



ESD5311X

1-Line, Bi-directional, Ultra-low Capacitance Transient Voltage Suppressors

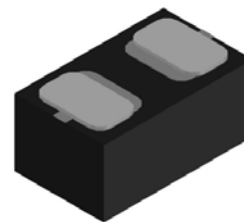
Descriptions

The ESD5311X is an ultra-low capacitance TVS (Transient Voltage Suppressor) designed to protect high speed data interfaces. It has been specifically designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge).

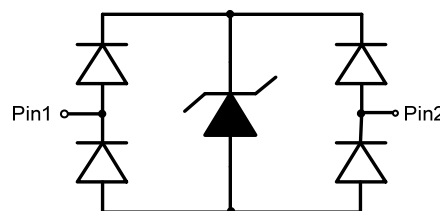
The ESD5311X incorporates one pair of ultra-low capacitance steering diodes plus a TVS diode.

The ESD5311X may be used to provide ESD protection up to ±20kV (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 4A (8/20µs) according to IEC61000-4-5.

The ESD5311X is available in WBFBP-02C-C package. Standard products are Pb-free and Halogen-free.



WBFBP-02C-C (Bottom View)



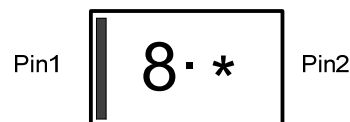
Pin configuration

Features

- Stand-off voltage: 5V Max
- Transient protection for each line according to IEC61000-4-2 (ESD): ±20kV (contact discharge) IEC61000-4-5 (surge): 4 A (8/20µs)
- Ultra-low capacitance: C_J = 0.25pF typ.
- Ultra-low leakage current: I_R < 1nA typ.
- Low clamping voltage: V_{CL} = 22V typ. @ I_{PP} = 16A (TLP)
- Solid-state silicon technology

Applications

- USB 2.0 and USB 3.0
- HDMI 1.3 and HDMI 1.4
- SATA and eSATA
- DVI
- IEEE 1394
- PCI Express
- Portable Electronics
- Notebooks



8 = Device code
* = Month code (A~Z)

Marking (Top View)

Order information

Table with 3 columns: Device, Package, Shipping. Row 1: ESD5311X-2/TR, WBFBP-02C-C, 10000/Tape&Reel

**Absolute maximum ratings**

| Parameter | Symbol | Rating | Unit |
|---|-----------|----------|--------------------|
| Peak pulse power ($t_p = 8/20\mu\text{s}$) | P_{pk} | 72 | W |
| Peak pulse current ($t_p = 8/20\mu\text{s}$) | I_{PP} | 4 | A |
| ESD according to IEC61000-4-2 air discharge | V_{ESD} | ± 20 | kV |
| ESD according to IEC61000-4-2 contact discharge | | ± 20 | |
| Junction temperature | T_J | 125 | $^{\circ}\text{C}$ |
| Operating temperature | T_{OP} | -40~85 | $^{\circ}\text{C}$ |
| Lead temperature | T_L | 260 | $^{\circ}\text{C}$ |
| Storage temperature | T_{STG} | -55~150 | $^{\circ}\text{C}$ |

