

# MM5Z2V4T1 SERIES

## Zener Voltage Regulators

### 200 mW SOD-523 Surface Mount

This series of Zener diodes is packaged in a SOD-523 surface mount package. 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:  
0.047" x 0.032" (1.20 mm x 0.80 mm)
- Low Body Height: 0.028" (0.7 mm)
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- Pb-Free Packages are Available

#### 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

#### MAXIMUM RATINGS

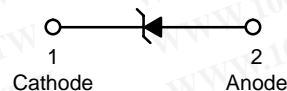
| Rating   | Symbol         | Max         | Unit |
|--|----------------|-------------|------|
| Total Device Dissipation FR-5 Board,<br>@ $T_A = 25^\circ\text{C}$ | $P_D$          | 200         | mW   |
| Junction and Storage<br>Temperature Range                          | $T_J, T_{stg}$ | -65 to +150 | °C   |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.



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**SOD-523  
CASE 502  
PLASTIC**

#### 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†        |
|------------|----------------------|------------------|
| MM5ZxxxT1  | SOD-523              | 3000/Tape & Reel |
| MM5ZxxxT1G | SOD-523<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

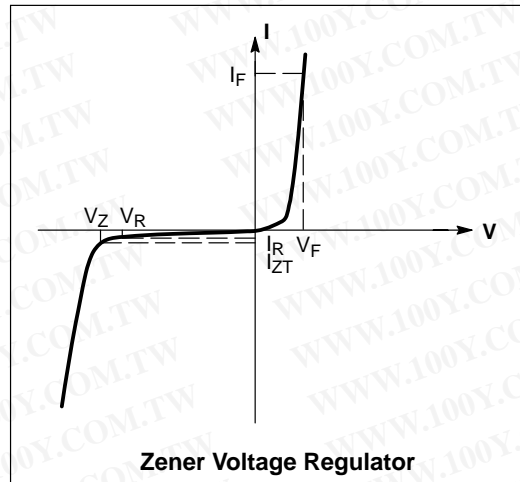
See specific marking information in the device marking column of the Electrical Characteristics tables starting on page 3 of this data sheet.

# MM5Z2V4T1 SERIES

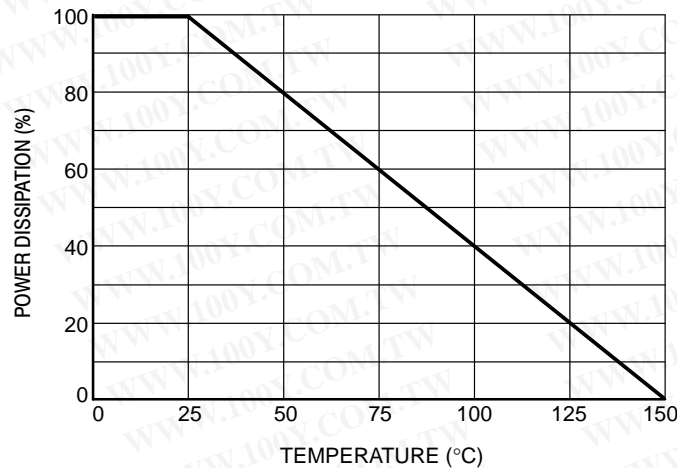
## ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  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 $f = 1\text{ MHz}$ |



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**Figure 1. Steady State Power Derating**

