

# MM3Z2V4T1 SERIES

## Zener Voltage Regulators

### 200 mW SOD-323 Surface Mount

This series of Zener diodes is packaged in a SOD-323 surface mount package that has a power dissipation of 200 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 200 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
- Pb-Free Packages are Available

#### 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-5 Board,<br>(Note 1) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 200<br>1.5  | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient  | $R_{\theta JA}$ | 635         | °C/W        |
| Junction and Storage Temperature Range   | $T_J, T_{stg}$  | -65 to +150 | °C          |

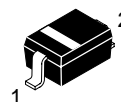
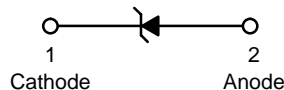
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 Minimum Pad



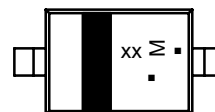
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SOD-323  
CASE 477  
STYLE 1

#### 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†        |
|------------|----------------------|------------------|
| MM3ZxxxT1  | SOD-323              | 3000/Tape & Reel |
| MM3ZxxxT1G | SOD-323<br>(Pb-Free) | 3000/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.

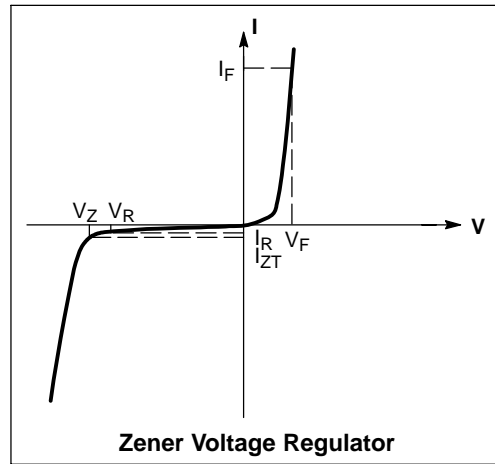
#### DEVICE MARKING INFORMATION

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

# MM3Z2V4T1 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 |       | $\Theta V_Z$ (mV/k) @ $I_{ZT}$ |      | C @ $V_R = 0$ f = 1 MHz |
|--------------|----------------|------------------------|-------|------|------------|---------------------|---------------------|-----|-----------------|-------|--------------------------------|------|-------------------------|
|              |                | $V_Z$ (Volts)          |       |      | @ $I_{ZT}$ | $Z_{ZT}$ @ $I_{ZT}$ | $Z_{ZK}$ @ $I_{ZK}$ |     | $I_R$ @ $V_R$   |       | Min                            | Max  | pF                      |
|              |                | Min                    | Nom   | Max  | mA         | $\Omega$            | $\Omega$            | mA  | $\mu\text{A}$   | Volts |                                |      |                         |
| MM3Z2V4T1, G | 00             | 2.2                    | 2.4   | 2.6  | 5          | 100                 | 1000                | 0.5 | 50              | 1.0   | -3.5                           | 0    | 450                     |
| MM3Z2V7T1, G | 01             | 2.5                    | 2.7   | 2.9  | 5          | 100                 | 1000                | 0.5 | 20              | 1.0   | -3.5                           | 0    | 450                     |
| MM3Z3V0T1, G | 02             | 2.8                    | 3.0   | 3.2  | 5          | 100                 | 1000                | 0.5 | 10              | 1.0   | -3.5                           | 0    | 450                     |
| MM3Z3V3T1, G | 05             | 3.1                    | 3.3   | 3.5  | 5          | 95                  | 1000                | 0.5 | 5               | 1.0   | -3.5                           | 0    | 450                     |
| MM3Z3V6T1, G | 06             | 3.4                    | 3.6   | 3.8  | 5          | 90                  | 1000                | 0.5 | 5               | 1.0   | -3.5                           | 0    | 450                     |
| MM3Z3V9T1, G | 07             | 3.7                    | 3.9   | 4.1  | 5          | 90                  | 1000                | 0.5 | 3               | 1.0   | -3.5                           | -2.5 | 450                     |
