

**SPD9103W**

**1 Lines, Bi-directional, Low Capacitance  
Transient Voltage Suppressors**

<http://www.sh-willsemi.com>

**Descriptions**

The SPD9103W is a low capacitance TVS (Transient Voltage Suppressor) array 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 Electrostatic Discharge (ESD), cable discharge events (CDE), lightning and other induced voltage surges.

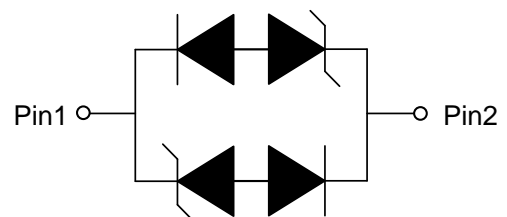
The SPD9103W incorporates low capacitance steering diodes that reduce the typical capacitance to 1pF per line.

The SPD9103W may be used to provide ESD protection up to  $\pm 30\text{kV}$  (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 20A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

The SPD9103W is available in SOD-323 package. Standard products are Pb-free and Halogen-free.



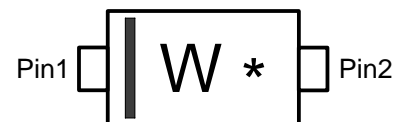
**SOD-323**



**Circuit diagram**

**Features**

- Stand-off voltage: 3.3V Max.
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 30\text{kV}$  (contact discharge)  
IEC61000-4-4 (EFT): 40A - 5/50ns  
IEC61000-4-5 (surge): 20A (8/20 $\mu\text{s}$ ).
- Low capacitance:  $C_J = 1\text{pF}$  typ.
- Ultra-low leakage current:  $I_R = 0.1\text{nA}$  typ.
- Low clamping voltage.
- Solid-state silicon technology



W = Device code

\* = Month code ( A~Z)

**Marking (Top View)**

**Applications**

- 10/100/1000 Ethernet
- STB
- Router
- Networking
- Modem

**Order information**

| Device        | Package | Shipping       |
|---------------|---------|----------------|
| SPD9103W-2/TR | SOD-323 | 3000/Tape&Reel |

**Absolute maximum ratings**

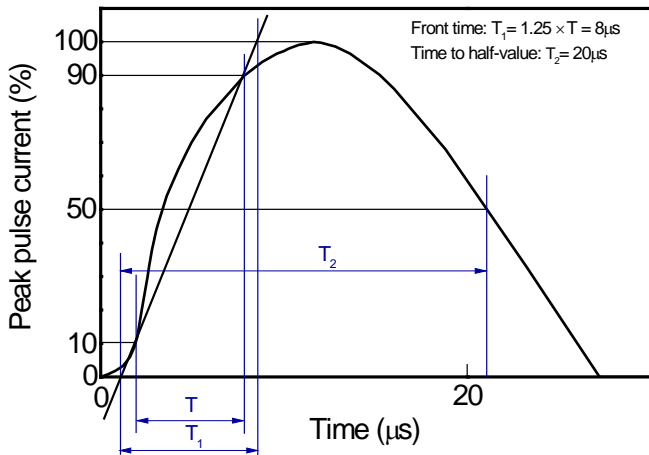
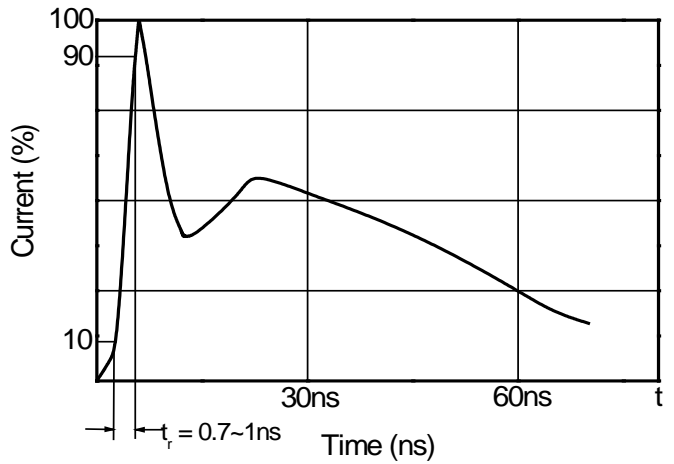
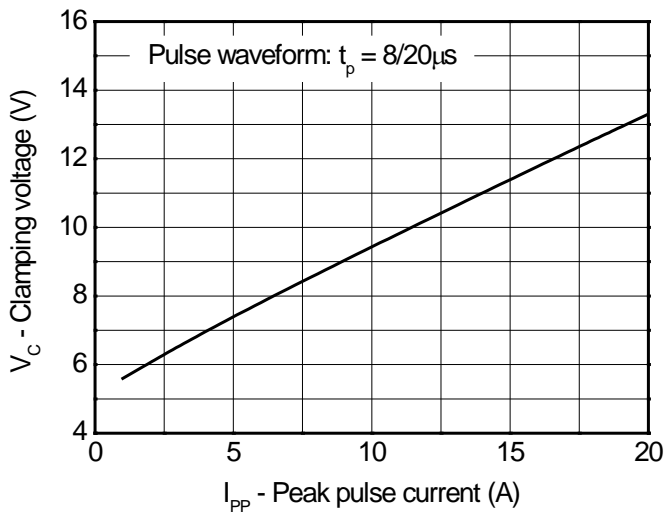
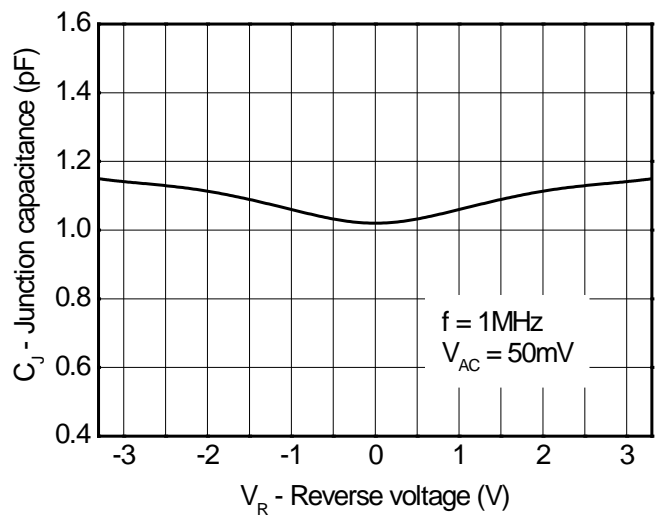
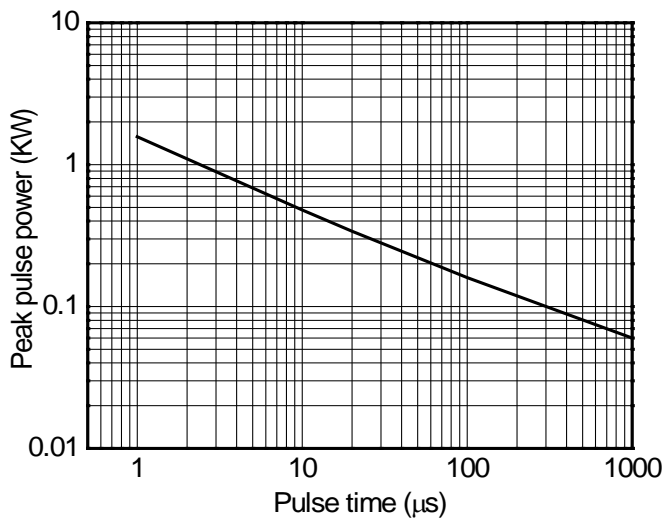
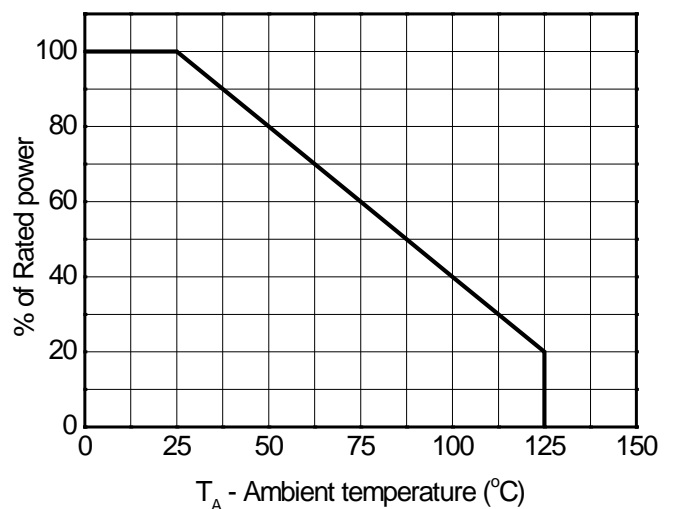
| Parameter                                       | Symbol    | Rating   | Unit        |
|---|-----------|----------|-------------|
| Peak pulse power ( $t_p = 8/20\mu s$ )          | $P_{pk}$  | 340      | W           |
| Peak pulse current ( $t_p = 8/20\mu s$ )        | $I_{PP}$  | 20       | A           |
| ESD according to IEC61000-4-2 air discharge     | $V_{ESD}$ | $\pm 30$ | kV          |
| ESD according to IEC61000-4-2 contact discharge |           | $\pm 30$ |             |
| 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)**

