



# ESD protection for USB2.0 ports

PRTR5V0U2X, PRTR5V0U2AX, PRTR5V0U4D

Handling data rates up to 480 Mbit/s, USB2.0 interfaces require ESD protection devices with an extremely low line capacitance in order to avoid signal distortion.

With a capacitance below 2 pF, Philips' PRTR5V0U2X, PRTR5V0U2AX and PRTR5V0U4D offer IEC 61000-4-2, level 4 compliant ESD protection.

The devices integrate ultra-low capacitance rail-to-rail ESD protection diodes as well as an additional ESD protection diode connected between ground and  $V_{CC}$  to prevent charging of the supply. To achieve the maximum ESD protection level, no additional external capacitors are required. PRTR5V0U2X and PRTR5V0U2AX in the small SOT143 package are designed to protect one USB2.0 port whereas PRTR5V0U4D in SOT457 (SC-74) package is intended to protect two USB2.0 ports.

**PHILIPS**

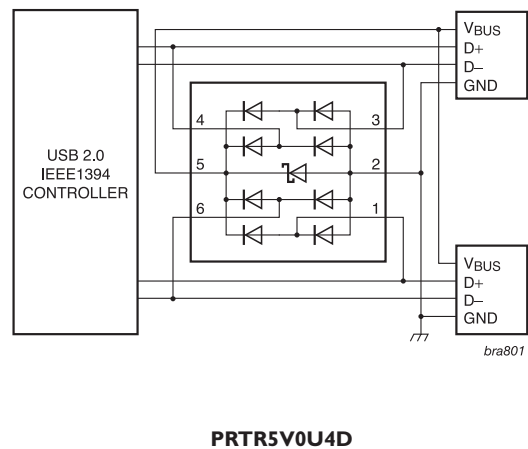
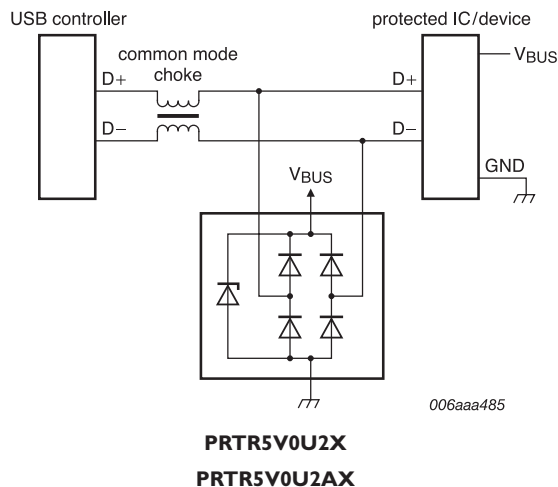
## Features

- ESD protection of USB2.0 high speed ports
- Ultra low input to ground capacitance:
  - $C_{(I/O-GND)} = 1 \text{ pF}$  (PRTR5V0U2X / PRTR5V0U4D)
  - $C_{(I/O-GND)} = 1.8 \text{ pF}$  (PRTR5V0U2AX)
- Very high ESD robustness
  - Up to 8 kV (PRTR5V0U2X / PRTR5V0U4D)
  - Up to 12 kV (PRTR5V0U2AX)
- IEC61000-4-2, level 4 compliance
- Very low clamping voltage
- Very low leakage current
- Small SMD plastic packages

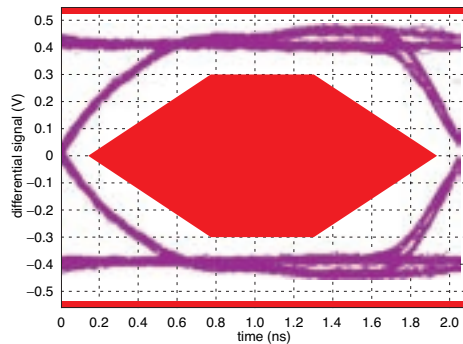
## Applications

- USB2.0 ports
- Mobile and cordless phones
- Personal Digital Assistants (PDA)
- Digital cameras
- Wide Area Network (WAN) / Local Area Network (LAN) systems
- PCs, notebooks, printers and other PC peripherals

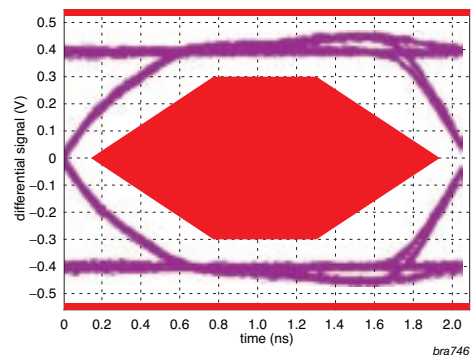
## Application examples



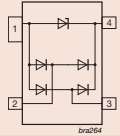

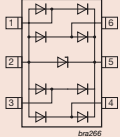

## USB compliance test



USB2.0 high-speed signal quality test for USB port  
(motherboard) **without PRTR5V0U2X**



USB2.0 high-speed signal quality test for USB port  
(motherboard) **with PRTR5V0U2X**

Types and parametric data								
Number of protected data lines	$I_R$ max [ $\mu$ A]	@	$V_R$ [V]	$C_{line}$ typ [pF]	ESD rating* max [kV]	Configuration	Type	Package
2	0.1		3	1	8		PRTR5V0U2X	SOT143 2.9 x 1.3 x 1.0 
	0.1		3	1.8	12		PRTR5V0U2AX	
4	0.1		3	1	8		PRTR5V0U4D	SOT457 (SC-74) 2.9 x 1.5 x 1.0 

\*acc. to IEC61000-4-2 (contact discharge)

Philips Semiconductors

**PRTR5V0U2X**

Maximum flexibility,  
minimum space

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**PRTR5V0U2AX**

Maximum flexibility,  
minimum space

Philips Semiconductors

**PRTR5V0U4D**

Maximum flexibility,  
minimum space

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