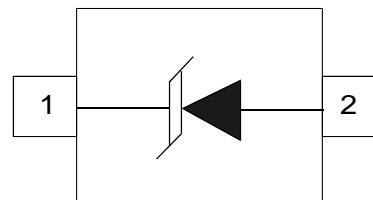


Descriptions

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. Because of its small size, it is suited for use in cellular phones, portable devices, digital cameras, power supplies and many other portable applications.



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 – 12V
- Peak Power up to 240 Watts @ 8 x 20s Pulse
- Low Leakage
- 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
- Pb-Free Packages are Available

Mechanical Characteristics

- CASE: Void-free, transfer-molded, thermosetting plastic
- Epoxy Meets UL 94 V-0
- LEAD FINISH: 100% Matte Sn (Tin)
- MOUNTING POSITION: Any
- QUALIFIED MAX REFLOW TEMPERATURE: 260°C
- Device Meets MSL 1 Requirements

MAXIMUM RATINGS

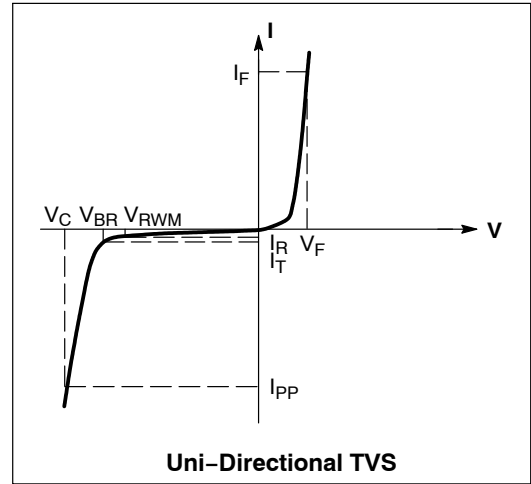
| Rating | Symbol | Value | Unit |
|--|-----------------------------------|-------------|---------|
| IEC 61000-4-2 (ESD) Contact Air | | ±30 ±30 | kV |
| IEC 61000-4-4 (EFT) | | 40 | A |
| ESD Voltage Per Human Body Model Per Machine Model | | 16 400 | kV V |
| Total Power Dissipation on FR-5 Board (Note 1) @ T _A = 25°C | P _D | 200 | mW |
| Junction and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °C |
| Lead Solder Temperature – Maximum (10 Second Duration) | T _L | 260 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.
1. FR-5 = 1.0 x 0.75 x 0.62 in

ELECTRICAL CHARACTERISTICS

(T_A = 25 °C unless otherwise noted)

| Symbol | Parameter |
|------------------|--|
| I _{PP} | Maximum Reverse Peak Pulse Current |
| V _C | Clamping Voltage @ I _{PP} |
| V _{RWM} | Working Peak Reverse Voltage |
| I _R | Maximum Reverse Leakage Current @ V _{RWM} |
| V _{BR} | Breakdown Voltage @ I _T |
| I _T | Test Current |
| I _F | Forward Current |
| V _F | Forward Voltage @ I _F |
| P _{pk} | Peak Power Dissipation |
| C | Max. Capacitance @V _R = 0 and f = 1 MHz |



ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.1 V Max. @ I_F = 10 mA for all types)

| Device | V _{RWM} (V) | I _R (μA) @ V _{RWM} | V _{BR} (V) @ I _T (Note 2) | I _T | V _C (V) @ I _{PP} = 5.0 A [†] | V _C (V) @ Max I _{PP} [†] | I _{PP} (A) [†] | P _{pk} (W) [†] | C (pF) | V _C |
|-------------|----------------------|--|---|----------------|---|---|----------------------------------|----------------------------------|--------|------------------------------------|
| | Max | Max | Min | mA | Typ | Max | Max | Max | Typ | Per IEC61000-4-2 (Note 3) |
| ESD5Z2.5T1G | 2.5 | 6.0 | 4.0 | 1.0 | 6.5 | 10.9 | 11.0 | 120 | 145 | Figures 1 and 2 See Below (Note 4) |
| ESD5Z3.3T1G | 3.3 | 0.05 | 5.0 | 1.0 | 8.4 | 14.1 | 11.2 | 158 | 105 | |
| ESD5Z5.0T1G | 5.0 | 0.05 | 6.2 | 1.0 | 11.6 | 18.6 | 9.4 | 174 | 80 | |
| ESD5Z6.0T1G | 6.0 | 0.01 | 6.8 | 1.0 | 12.4 | 20.5 | 8.8 | 181 | 70 | |
| ESD5Z7.0T1G | 7.0 | 0.01 | 7.5 | 1.0 | 13.5 | 22.7 | 8.8 | 200 | 65 | |
| ESD5Z12T1G | 12 | 0.01 | 14.1 | 1.0 | 17 | 25 | 9.6 | 240 | 55 | |

[†] Surge current waveform per Figure 5.

