

# ESD5B5.0S, SZESD5B5.0S

## ESD Protection Diode

### Micro-Packaged Diodes 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 Pulsed
- 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
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- 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 <sub>PK</sub>	50 10	W
Total Power Dissipation on FR-5 Board (Note 1) @ T <sub>A</sub> = 25°C	P <sub>D</sub>	200	mW
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Lead Solder Temperature – Maximum (10 Second Duration)	T <sub>L</sub>	260	°C

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-5 = 1.0 x 0.75 x 0.62 in.

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



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

ESD5B系列旨在保护电压敏感组件免受ESD影响。出色的钳位能力、低泄漏和快速响应时间为暴露于ESD的设计提供了一流的保护。由于其体积小和双向设计，因此非常适合用于蜂窝电话、MP3播放器以及需要音频线路保护的便携式应用。

特征 好处

上限 = 32 pF

保留高速数据线的信号完整性。  
低泄漏

延长电池寿命

IEC61000-4-2 30 kV触点

在最严酷的ESD条件下提供一流的保护

钳位电压低

保护敏感组件

长寿

与电压敏感电阻技术相比，不会因多次ESD冲击而降低性能

应用领域 最终产品

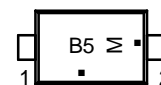
扬声器线

手机、MP3播放器



SOD-523  
CASE 502

#### 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
ESD5B5.0ST5G	SOD-523 (Pb-Free)	8000 / Tape & Reel
SZESD5B5.0ST1G	SOD-523 (Pb-Free)	3000 / Tape & Reel
SZESD5B5.0ST5G	SOD-523 (Pb-Free)	8000 / 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.

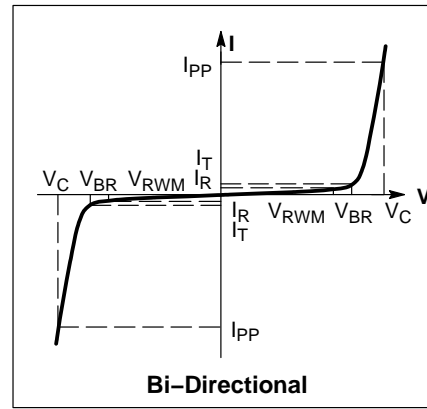
# ESD5B5.0S, SZESD5B5.0S

## 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.



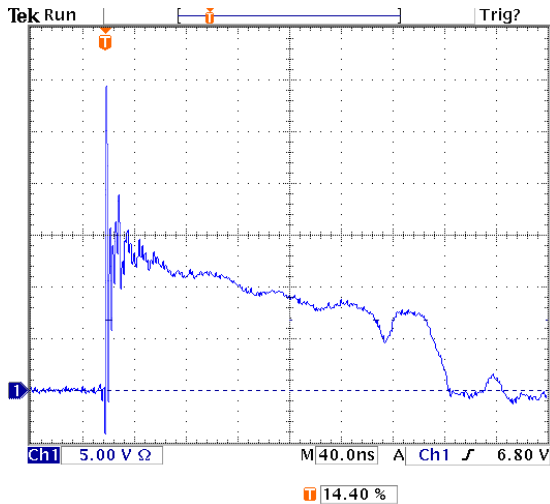
## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 0.9\text{ V Max.}$ @ $I_F = 10\text{ mA}$ for all types)

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/T5G, SZESD5B5.0ST1G	5.0	1.0	5.8	7.8	1.0	32	Figures 1 and 2 See Below

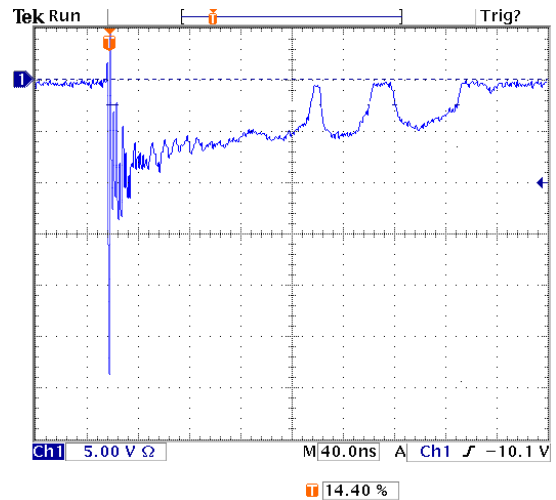
\*Other voltages available upon request.

