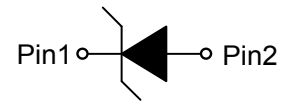


**ESD5Z5V**
**1-Line, Uni-directional, Transient Voltage Suppressor**
<http://www.sh-willsemi.com>
**Descriptions**

The ESD5Z5V is a Uni-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components that may be subjected to ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning. It is particularly well-suited for cellular phones, portable device, digital cameras, power supplies and many other portable applications because of its small package and low weight.

The ESD5Z5V 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 8 A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

The ESD5Z5V is available in SOD-523 package. Standard products are Pb-free and Halogen-free.


**SOD-523**

**Circuit diagram**


\* = Date code ( A~Z)

H = Device code

**Marking (Top View)**
**Features**

- Stand-off voltage: 5V 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): 8A (8/20 $\mu\text{s}$ )
- Capacitance:  $C_J = 60\text{pF}$  typ.
- Solid-state silicon technology

**Applications**

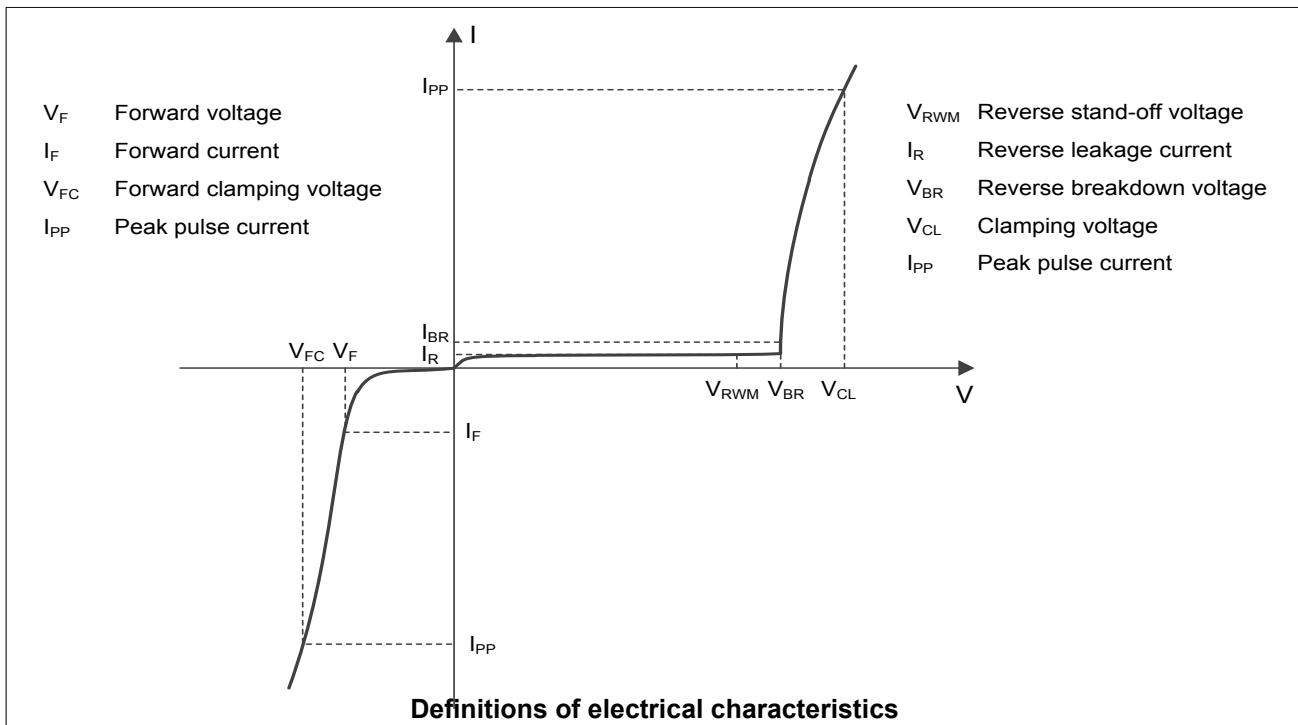
- Cell phone handsets and accessories
- Personal Digital Assistants (PDAs)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Digital Cameras

**Order information**

| Device       | Package | Shipping       |
|--------------|---------|----------------|
| ESD5Z5V-2/TR | SOD-523 | 3000/Tape&Reel |

