

**PROTECTION PRODUCTS**

**ESD Protection Solution for LVDS Interfaces**

LVDS or Low-Voltage Differential Signaling is defined by both the IEEE 1596.3 and the ANSI/TIA/EIA-644 standards to be a technology that performs high-speed data transmission for communication applications such as hubs, set-top boxes, and flat panel displays. In general, the LVDS interface consists of a driver connecting to a receiver via a cable. If not protected properly, both the driver and the receiver are susceptible to damages from threats such as electrostatic discharges.

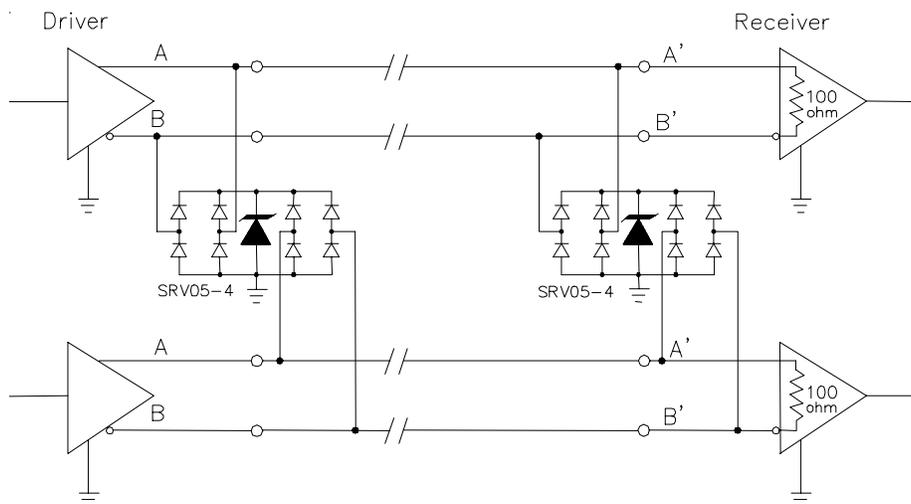
As the name implies, LVDS operates with low signal levels. In order to maintain low stress level on the interfaces, a protection device with low operating and low clamping voltage is needed. LVDS also performs high-speed data transmission greater than 155.5Mbps. The typical data transmission rate of LVDS is 500Mbps. Although LVDS can theoretically achieve a maximum of 1.923Gbps based on a loss-less media, 655Mbps is the maximum data transmission rate recommended by both the IEEE 1596.3 and the ANSI/TIA/EIA-644 standards. Having high-speed data rate means the protection device used to protect the LVDS interface must be low capacitance to maintain signal integrity.

The Semtech SRV05-4 is a 5V TVS protection device that offers low capacitance and low clamping voltage. Figure 1 shows the connection of the Semtech SRV05-4 to provide common mode and differential mode protection for two LVDS interfaces. The figure

also shows how the Semtech SRV05-4 is used to protect the lines on both the driver and the receiver side. In the diagram, the Semtech SRV05-4 is connected in both line-to-line and line-to-ground configuration. The line-to-line connection provides differential mode protection, while the line-to-ground connection serves as common mode protection.

The typical differential mode capacitance of the Semtech SRV05-4 is less than 1pF and the typical common mode capacitance is 3pF. The low capacitance of the Semtech SRV05-4 will ensure that the signal integrity will not degrade at a data rate up to 655Mbps, the maximum data rate recommended. Furthermore, the Semtech SRV05-4 provides protection to and beyond Level 4 of IEC 61000-4-2 ESD ( $\pm 8\text{kV}$  Contact,  $\pm 15\text{kV}$  Air) as well as protection to IEC 61000-4-4 EFT (40A, 5/50ns) and IEC61000-4-5 lightning (12A, 8/20 $\mu\text{s}$ ). Regardless of the level of the threat environment, the Semtech SRV05-4 offers low clamping voltage to provide superior protection for LVDS interfaces.

With LVDS's specific characteristics and functions, in order to provide adequate ESD protection for its interfaces, an appropriate protection device should accommodate the high-speed applications and at the same time, provide sufficient level of protection against the threat environment. Low capacitance and low clamping voltage coupled with multiple protection capabilities allow the Semtech SRV05-4 to provide full protection for LVDS interfaces without interfering with the high data transmission rate.



**Figure 1. Semtech SRV05-4 for LVDS Protection**