SD05T1 Series

Preferred Device

Transient Voltage Suppressor Diode

SOD−323 Zeners for ESD Protection

These zener diodes are designed for applications requiring transient overvoltage protection capability. They are intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment and other applications. These devices are ideal for situations where board space is at a premium.

Specification Features:

- Steady State Power Routing of 200 mW
- Peak Power − 350 Watt (8 × 20 μs)
- Low Leakage
- Cathode Indicated by Polarity Band
- Package Weight: 4.507 mg/wmt
- Meets IEC61000−4−2 Level 4, 15 kV (Air), 8 kV (Contact)
- Meets IEC6100−4−4 Level 4, 40 A
- Meets IEC6100−4−5 (Lightning), 24 A
- Meets 16 kV Human Body Model ESD Requirements

Mechanical Characteristics:

CASE: Void-free, transfer-molded, thermosetting plastic Epoxy Meets UL94, VO
LEAD FINISH: 100% Matte Sn (Tin)
MOUNTING POSITION: Any
QUALIFIED MAX REFLOW TEMPERATURE: 260°C
Device Meets MSL 1 Requirements

Use the Device Number to order the 7 inch/3,000 unit reel. Replace the “T1” with “T3” in the Device Number to order the 13 inch/10,000 unit reel.

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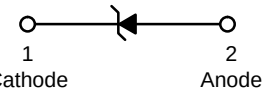
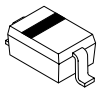
http://onsemi.com





SOD−323
CASE 477
STYLE 1

MARKING DIAGRAM

xx = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
SD05T1	SOD−323	3000/Tape & Reel
SD12T1	SOD−323	3000/Tape & Reel

Preferred devices are recommended choices for future use and best overall value.

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

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 20 μs (Note 1) @ $T_L \le 25°C$	P_{pk}	350	Watts
IEC 61000−4−2 (ESD) Air Contact		±15 ±8.0	kV
IEC 61000−4−4 (EFT)		40	A
ESD Voltage (HBM Waveform per IEC 61000−4−2)	V_{PP}	30	kV
Total Power Dissipation on FR−5 Board (Note 2) @ T_A = 25°C Derate above 25°C	P_D	200 1.6	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	635	°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

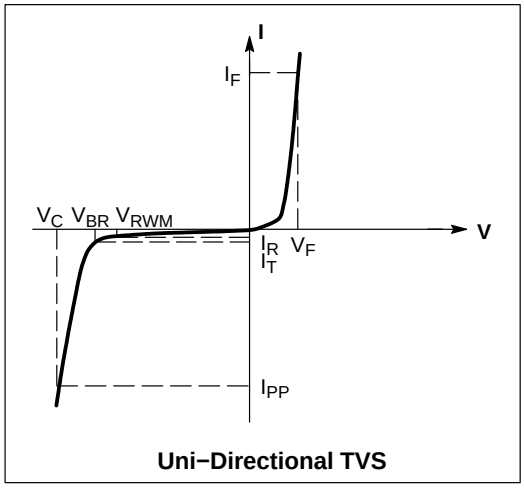
1. Non−repetitive current pulse, per Figure 6.
2. FR−5 = 1.0 x 0.75 x 0.62 in.

*Other voltages may be available upon request.

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



Uni−Directional TVS

ELECTRICAL CHARACTERISTICS

Device	Device Marking	V_{RWM} (Volts)	I_R @ V_{RWM} (μA)	V_{BR}, Breakdown Voltage (Volts) Min	Max	I_T mA	V_C @ I_{PP} = 5 Amp (Note 3) (Volts)	Max I_{PP} (Note 3) (Amps)	V_C @ Max I_{PP} (Note 3) (Volts)	Max Capacitance (pF) V_R = 0 V f = 1.0 MHz
SD05T1	ZA	5.0	10	6.2	7.3	1.0	9.8	24	14.5	350
SD12T1	ZC	12	1.0	13.3	15.75	1.0	19	15	25	150

3. 8 × 20 μs pulse waveform.

