

## 1.Description

The ESD5Zxx Series is designed to protect voltage sensitive components from ESD and transient voltage events. Excellent clamping capability, low leakage, and fast response time, make these parts ideal for ESD protection on designs where board space is at a premium.

## 3.Features

- Low Clamping Voltage
- Small Body Outline Dimensions:  
0.047" x 0.032" (1.20 mm x 0.80 mm)
- Low Body Height: 0.028" (0.7 mm)
- Stand-off Voltage: 2.5 V – 12 V
- Peak Power up to 240 Watts @ 8 x 20  $\mu$ s Pulse
- Low Leakage

## 2.Mechanical Characteristics

CASE: Void-free, transfer-molded, thermosetting plastic Epoxy Meets UL 94V-0

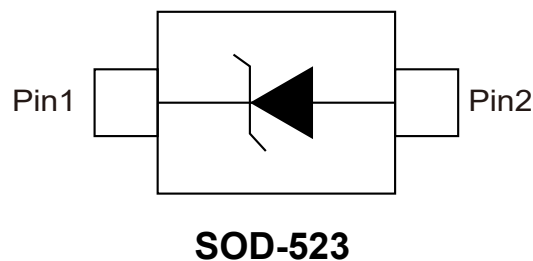
LEAD FINISH: 100% Matte Sn (Tin)

MOUNTING POSITION: Any

QUALIFIED MAX REFLOW TEMPERATURE:  
260°C Device Meets MSL 1 Requirements

- Response Time is Typically < 1 ns
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- IEC61000-4-2 Level 4 ESD Protection
- IEC61000-4-4 Level 4 EFT Protection
- These Devices are Pb-Free and are RoHS Compliant

## 4.Pinning information





## 5. Absolute Ratings

| Parameter                                                                | Symbol               | Value      | Units              |
|--------------------------------------------------------------------------|----------------------|------------|--------------------|
| IEC 61000-4-2 (ESD)                                                      | Contact              | ±30        | kV                 |
|                                                                          | Air                  | ±30        | kV                 |
| IEC 61000-4-4 (EFT)                                                      |                      | 40         | A                  |
| ESD Voltage                                                              | Per Human Body Model | 16         | kV                 |
|                                                                          | Per Machine Model    | 400        | V                  |
| Total Power Dissipation on FR-4 Board (Note 1)@ $T_A=25^{\circ}\text{C}$ | $P_D$                | 500        | mW                 |
| Junction and Storage Temperature Range                                   | $T_J, T_{STG}$       | -55 to 150 | $^{\circ}\text{C}$ |
| Lead Solder Temperature-Maximum (10 Second Duration)                     | $T_L$                | 260        | $^{\circ}\text{C}$ |

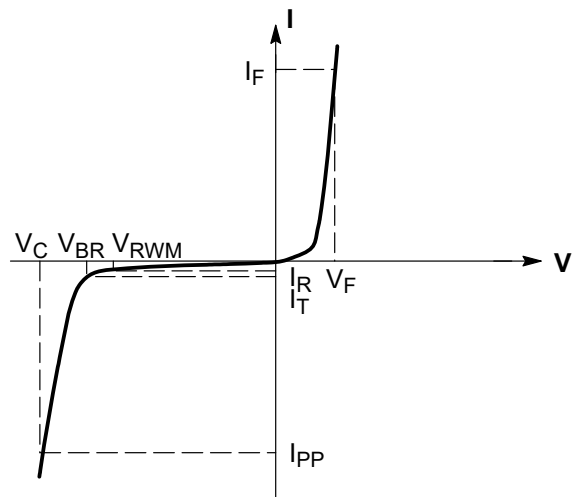
Notes:

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 printed circuit board, single-sided copper, mounting pad 1 cm<sup>2</sup>.



6.Electrical Parameters (T<sub>A</sub>=25°C unless otherwise noted )



Uni-Directional TVS

| Symbol           | Parameter                                          |
|------------------|----------------------------------------------------|
| I <sub>PP</sub>  | Maximum Reverse Peak Pulse Current                 |
| V <sub>C</sub>   | Clamping Voltage @ I <sub>PP</sub>                 |
| V <sub>RWM</sub> | Working Peak Reverse Voltage                       |
| I <sub>R</sub>   | Maximum Reverse Leakage Current @ V <sub>RWM</sub> |
| V <sub>BR</sub>  | Breakdown Voltage @ I <sub>T</sub>                 |
| I <sub>T</sub>   | Test Current                                       |
| I <sub>F</sub>   | Forward Current                                    |
| V <sub>F</sub>   | Forward Voltage @ I <sub>F</sub>                   |
| P <sub>PK</sub>  | Peak Power Dissipation                             |
| C                | Max. Capacitance @V <sub>R</sub> =0 and f =1MHz    |