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**

## ESD5B5.0S, SZESD5B5.0S

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

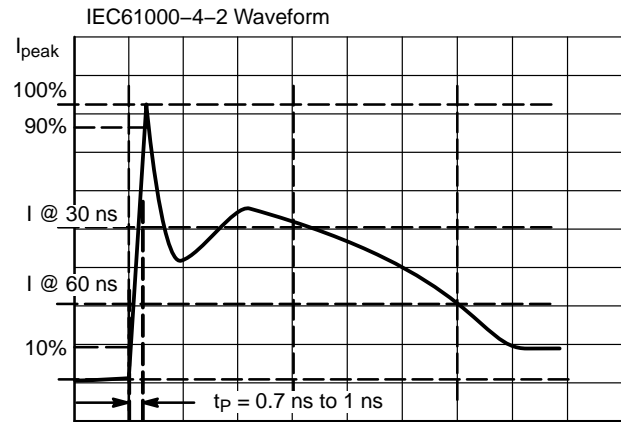


Figure 3. IEC61000-4-2 Spec

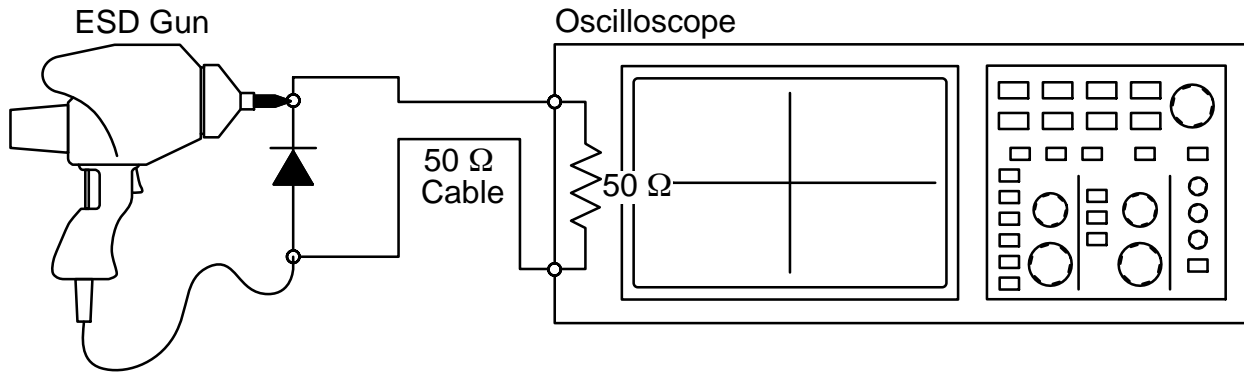


Figure 4. Diagram of ESD Test Setup

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

### ESD Voltage Clamping

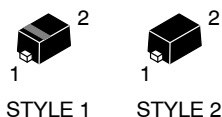
For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000-4-2 waveform. Since the IEC61000-4-2 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.

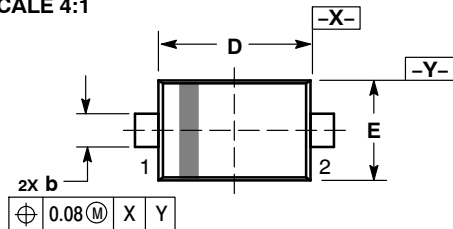
# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

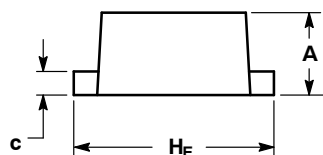
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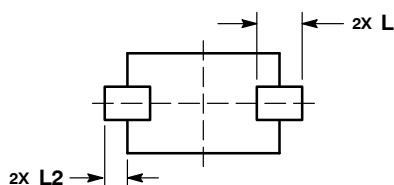
SCALE 4:1



TOP VIEW

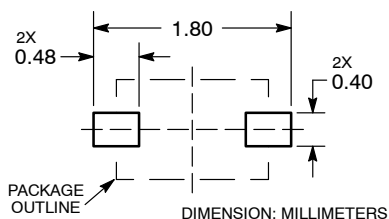


SIDE VIEW



BOTTOM VIEW

### RECOMMENDED SOLDERING FOOTPRINT\*



**SOD-523**  
CASE 502-01  
ISSUE E

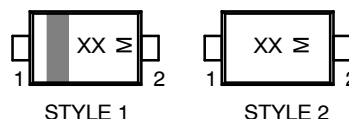
DATE 28 SEP 2010

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.50	0.60	0.70
b	0.25	0.30	0.35
c	0.07	0.14	0.20
D	1.10	1.20	1.30
E	0.70	0.80	0.90
H E	1.50	1.60	1.70
L	0.30 REF		
L2	0.15	0.20	0.25

### GENERIC MARKING DIAGRAM\*



XX = Specific Device Code  
M Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.


STYLE 1:  
PIN 1. CATHODE (POLARITY BAND)  
2. ANODE

STYLE 2:  
NO POLARITY

\*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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<b>DESCRIPTION:</b>	<b>SOD-523</b>	<b>PAGE 1 OF 1</b>

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