ESD Protection Diode

Micro−Packaged Diodes for ESD Protection

ESD9B, SZESD9B





SOD−923
CASE 514AB

The ESD9B 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, it is suited for use in cellular phones, MP3 players, digital cameras and many other portable applications where board space comes at a premium.

Specification Features

- Low Capacitance 15 pF
- Low Clamping Voltage
- Small Body Outline Dimensions: 0.039″ x 0.024″ (1.0 x 0.60 mm)
- Low Body Height: 0.016″ (0.4 mm)
- Stand−off Voltage: 3.3 V, 5 V
- Low Leakage
- Response Time is < 1 ns
- IEC61000−4−2 Level 4 ESD Protection
- AEC−Q101 Qualified and PPAP Capable
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb−Free Devices

Mechanical Characteristics

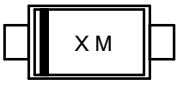
CASE: Void-free, transfer-molded, thermosetting plastic
Epoxy Meets UL 94 V−0
LEAD FINISH: 100% Matte Sn (Tin)
MOUNTING POSITION: Any
QUALIFIED MAX REFLOW TEMPERATURE: 260°C
Device Meets MSL 1 Requirements

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
IEC 61000−4−2 (ESD) Contact Air		±18 ±18	kV
IEC 61000−4−4 (EFT)		40	A
Total Power Dissipation on FR−5 Board (Note 1) @ T_A = 25°C	P_D	300	mW
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	400	°C/W
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 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.

MARKING DIAGRAM



X = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
ESD9B3.3ST5G	SOD−923 (Pb−Free)	8000 / Tape & Reel
ESD9B5.0ST5G	SOD−923 (Pb−Free)	8000 / Tape & Reel
SZESD9B3.3ST5G	SOD−923 (Pb−Free)	8000 / Tape & Reel
SZESD9B5.0ST5G	SOD−923 (Pb−Free)	8000 / Tape & Reel

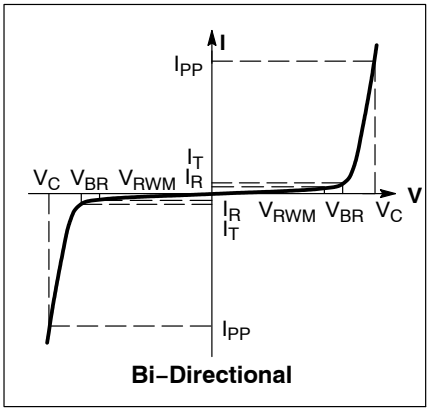
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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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
C	Capacitance @ V_R = 0 V and f = 1.0 MHz



ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Device	Device Marking	V_{RWM} (V) Max	I_R (nA) @ V_{RWM} Max	V_{BR} (V) @ I_T (Note 2) Min	V_{BR} (V) @ I_T (Note 2) Max	I_T mA	C (pF) Typ	V_C Per IEC61000−4−2 (Note 3)	V_C (V) Max Per 8 x 20 μs (Note 4) I_{PP} = 1 A	V_C (V) Max Per 8 x 20 μs (Note 4) I_{PP} = 2 A
ESD9B3.3ST5G, SZESD9B3.3ST5G	2*	3.3	100	5.0	7.0	1.0	15	Figures 1 and 2 See Below	10.5	11.5
ESD9B5.0ST5G, SZESD9B5.0ST5G	E	5.0	100	5.8	7.8	1.0	15	Figures 1 and 2 See Below	12.5	15.0

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.

* Rotated 270°.

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 and Application Note AND8307/D.
4. Surge current waveforms per Figure 5.