**Absolute maximum ratings**

| Parameter                                       | Symbol    | Rating   | Unit        |
|---|-----------|----------|-------------|
| Peak pulse power ( $t_p = 8/20\mu s$ )          | $P_{pk}$  | 120      | W           |
| Peak pulse current ( $t_p = 8/20\mu s$ )        | $I_{pp}$  | 8        | 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  | $^{\circ}C$ |

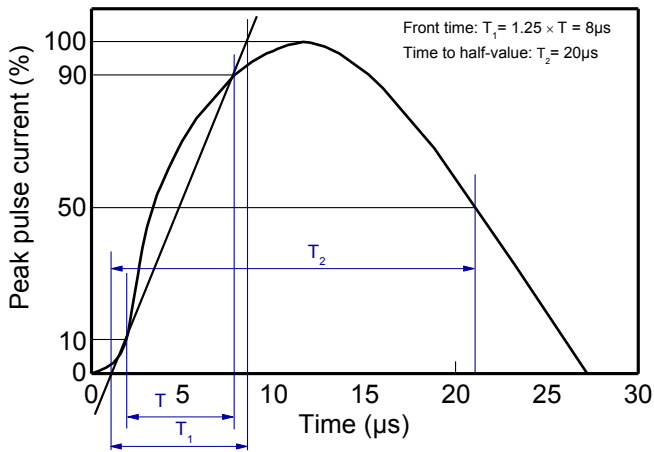
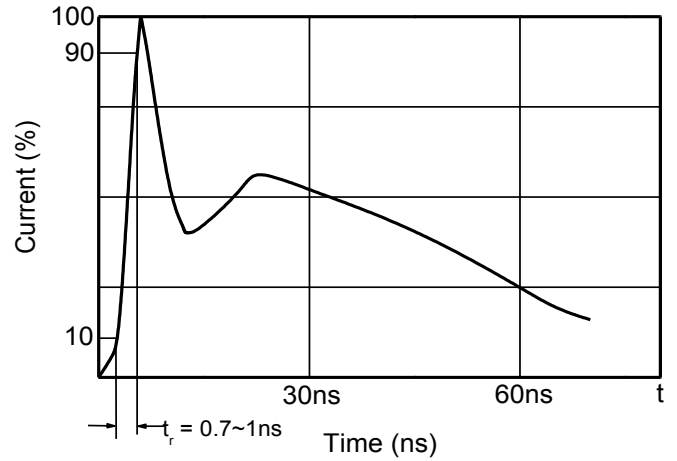
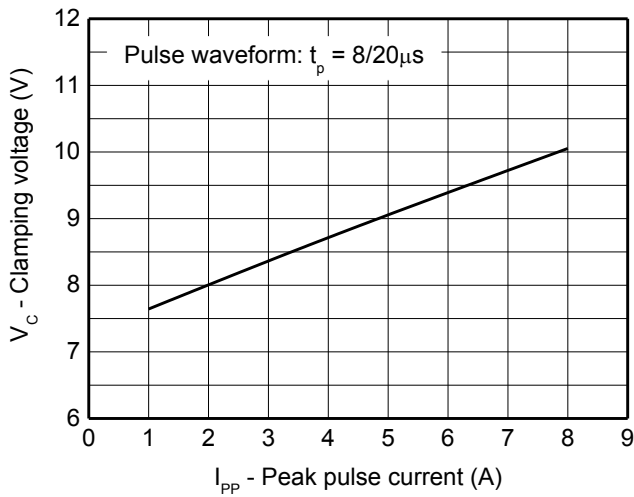
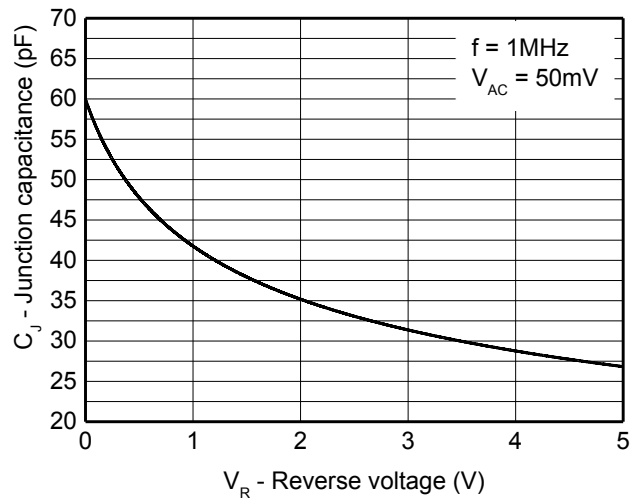
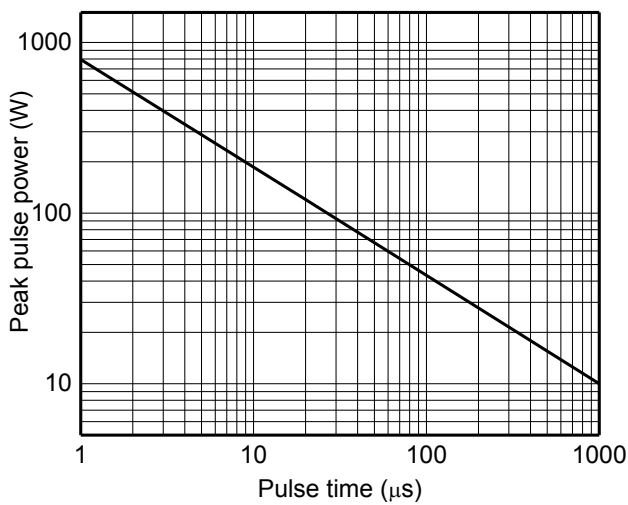
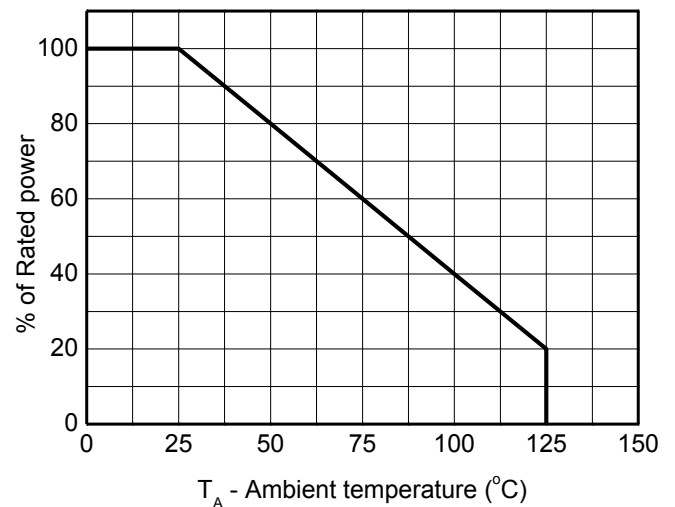
**Electrical characteristics ( $T_A = 25^{\circ}C$ , unless otherwise noted)**


