

# Zener Voltage Regulators

300 mW SOD-323 Surface Mount

## MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

This series of Zener diodes is packaged in a SOD-323 surface mount package that has a power dissipation of 300 mW. They are designed to provide voltage regulation protection and are especially attractive in situations where space is at a premium. They are well suited for applications such as cellular phones, hand held portables, and high density PC boards.

### Specification Features:

- Standard Zener Breakdown Voltage Range – 2.4 V to 75 V
- Steady State Power Rating of 300 mW
- Small Body Outline Dimensions:  
0.067" x 0.049" (1.7 mm x 1.25 mm)
- Low Body Height: 0.035" (0.9 mm)
- Package Weight: 4.507 mg/Unit
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices\*

### Mechanical Characteristics:

**CASE:** Void-free, Transfer-Molded Plastic

**FINISH:** All External Surfaces are Corrosion Resistant

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:**

260°C for 10 Seconds

**LEADS:** Plated with Pb-Sn or Sn Only (Pb-Free)

**POLARITY:** Cathode Indicated by Polarity Band

**FLAMMABILITY RATING:** UL 94 V-0

**MOUNTING POSITION:** Any

### MAXIMUM RATINGS

| Rating                                                                                        | Symbol                            | Max         | Unit        |
|-----------------------------------------------------------------------------------------------|-----------------------------------|-------------|-------------|
| Total Device Dissipation FR-4 Board,<br>(Note 1) @ T <sub>A</sub> = 25°C<br>Derate above 25°C | P <sub>D</sub>                    | 300<br>2.4  | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient                                                       | R <sub>θJA</sub>                  | 416         | °C/W        |
| Junction and Storage Temperature Range                                                        | T <sub>J</sub> , T <sub>stg</sub> | -65 to +150 | °C          |

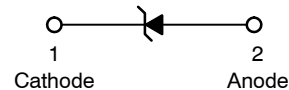
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 printed circuit board, single-sided copper, mounting pad 1 cm<sup>2</sup>.

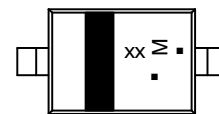
\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



SOD-323  
CASE 477  
STYLE 1



### MARKING DIAGRAM



xx = Specific Device Code

M = Date Code\*

■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device                      | Package              | Shipping†               |
|-----------------------------|----------------------|-------------------------|
| MM3ZxxxT1G,<br>SZMM3ZxxxT1G | SOD-323<br>(Pb-Free) | 3,000 /<br>Tape & Reel  |
| MM3ZxxxT3G,<br>SZMM3ZxxxT3G | SOD-323<br>(Pb-Free) | 10,000 /<br>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.

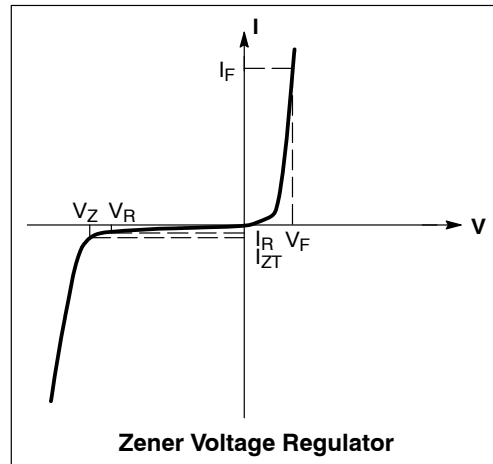
### DEVICE MARKING INFORMATION

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

# MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

## ELECTRICAL CHARACTERISTICS

| Symbol       | Parameter                                    |
|--------------|----------------------------------------------|
| $V_Z$        | Reverse Zener Voltage @ $I_{ZT}$             |
| $I_{ZT}$     | Reverse Current                              |
| $Z_{ZT}$     | Maximum Zener Impedance @ $I_{ZT}$           |
| $I_{ZK}$     | Reverse Current                              |
| $Z_{ZK}$     | Maximum Zener Impedance @ $I_{ZK}$           |
| $I_R$        | Reverse Leakage Current @ $V_R$              |
| $V_R$        | Reverse Voltage                              |
| $I_F$        | Forward Current                              |
| $V_F$        | Forward Voltage @ $I_F$                      |
| $\Theta V_Z$ | Maximum Temperature Coefficient of $V_Z$     |
| C            | Max. Capacitance @ $V_R = 0$ and $f = 1$ MHz |



