

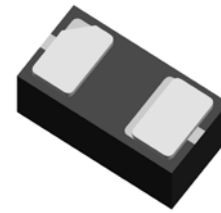
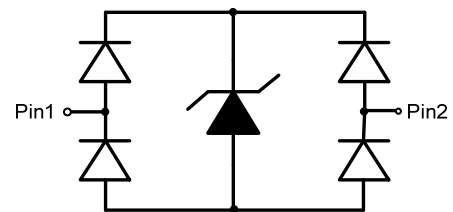
ESD5311XZ
**1-Line, Bi-directional, Ultra-low Capacitance
Transient Voltage Suppressor**
<http://www.sh-willsemi.com>
Descriptions

The ESD5311XZ 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 ESD5311XZ incorporates one pair of ultra-low capacitance steering diodes plus a TVS diode.

The ESD5311XZ may be used to provide ESD protection up to $\pm 20\text{kV}$ (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 4A (8/20 μs) according to IEC61000-4-5.

The ESD5311XZ is available in FBP0603-2L package. Standard products are Pb-free and Halogen-free.


FBP0603-2L (Bottom View)

Pin configuration
Features

- Stand-off voltage: 5V Max.
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 20\text{kV}$ (contact discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 4A (8/20 μs)
- Ultra-low capacitance: $C_J = 0.25\text{pF}$ typ.
- Ultra-low leakage current: $I_R < 1\text{nA}$ typ.
- Low clamping voltage: $V_{CL} = 21\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Small package

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



D = Device code
* = Month code

Marking (Top View)
Order information

| Device | Package | Shipping |
|----------------|------------|-----------------|
| ESD5311XZ-2/TR | FBP0603-2L | 10000/Tape&Reel |