| MM3Z4V3T1, G | 08             | 4.0                    | 4.3   | 4.6  | 5          | 90                  | 1000                | 0.5 | 3               | 1.0   | -3.5                           | 0    | 450                     |
| MM3Z4V7T1, G | 09             | 4.4                    | 4.7   | 5.0  | 5          | 80                  | 800                 | 0.5 | 3               | 2.0   | -3.5                           | 0.2  | 260                     |
| MM3Z5V1T1, G | 0A             | 4.8                    | 5.1   | 5.4  | 5          | 60                  | 500                 | 0.5 | 2               | 2.0   | -2.7                           | 1.2  | 225                     |
| MM3Z5V6T1, G | 0C             | 5.2                    | 5.6   | 6.0  | 5          | 40                  | 200                 | 0.5 | 1               | 2.0   | -2.0                           | 2.5  | 200                     |
| MM3Z6V2T1, G | 0E             | 5.8                    | 6.2   | 6.6  | 5          | 10                  | 100                 | 0.5 | 3               | 4.0   | 0.4                            | 3.7  | 185                     |
| MM3Z6V8T1, G | 0F             | 6.4                    | 6.8   | 7.2  | 5          | 15                  | 160                 | 0.5 | 2               | 4.0   | 1.2                            | 4.5  | 155                     |
| MM3Z7V5T1, G | 0G             | 7.0                    | 7.5   | 7.9  | 5          | 15                  | 160                 | 0.5 | 1               | 5.0   | 2.5                            | 5.3  | 140                     |
| MM3Z8V2T1, G | 0H             | 7.7                    | 8.2   | 8.7  | 5          | 15                  | 160                 | 0.5 | 0.7             | 5.0   | 3.2                            | 6.2  | 135                     |
| MM3Z9V1T1, G | 0K             | 8.5                    | 9.1   | 9.6  | 5          | 15                  | 160                 | 0.5 | 0.2             | 7.0   | 3.8                            | 7.0  | 130                     |
| MM3Z10VT1, G | 0L             | 9.4                    | 10    | 10.6 | 5          | 20                  | 160                 | 0.5 | 0.1             | 8.0   | 4.5                            | 8.0  | 130                     |
| MM3Z11VT1, G | 0M             | 10.4                   | 11    | 11.6 | 5          | 20                  | 160                 | 0.5 | 0.1             | 8.0   | 5.4                            | 9.0  | 130                     |
| MM3Z12VT1, G | 0N             | 11.4                   | 12    | 12.7 | 5          | 25                  | 80                  | 0.5 | 0.1             | 8.0   | 6.0                            | 10   | 130                     |
| MM3Z13VT1, G | 0P             | 12.4                   | 13.25 | 14.1 | 5          | 30                  | 80                  | 0.5 | 0.1             | 8.0   | 7.0                            | 11   | 120                     |
| MM3Z15VT1, G | 0T             | 14.3                   | 15    | 15.8 | 5          | 30                  | 80                  | 0.5 | 0.05            | 10.5  | 9.2                            | 13   | 110                     |
| MM3Z16VT1, G | 0U             | 15.3                   | 16.2  | 17.1 | 5          | 40                  | 80                  | 0.5 | 0.05            | 11.2  | 10.4                           | 14   | 105                     |