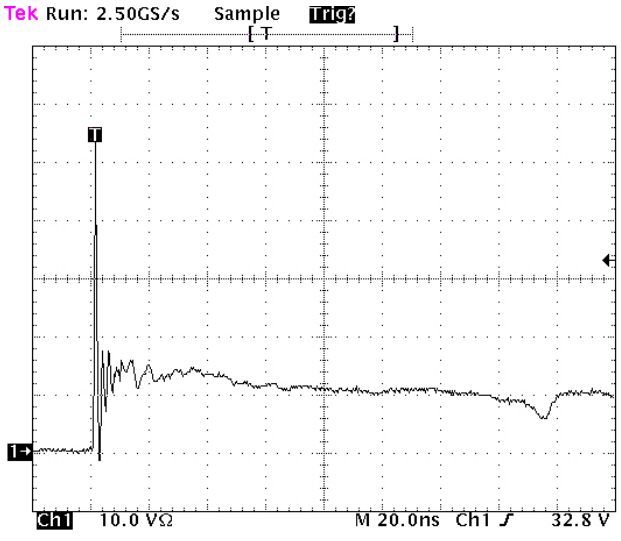


Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000−4−2

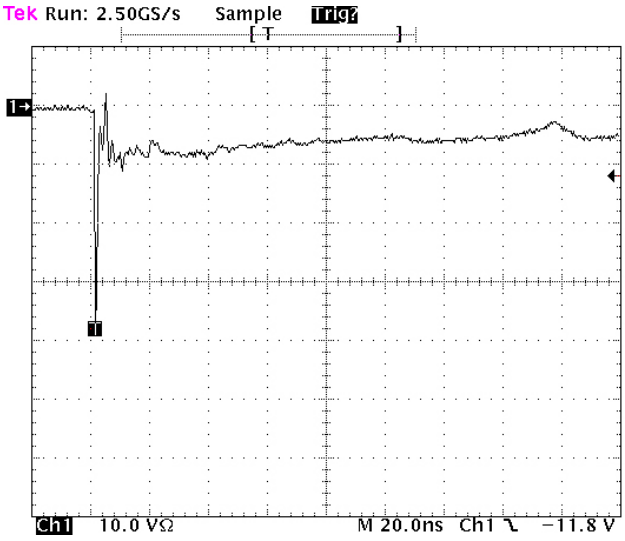


Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000−4−2

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

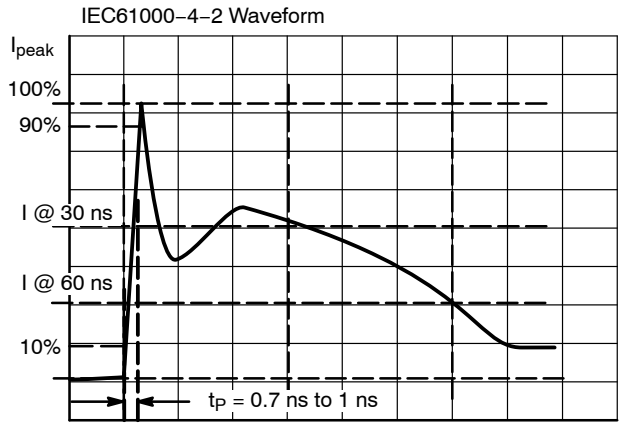


Figure 3. IEC61000−4−2 Spec

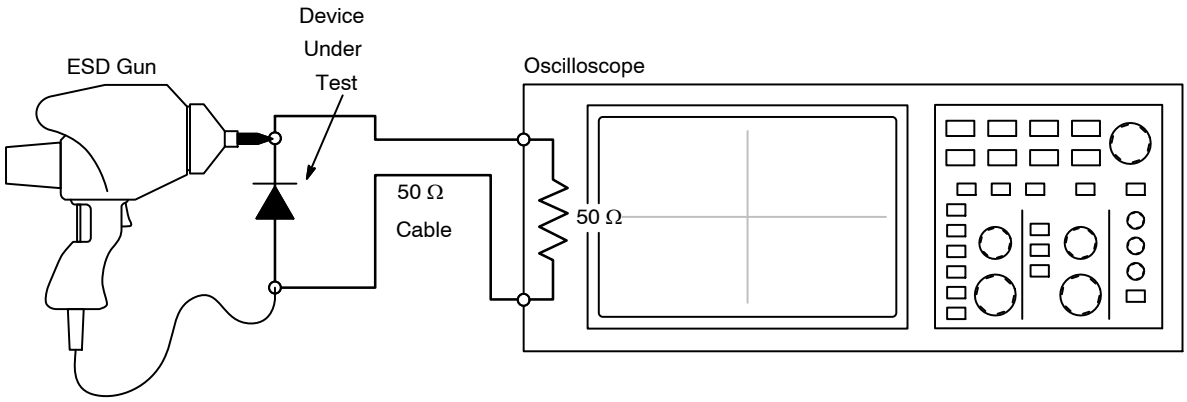


Figure 4. Diagram of ESD Test Setup

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. **onsemi** 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 **onsemi** creates these screenshots and how to interpret them please refer to AND8307/D.