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

| Device*    | Device Marking | Zener Voltage (Note 2) |       |      |                   | Zener Impedance                      |                                   |                                 | Leakage Current |       | ϑV <sub>Z</sub><br>(mV/k)<br>@ I <sub>ZT</sub> |      | C<br>@ V <sub>R</sub> = 0<br>f = 1 MHz |
|------------|----------------|------------------------|-------|------|-------------------|--------------------------------------|-----------------------------------|---------------------------------|-----------------|-------|------------------------------------------------|------|----------------------------------------|
|            |                | V <sub>Z</sub> (Volts) |       |      | @ I <sub>ZT</sub> | Z <sub>ZT</sub><br>@ I <sub>ZT</sub> | Z <sub>ZK</sub> @ I <sub>ZK</sub> | I <sub>R</sub> @ V <sub>R</sub> |                 |       |                                                |      |                                        |
|            |                | Min                    | Nom   | Max  | mA                | Ω                                    | Ω                                 | mA                              | μA              | Volts | Min                                            | Max  | pF                                     |
| MM3Z2V4T1G | 00             | 2.2                    | 2.4   | 2.6  | 5                 | 100                                  | 1000                              | 0.5                             | 50              | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z2V7T1G | 01             | 2.5                    | 2.7   | 2.9  | 5                 | 100                                  | 1000                              | 0.5                             | 20              | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V0T1G | 02             | 2.8                    | 3.0   | 3.2  | 5                 | 100                                  | 1000                              | 0.5                             | 10              | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V3T1G | 05             | 3.1                    | 3.3   | 3.5  | 5                 | 95                                   | 1000                              | 0.5                             | 5               | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V6T1G | 06             | 3.4                    | 3.6   | 3.8  | 5                 | 90                                   | 1000                              | 0.5                             | 5               | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z3V9T1G | 07             | 3.7                    | 3.9   | 4.1  | 5                 | 90                                   | 1000                              | 0.5                             | 3               | 1.0   | −3.5                                           | −2.5 | 450                                    |
| MM3Z4V3T1G | 08             | 4.0                    | 4.3   | 4.6  | 5                 | 90                                   | 1000                              | 0.5                             | 3               | 1.0   | −3.5                                           | 0    | 450                                    |
| MM3Z4V7T1G | 09             | 4.4                    | 4.7   | 5.0  | 5                 | 80                                   | 800                               | 0.5                             | 3               | 2.0   | −3.5                                           | 0.2  | 260                                    |
| MM3Z5V1T1G | 0A             | 4.8                    | 5.1   | 5.4  | 5                 | 60                                   | 500                               | 0.5                             | 2               | 2.0   | −2.7                                           | 1.2  | 225                                    |
| MM3Z5V6T1G | 0C             | 5.2                    | 5.6   | 6.0  | 5                 | 40                                   | 200                               | 0.5                             | 1               | 2.0   | −2.0                                           | 2.5  | 200                                    |
| MM3Z6V2T1G | 0E             | 5.8                    | 6.2   | 6.6  | 5                 | 10                                   | 100                               | 0.5                             | 3               | 4.0   | 0.4                                            | 3.7  | 185                                    |
| MM3Z6V8T1G | 0F             | 6.4                    | 6.8   | 7.2  | 5                 | 15                                   | 160                               | 0.5                             | 2               | 4.0   | 1.2                                            | 4.5  | 155                                    |
| MM3Z7V5T1G | 0G             | 7.0                    | 7.5   | 7.9  | 5                 | 15                                   | 160                               | 0.5                             | 1               | 5.0   | 2.5                                            | 5.3  | 140                                    |
| MM3Z8V2T1G | 0H             | 7.7                    | 8.2   | 8.7  | 5                 | 15                                   | 160                               | 0.5                             | 0.7             | 5.0   | 3.2                                            | 6.2  | 135                                    |
| MM3Z9V1T1G | 0K             | 8.5                    | 9.1   | 9.6  | 5                 | 15                                   | 160                               | 0.5                             | 0.2             | 7.0   | 3.8                                            | 7.0  | 130                                    |
| MM3Z10VT1G | 0L             | 9.4                    | 10    | 10.6 | 5                 | 20                                   | 160                               | 0.5                             | 0.1             | 8.0   | 4.5                                            | 8.0  | 130                                    |
| MM3Z11VT1G | 0M             | 10.4                   | 11    | 11.6 | 5                 | 20                                   | 160                               | 0.5                             | 0.1             | 8.0   | 5.4                                            | 9.0  | 130                                    |