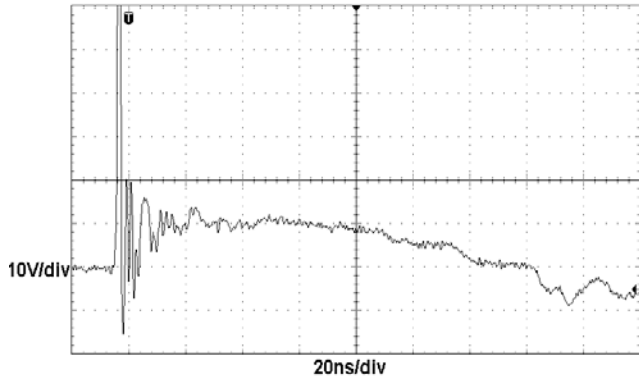
\*\_-

| Parameter                       | Symbol    | Condition                          | Min. | Typ. | Max. | Unit |
|---------------------------------|-----------|------------------------------------|------|------|------|------|
| Reverse maximum working voltage | $V_{RWM}$ |                                    |      |      | 3.3  | V    |
| Reverse leakage current         | $I_R$     | $V_{RWM} = 3.3V$                   |      | 0.1  | 100  | nA   |
| Reverse breakdown voltage       | $V_{BR}$  | $I_T = 1mA$                        | 4.0  |      |      | V    |
| Clamping voltage <sup>1)</sup>  | $V_{CL}$  | $I_{PP} = 1A, t_p = 8/20\mu s$     |      |      | 8    | V    |
|                                 |           | $I_{PP} = 5A, t_p = 8/20\mu s$     |      |      | 10   | V    |
|                                 |           | $I_{PP} = 20A, t_p = 8/20\mu s$    |      |      | 17   | V    |
| Junction capacitance            | $C_J$     | $V_R = 0V, f = 1MHz$<br>I/O to I/O |      | 1.0  | 1.5  | pF   |

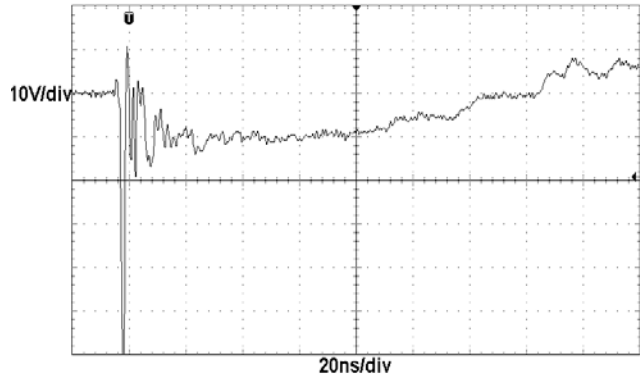
1) According to IEC61000-4-5.

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

**8/20 $\mu\text{s}$  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**

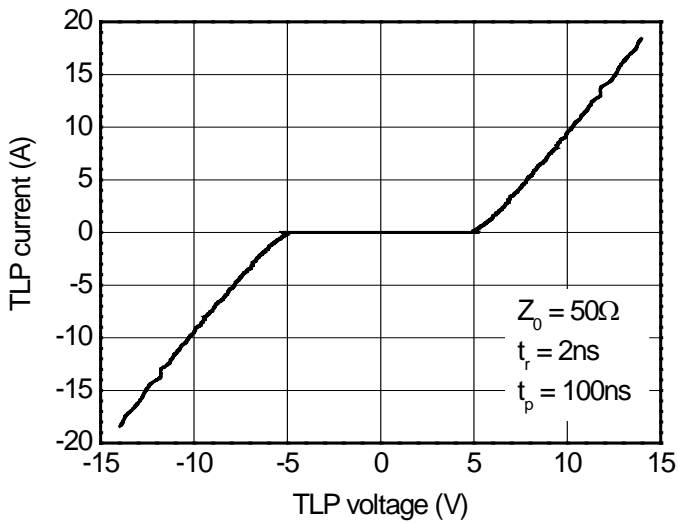
Typical characteristics ( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)