## 7. Electrical Characteristic ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Device      | Device Marking | $V_{RWM}$ (V) | $I_R$ ( $\mu\text{A}$ ) @ $V_{RWM}$ | $V_{BR}$ (V) @ $I_T$ (Note 2) | $I_T$ | $V_C$ (V) @ $I_{PP}=5.0\text{A}^\dagger$ | $V_C$ (V) @ Max $I_{PP}^\dagger$ | $I_{PP}$ (A) <sup>†</sup> | $P_{pk}$ (W) <sup>†</sup> | C (pF) | $V_C$                                 |
|-------------|----------------|---------------|-------------------------------------|-------------------------------|-------|------------------------------------------|----------------------------------|---------------------------|---------------------------|--------|---------------------------------------|
|             |                | Max           | Max                                 | Min                           | mA    | Typ                                      | Max                              | Max                       | Max                       | Typ    | Per IEC61000-4-2 (Note 3)             |
| ESD5Z2.5T1G | ZD             | 2.5           | 6.0                                 | 4.0                           | 1.0   | 6.5                                      | 10.9                             | 11.0                      | 120                       | 145    | Figures 1 and 2<br>See Below (Note 4) |
| ESD5Z3.3T1G | ZE             | 3.3           | 0.05                                | 5.0                           | 1.0   | 8.4                                      | 14.1                             | 11.2                      | 158                       | 105    |                                       |
| ESD5Z5.0T1G | ZF             | 5.0           | 0.05                                | 6.2                           | 1.0   | 11.6                                     | 18.6                             | 9.4                       | 174                       | 80     |                                       |
| ESD5Z6.0T1G | ZG             | 6.0           | 0.01                                | 6.8                           | 1.0   | 12.4                                     | 20.5                             | 8.8                       | 181                       | 70     |                                       |
| ESD5Z7.0T1G | ZH             | 7.0           | 0.01                                | 7.5                           | 1.0   | 13.5                                     | 22.7                             | 8.8                       | 200                       | 65     |                                       |
| ESD5Z12T1G  | ZM             | 12            | 0.01                                | 14.1                          | 1.0   | 17                                       | 25                               | 9.6                       | 240                       | 55     |                                       |

Notes:

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted.

Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

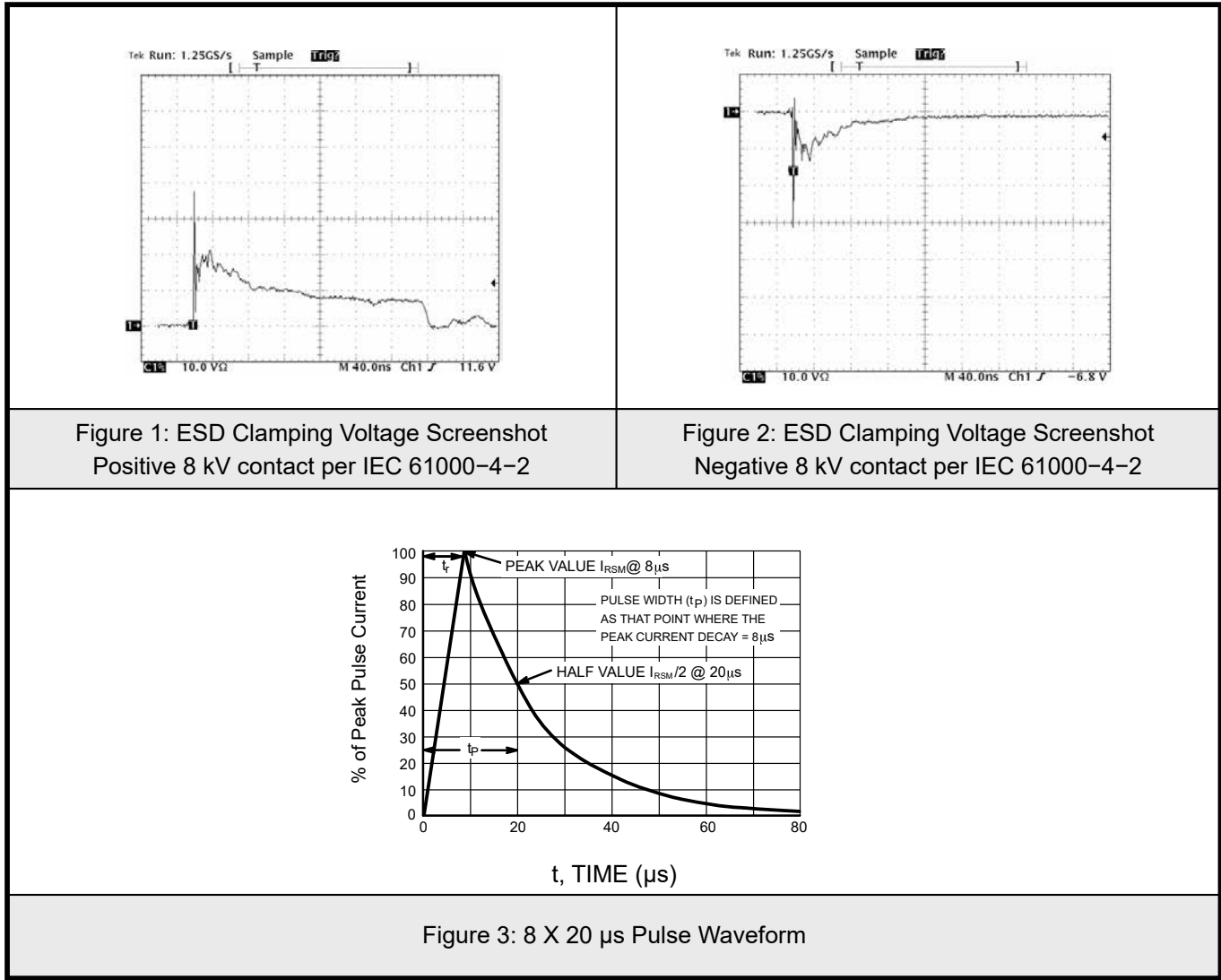
<sup>†</sup> Surge current waveform per Figure 5.