| MM3Z12VT1G | 0N             | 11.4                   | 12    | 12.7 | 5                 | 25                                   | 80                                | 0.5                             | 0.1             | 8.0   | 6.0                                            | 10   | 130                                    |
| MM3Z13VT1G | 0P             | 12.4                   | 13.25 | 14.1 | 5                 | 30                                   | 80                                | 0.5                             | 0.1             | 8.0   | 7.0                                            | 11   | 120                                    |
| MM3Z15VT1G | 0T             | 14.3                   | 15    | 15.8 | 5                 | 30                                   | 80                                | 0.5                             | 0.05            | 10.5  | 9.2                                            | 13   | 110                                    |
| MM3Z16VT1G | 0U             | 15.3                   | 16.2  | 17.1 | 5                 | 40                                   | 80                                | 0.5                             | 0.05            | 11.2  | 10.4                                           | 14   | 105                                    |
| MM3Z18VT1G | 0W             | 16.8                   | 18    | 19.1 | 5                 | 45                                   | 80                                | 0.5                             | 0.05            | 12.6  | 12.4                                           | 16   | 100                                    |
| MM3Z20VT1G | 0Z             | 18.8                   | 20    | 21.2 | 5                 | 55                                   | 100                               | 0.5                             | 0.05            | 14.0  | 14.4                                           | 18   | 85                                     |
| MM3Z22VT1G | 10             | 20.8                   | 22    | 23.3 | 5                 | 55                                   | 100                               | 0.5                             | 0.05            | 15.4  | 16.4                                           | 20   | 85                                     |
| MM3Z24VT1G | 11             | 22.8                   | 24.2  | 25.6 | 5                 | 70                                   | 120                               | 0.5                             | 0.05            | 16.8  | 18.4                                           | 22   | 80                                     |
| MM3Z27VT1G | 12             | 25.1                   | 27    | 28.9 | 2                 | 80                                   | 300                               | 0.5                             | 0.05            | 18.9  | 21.4                                           | 25.3 | 70                                     |
| MM3Z30VT1G | 14             | 28                     | 30    | 32   | 2                 | 80                                   | 300                               | 0.5                             | 0.05            | 21.0  | 24.4                                           | 29.4 | 70                                     |
| MM3Z33VT1G | 18             | 31                     | 33    | 35   | 2                 | 80                                   | 300                               | 0.5                             | 0.05            | 23.2  | 27.4                                           | 33.4 | 70                                     |
| MM3Z36VT1G | 19             | 34                     | 36    | 38   | 2                 | 90                                   | 500                               | 0.5                             | 0.05            | 25.2  | 30.4                                           | 37.4 | 70                                     |
| MM3Z39VT1G | 20             | 37                     | 39    | 41   | 2                 | 130                                  | 500                               | 0.5                             | 0.05            | 27.3  | 33.4                                           | 41.2 | 45                                     |
| MM3Z43VT1G | 21             | 40                     | 43    | 46   | 2                 | 150                                  | 500                               | 0.5                             | 0.05            | 30.1  | 37.6                                           | 46.6 | 40                                     |
| MM3Z47VT1G | 1A             | 44                     | 47    | 50   | 2                 | 170                                  | 500                               | 0.5                             | 0.05            | 32.9  | 42.0                                           | 51.8 | 40                                     |
| MM3Z51VT1G | 1C             | 48                     | 51    | 54   | 2                 | 180                                  | 500                               | 0.5                             | 0.05            | 35.7  | 46.6                                           | 57.2 | 40                                     |
| MM3Z56VT1G | 1D             | 52                     | 56    | 60   | 2                 | 200                                  | 500                               | 0.5                             | 0.05            | 39.2  | 52.2                                           | 63.8 | 40                                     |
| MM3Z62VT1G | 2A             | 58                     | 62    | 66   | 2                 | 215                                  | 500                               | 0.5                             | 0.05            | 43.4  | 58.9                                           | 71.8 | 35                                     |
| MM3Z68VT1G | 1F             | 64                     | 68    | 72   | 2                 | 240                                  | 500                               | 0.5                             | 0.05            | 47.6  | 65.6                                           | 79.8 | 35                                     |
| MM3Z75VT1G | 1G             | 70                     | 75    | 79   | 2                 | 255                                  | 500                               | 0.5                             | 0.05            | 52.5  | 73.4                                           | 88.6 | 35                                     |