Electrical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

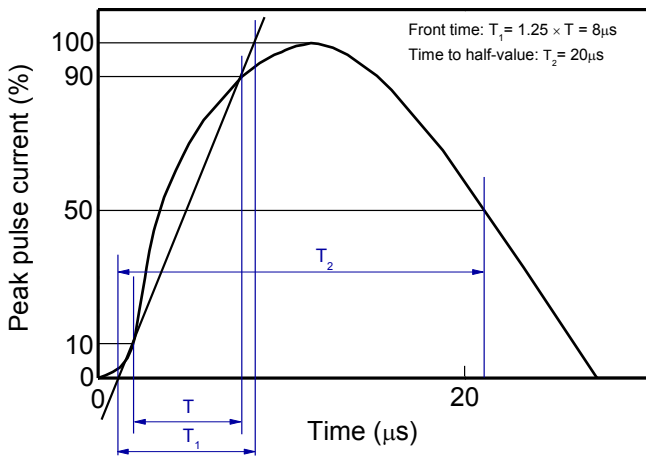
| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------|--|------|------|------|----------|
| Reverse maximum working voltage | V_{RWM} | | | | 5.0 | V |
| Reverse leakage current | I_R | $V_{RWM} = 5\text{V}$ | | <1 | 100 | nA |
| Reverse breakdown voltage | V_{BR} | $I_T = 1\text{mA}$ | 7.5 | 9.0 | 10.0 | V |
| Clamping voltage ¹⁾ | V_{CL} | $I_{PP} = 16\text{A}$, $t_p = 100\text{ns}$ | | 22 | | V |
| Dynamic resistance ¹⁾ | R_{DYN} | | | 0.7 | | Ω |
| Clamping voltage ²⁾ | V_{CL} | $V_{ESD} = 8\text{kV}$ | | 22 | | V |
| Clamping voltage ³⁾ | V_{CL} | $I_{PP} = 1\text{A}$, $t_p = 8/20\mu\text{s}$ | | | 13 | V |
| | | $I_{PP} = 4\text{A}$, $t_p = 8/20\mu\text{s}$ | | | 18 | V |
| Junction capacitance | C_J | $V_R = 0\text{V}$, $f = 1\text{MHz}$ | | 0.25 | 0.4 | pF |

Notes:

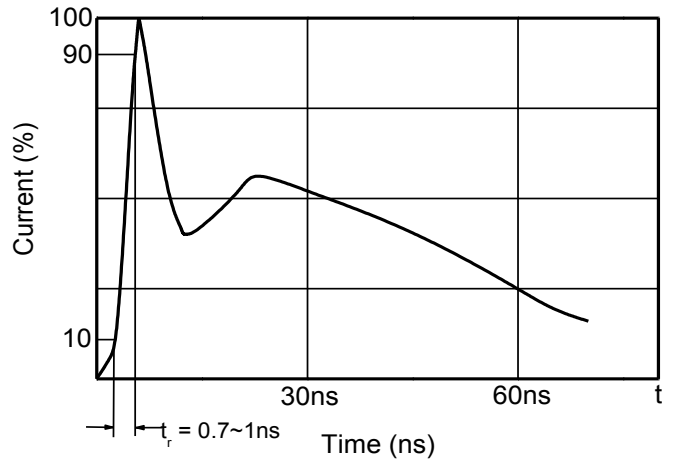
- 1) TLP parameter: $Z_0 = 50\Omega$, $t_p = 100\text{ns}$, $t_r = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.



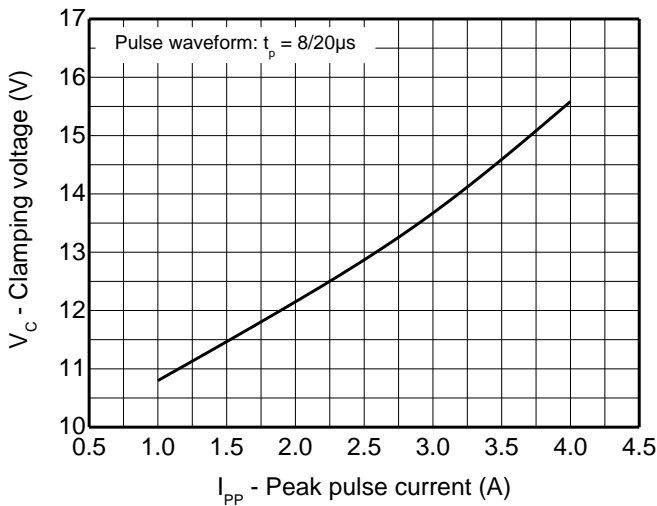
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)