Absolute maximum ratings

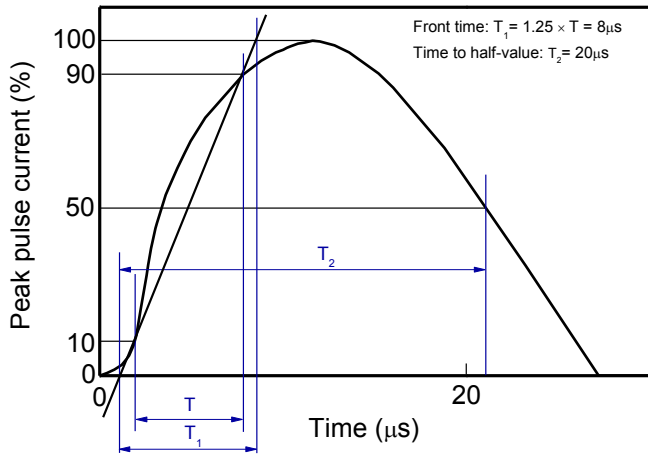
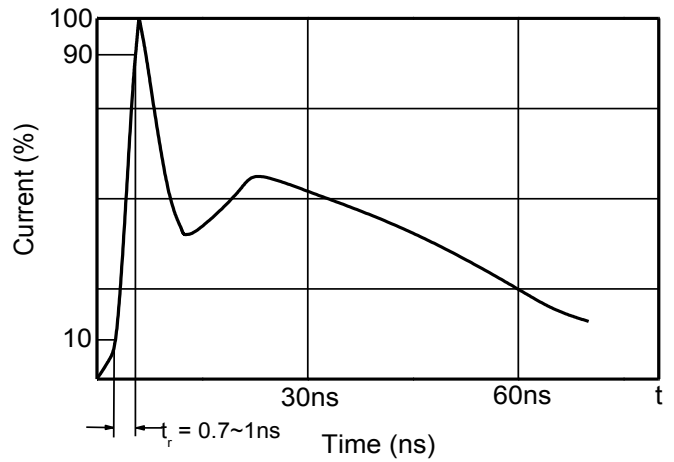
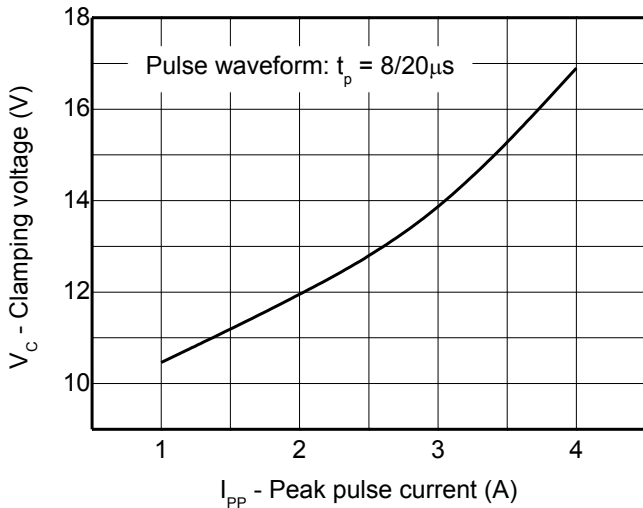
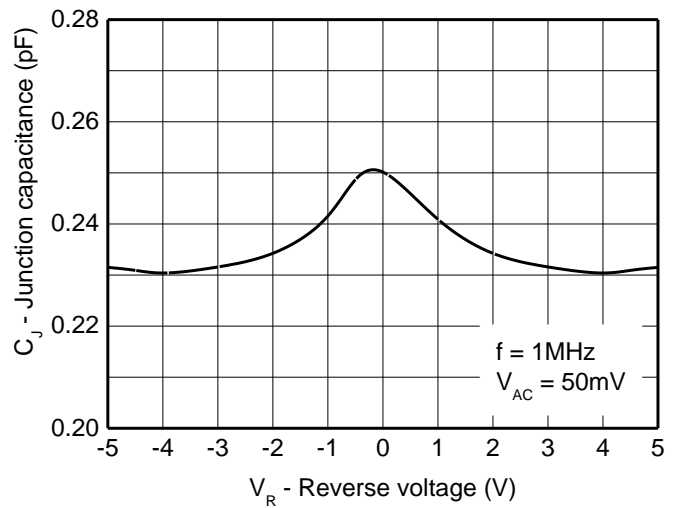
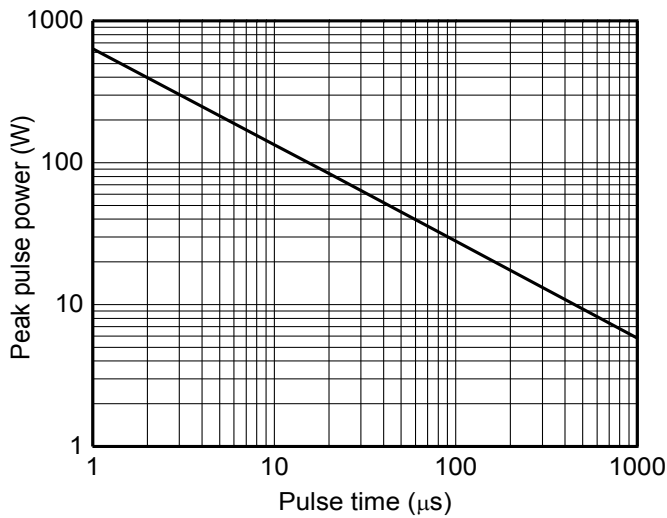
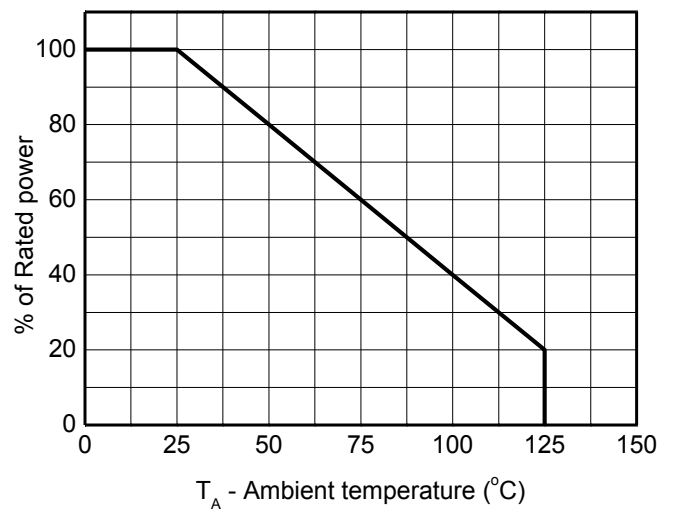
| Parameter | Symbol | Rating | Unit |
|---|-----------|----------|-------------|
| Peak pulse power ($t_p = 8/20\mu s$) | P_{pk} | 84 | W |
| Peak pulse current ($t_p = 8/20\mu s$) | I_{PP} | 4 | A |
| ESD according to IEC61000-4-2 air discharge | V_{ESD} | ± 20 | kV |
| ESD according to IEC61000-4-2 contact discharge | | ± 20 | |
| Junction temperature | T_J | 125 | $^{\circ}C$ |
| Operating temperature | T_{OP} | -40~85 | $^{\circ}C$ |
| Lead temperature | T_L | 260 | $^{\circ}C$ |
| Storage temperature | T_{STG} | -55~150 | $^{\circ}C$ |