| MM3Z18VT1, G | 0W             | 16.8                   | 18    | 19.1 | 5          | 45                  | 80                  | 0.5 | 0.05            | 12.6  | 12.4                           | 16   | 100                     |
| MM3Z20VT1, G | 0Z             | 18.8                   | 20    | 21.2 | 5          | 55                  | 100                 | 0.5 | 0.05            | 14.0  | 14.4                           | 18   | 85                      |
| MM3Z22VT1, G | 10             | 20.8                   | 22    | 23.3 | 5          | 55                  | 100                 | 0.5 | 0.05            | 15.4  | 16.4                           | 20   | 85                      |
| MM3Z24VT1, G | 11             | 22.8                   | 24.2  | 25.6 | 5          | 70                  | 120                 | 0.5 | 0.05            | 16.8  | 18.4                           | 22   | 80                      |
| MM3Z27VT1, G | 12             | 25.1                   | 27    | 28.9 | 2          | 80                  | 300                 | 0.5 | 0.05            | 18.9  | 21.4                           | 25.3 | 70                      |
| MM3Z30VT1, G | 14             | 28                     | 30    | 32   | 2          | 80                  | 300                 | 0.5 | 0.05            | 21.0  | 24.4                           | 29.4 | 70                      |
| MM3Z33VT1, G | 18             | 31                     | 33    | 35   | 2          | 80                  | 300                 | 0.5 | 0.05            | 23.2  | 27.4                           | 33.4 | 70                      |
| MM3Z36VT1, G | 19             | 34                     | 36    | 38   | 2          | 90                  | 500                 | 0.5 | 0.05            | 25.2  | 30.4                           | 37.4 | 70                      |
| MM3Z39VT1, G | 20             | 37                     | 39    | 41   | 2          | 130                 | 500                 | 0.5 | 0.05            | 27.3  | 33.4                           | 41.2 | 45                      |
| MM3Z43VT1, G | 21             | 40                     | 43    | 46   | 2          | 150                 | 500                 | 0.5 | 0.05            | 30.1  | 37.6                           | 46.6 | 40                      |
| MM3Z47VT1, G | 1A             | 44                     | 47    | 50   | 2          | 170                 | 500                 | 0.5 | 0.05            | 32.9  | 42.0                           | 51.8 | 40                      |
| MM3Z51VT1, G | 1C             | 48                     | 51    | 54   | 2          | 180                 | 500                 | 0.5 | 0.05            | 35.7  | 46.6                           | 57.2 | 40                      |
| MM3Z56VT1, G | 1D             | 52                     | 56    | 60   | 2          | 200                 | 500                 | 0.5 | 0.05            | 39.2  | 52.2                           | 63.8 | 40                      |
| MM3Z62VT1    | 1E             | 58                     | 62    | 66   | 2          | 215                 | 500                 | 0.5 | 0.05            | 43.4  | 58.8                           | 71.6 | 35                      |
| MM3Z68VT1, G | 1F             | 64                     | 68    | 72   | 2          | 240                 | 500                 | 0.5 | 0.05            | 47.6  | 65.6                           | 79.8 | 35                      |
| MM3Z75VT1, G | 1G             | 70                     | 75    | 79   | 2          | 255                 | 500                 | 0.5 | 0.05            | 52.5  | 73.4                           | 88.6 | 35                      |