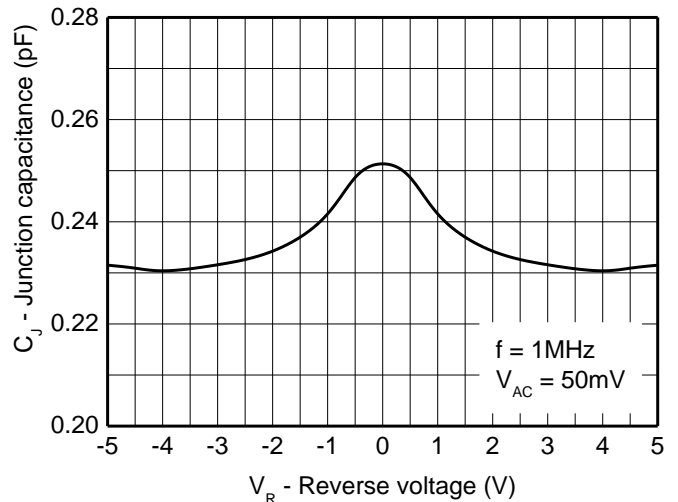
8/20μs waveform per IEC61000-4-5



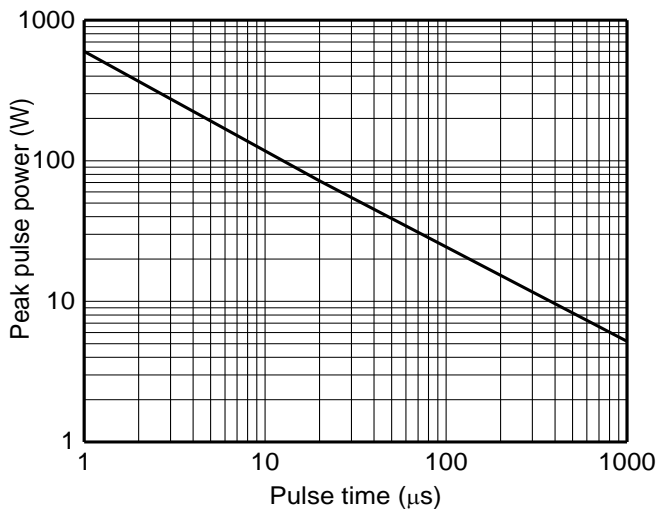
Contact discharge current waveform per IEC61000-4-2



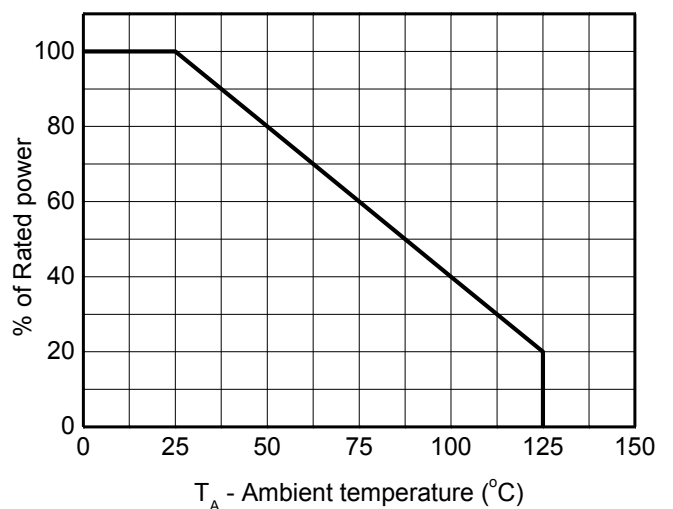
Clamping voltage vs. Peak pulse current



Capacitance vs. Reverse voltage



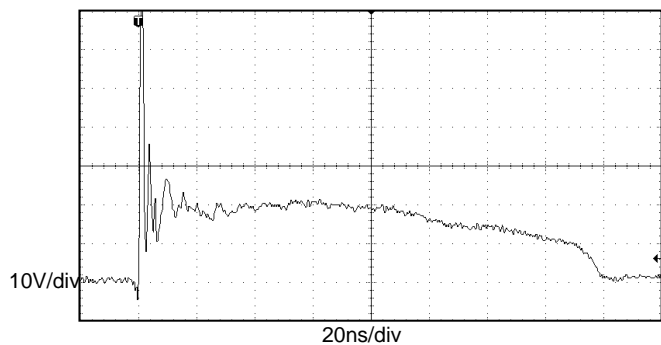
Non-repetitive peak pulse power vs. Pulse time