2. V_{BR} is measured with a pulse test current I_T at an ambient temperature of 25°C.

3. For test procedure see Figures 3 and 4 .

4. ESD5Z5.0T1G shown below.

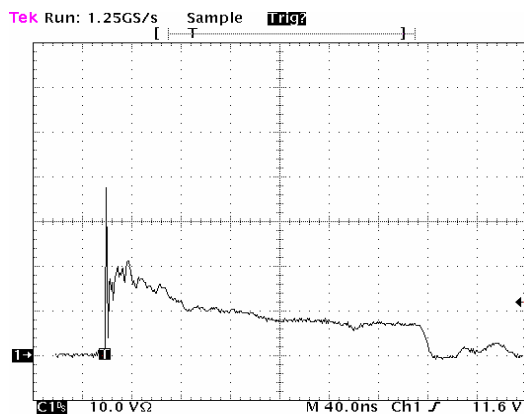


Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV contact per IEC 61000-4-2

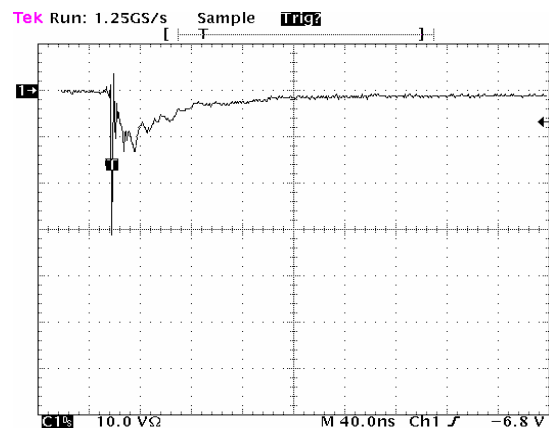


Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV contact per IEC 61000-4-2

IEC 61000-4-2 Spec.

| Level | Test Voltage (kV) | First Peak Current (A) | Current at 30 ns (A) | Current at 60 ns (A) |
|-------|-------------------|------------------------|----------------------|----------------------|
| 1 | 2 | 7.5 | 4 | 2 |
| 2 | 4 | 15 | 8 | 4 |
| 3 | 6 | 22.5 | 12 | 6 |
| 4 | 8 | 30 | 16 | 8 |