\*The "G" suffix indicates Pb-Free package available.

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

# MM3Z2V4T1 SERIES

## TYPICAL CHARACTERISTICS

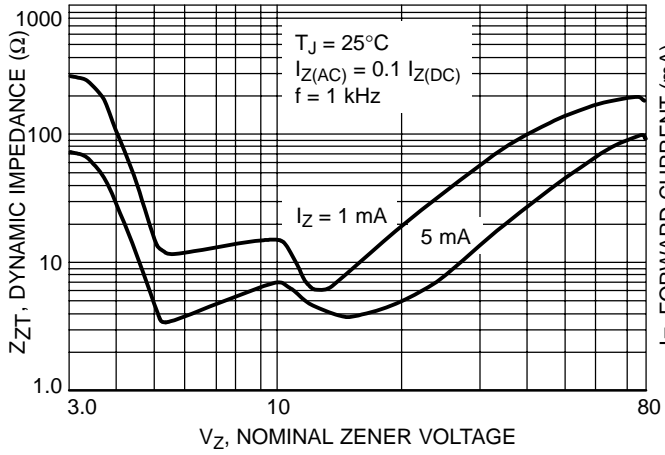


Figure 1. Effect of Zener Voltage on Zener Impedance

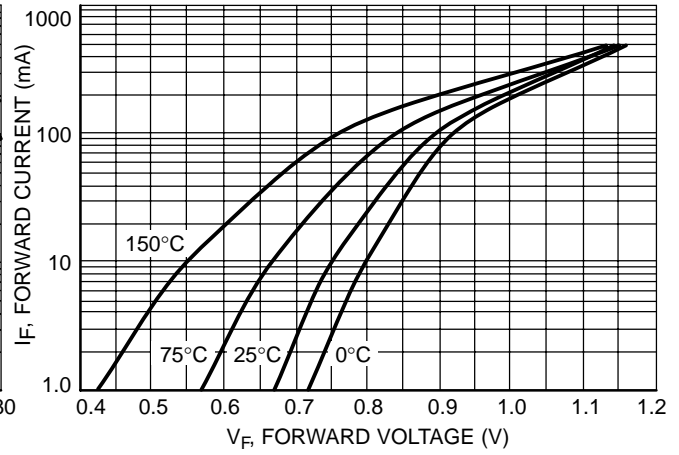


Figure 2. Typical Forward Voltage

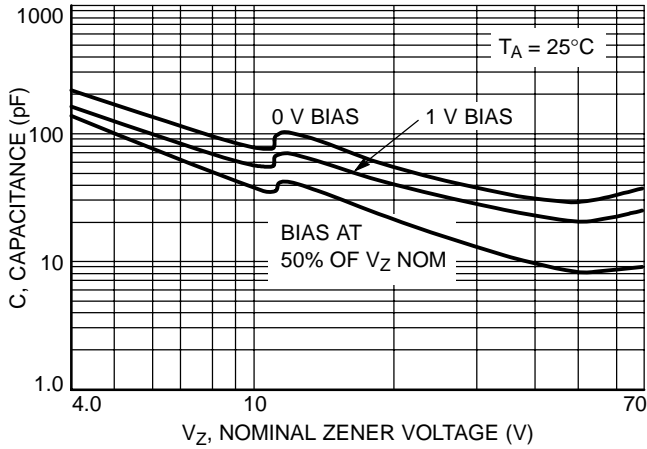


Figure 3. Typical Capacitance

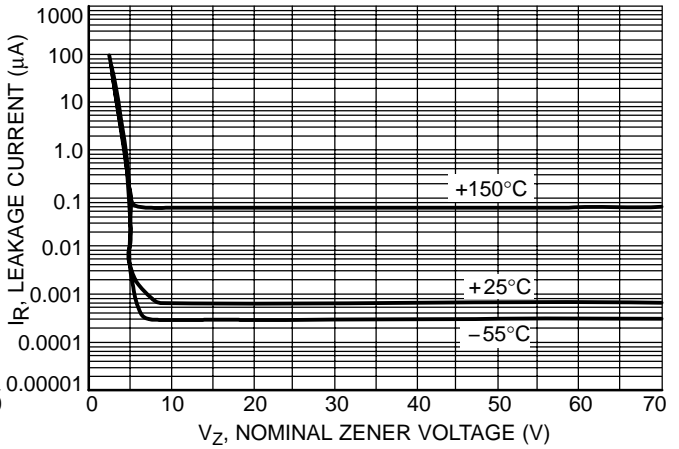


Figure 4. Typical Leakage Current

# MM3Z2V4T1 SERIES

## TYPICAL CHARACTERISTICS

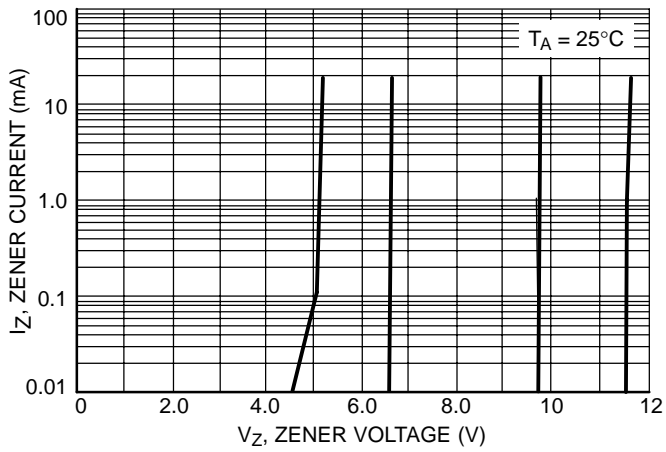


Figure 5. Zener Voltage versus Zener Current ( $V_Z$  Up to 12 V)