# MM5Z2V4T1 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)

| Device*   | Device Marking | Zener Voltage (Note 1) |       |      | Zener Impedance        |                     |          | Leakage Current |               | $\theta_{VZ}$<br>(mV/k) @ $I_{ZT}$ |      | C<br>@ $V_R = 0$<br>f = 1 MHz |     |
|-----------|----------------|------------------------|-------|------|------------------------|---------------------|----------|-----------------|---------------|------------------------------------|------|-------------------------------|-----|
|           |                | $V_Z$ (Volts)          |       |      | $Z_{ZT}$<br>@ $I_{ZT}$ | $Z_{ZK}$ @ $I_{ZK}$ |          | $I_R$ @ $V_R$   |               | Min                                | Max  |                               |     |
|           |                | Min                    | Nom   | Max  | mA                     | $\Omega$            | $\Omega$ | mA              | $\mu\text{A}$ | Volts                              | Min  | Max                           | pF  |
| MM5Z2V4T1 | 00             | 2.2                    | 2.4   | 2.6  | 5                      | 100                 | 1000     | 1.0             | 50            | 1.0                                | -3.5 | 0                             | 450 |
| MM5Z2V7T1 | 01             | 2.5                    | 2.7   | 2.9  | 5                      | 100                 | 1000     | 1.0             | 20            | 1.0                                | -3.5 | 0                             | 450 |
| MM5Z3V0T1 | 02             | 2.8                    | 3.0   | 3.2  | 5                      | 100                 | 1000     | 1.0             | 10            | 1.0                                | -3.5 | 0                             | 450 |
| MM5Z3V3T1 | 05             | 3.1                    | 3.3   | 3.5  | 5                      | 95                  | 1000     | 1.0             | 5             | 1.0                                | -3.5 | 0                             | 450 |
| MM5Z3V6T1 | 06             | 3.4                    | 3.6   | 3.8  | 5                      | 90                  | 1000     | 1.0             | 5             | 1.0                                | -3.5 | 0                             | 450 |
| MM5Z3V9T1 | 07             | 3.7                    | 3.9   | 4.1  | 5                      | 90                  | 1000     | 1.0             | 3             | 1.0                                | -3.5 | -2.5                          | 450 |
| MM5Z4V3T1 | 08             | 4.0                    | 4.3   | 4.6  | 5                      | 90                  | 1000     | 1.0             | 3             | 1.0                                | -3.5 | 0                             | 450 |
| MM5Z4V7T1 | 09             | 4.4                    | 4.7   | 5.0  | 5                      | 80                  | 800      | 1.0             | 3             | 2.0                                | -3.5 | 0.2                           | 260 |
| MM5Z5V1T1 | 0A             | 4.8                    | 5.1   | 5.4  | 5                      | 60                  | 500      | 1.0             | 2             | 2.0                                | -2.7 | 1.2                           | 225 |
| MM5Z5V6T1 | 0C             | 5.2                    | 5.6   | 6.0  | 5                      | 40                  | 200      | 1.0             | 1             | 2.0                                | -2.0 | 2.5                           | 200 |
| MM5Z6V2T1 | 0E             | 5.8                    | 6.2   | 6.6  | 5                      | 10                  | 100      | 1.0             | 3             | 4.0                                | 0.4  | 3.7                           | 185 |
| MM5Z6V8T1 | 0F             | 6.4                    | 6.8   | 7.2  | 5                      | 15                  | 160      | 1.0             | 2             | 4.0                                | 1.2  | 4.5                           | 155 |
| MM5Z7V5T1 | 0G             | 7.0                    | 7.5   | 7.9  | 5                      | 15                  | 160      | 1.0             | 1             | 5.0                                | 2.5  | 5.3                           | 140 |
| MM5Z8V2T1 | 0H             | 7.7                    | 8.2   | 8.7  | 5                      | 15                  | 160      | 1.0             | 0.7           | 5.0                                | 3.2  | 6.2                           | 135 |
| MM5Z9V1T1 | 0K             | 8.5                    | 9.1   | 9.6  | 5                      | 15                  | 160      | 1.0             | 0.2           | 7.0                                | 3.8  | 7.0                           | 130 |
| MM5Z10VT1 | 0L             | 9.4                    | 10    | 10.6 | 5                      | 20                  | 160      | 1.0             | 0.1           | 8.0                                | 4.5  | 8.0                           | 130 |
| MM5Z11VT1 | 0M             | 10.4                   | 11    | 11.6 | 5                      | 20                  | 160      | 1.0             | 0.1           | 8.0                                | 5.4  | 9.0                           | 130 |
| MM5Z12VT1 | 0N             | 11.4                   | 12    | 12.7 | 5                      | 25                  | 80       | 1.0             | 0.1           | 8.0                                | 6.0  | 10                            | 130 |
| MM5Z13VT1 | 0P             | 12.4                   | 13.25 | 14.1 | 5                      | 30                  | 80       | 1.0             | 0.1           | 8.0                                | 7.0  | 11                            | 120 |
| MM5Z15VT1 | 0T             | 14.3                   | 15    | 15.8 | 5                      | 30                  | 80       | 1.0             | 0.05          | 10.5                               | 9.2  | 13                            | 110 |
| MM5Z16VT1 | 0U             | 15.3                   | 16.2  | 17.1 | 5                      | 40                  | 80       | 1.0             | 0.05          | 11.2                               | 10.4 | 14                            | 105 |
| MM5Z18VT1 | 0W             | 16.8                   | 18    | 19.1 | 5                      | 45                  | 80       | 1.0             | 0.05          | 12.6                               | 12.4 | 16                            | 100 |
| MM5Z20VT1 | 0Z             | 18.8                   | 20    | 21.2 | 5                      | 55                  | 100      | 1.0             | 0.05          | 14.0                               | 14.4 | 18                            | 85  |
| MM5Z22VT1 | 10             | 20.8                   | 22    | 23.3 | 5                      | 55                  | 100      | 1.0             | 0.05          | 15.4                               | 16.4 | 20                            | 85  |
| MM5Z24VT1 | 11             | 22.8                   | 24.2  | 25.6 | 5                      | 70                  | 120      | 1.0             | 0.05          | 16.8                               | 18.4 | 22                            | 80  |
| MM5Z27VT1 | 12             | 25.1                   | 27    | 28.9 | 2                      | 80                  | 300      | 1.0             | 0.05          | 18.9                               | 21.4 | 25.3                          | 70  |
| MM5Z30VT1 | 14             | 28                     | 30    | 32   | 2                      | 80                  | 300      | 1.0             | 0.05          | 21.0                               | 24.4 | 29.4                          | 70  |
| MM5Z33VT1 | 18             | 31                     | 33    | 35   | 2                      | 80                  | 300      | 1.0             | 0.05          | 23.2                               | 27.4 | 33.4                          | 70  |
| MM5Z36VT1 | 19             | 34                     | 36    | 38   | 2                      | 90                  | 500      | 1.0             | 0.05          | 25.2                               | 30.4 | 37.4                          | 70  |
| MM5Z39VT1 | 20             | 37                     | 39    | 41   | 2                      | 130                 | 500      | 1.0             | 0.05          | 27.3                               | 33.4 | 41.2                          | 45  |
| MM5Z43VT1 | 21             | 40                     | 43    | 46   | 2                      | 150                 | 500      | 1.0             | 0.05          | 30.1                               | 37.6 | 46.6                          | 40  |
| MM5Z47VT1 | 1A             | 44                     | 47    | 50   | 2                      | 170                 | 500      | 1.0             | 0.05          | 32.9                               | 42.0 | 51.8                          | 40  |
| MM5Z51VT1 | 1C             | 48                     | 51    | 54   | 2                      | 180                 | 500      | 1.0             | 0.05          | 35.7                               | 46.6 | 57.2                          | 40  |
| MM5Z56VT1 | 1D             | 52                     | 56    | 60   | 2                      | 200                 | 500      | 1.0             | 0.05          | 39.2                               | 52.2 | 63.8                          | 40  |
| MM5Z62VT1 | 1E             | 58                     | 62    | 66   | 2                      | 215                 | 500      | 1.0             | 0.05          | 43.4                               | 58.8 | 71.6                          | 35  |
| MM5Z68VT1 | 1F             | 64                     | 68    | 72   | 2                      | 240                 | 500      | 1.0             | 0.05          | 47.6                               | 65.6 | 79.8                          | 35  |
| MM5Z75VT1 | 1G             | 70                     | 75    | 79   | 2                      | 255                 | 500      | 1.0             | 0.05          | 52.5                               | 73.4 | 88.6                          | 35  |

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

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

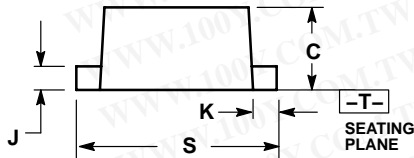
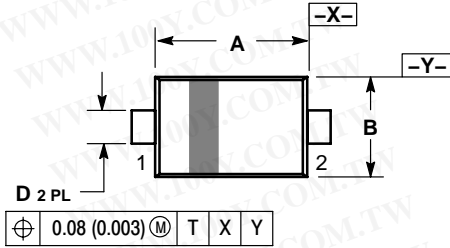
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# MM5Z2V4T1 SERIES

## PACKAGE DIMENSIONS

SOD-523  
CASE 502-01  
ISSUE B

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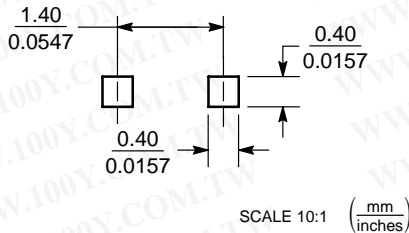


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM | MILLIMETERS |      |      | INCHES |        |        |
|-----|-------------|------|------|--------|--------|--------|
|     | MIN         | NOM  | MAX  | MIN    | NOM    | MAX    |
| A   | 1.10        | 1.20 | 1.30 | 0.043  | 0.047  | 0.051  |
| B   | 0.70        | 0.80 | 0.90 | 0.028  | 0.032  | 0.035  |
| C   | 0.50        | 0.60 | 0.70 | 0.020  | 0.024  | 0.028  |
| D   | 0.25        | 0.30 | 0.35 | 0.010  | 0.012  | 0.014  |
| J   | 0.07        | 0.14 | 0.20 | 0.0028 | 0.0055 | 0.0079 |
| K   | 0.15        | 0.20 | 0.25 | 0.006  | 0.008  | 0.010  |
| S   | 1.50        | 1.60 | 1.70 | 0.059  | 0.063  | 0.067  |

### 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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