ESD Protection Diode



Ultra−Low Capacitance

ESD9M5.0ST5G

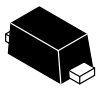
The ESD9M Series is designed to protect voltage sensitive components that require low capacitance from ESD and transient voltage events. Excellent clamping capability, low capacitance, low leakage, and fast response time, make these parts ideal for ESD protection on designs that utilize high−speed lines such as USB.

Specification Features:

- Low Capacitance 2.5 pF
- Low Clamping Voltage
- Small Body Outline Dimensions:
  0.039″ x 0.024″ (1.00 mm x 0.60 mm)
- Low Body Height: 0.016″ (0.4 mm)
- Stand−off Voltage: 5 V
- Low Leakage
- Response Time is Typically < 1.0 ns
- IEC61000−4−2 Level 4 ESD Protection
- AEC−Q101 Qualified and PPAP Capable for SZ Prefix
- This is a Pb−Free Device

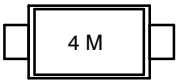
Mechanical Characteristics:

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



SOD−923
CASE 514AB

MARKING DIAGRAM



4 = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
ESD9M5.0ST5G	SOD−923 (Pb−Free)	8000 / Tape & Reel
SZESD9M5.0ST5G	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.

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics tables starting on page 2 of this data sheet.

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
IEC 61000−4−2 (ESD)	Contact Air		±10 ±15	kV
Total Power Dissipation on FR−5 Board (Note 1) @ T_A = 25°C		P_D	150	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 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.

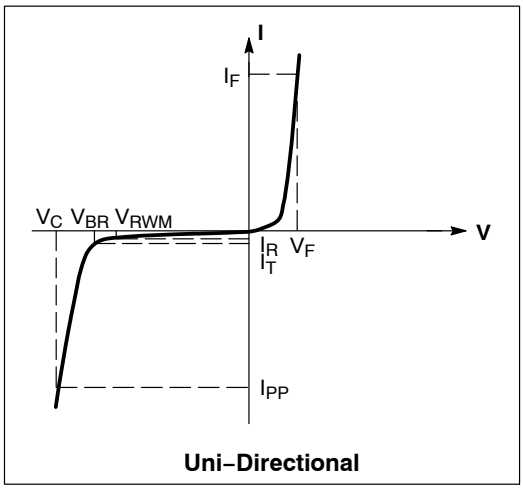
© Semiconductor Components Industries, LLC, 2013

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 = 1.0 MHz

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



ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.0 V Max. @ I_F = 10 mA for all types)

Device	Device Marking	V_{RWM} (V)	I_R (μA) @ V_{RWM}	V_{BR} (V) @ I_T (Note 2)	I_T	C (pF)	V_C (V) @ I_{PP} = 1 A (Note 4)	V_C
		Max	Max	Min	mA	Max	Max	Per IEC61000−4−2 (Note 3)
ESD9M5.0ST5G, SZESD9M5.0ST5G	4*	5.0	1.0	5.8	1.0	2.5	9.8	Figures1and 2 See Below

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°.

**The “G” suffix indicates Pb−Free package available.

***Other voltages available upon request.

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 waveform per Figure 5.