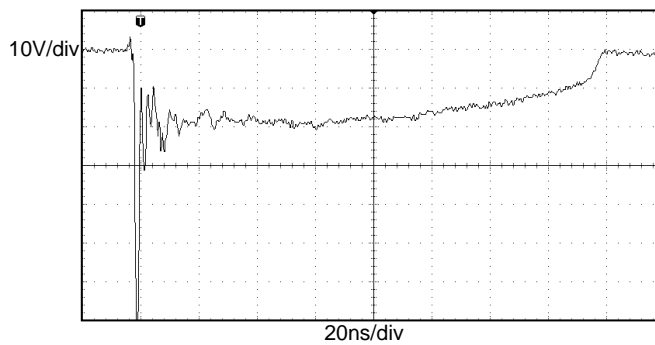
Power derating vs. Ambient temperature



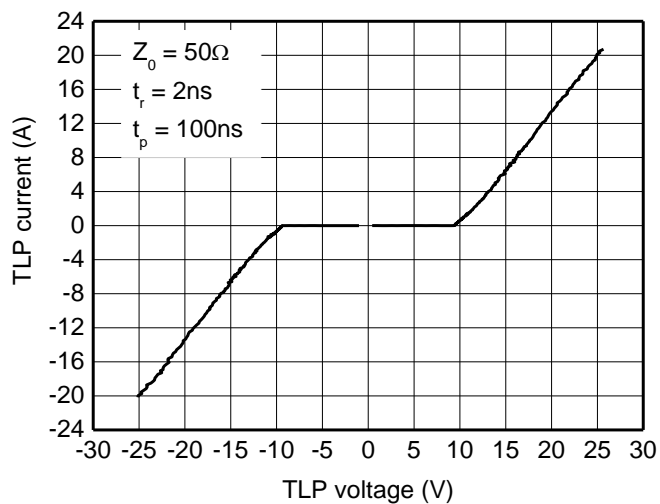
Typical characteristics ($T_A = 25^\circ\text{C}$, unless otherwise noted)



ESD clamping
(+8kV contact discharge per IEC61000-4-2)



ESD clamping
(-8kV contact discharge per IEC61000-4-2)

