

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.

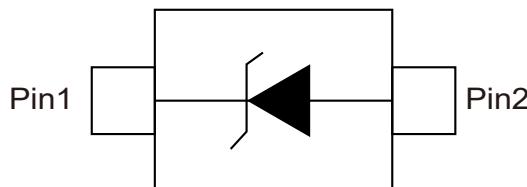
2. Mechanical Characteristics

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

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 μ s 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
- These Devices are Pb-Free and are RoHS Compliant

4. Pinning information



SOD-523



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	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

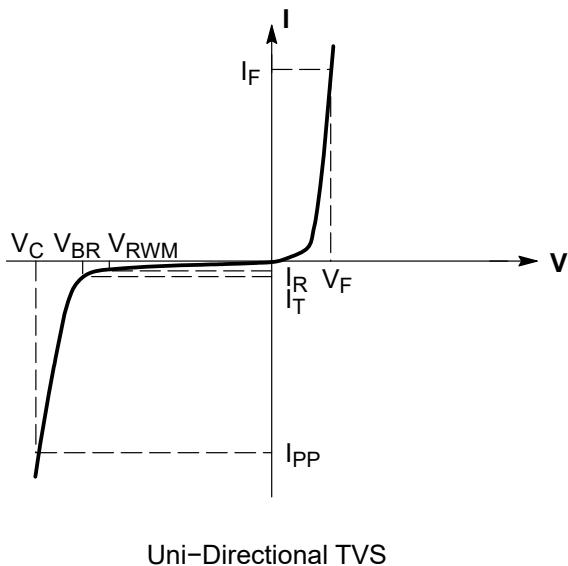
Notes:

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 cm².



6.Electrical Parameters ($T_A=25^\circ\text{C}$ 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 $f = 1\text{MHz}$



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

Device	Device Marking	V_{RWM} (V)	I_R (μA) @ V_{RWM}	$V_{\text{BR}}(\text{V})$ @ I_T (Note 2)	I_T	V_C (V) @ $I_{\text{PP}}=5.0\text{A}^\dagger$	$V_C(\text{V})$ @ Max I_{PP}^\dagger	I_{PP} (A) [†]	P_{pk} (W) [†]	C (pF)	V_C	Per IEC61000-4-2 (Note 3)
		Max	Max	Min	mA	Typ	Max	Max	Max	Typ		
ESD5Z2.5T1G	ZD	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	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:

- † 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.



8.1 Typical characteristic

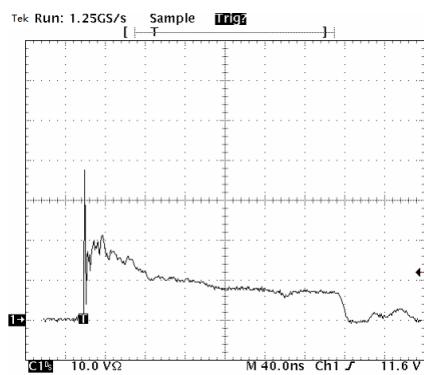


Figure 1: ESD Clamping Voltage Screenshot
Positive 8 kV contact per IEC 61000-4-2

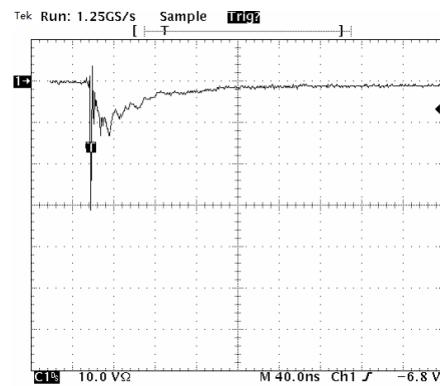


Figure 2: ESD Clamping Voltage Screenshot
Negative 8 kV contact per IEC 61000-4-2

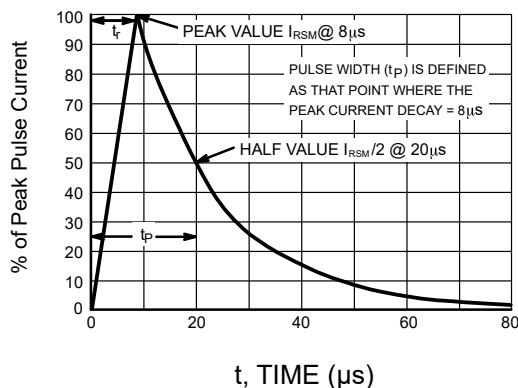
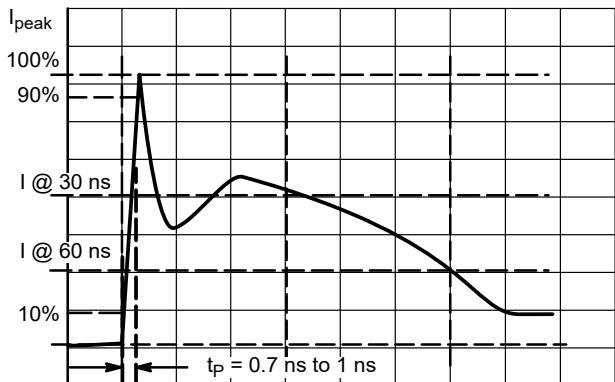