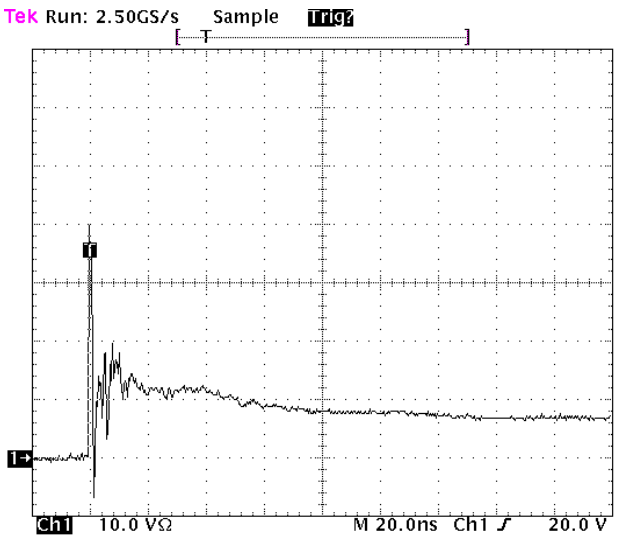


Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000−4−2

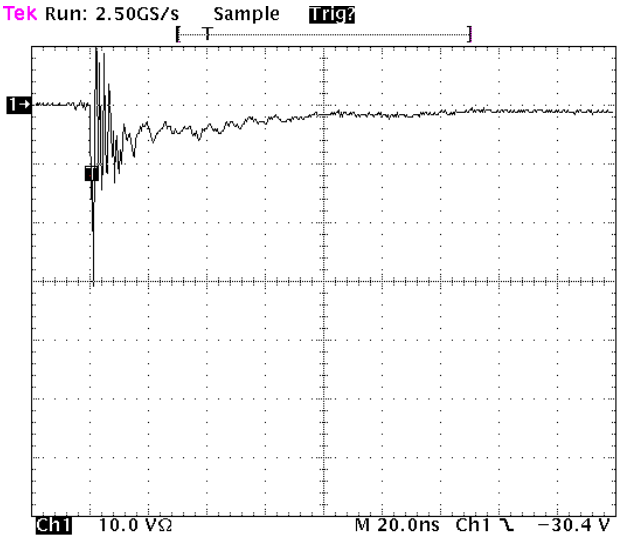


Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000−4−2

Share Feedback
Your Opinion Matters

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

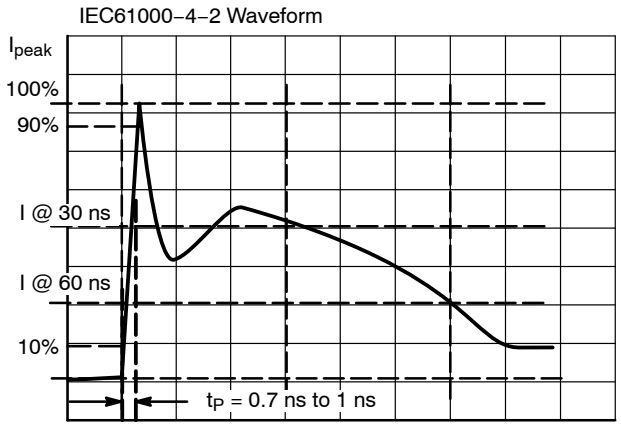


Figure 3. IEC61000−4−2 Spec

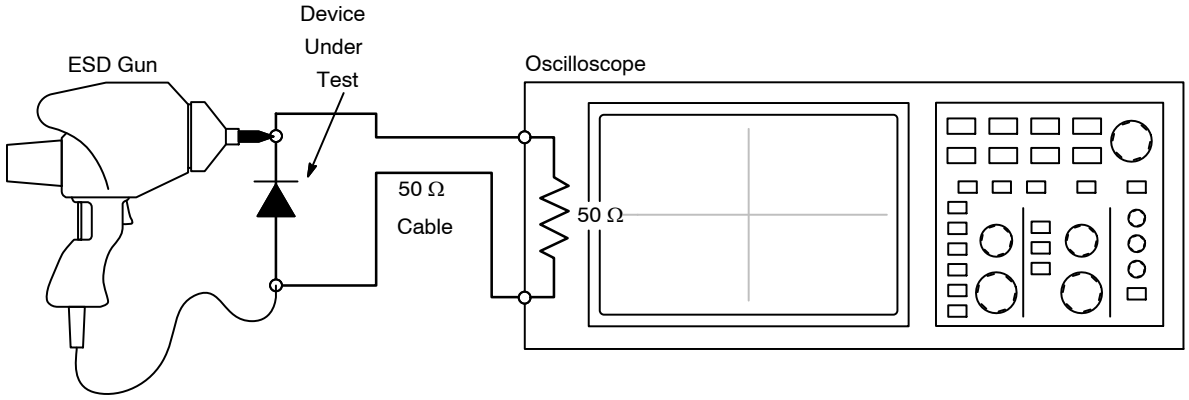


Figure 4. Diagram of ESD Test Setup

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.

