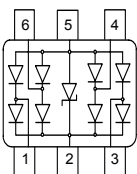


**Ultra-Low Capacitance ESD Diode Array**

- Rail-to-rail diodes with internal TVS diode
- ESD / transient protection of four I/O lines and one Vcc line exceeding:
  - IEC61000-4-2 (ESD):  $\pm 15$  kV (contact)
  - IEC61000-4-4 (EFT): 2.5 kV / 50 A (5/50 ns)
  - IEC61000-4-5 (surge): 3 A (8/20  $\mu$ s)
- Reverse working voltage data lines: 5.3 V max.
- Reverse working voltage Vcc: 6 V max.
- Very low capacitance: 0.4 pF typ.
- Very low reverse current < 10 nA typ.
- Very low clamping voltage:
  - 12 V typ. at positive transients
  - 4 V typ. at negative transients
- Pb-free (RoHS compliant) package


**Applications**

- USB 2.0 ports and future USB 3.0 ports
- Ethernet port: 10/100/1000 Mb/s
- IEEE 1394 FireWire ports
- Mobile communications e.g. high-speed SIM card protection
- Consumer products (STB, DVD, DSC, DVC...)
- Notebooks and desktop computers, peripherals


**ESD5V3U4RRS**


| Type        | Package | Configuration           | Marking |
|-------------|---------|-------------------------|---------|
| ESD5V3U4RRS | SOT363  | 6 pins, uni-directional | E8s     |

**Maximum Ratings** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

| Parameter   | Symbol           | Value     | Unit |
|---|------------------|-----------|------|
| ESD contact discharge <sup>1)</sup>                             | $V_{\text{ESD}}$ | 15        | kV   |
| Peak pulse current ( $t_p = 8 / 20 \mu\text{s}$ ) <sup>2)</sup> | $I_{\text{pp}}$  | 3         | A    |
| Peak pulse power ( $t_p = 8 / 20 \mu\text{s}$ ) <sup>2)</sup>   | $P_{\text{pk}}$  | 50        | W    |
| Operating temperature range                                     | $T_{\text{op}}$  | -55...125 | °C   |
| Storage temperature   | $T_{\text{stg}}$ | -65...150 |      |

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

| Parameter  | Symbol            | Values |          |          | Unit |
|--|-------------------|--------|----------|----------|------|
|  |                   | min.   | typ.     | max.     |      |
| <b>Characteristics</b> <sup>3)</sup>   |                   |        |          |          |      |
| Reverse working voltage<br>I/O pin <sup>4)</sup> to pin 5<br>pin 2 to pin 5  | $V_{\text{RWM}}$  | -      | -        | 5.3<br>6 | V    |
| Breakdown voltage<br>$I_{\text{(BR)}} = 1 \text{ mA}$ , any pin to pin 5   | $V_{\text{(BR)}}$ | 6.3    | -        | -        |      |
| Reverse current<br>$V_{\text{R}} = 5.3 \text{ V}$ , any pin to pin 5   | $I_{\text{R}}$    | -      | < 10     | 100      | nA   |
| Clamping voltage<br>$I_{\text{PP}} = 1 \text{ A}$ , $t_p = 8/20 \mu\text{s}^2$ , any pin to pin 5<br>$I_{\text{PP}} = 3 \text{ A}$ , $t_p = 8/20 \mu\text{s}^2$ , any pin to pin 5         | $V_{\text{CL}}$   | -      | 10<br>12 | 13<br>15 | V    |
| Forward clamping voltage<br>$I_{\text{PP}} = 1 \text{ A}$ , $t_p = 8/20 \mu\text{s}^2$ , any pin to pin 5<br>$I_{\text{PP}} = 3 \text{ A}$ , $t_p = 8/20 \mu\text{s}^2$ , any pin to pin 5 | $V_{\text{FC}}$   | -      | 2<br>4   | 4<br>6   |      |
| Line capacitance <sup>5)4)</sup><br>$V_{\text{R}} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ , any I/O pin to pin 5  | $C_{\text{T}}$    | -      | 0.4      | 0.6      | pF   |
| Dynamic resistance <sup>6)</sup>   | $R_{\text{D}}$    | -      | -        | -        | -    |