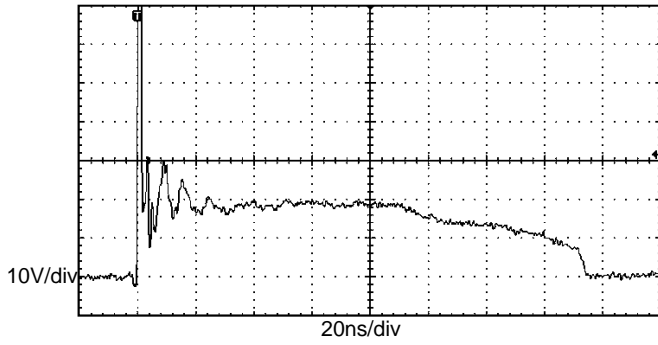
Electrical characteristics ($T_A=25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------|--------------------------------|------|------|------|----------|
| Reverse maximum working voltage | V_{RWM} | | | | 5.0 | V |
| Reverse leakage current | I_R | $V_{RWM} = 5V$ | | <1 | 100 | nA |
| Reverse breakdown voltage | V_{BR} | $I_T = 1mA$ | 7.5 | 9.0 | 10.0 | V |
| Clamping voltage ¹⁾ | V_{CL} | $I_{PP} = 16A, t_p = 100ns$ | | 21 | | V |
| Dynamic resistance ¹⁾ | R_{DYN} | | | 0.75 | | Ω |
| Clamping voltage ²⁾ | V_{CL} | $V_{ESD} = 8kV$ | | 21 | | V |
| Clamping voltage ³⁾ | V_{CL} | $I_{PP} = 1A, t_p = 8/20\mu s$ | | | 14 | V |
| | | $I_{PP} = 4A, t_p = 8/20\mu s$ | | | 21 | V |
| Junction capacitance | C_J | $V_R = 0V, f = 1MHz$ | | 0.25 | 0.40 | pF |

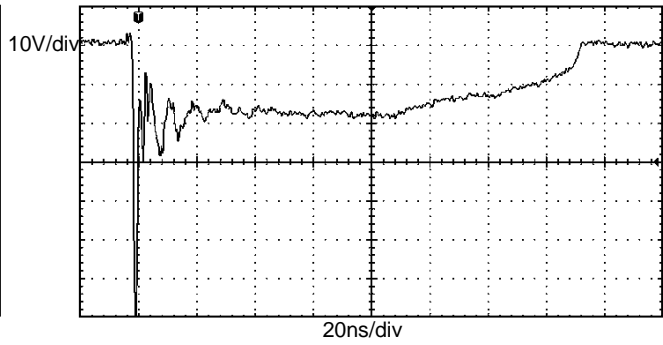
Notes:

- 1) TLP parameter: $Z_0 = 50\Omega, t_p = 100ns, t_r = 2ns$, 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.