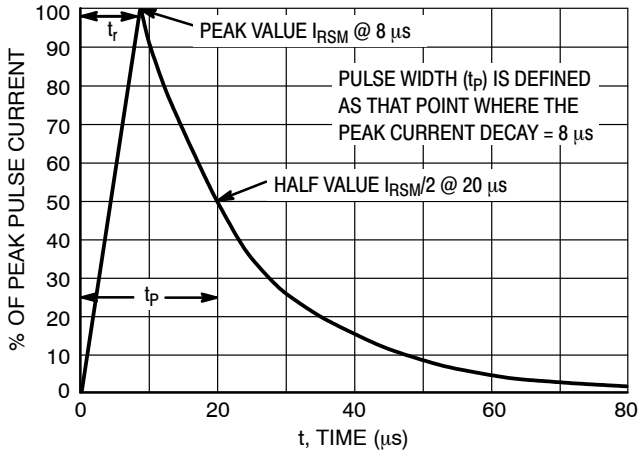
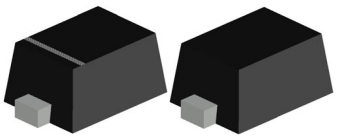


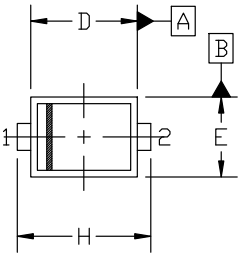
Figure 5. 8 x 20 μs Pulse Waveform

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

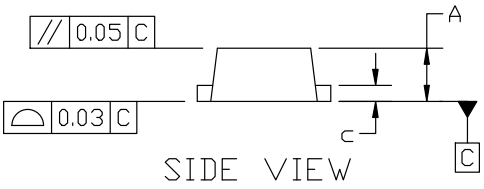


SOD−923 0.80x0.60x0.37
CASE 514AB
ISSUE E

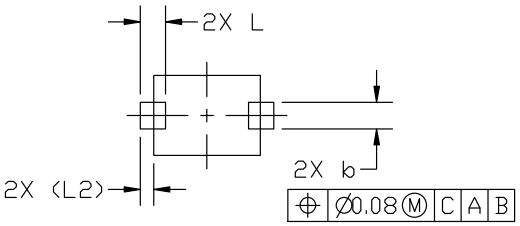
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TOP VIEW



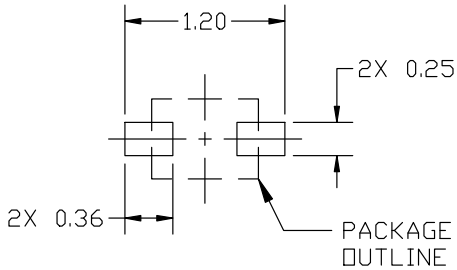
SIDE VIEW



BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
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.
5. DIMENSION L WILL NOT EXCEED 0.30mm.

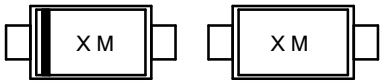
MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	0.34	0.37	0.40
b	0.15	0.20	0.25
c	0.07	0.12	0.17
D	0.75	0.80	0.85
E	0.55	0.60	0.65
H	0.95	1.00	1.05
L	0.19 REF		
L2	0.05	0.10	0.15



RECOMMENDED MOUNTING 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.

GENERIC MARKING DIAGRAM*



STYLE 1 STYLE 2

X = 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. Some products may not follow the Generic Marking.

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

STYLE 2:
NO POLARITY

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