<sup>1)</sup>  $V_{\text{ESD}}$  according to IEC61000-4-2

<sup>2)</sup>  $I_{\text{pp}}$  according to IEC61000-4-5

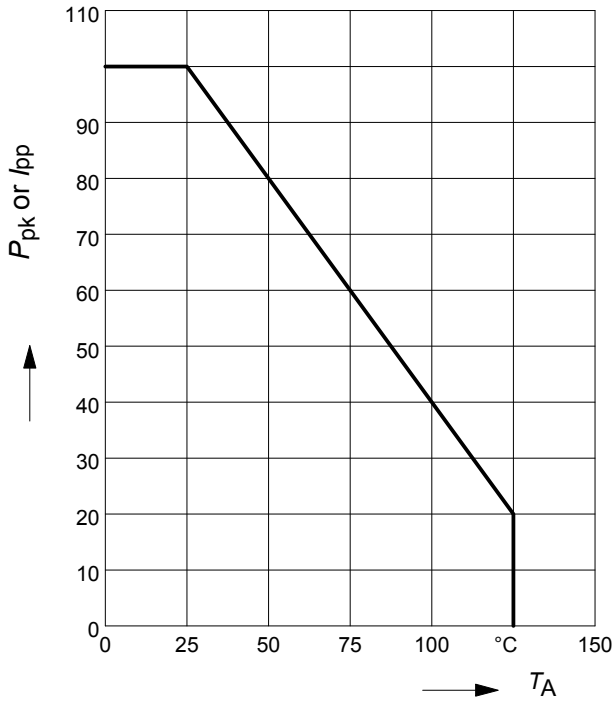
<sup>3)</sup> It is strongly recommended that pin 5 is connected to ground for proper functionality.

<sup>4)</sup> I/O pins are pin 1, 3, 4, 6

<sup>5)</sup> Total capacitance line to ground

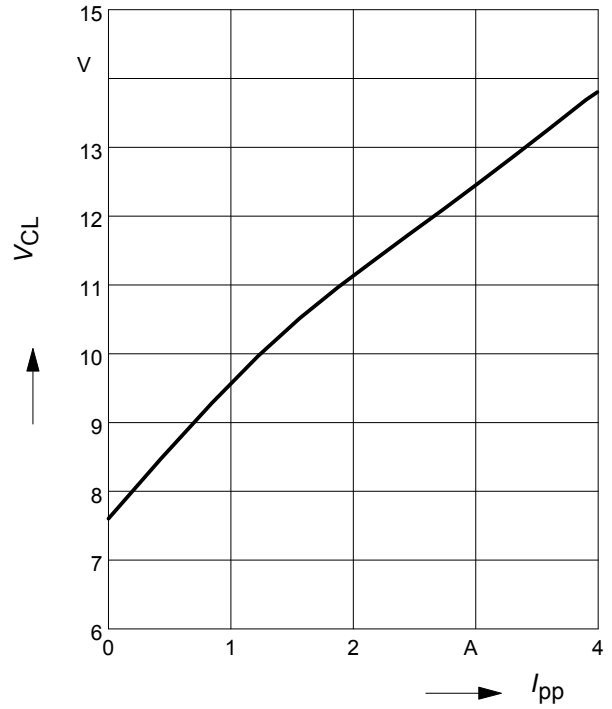
<sup>6)</sup> according to TLP tests

Power derating curve  $P_{pk} = f(T_A)$



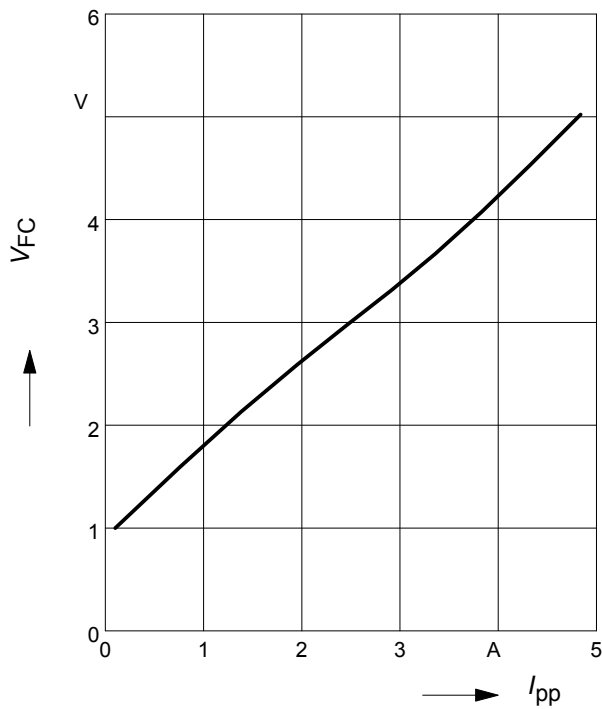
Clamping voltage,  $V_{cl} = f(I_{pp})$

$t_p = 8 / 20 \mu s$



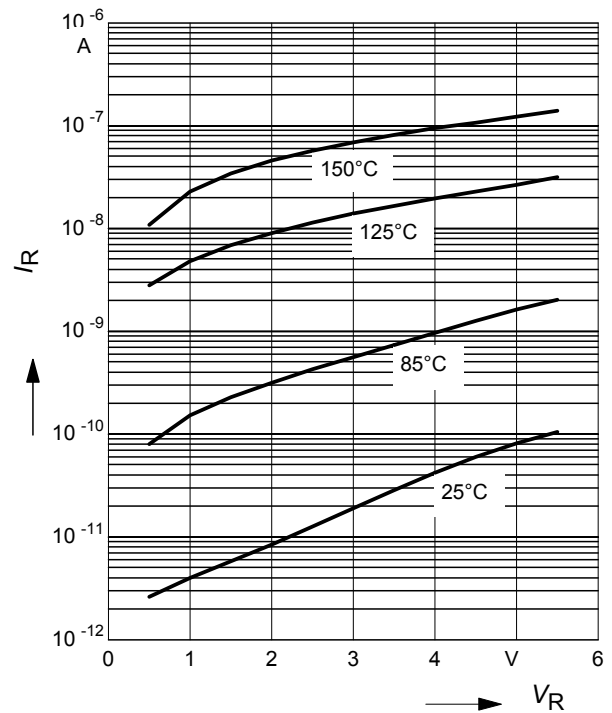
Forward clamping voltage  $V_{FC} = f(I_{PP})$

