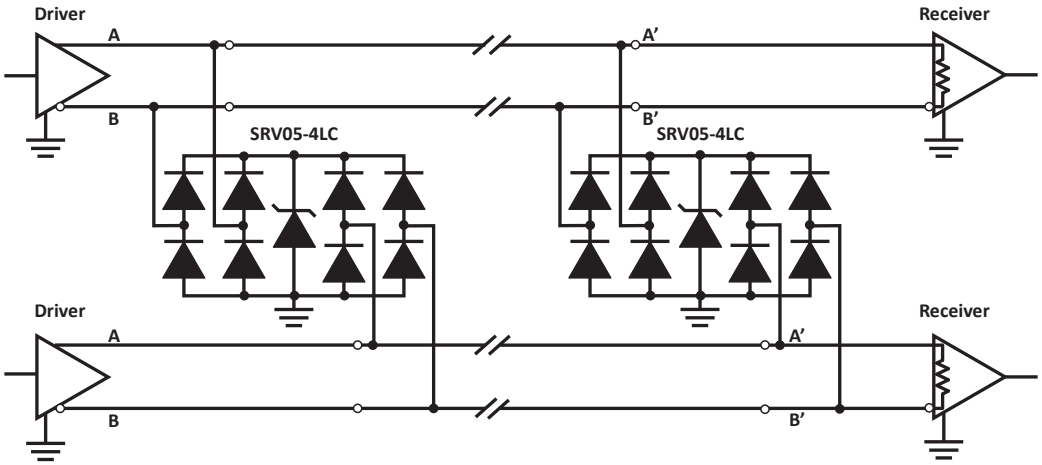
Low-Voltage Differential Signaling or LVDS is a technology used in a variety of high-speed data transmission applications such as switches, set-top boxes and flat panel displays. In the simplest form, an LVDS interface, as defined by IEEE 1596.3 and ANSI/TIA/EIA-644, is a driver that transmits the signal over a trace or a cable to a receiver. If not protected properly, electrostatic discharge can damage the driver and receiver. In addition, the typical data transmission rate of LVDS is typically 500Mbps up to a theoretical maximum of 1.9Gbps. High data transmission rate applications require protection devices that can provide adequate protection while maintaining signal integrity.

ProTek Devices SRV05-4LC is a 5 Volt, transient voltage suppression device that provides up to four channels of protection. The SRV05-4LC has a significantly low device capacitance (0.7pF typical) and break down voltage. These features make it an ideal device to protect LVDS Interfaces. LVDS calls for a protection device with low clamping voltage owing to its characteristic of low voltage operation. LVDS IEEE 1596.3 and ANSI/TIA/EIA-644 standard supports a maximum data rate of 655Mbps, which requires a protection device with a very low device capacitance to avoid loading or signal distortion. Table 1 shows the electrical characteristics for the SRV05-4LC.

TABLE 1: ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

PART NUMBER	RATED STAND-OFF VOLTAGE V_{WM} VOLTS	MINIMUM BREAKDOWN VOLTAGE @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM CLAMPING VOLTAGE @ I_P = 5A V_C VOLTS	MAXIMUM LEAKAGE CURRENT @V_{WM} I_D µA	TYPICAL CAPACITANCE I/O TO I/O @0V, 1MHz $C_{J(SD)}$ pF	MAXIMUM CAPACITANCE I/O to GND @0V, 1MHz $C_{J(SD)}$ pF
SRV05-4LC	5.0	6.0	15.0	5	0.7	1.4

The figure below shows two SRV05-4LC devices which protect both sides of the LVDS transmission system. The SRV05-4LC is connected a in line to line configuration where it protects a differential data line and also in a line to ground configuration showing a single ended.



When operated in a differential mode (I/O to I/O) configuration, the SRV05-4LC has a typical device capacitance of 0.7pF. In a common mode configuration (I/O to ground), the capacitance rises to 1.4pF. In either case, the SRV05-4LC can handle up to 1Gbps data rate without any observable depreciation in signal integrity.

The SRV05-4LC is qualified to meet and exceed the IEC 61000-4-2(Level 4 (ESD): ±8kV contact and ±15kV air) standard. It is also compatible with IEC 61000-4-4(EFT: 40A, 5/50ns) and IEC 61000-4-5(Surge: 24A,8/20µs – Level 2 and Level 3) standards.