TYPICAL CHARACTERISTICS

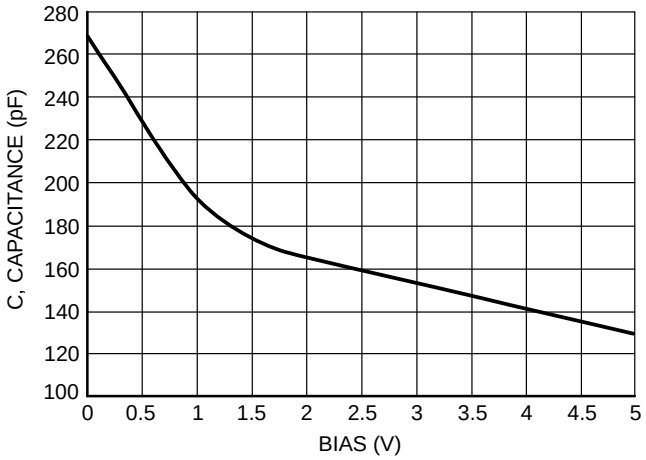


Figure 1. SD05 Typical Capacitance versus Bias Voltage

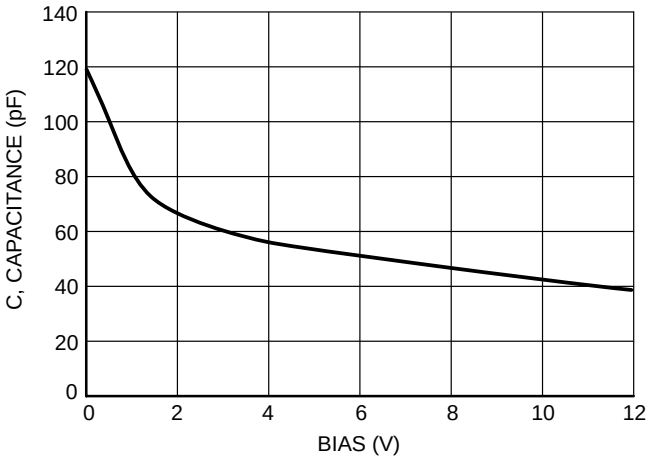


Figure 2. SD12 Typical Capacitance versus Bias Voltage

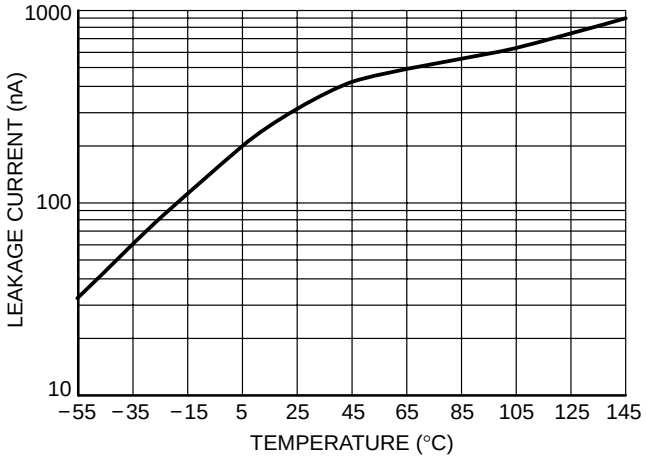


Figure 3. SD05 Typical Leakage Current versus Temperature

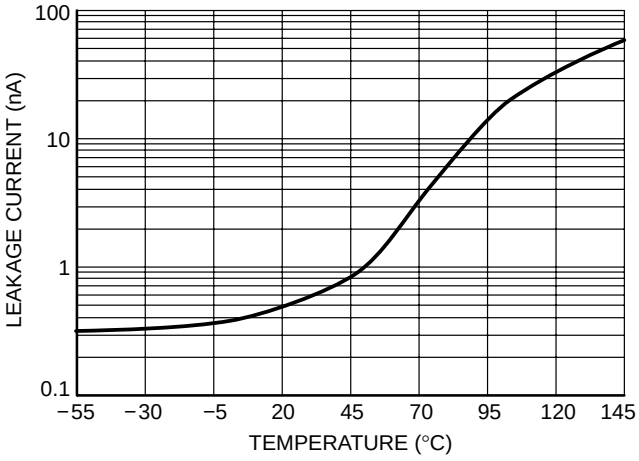


Figure 4. SD12 Typical Leakage Current versus Temperature

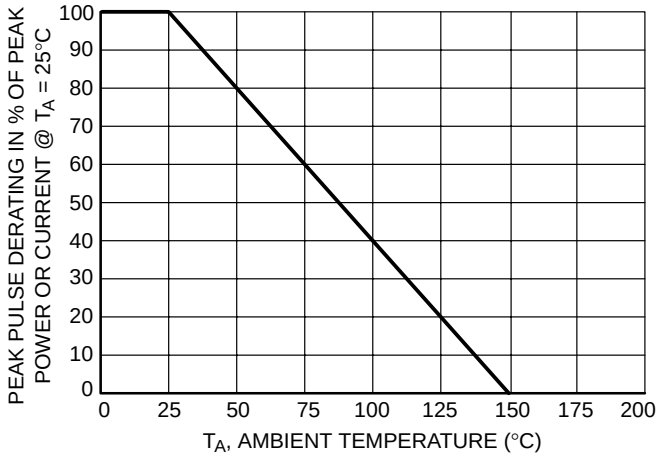


Figure 5. Pulse Derating Curve

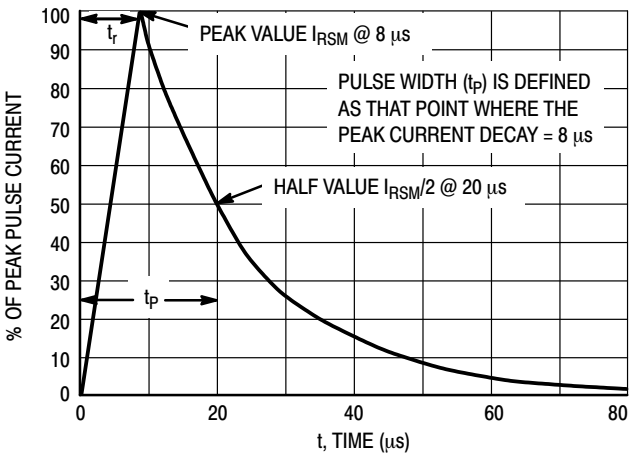
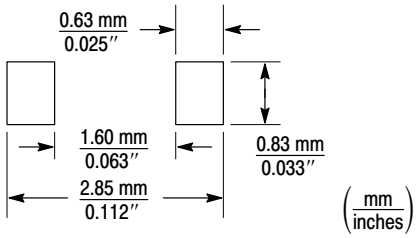


Figure 6. 8 × 20 μs Pulse Waveform

INFORMATION FOR USING THE SOD−323 SURFACE MOUNT PACKAGE

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



SOD−323

SOD−323 POWER DISSIPATION

The power dissipation of the SOD−323 is a function of the drain pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, T_A. Using the values provided on the data sheet for the SOD−323 package, P_D can be calculated as follows:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature T_A of 25°C, one can calculate the power dissipation of the device which in this case is 200 milliwatts.

