

# ESD5B5.0ST1G

## Transient Voltage Suppressor

### Micro-Packaged Diode for ESD Protection

The ESD5B Series is designed to protect voltage sensitive components from ESD. Excellent clamping capability, low leakage, and fast response time provide best in class protection on designs that are exposed to ESD. Because of its small size and bi-directional design, it is ideal for use in cellular phones, MP3 players, and portable applications that require audio line protection.

#### Specification Features

- Low Capacitance 32 pF
- Low Clamping Voltage
- Small Body Outline Dimensions: nom 0.063" x 0.032" (1.6x0.8 mm)
- Low Body Height: nom 0.024" (0.6 mm)
- Reverse Working (Stand-off) Voltage: 5.0 V
- Peak Power up to 50 W @ 8 x 20  $\mu$ 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
- This is a Pb-Free Device

#### 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		$\pm 30$ $\pm 30$	kV
ESD Voltage Per Human Body Model Per Machine Model		16 400	kV V
Peak Power (Figure 1) Per 8 x 20 $\mu$ s Waveform Peak Power (Figure 2) Per 10 x 1000 $\mu$ s Waveform	$P_{PK}$	50 10	W
Total Power Dissipation on FR-5 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

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.

See Application Note AND8308/D for further description of survivability specs.



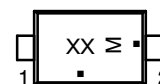
**ON Semiconductor®**

<http://onsemi.com>



**SOD-523  
CASE 502  
PLASTIC**

#### MARKING DIAGRAM



B5 = Specific Device Code  
M Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
ESD5B5.0ST1G	SOD-523 (Pb-Free)	3000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

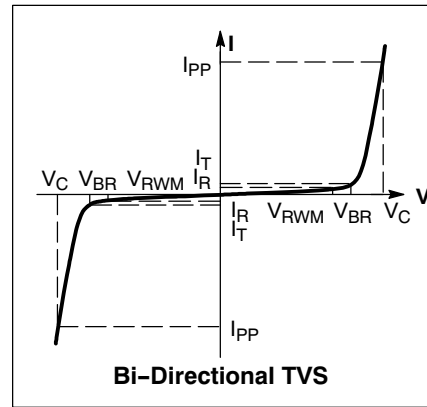
# ESD5B5.0ST1G

## ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter
$I_{PP}$	Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Working Peak Reverse Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current

\*See Application Note AND8308/D for detailed explanations of datasheet parameters.



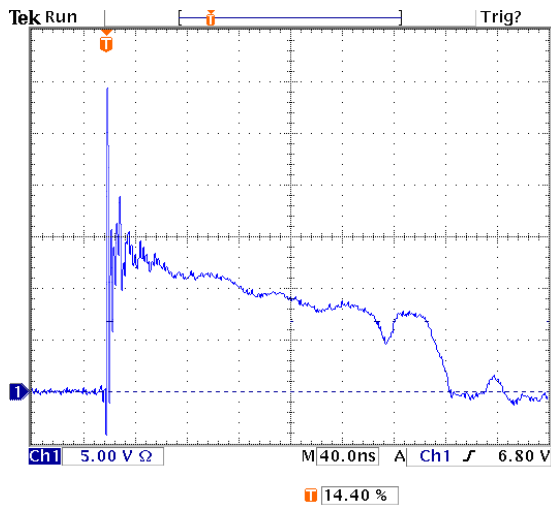
## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 0.9\text{ V Max.}$ @ $I_F = 10\text{ mA}$ for all types)

Device*	$V_{RWM}$ (V)	$I_R$ ( $\mu\text{A}$ ) @ $V_{RWM}$	$V_{BR}$ (V) @ $I_T$ (Note 2)		$I_T$	$C$ (pF) @ $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$	$V_C$
	Max	Max	Min	Max	mA	Typ	Per IEC61000-4-2 (Note 3)
ESD5B5.0ST1G	5.0	1.0	5.8	7.8	1.0	32	Figures 1 and 2 See Below

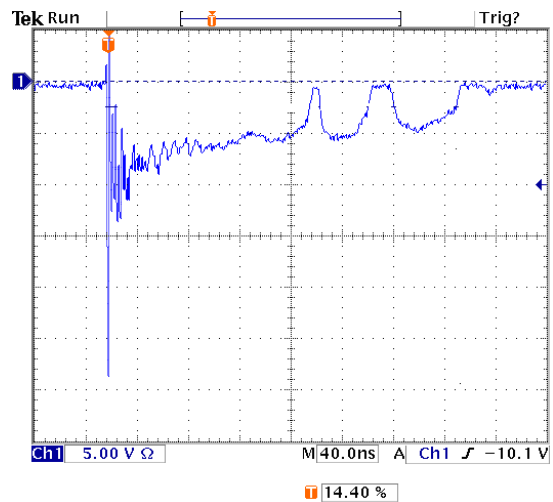
\*Other voltages available upon request.