\*Includes SZ-prefix devices where applicable.

2. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of  $25^\circ\text{C}$ .

# MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

## TYPICAL CHARACTERISTICS

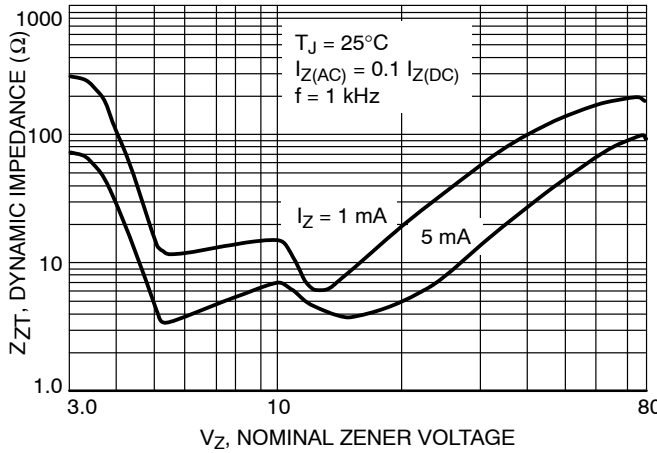


Figure 1. Effect of Zener Voltage on Zener Impedance

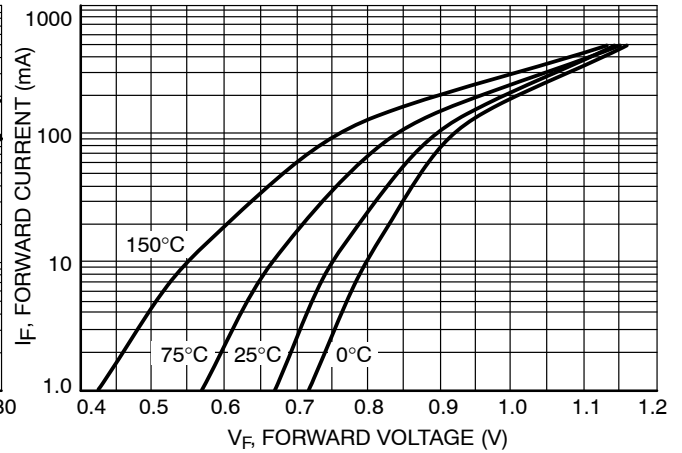