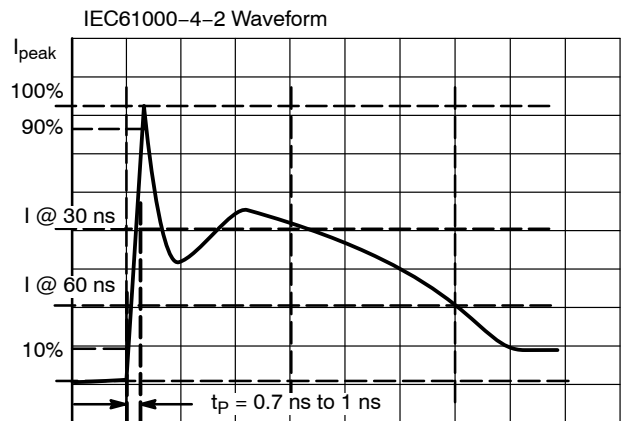


Figure 3. IEC61000-4-2 Spec

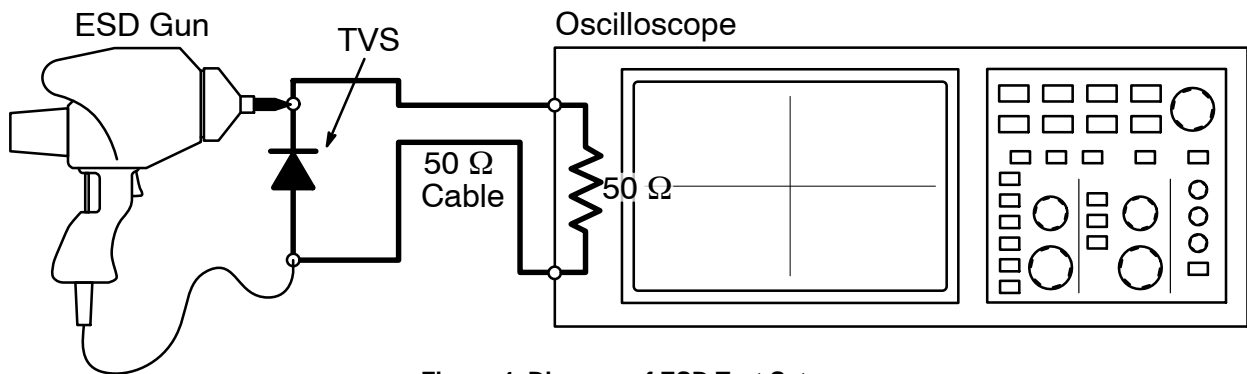


Figure 4. Diagram of ESD Test Setup

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. There 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.

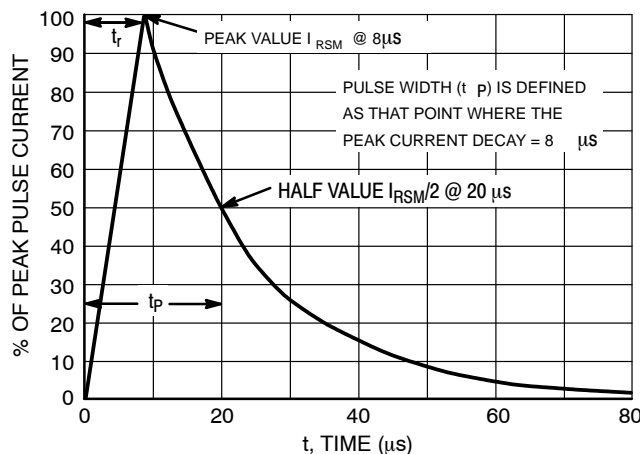
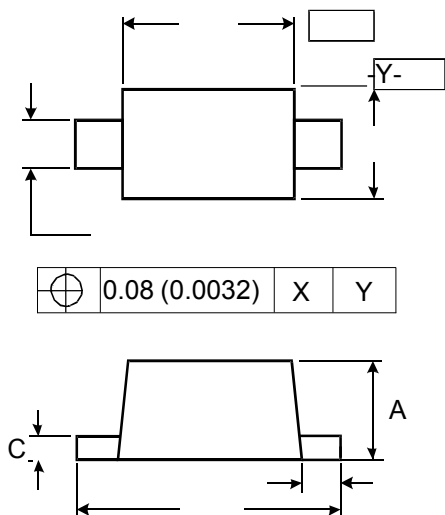


Figure 5. 8 X 20 μs Pulse Waveform

SOD-523 Package Outline Dimensions



DIMENSIONS

| SYMBOL | MILLIMETER | | INCHES | |
|----------------|------------|------|--------|--------|
| | MIN | MAX | MIN | MAX |
| A | 0.50 | 0.70 | 0.020 | 0.028 |
| b | 0.25 | 0.35 | 0.010 | 0.014 |
| C | 0.07 | 0.20 | 0.0028 | 0.0079 |
| D | 1.10 | 1.30 | 0.043 | 0.051 |
| E | 0.70 | 0.90 | 0.028 | 0.035 |
| H _E | 1.50 | 1.70 | 0.059 | 0.067 |

Marking



Ordering information

| Order code | Marking code | Package | Baseqty | Deliverymode |
|-----------------|--------------|---------|---------|---------------|
| UMW ESD5Z2.5T1G | ZD | SOD-523 | 3000 | Tape and reel |
| UMW ESD5Z3.3T1G | ZE | SOD-523 | 3000 | Tape and reel |
| UMW ESD5Z5.0T1G | ZF | SOD-523 | 3000 | Tape and reel |
| UMW ESD5Z6.0T1G | ZG | SOD-523 | 3000 | Tape and reel |
| UMW ESD5Z7.0T1G | ZH | SOD-523 | 3000 | Tape and reel |
| UMW ESD5Z12T1G | ZM | SOD-523 | 3000 | Tape and reel |