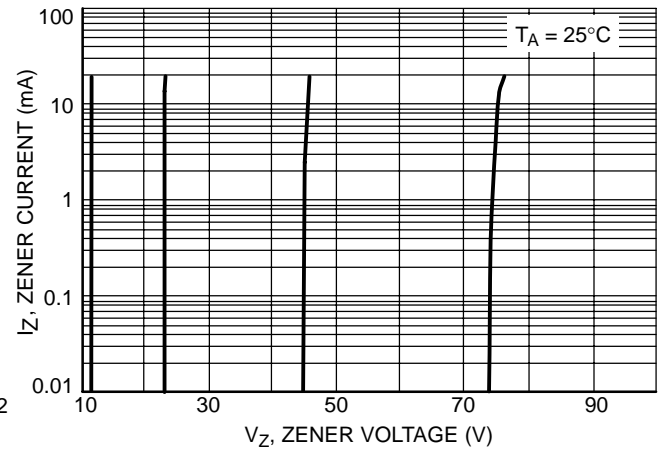


Figure 6. Zener Voltage versus Zener Current (12 V to 75 V)

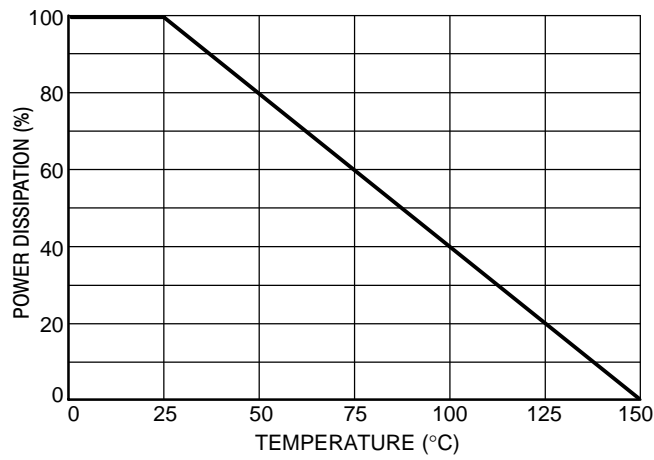
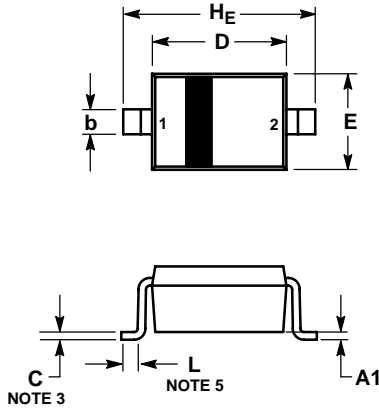


Figure 7. Steady State Power Derating

# MM3Z2V4T1 SERIES

## PACKAGE DIMENSIONS

SOD-323  
CASE 477-02  
ISSUE G



NOTES:

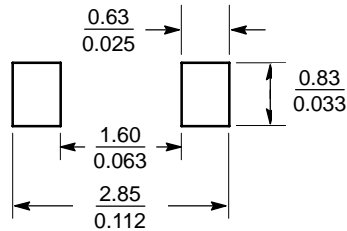
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SOLDER PLATING.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DIMENSION L IS MEASURED FROM END OF RADIUS.

| 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 |

STYLE 1:

- PIN 1. CATHODE
- ANODE

### 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.

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