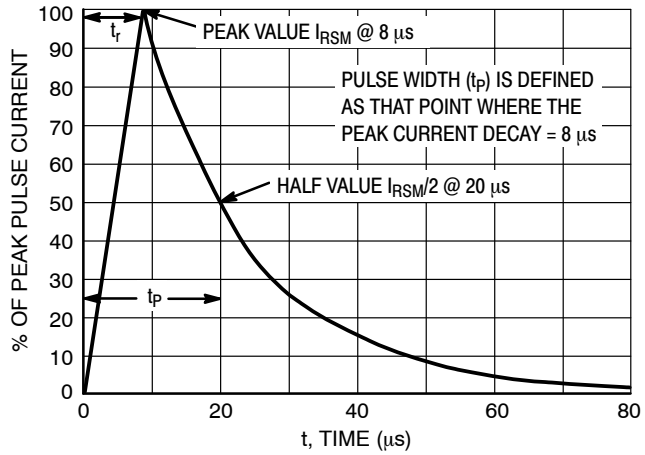
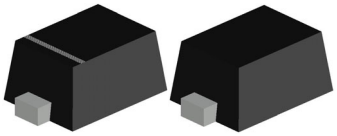


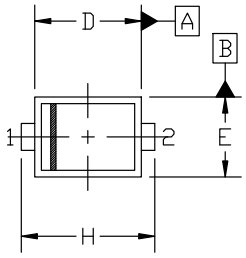
Figure 5. 8 x 20 μs Pulse Waveform

Share Feedback
Your Opinion Matters

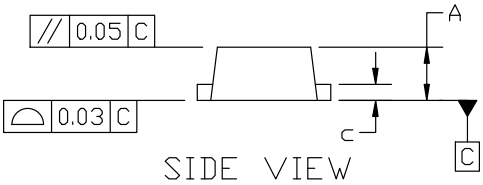


SOD−923 0.80x0.60x0.37
CASE 514AB
ISSUE E

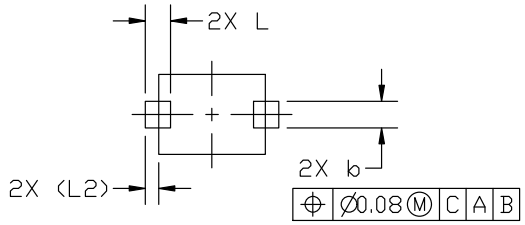
DATE 08 FEB 2024



TOP VIEW



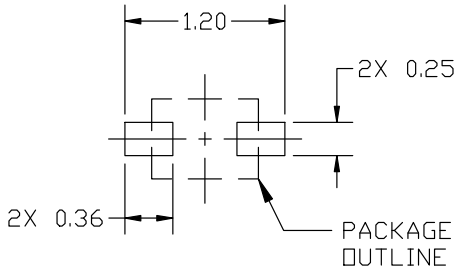
SIDE VIEW



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.

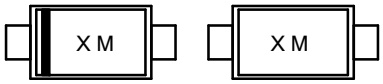
MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	0.34	0.37	0.40
b	0.15	0.20	0.25
c	0.07	0.12	0.17
D	0.75	0.80	0.85
E	0.55	0.60	0.65
H	0.95	1.00	1.05
L	0.19 REF		
L2	0.05	0.10	0.15



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

DOCUMENT NUMBER:	**98AON23284D**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.	
DESCRIPTION:	**SOD−923 0.80x0.60x0.37**		**PAGE 1 OF 1**

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales