

# MM3Z2V4ST1 SERIES

## Zener Voltage Regulators

200 mW SOD-323 Surface Mount

### Tight Tolerance Portfolio

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 18 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
- Tight Tolerance  $V_Z$
- 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, (Note 1) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 200<br>1.5  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance from Junction-to-Ambient   | $R_{\theta JA}$ | 635         | $^\circ\text{C}/\text{W}$  |
| Junction and Storage Temperature Range  | $T_J, T_{stg}$  | -65 to +150 | $^\circ\text{C}$           |

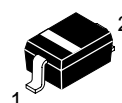
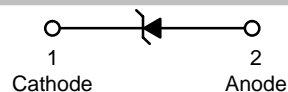
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 Minimum Pad.



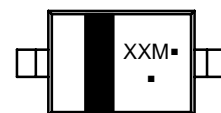
ON Semiconductor®

<http://onsemi.com>



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†          |
|-------------|----------------------|--------------------|
| MM3ZxxxST1  | SOD-323              | 3000/Tape & Reel   |
| MM3ZxxxST1G | SOD-323<br>(Pb-Free) | 3000/Tape & Reel   |
| MM3ZxxxST3  | SOD-323              | 10,000/Tape & Reel |
| MM3ZxxxST3G | SOD-323<br>(Pb-Free) | 10,000/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

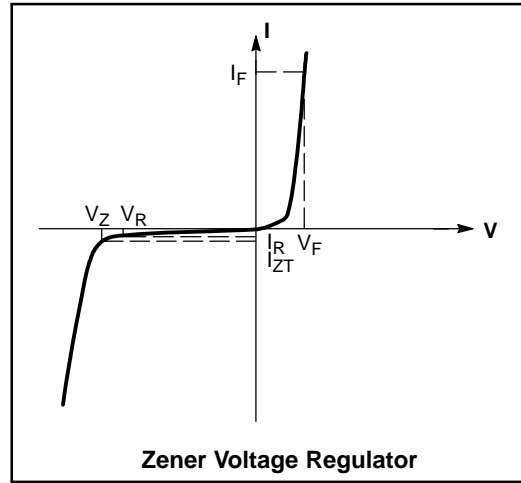
See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

# MM3Z2V4ST1 SERIES

## ELECTRICAL CHARACTERISTICS

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

| 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 @ $I_F$                             |
| $\Theta_{VZ}$ | Maximum Temperature Coefficient of $V_Z$            |
| C             | Max. Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$ |



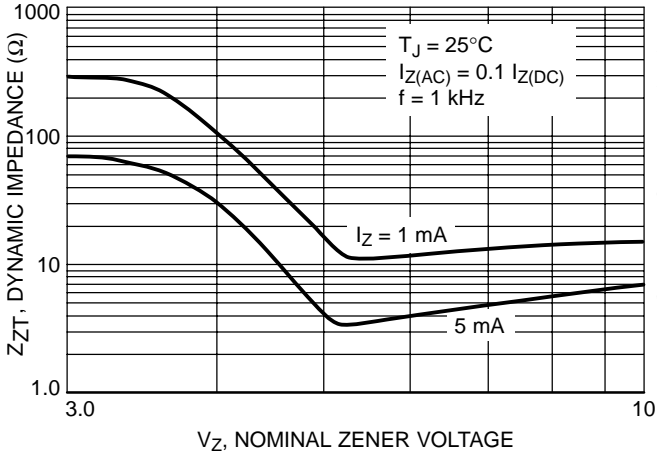
## ELECTRICAL CHARACTERISTICS ( $V_F = 0.9\text{ Max @ } I_F = 10\text{ mA}$ for all types)

| Device*       | Device Marking | Test Current $I_{zt}$ mA | Zener Voltage $V_Z$ |       | $Z_{ZK}$ $I_Z = 0.5\text{ mA}$ $\Omega$ Max | $Z_{ZT}$ $I_Z = I_{ZT}$ @ 10% Mod $\Omega$ Max | Max $I_R$ @ $V_R$ |      | $dV_Z/dt$ (mV/k) @ $I_{ZT1} = 5\text{ mA}$ |      | C pF Max @ $V_R = 0$ $f = 1\text{ MHz}$ |
|---------------|----------------|--------------------------|---------------------|-------|---|--|-------------------|------|--|------|---|
|               |                |                          | Min                 | Max   |   |  | $\mu\text{A}$     | V    | Min  | Max  |   |
| MM3Z3V3ST1, G | T5             | 5.0                      | 3.32                | 3.53  | 1000  | 95   | 5.0               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM3Z3V9ST1, G | T7             | 5.0                      | 3.89                | 4.16  | 1000  | 90   | 3.0               | 1.0  | -3.5                                       | -2.5 | 450                                     |
| MM3Z4V3ST1, G | T8             | 5.0                      | 4.17                | 4.43  | 1000  | 90   | 3.0               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM3Z4V7ST1, G | T9             | 5.0                      | 4.55                | 4.75  | 800   | 80   | 3.0               | 2.0  | -3.5                                       | 0.2  | 260                                     |
| MM3Z5V1ST1, G | TA             | 5.0                      | 4.98                | 5.2   | 500   | 60   | 2.0               | 2.0  | -2.7                                       | 1.2  | 225                                     |
| MM3Z5V6ST1, G | TC             | 5.0                      | 5.49                | 5.73  | 200   | 40   | 1.0               | 2.0  | -2.0                                       | 2.5  | 200                                     |
| MM3Z6V2ST1, G | TE             | 5.0                      | 6.06                | 6.33  | 100   | 10   | 3.0               | 4.0  | 0.4  | 3.7  | 185                                     |
| MM3Z6V8ST1, G | TF             | 5.0                      | 6.65                | 6.93  | 160   | 15   | 2.0               | 4.0  | 1.2  | 4.5  | 155                                     |
| MM3Z7V5ST1, G | TG             | 5.0                      | 7.28                | 7.6   | 160   | 15   | 1.0               | 5.0  | 2.5  | 5.3  | 140                                     |
| MM3Z8V2ST1, G | TH             | 5.0                      | 8.02                | 8.36  | 160   | 15   | 0.7               | 5.0  | 3.2  | 6.2  | 1358                                    |
| MM3Z9V1ST1, G | TK             | 5.0                      | 8.85                | 9.23  | 160   | 15   | 0.5               | 6.0  | 3.8  | 7.0  | 130                                     |
| MM3Z10VST1, G | WB             | 5.0                      | 9.80                | 10.20 | 160   | 15   | 0.5               | 6.0  | 4.5  | 8.0  | 130                                     |
| MM3Z12VST1, G | TN             | 5.0                      | 11.74               | 12.24 | 80  | 25   | 0.1               | 8.0  | 6.0  | 10   | 130                                     |
| MM3Z15VST1, G | TP             | 5.0                      | 14.34               | 14.98 | 80  | 40   | 0.1               | 11   | 8.8  | 12.7 | 130                                     |
| MM3Z16VST1, G | TU             | 5.0                      | 15.85               | 16.51 | 80  | 40   | 0.05              | 11.2 | 10.4                                       | 14   | 105                                     |
| MM3Z18VST1, G | TW             | 5.0                      | 17.56               | 18.35 | 80  | 45   | 0.05              | 12.6 | 12.4                                       | 16   | 100                                     |

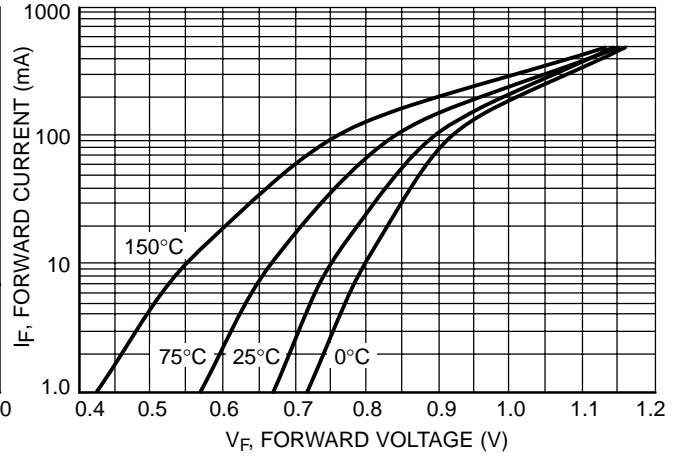
\*The "G" suffix indicates Pb-Free package available.

# MM3Z2V4ST1 SERIES

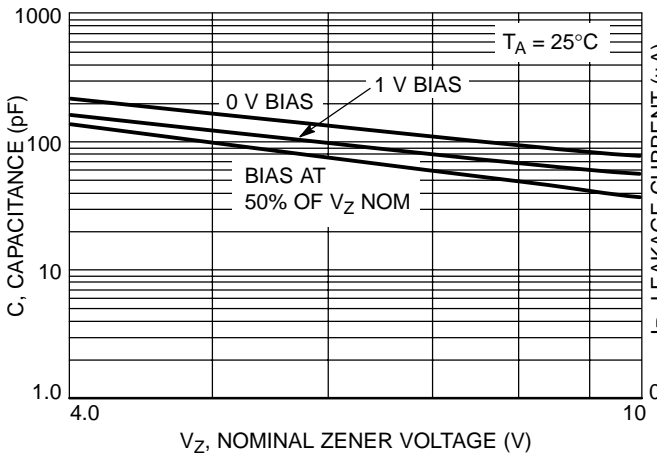
## TYPICAL CHARACTERISTICS



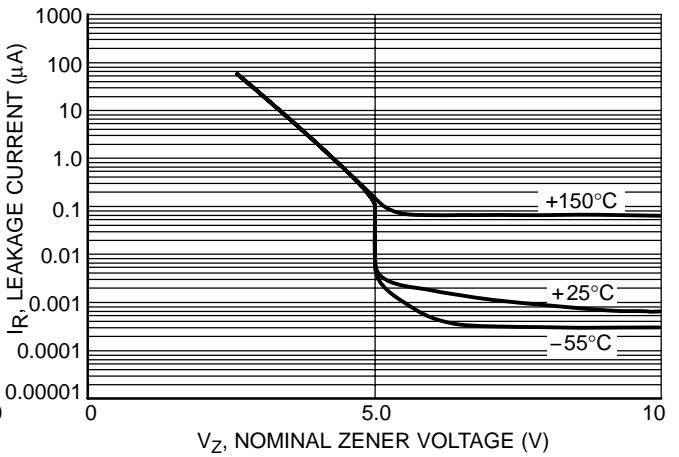
**Figure 1. Effect of Zener Voltage on Zener Impedance**



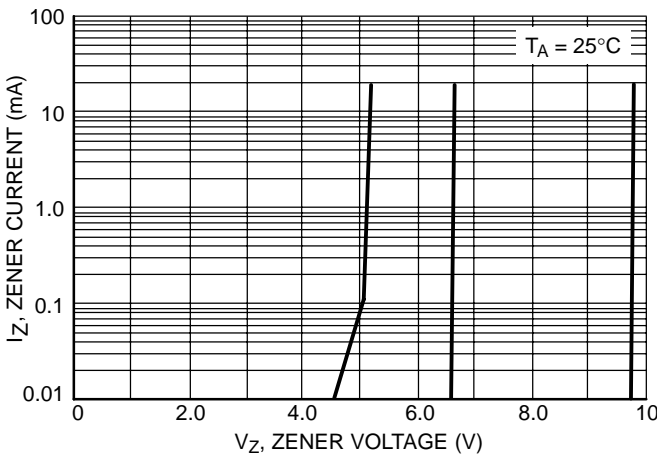
**Figure 2. Typical Forward Voltage**



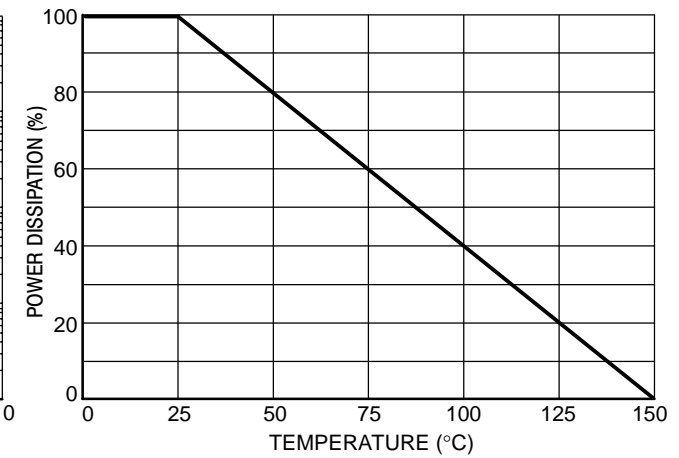
**Figure 3. Typical Capacitance**



**Figure 4. Typical Leakage Current**



**Figure 5. Zener Voltage versus Zener Current (V<sub>Z</sub> Up to 9 V)**

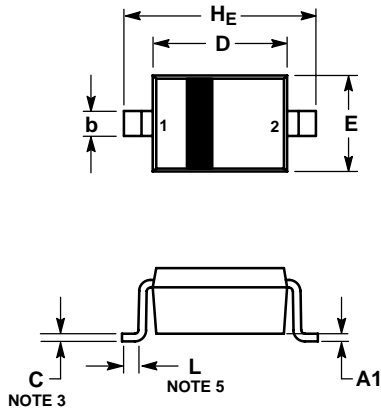


**Figure 6. Steady State Power Derating**

# MM3Z2V4ST1 SERIES

## PACKAGE DIMENSIONS

SOD-323  
CASE 477-02  
ISSUE G



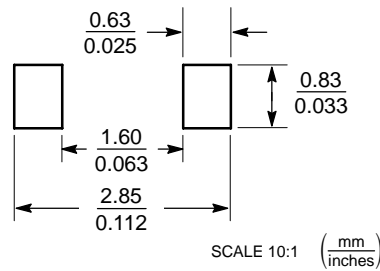
NOTES:

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  
2. 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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