Figure 2. Typical Forward Voltage

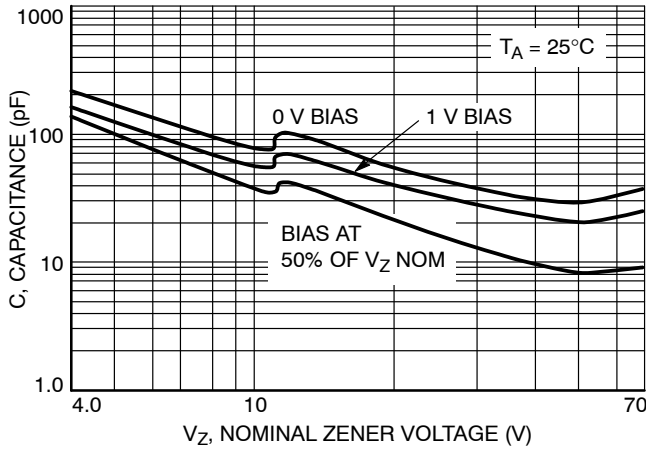


Figure 3. Typical Capacitance

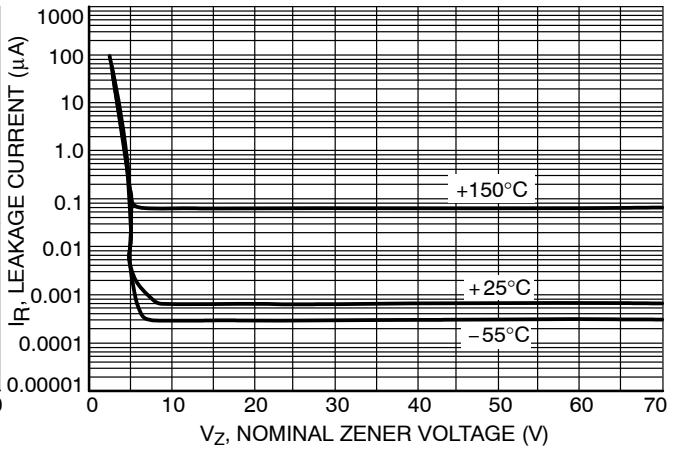


Figure 4. Typical Leakage Current

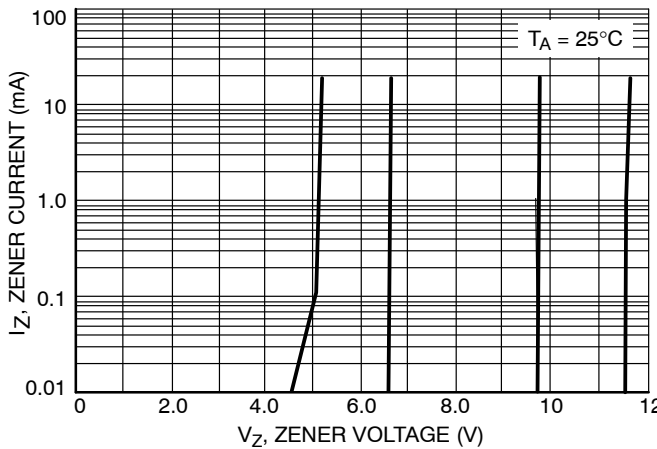


Figure 5. Zener Voltage versus Zener Current ( $V_Z$  Up to 12 V)

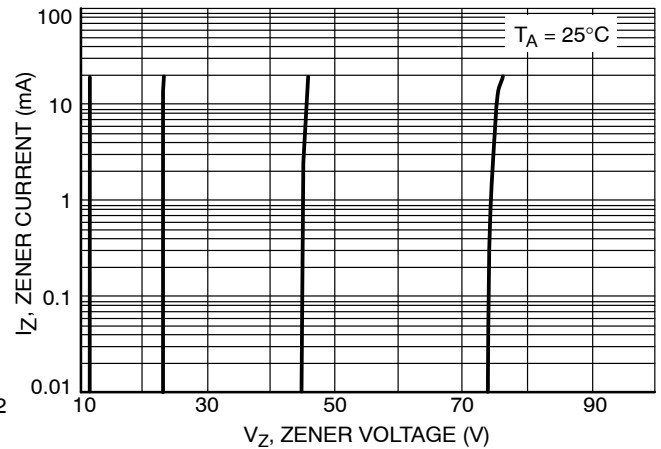
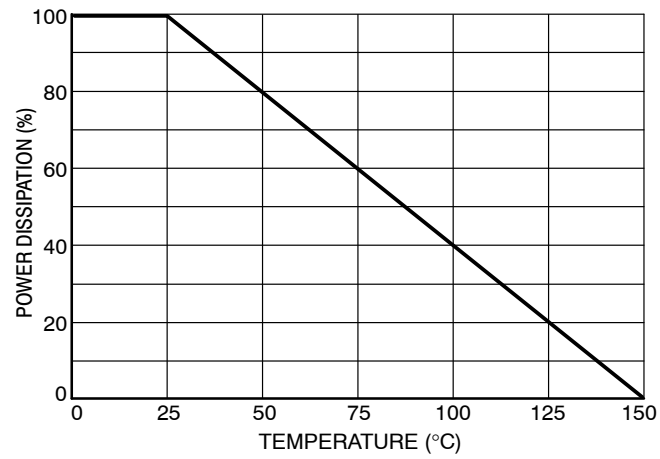