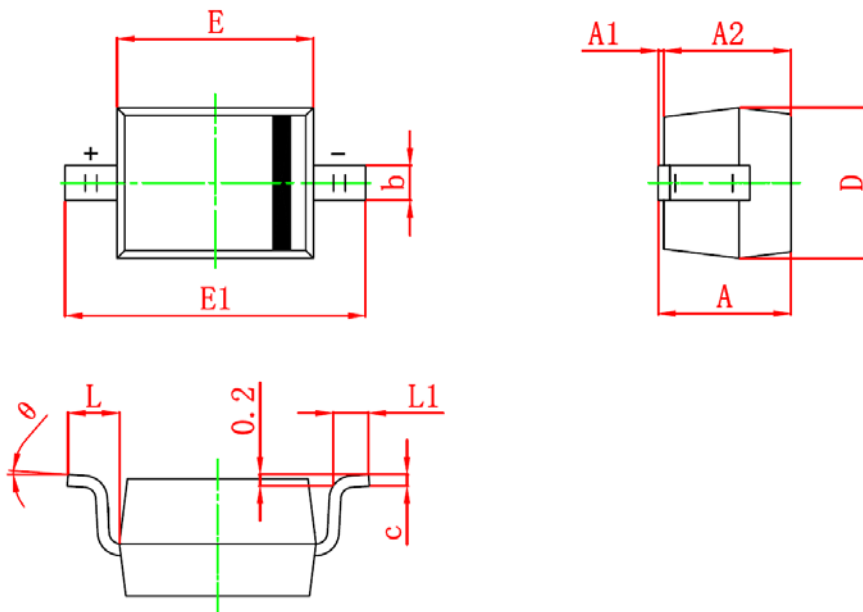
**ESD clamping**  
 (+8kV contact discharge per IEC61000-4-2)



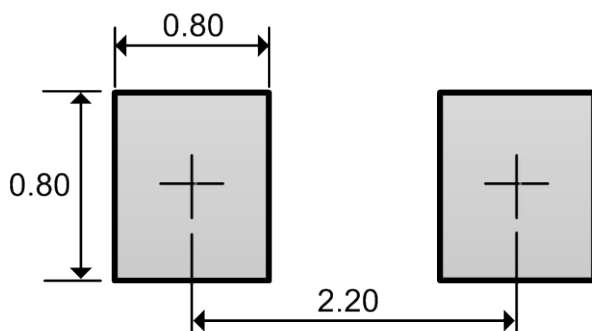
**ESD clamping**  
 (-8kV contact discharge per IEC61000-4-2)



**TLP Measurement**

**Package outline dimensions**
**SOD-323**


| Symbol    | Dimensions in millimeters |       | Dimensions in Inches |       |
|-----------|---------------------------|-------|----------------------|-------|
|           | Min.                      | Max.  | Min.                 | Max.  |
| <b>A</b>  | 0.800                     | 1.000 | 0.031                | 0.039 |
| <b>A1</b> | 0.000                     | 0.100 | 0.000                | 0.004 |
| <b>A2</b> | 0.800                     | 0.900 | 0.031                | 0.035 |
| <b>b</b>  | 0.250                     | 0.350 | 0.010                | 0.014 |
| <b>c</b>  | 0.080                     | 0.150 | 0.003                | 0.006 |
| <b>D</b>  | 1.200                     | 1.400 | 0.047                | 0.055 |
| <b>E</b>  | 1.600                     | 1.800 | 0.063                | 0.071 |
| <b>E1</b> | 2.500                     | 2.700 | 0.098                | 0.106 |
| <b>L</b>  | 0.475 REF                 |       | 0.019 REF            |       |
| <b>L1</b> | 0.250                     | 0.400 | 0.010                | 0.016 |
| <b>θ</b>  | 0°                        | 8°    | 0°                   | 8°    |

**Recommend land pattern (Unit: mm)**


*Note: This land pattern is for your reference only. Actual pad layouts may vary depending on application.*

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