$$P_D = \frac{150°C - 25°C}{635°C/W} = 200 \text{ milliwatts}$$

The 635°C/W for the SOD−323 package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 200 milliwatts. There are other alternatives to achieving higher power dissipation from the SOD−323 package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad®. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

SOLDERING PRECAUTIONS

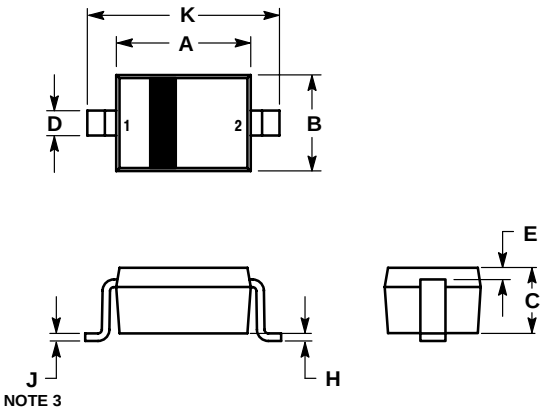
The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

PACKAGE DIMENSIONS

SOD−323
CASE 477−02
ISSUE C



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SOLDER PLATING.
4. 477−01 OBSOLETE, NEW STANDARD 477−02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	1.60	1.80	0.063	0.071
B	1.15	1.35	0.045	0.053
C	0.80	1.00	0.031	0.039
D	0.25	0.40	0.010	0.016
E	0.15 REF		0.006 REF	
H	0.00	0.10	0.000	0.004
J	0.089	0.177	0.0035	0.0070
K	2.30	2.70	0.091	0.106

STYLE 1:
PIN 1. CATHODE
2. ANODE

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