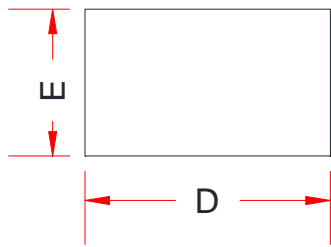


TLP Measurement

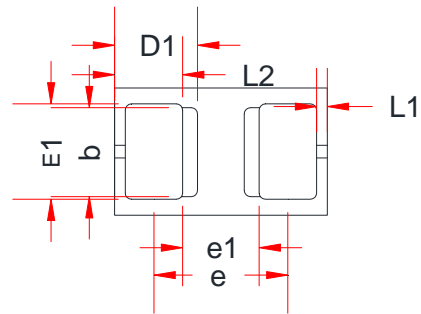


PACKAGE OUTLINE DIMENSIONS

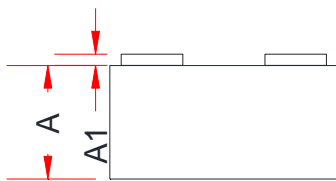
WBFBP-02C-C



TOP VIEW



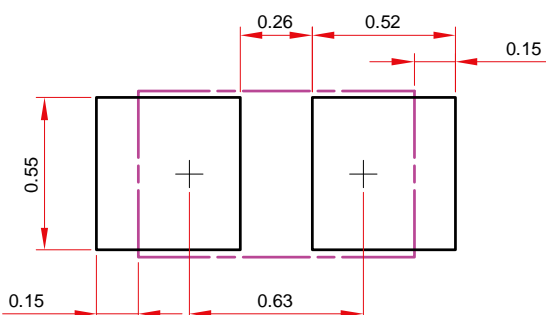
BOTTOM VIEW



SIDE VIEW

| Symbol | Dimensions in Millimeters | | |
|--------|---------------------------|------|------|
| | Min. | Typ. | Max. |
| A | 0.45 | 0.50 | 0.55 |
| A1 | 0.01 | 0.05 | 0.09 |
| D | 0.95 | 1.00 | 1.05 |
| E | 0.55 | 0.60 | 0.65 |
| D1 | 0.39Ref | | |
| E1 | 0.40 | 0.45 | 0.50 |
| b | 0.42Ref | | |
| e | 0.58 | 0.63 | 0.68 |
| e1 | 0.36Ref | | |
| L1 | 0.05Ref | | |
| L2 | 0.27 | 0.32 | 0.37 |

Recommended land pattern (Unit: mm)



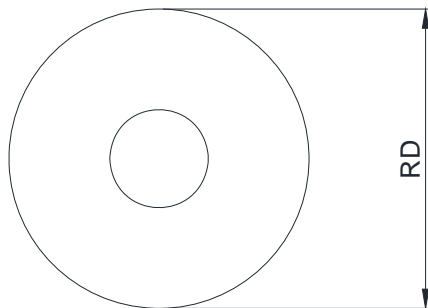
Notes:

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.

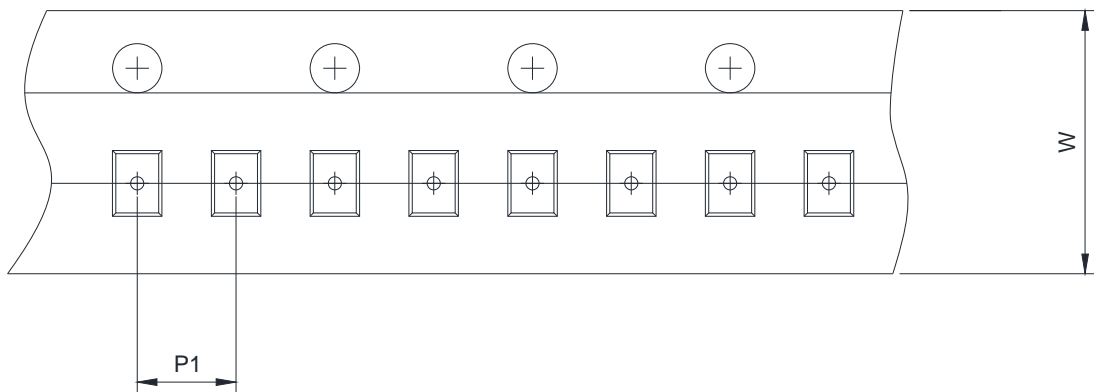


TAPE AND REEL INFORMATION

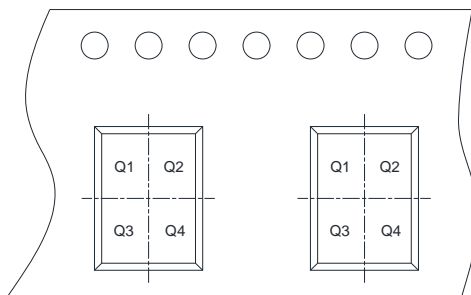
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



➔
User Direction of Feed

| | | | |
|------|---|---|--|
| RD | Reel Dimension | <input checked="" type="checkbox"/> 7inch | <input type="checkbox"/> 13inch |
| W | Overall width of the carrier tape | <input checked="" type="checkbox"/> 8mm | <input type="checkbox"/> 12mm <input type="checkbox"/> 16mm |
| P1 | Pitch between successive cavity centers | <input checked="" type="checkbox"/> 2mm | <input type="checkbox"/> 4mm <input type="checkbox"/> 8mm |
| Pin1 | Pin1 Quadrant | <input checked="" type="checkbox"/> Q1 | <input checked="" type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4 |