$t_p = 8 / 20 \mu s$



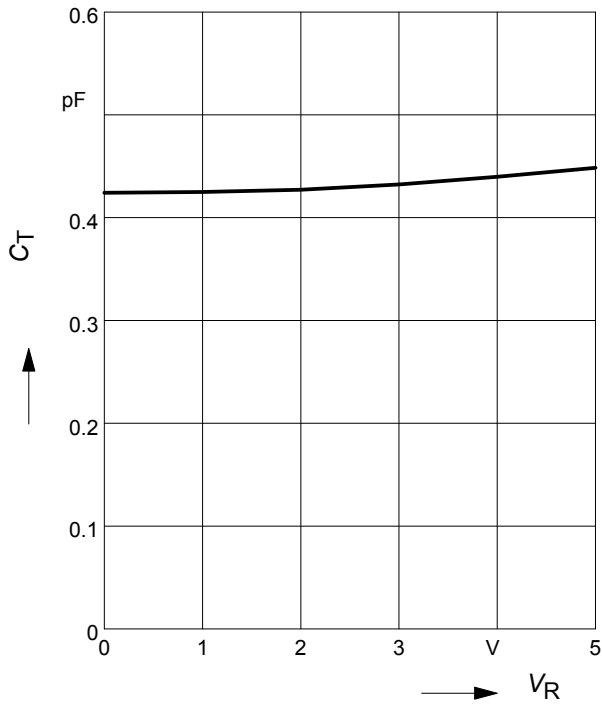
Reverse current  $I_R = f(V_R)$

$T_A = \text{Parameter}$



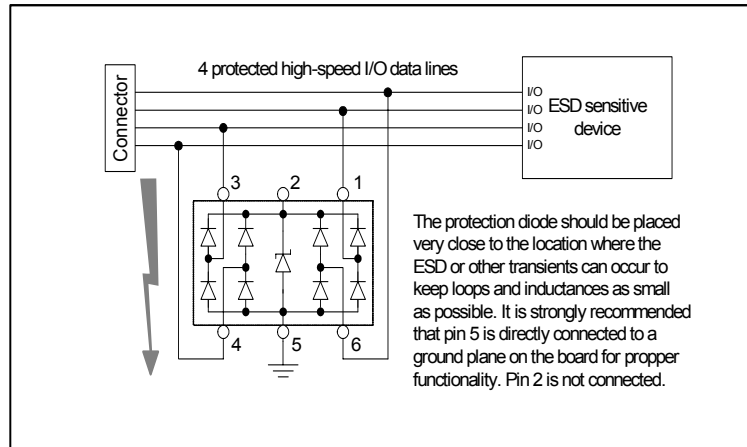
Diode capacitance  $C_T = f(V_R)$

$f = 1\text{MHz}$



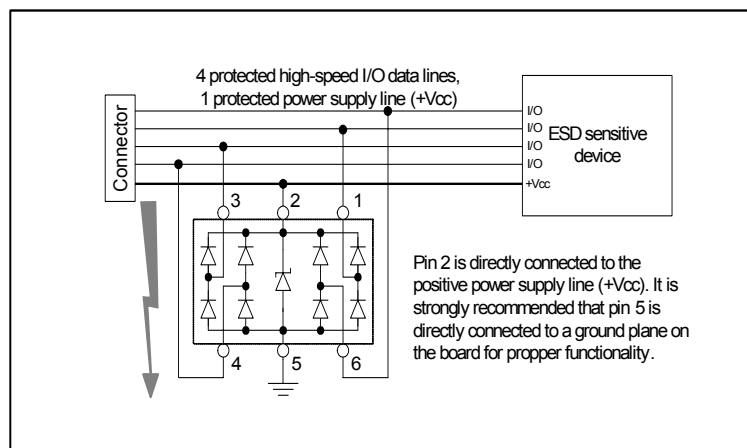
**Application example ESD5V3U4RRS**

4 data lines, uni-directional



**Application example ESD5V3U4RRS**

4 data lines and 1 power supply line, uni-directional



Package Outline



Foot Print



Marking Layout (Example)

Small variations in positioning of Date code, Type code and Manufacture are possible.



Standard Packing

Reel  $\varnothing$ 180 mm = 3.000 Pieces/Reel  
 Reel  $\varnothing$ 330 mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.



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