2.  $V_{BR}$  is measured with a pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

3. ESD5Z5.0T1G shown below.



8.1Typical characteristic





8.2Typical characteristic

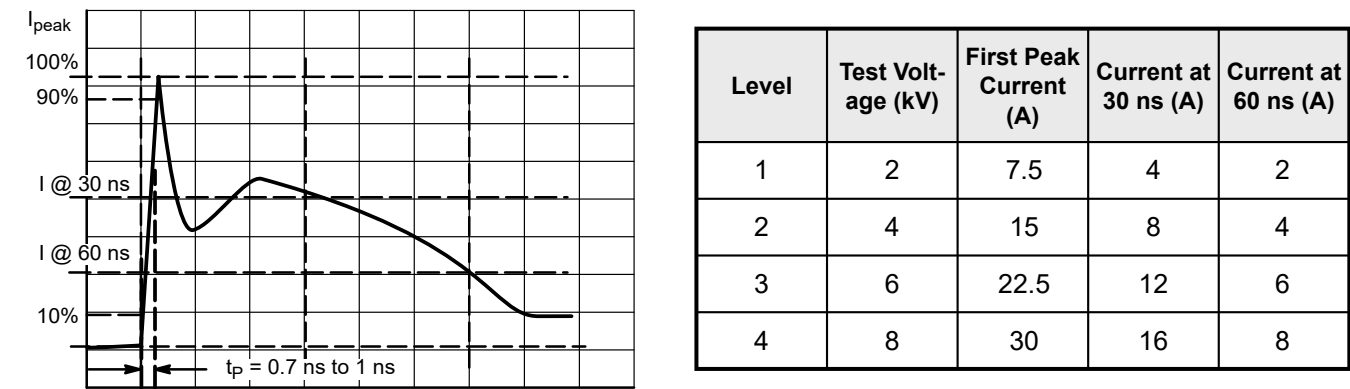


Figure 4: IEC61000-4-2 Spec



### 8.3 Typical characteristic

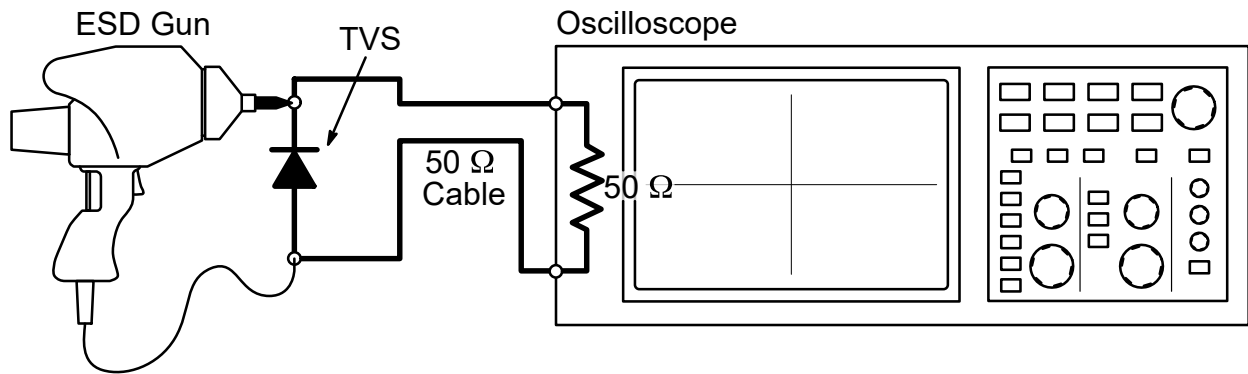


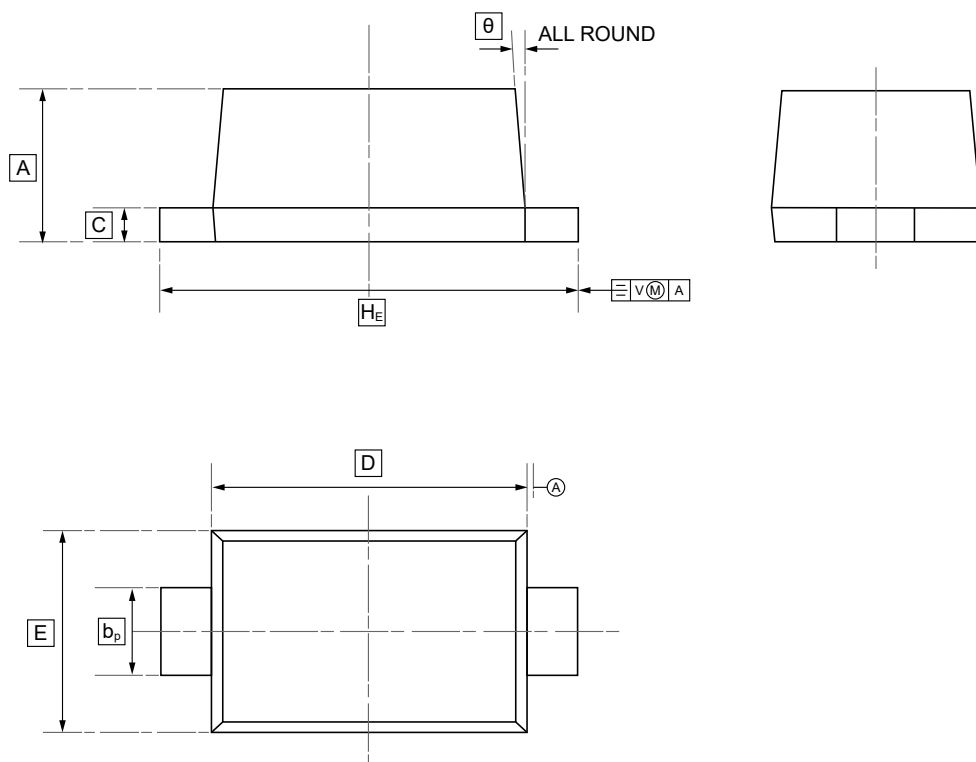
Figure 5: Diagram of ESD Test Setup

#### ESD Voltage Clamping

For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000-4-2 waveform. Since the IEC61000-4-2 was written as a pass/fail spec for larger systems such as cell phones or laptop computers it is not clearly defined in the spec how to specify a clamping voltage at the device level. They has developed a way to examine the entire voltage waveform across the ESD protection diode over the time domain of an ESD pulse in the form of an oscilloscope screenshot, which can be found on the datasheets for all ESD protection diodes.