Figure 3: 8 X 20 μs Pulse Waveform



8.2 Typical characteristic



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 4: IEC61000-4-2 Spec



8.3 Typical characteristic

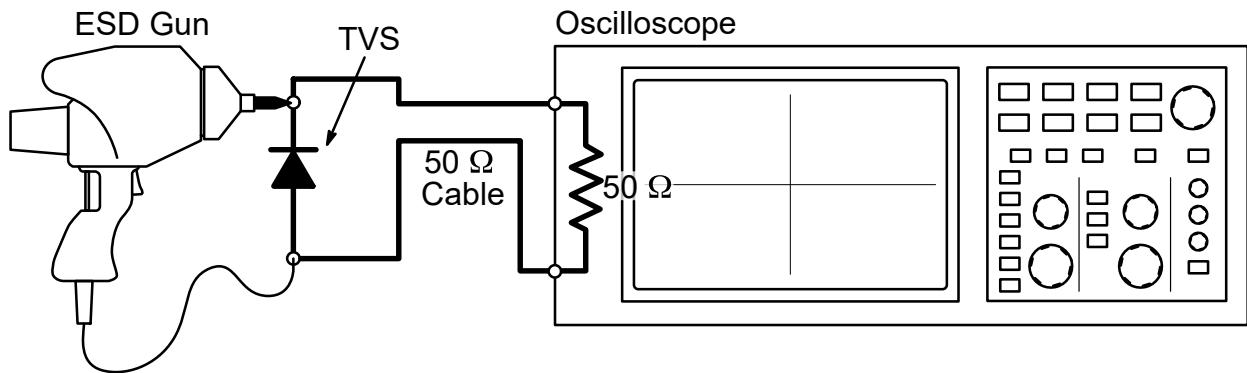


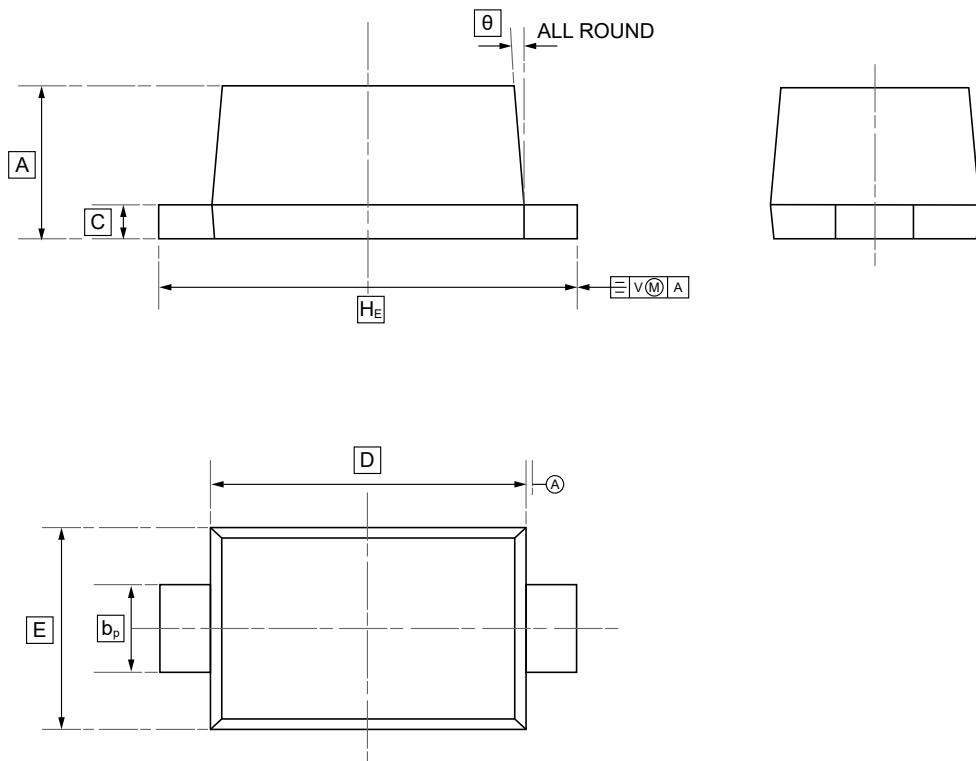
Figure 5: Diagram of ESD Test Setup

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 have 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

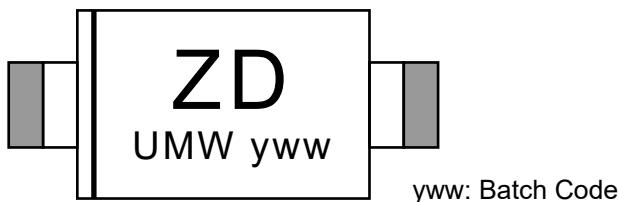


DIMENSIONS (mm are the original dimensions)

Symbol	A	b_p	C	D	E	H_E	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



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