Figure 6. Zener Voltage versus Zener Current (12 V to 75 V)

**TYPICAL CHARACTERISTICS**



**Figure 7. Steady State Power Derating**

# MECHANICAL CASE OUTLINE

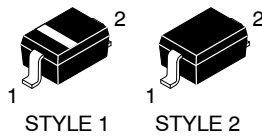
## PACKAGE DIMENSIONS

ON Semiconductor®

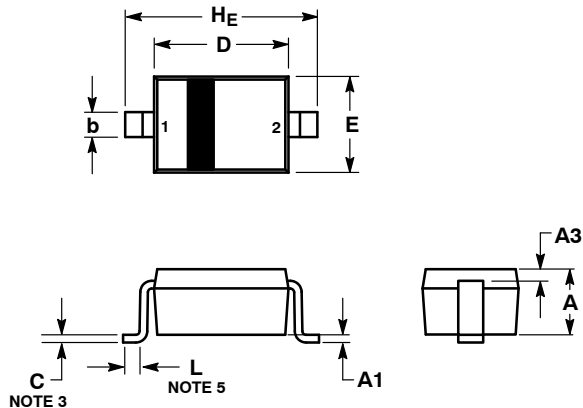


**SOD-323**  
CASE 477-02  
ISSUE H

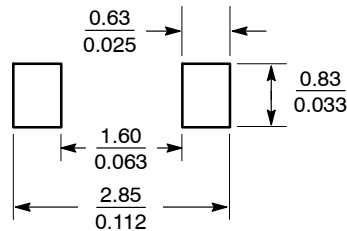
DATE 13 MAR 2007



SCALE 4:1



### SOLDERING FOOTPRINT\*



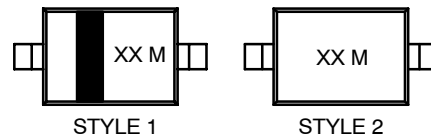
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

### 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. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DIMENSION L IS MEASURED FROM END OF RADIUS.

| DIM | MILLIMETERS |      |       | INCHES    |       |       |
|-----|-------------|------|-------|-----------|-------|-------|
|     | MIN         | NOM  | MAX   | MIN       | NOM   | MAX   |
| A   | 0.80        | 0.90 | 1.00  | 0.031     | 0.035 | 0.040 |
| A1  | 0.00        | 0.05 | 0.10  | 0.000     | 0.002 | 0.004 |
| A3  | 0.15 REF    |      |       | 0.006 REF |       |       |
| b   | 0.25        | 0.32 | 0.4   | 0.010     | 0.012 | 0.016 |
| C   | 0.089       | 0.12 | 0.177 | 0.003     | 0.005 | 0.007 |
| D   | 1.60        | 1.70 | 1.80  | 0.062     | 0.066 | 0.070 |
| E   | 1.15        | 1.25 | 1.35  | 0.045     | 0.049 | 0.053 |
| L   | 0.08        |      |       | 0.003     |       |       |
| HE  | 2.30        | 2.50 | 2.70  | 0.090     | 0.098 | 0.105 |

### 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

|                  |             |                                                                                                                                                                                  |
|------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| DESCRIPTION:     | SOD-323     | PAGE 1 OF 1                                                                                                                                                                      |

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