## 9.SOD-523 Package Outline Dimensions

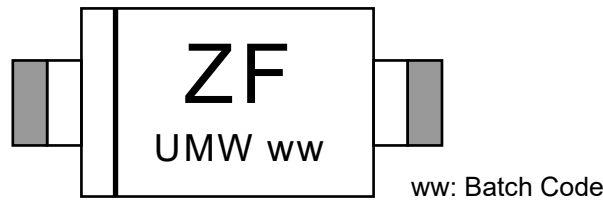


### DIMENSIONS (mm are the original dimensions)

| Symbol | A    | b <sub>p</sub> | C     | D    | E    | H <sub>E</sub> | θ  |
|--------|------|----------------|-------|------|------|----------------|----|
| Min    | 0.58 | 0.3            | 0.100 | 1.15 | 0.75 | 1.5            | 5° |
| Max    | 0.68 | 0.4            | 0.135 | 1.25 | 0.85 | 1.7            |    |



10.Ordering information



| Order Code      | Package | Base QTY | Delivery Mode |
|-----------------|---------|----------|---------------|
| UMW ESD5Z2.5T1G | SOD-523 | 3000     | Tape and reel |
| UMW ESD5Z3.3T1G | SOD-523 | 3000     | Tape and reel |
| UMW ESD5Z5.0T1G | SOD-523 | 3000     | Tape and reel |
| UMW ESD5Z6.0T1G | SOD-523 | 3000     | Tape and reel |
| UMW ESD5Z7.0T1G | SOD-523 | 3000     | Tape and reel |
| UMW ESD5Z12T1G  | SOD-523 | 3000     | Tape and reel |



## 11.Disclaimer

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