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

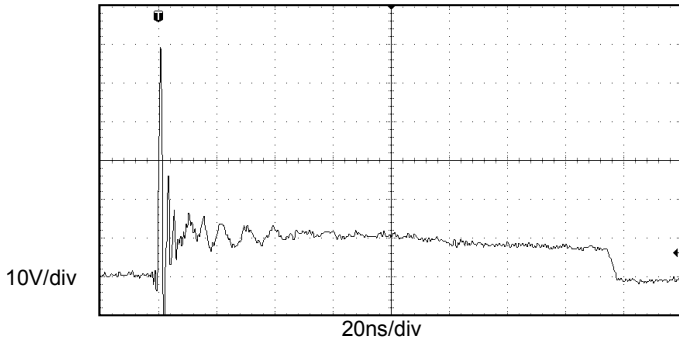
| Parameter                        | Symbol    | Condition                                    | Min. | Typ. | Max. | Unit          |
|----------------------------------|-----------|--|------|------|------|---------------|
| Reverse stand-off voltage        | $V_{RWM}$ |  |      |      | 5    | V             |
| Reverse leakage current          | $I_R$     | $V_{RWM} = 5\text{V}$                        |      |      | 1    | $\mu\text{A}$ |
| Reverse breakdown voltage        | $V_{BR}$  | $I_T = 1\text{mA}$                           | 6.0  |      | 8.0  | V             |
| Forward voltage                  | $V_F$     | $I_F = 10\text{mA}$                          | 0.5  | 0.8  | 1.2  | V             |
| Clamping voltage <sup>1)</sup>   | $V_{CL}$  | $I_{PP} = 16\text{A}$ , $t_p = 100\text{ns}$ |      | 11   |      | V             |
| Clamping voltage <sup>2)</sup>   | $V_{CL}$  | $V_{ESD} = 8\text{kV}$                       |      | 11   |      | V             |
| Clamping voltage <sup>3)</sup>   | $V_C$     | $I_{pp}=1\text{A}$ $t_p=8/20\mu\text{s}$     |      |      | 10   | V             |
|                                  |           | $I_{pp}=8\text{A}$ $t_p=8/20\mu\text{s}$     |      |      | 15   | V             |
| Dynamic resistance <sup>1)</sup> | $R_{DYN}$ |  |      | 0.25 |      | $\Omega$      |
| Junction capacitance             | $C_J$     | $V_R = 0\text{V}$ , $f = 1\text{MHz}$        |      | 60   | 80   | pF            |
|                                  |           | $V_R = 5\text{V}$ , $f = 1\text{MHz}$        |      | 30   | 45   | pF            |