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

3. For test procedure see Figures 3 and 4 and Application Note AND8307/D.



**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**

## ESD5B5.0ST1G

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

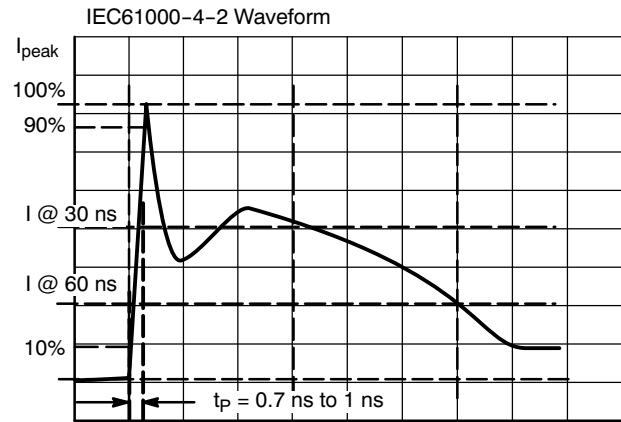


Figure 3. IEC61000-4-2 Spec

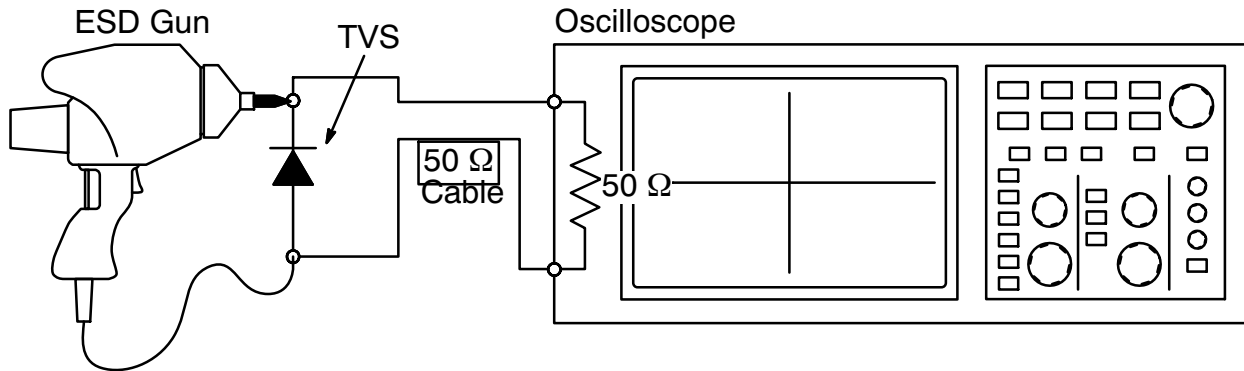


Figure 4. Diagram of ESD Test Setup

The following is taken from Application Note AND8308/D – Interpretation of Datasheet Parameters for ESD Devices.

### ESD Voltage Clamping

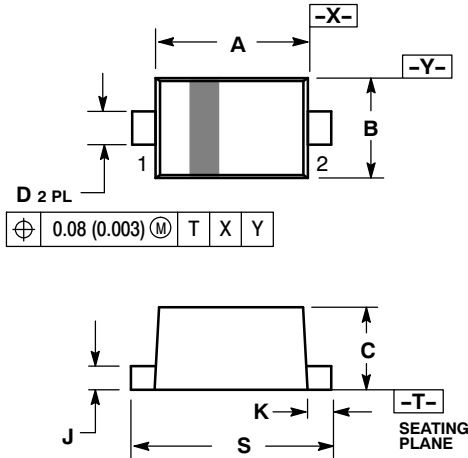
For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000-4-2 waveform. Since the IEC61000-4-2 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. ON Semiconductor 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. For more information on how ON Semiconductor creates these screenshots and how to interpret them please refer to AND8307/D.

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## PACKAGE DIMENSIONS

SOD-523  
CASE 502-01  
ISSUE C

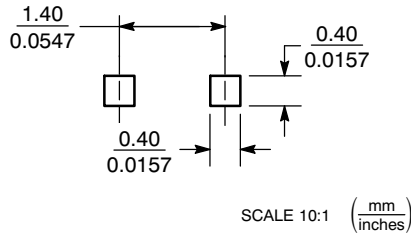


### NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.10	1.20	1.30	0.043	0.047	0.051
B	0.70	0.80	0.90	0.028	0.032	0.035
C	0.50	0.60	0.70	0.020	0.024	0.028
D	0.25	0.30	0.35	0.010	0.012	0.014
J	0.07	0.14	0.20	0.0028	0.0055	0.0079
K	0.15	0.20	0.25	0.006	0.008	0.010
S	1.50	1.60	1.70	0.059	0.063	0.067

## SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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