

## LVDS Signaling Standard

### What is LVDS?

Interfacing today's high-speed, high resolution digital cameras to frame grabbers and vision processor boards requires an electrical interface that can quickly handle a large amount of data over long cable lengths. Until now, the most commonly used digital signaling standard for such applications has been RS-422, however this standard is starting to show its limitations.

To overcome these limitations, camera and board manufacturers have adopted a new digital signaling standard - Low Voltage Differential Signaling (LVDS). LVDS, as the name indicates, is a low-voltage differential-signaling technology. There are currently several industry standards that define LVDS including ANSI/TIA/EIA-644 (EIA-644) and IEEE 1596.3.

IEEE 1596.3 is used primarily for communication between processors or grouping workstations into clusters. EIA-644 is more general-purpose and application independent, and it provides a high bandwidth from higher transmission speeds with low noise and power consumption. EIA-644 is particularly well suited for interfacing high performance video cameras to imaging systems such as Matrox frame grabbers and image processors.

### What are the differences between RS-422 and LVDS?

RS-422 is an electrical specification for the transmission of digital data. RS-422 requires the use of a twisted pair of wires to transmit one signal in a differential mode. The balanced signal<sup>2</sup> is transmitted in differential mode; one signal must be high (» 3 volts) while the other signal must be low (» 0 volts). RS-422 devices can operate at full duplex (i.e., transmit and receive data simultaneously) or half duplex (i.e., cannot transmit and receive data simultaneously). Typical data rates for RS-422 are 40 Mbps for distances between 1 and 3 meters. The rate drops to 10 Mbps at 10 meters.

Similar in design, LVDS provides higher transmission speed due to several factors. Firstly by using a constant-current driver, whereby the constant-current allows power consumption to be relatively independent of frequency. Another is by way of the standard's ability to operate independently from the power-supply voltage (since the interface voltage is low enough to operate from a 2V power supply). LVDS drivers and receivers have a very low voltage swing (typically 350 mV with an offset of 1.25V) and achieve high speeds using little power. Typical data rates for LVDS<sup>3</sup> are 110 Mbps for a 1meter distance, dropping to 90 Mbps over a 10-meter distance.

### Where can I find information about LVDS?

Visit **National Semiconductor(R) LVDS home page** for a comprehensive selection of product briefs, FAQs, design guides and tools (LVDS owner manuals and white papers), and late-breaking LVDS news.