**Notes:**

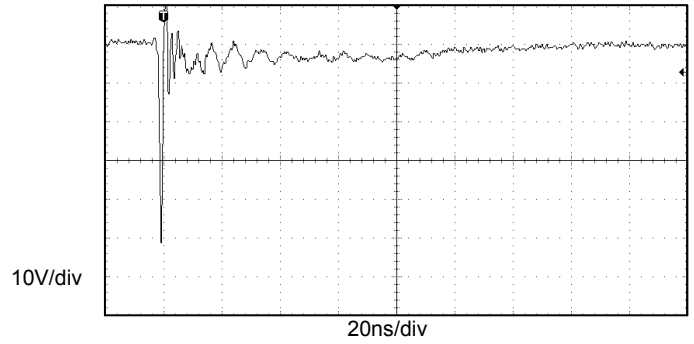
- 1) TLP parameter:  $Z_0 = 50\Omega$ ,  $t_p = 100\text{ns}$ ,  $t_r = 2\text{ns}$ , averaging window from 60ns to 80ns.  $R_{DYN}$  is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

**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**

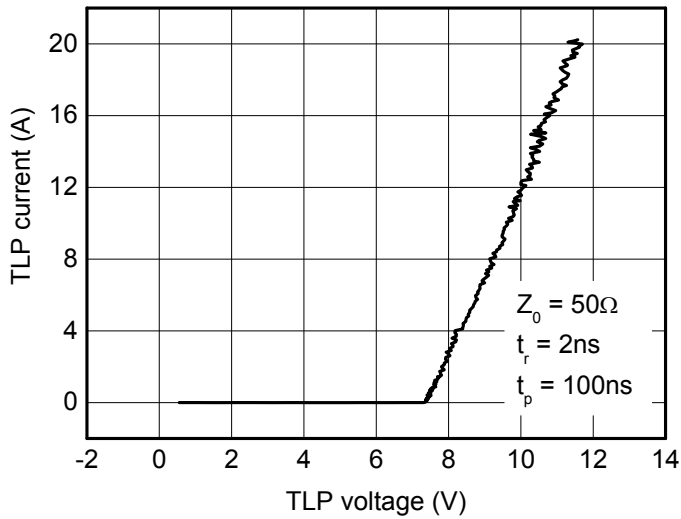
Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)



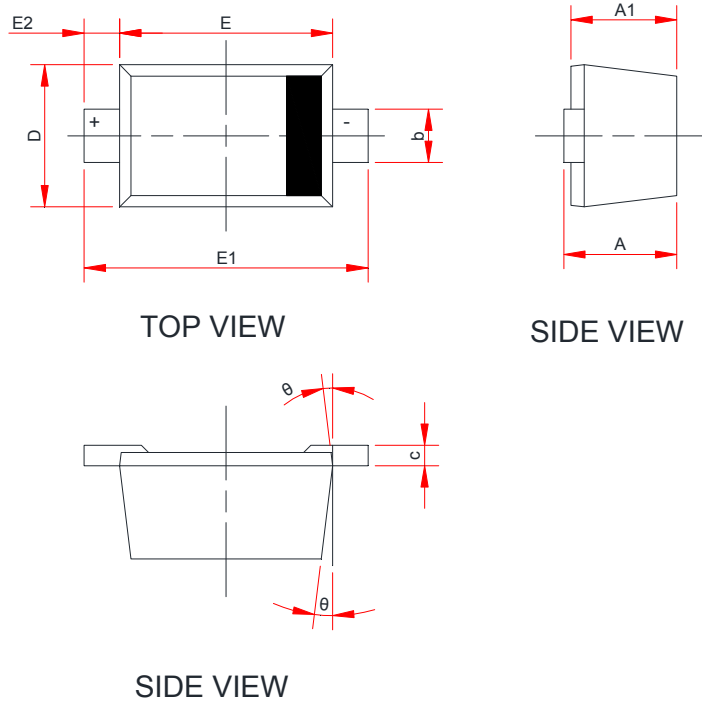
**ESD clamping**  
(+8kV contact discharge per IEC61000-4-2)



