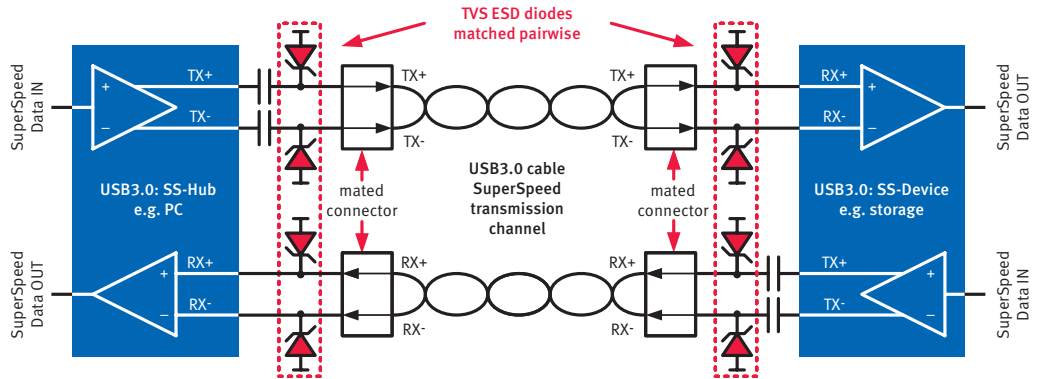




## ESD Protection for Super Speed USB 3.0 Interface

## The Block Diagram

With the new SuperSpeed USB3.0 standard (up to 5Gbit/sec) also the requirements for ESD protection have increased due to the new connector design. USB2.0 and USB3.0 data lines are combined in to one connector and of most significance the pads for USB3.0 are more exposed to the user. In parallel the device structures of the USB Transceiver IC itself have shrunk and are therefore more ESD sensitive.



## The Signal Integrity/Eye Diagram

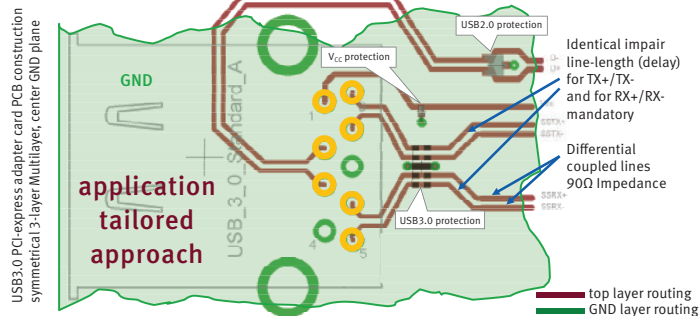
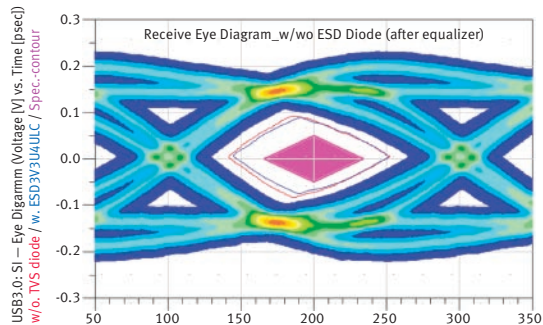
Most important for ultra high speed data transmission systems is to ensure a certain level of Signal Integrity (SI). Excellent SI is important to achieve a low bit error rate and characterized by the eye diagram!

In a perfect system without limitation in bandwidth the eye diagram would be perfectly open. In a real system, the signal rise-/fall-time is limited by the TX and the RX impedance in combination with all parasitic capacitance at TX side and RX side. These parasitic capacitances are inside the USB3.0 transceiver, and/or externally on the PCB. With our ESD protection diode we offer extreme low line capacitance with nearly no impact on Signal Integrity.

## The Layout Solution

We offer optimized layout proposals using protection diodes for:

- USB3.0: ESD3V3U4ULC
- USB2.0: ESD5V3U2U series
- $V_{CC}$ : ESD8V0 series or ESD5V3U1U series.



## Infiniteon Technologies – The ESD-Protection Competence Center

At Infineon Technologies one of our major focuses is on high performance ESD Protection with minimized impact on signal integrity. Infineon system level ESD protection devices are optimized for applications like high speed interfaces (USB3.0, HDMI) and RF-/antenna protection.

### Key Benefits of Infineon ESD Diodes

- Very low differential crosstalk
- Excellent line to line capacitance matching of 0.05 pF (typical)
- Extremely low channel capacitance.
- Extremely wide pass-band up to 8GHz.
- Very low clamping voltage and dynamic resistance
- Miniaturized packages optimized for easy PCB layout.

### Your partner for effective ESD design

Besides market-leading ESD protection devices the Infineon ESD Protection Competence Center supports designers in the selection of an effective ESD design strategy with:

- Advanced Transmission Line Pulse (TLP) measurement for system co-design approach.
- Complete simulation library.
- Simulated and measured eye-diagrams to quantify impact on signal integrity.
- Cross talk measurements
- Optimized PCB layout and BOM suggestions addressing different needs.
- Library of application notes including USB3.0.

For further information about Infineon ESD Protection services please contact [www.infineon.com/tvsdiodes](http://www.infineon.com/tvsdiodes).

## Where to Buy

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Published by Infineon Technologies AG

Order Number: B132-H9529-X-X-7600

Date: 11 / 2010