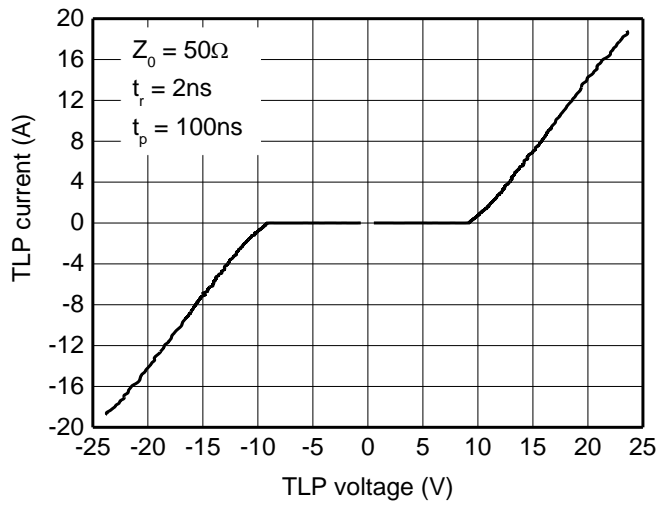
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

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)


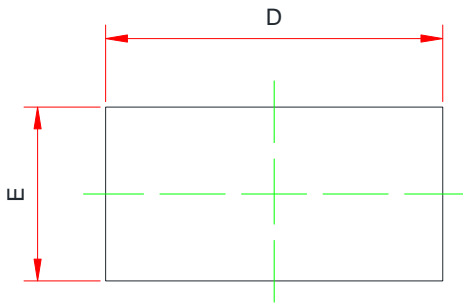
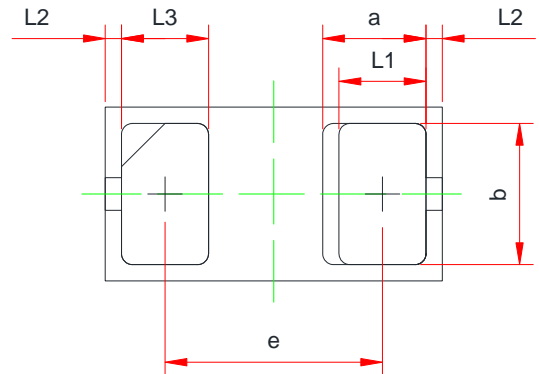
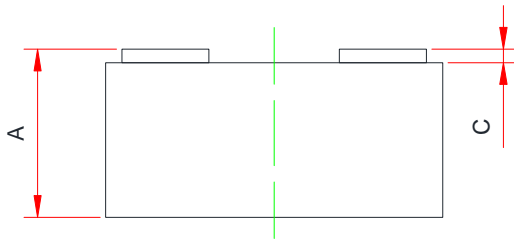
ESD clamping
 (+8kV contact discharge per IEC61000-4-2)



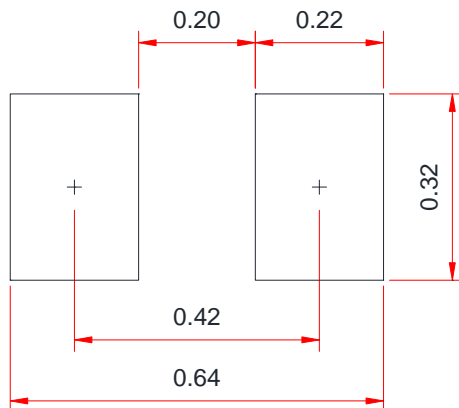
ESD clamping
 (+8kV contact discharge per IEC61000-4-2)



TLP Measurement

Package outline dimensions
FBP0603-2L

Top View

Bottom View

Side View

| Symbol | Dimensions in millimeter | | |
|--------|--------------------------|------|-------|
| | Min. | Typ. | Max. |
| A | 0.275 | - | 0.340 |
| D | 0.570 | - | 0.670 |
| a | 0.190 REF. | | |
| E | 0.270 | - | 0.370 |
| b | 0.225 | - | 0.295 |
| c | 0.010 | - | 0.090 |
| e | 0.365 | | 0.435 |
| L1 | 0.125 | - | 0.195 |
| L3 | 0.125 | - | 0.195 |
| L2 | 0.030 REF. | | |

Recommend 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.

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