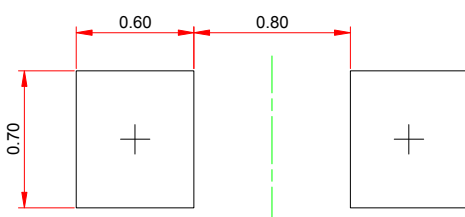
**ESD clamping**  
(-8kV contact discharge per IEC61000-4-2)



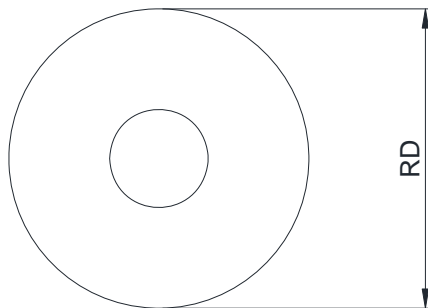
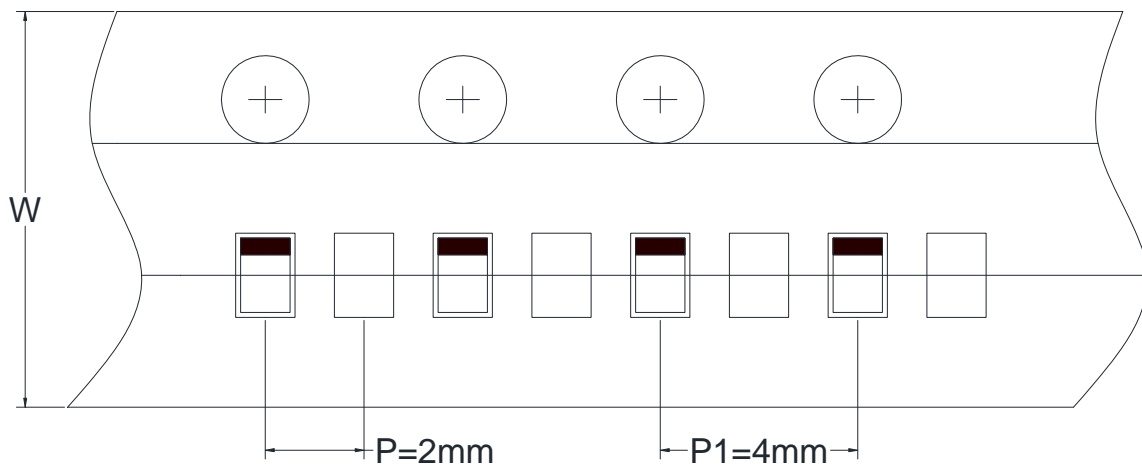
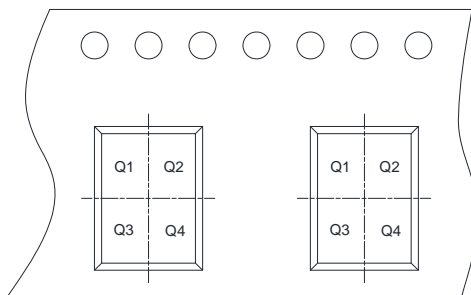
**TLP Measurement**

**PACKAGE OUTLINE DIMENSIONS**
**SOD-523**


| Symbol   | Dimensions in Millimeters |      |      |
|----------|---------------------------|------|------|
|          | Min.                      | Typ. | Max. |
| A        | 0.51                      | -    | 0.77 |
| A1       | 0.50                      | 0.60 | 0.70 |
| b        | 0.25                      | -    | 0.40 |
| c        | 0.08                      | -    | 0.15 |
| D        | 0.75                      | 0.80 | 0.85 |
| E        | 1.10                      | 1.20 | 1.30 |
| E1       | 1.50                      | 1.60 | 1.70 |
| E2       | 0.20 Ref.                 |      |      |
| $\theta$ | 7 °C 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.

**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 type="checkbox"/> 2mm              | <input checked="" 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 |

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