

# MM5ZxxxT1G Series, SZMM5ZxxxT1G 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
- AEC-Q101 Qualified and PPAP Capable – SZMM5ZxxxT1G
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb-Free Devices\*

#### 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                 |
| Thermal Resistance,<br>Junction-to-Ambient (Note 1)                | $R_{\theta JA}$ | 390         | $^\circ\text{C/W}$ |
| Junction and Storage<br>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. EIA/JEDEC51.3 board design and EIA/JEDEC51.2 still air test method (25 mm<sup>2</sup>, 2 oz., 3.8  $\mu\text{m}$  plating).

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

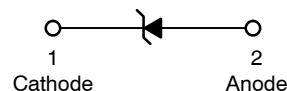


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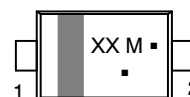
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SOD-523  
CASE 502  
STYLE 1



#### 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 <sup>†</sup>  |
|--------------|----------------------|------------------------|
| MM5ZxxxT1G   | SOD-523<br>(Pb-Free) | 3,000 /<br>Tape & Reel |
| SZMM5ZxxxT1G | SOD-523<br>(Pb-Free) | 3,000 /<br>Tape & Reel |

<sup>†</sup>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

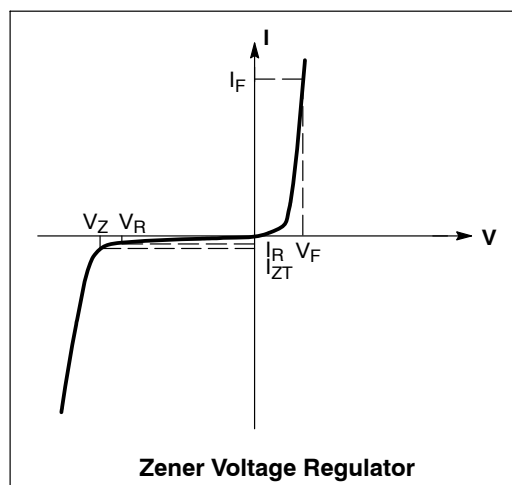
See specific marking information in the device marking column of the Electrical Characteristics tables starting on page 3 of this data sheet.

## MM5ZxxxT1G Series, SZMM5ZxxxT1G Series

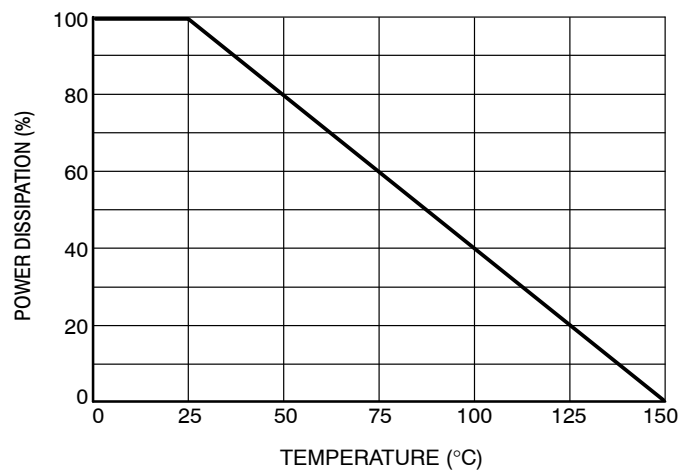
### ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  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 @ $I_F$                             |
| $\Theta V_Z$ | Maximum Temperature Coefficient of $V_Z$            |
| C            | Max. Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$ |



### TYPICAL CHARACTERISTICS



**Figure 1. Steady State Power Derating**

## MM5ZxxxT1G Series, SZMM5ZxxxT1G 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 |       | $\theta V_Z$<br>(mV/k) @ $I_{ZT}$ |      | C<br>@ $V_R = 0$<br>f = 1 MHz |
|------------|----------------|------------------------|-------|------|------------|------------------------|---------------------|---------------|-----------------|-------|-----------------------------------|------|-------------------------------|
|            |                | $V_Z$ (Volts)          |       |      | @ $I_{ZT}$ | $Z_{ZT}$<br>@ $I_{ZT}$ | $Z_{ZK}$ @ $I_{ZK}$ | $I_R$ @ $V_R$ |                 |       |                                   |      |                               |
|            |                | Min                    | Nom   | Max  | mA         | $\Omega$               | $\Omega$            | mA            | $\mu A$         | Volts | Min                               | Max  | pF                            |
| MM5Z2V4T1G | 00             | 2.2                    | 2.4   | 2.6  | 5          | 100                    | 1000                | 1.0           | 50              | 1.0   | -3.5                              | 0    | 450                           |
| MM5Z2V7T1G | 01             | 2.5                    | 2.7   | 2.9  | 5          | 100                    | 1000                | 1.0           | 20              | 1.0   | -3.5                              | 0    | 450                           |
| MM5Z3V0T1G | 02             | 2.8                    | 3.0   | 3.2  | 5          | 100                    | 1000                | 1.0           | 10              | 1.0   | -3.5                              | 0    | 450                           |
| MM5Z3V3T1G | 05             | 3.1                    | 3.3   | 3.5  | 5          | 95                     | 1000                | 1.0           | 5               | 1.0   | -3.5                              | 0    | 450                           |
| MM5Z3V6T1G | 06             | 3.4                    | 3.6   | 3.8  | 5          | 90                     | 1000                | 1.0           | 5               | 1.0   | -3.5                              | 0    | 450                           |
| MM5Z4V3T1G | 08             | 4.0                    | 4.3   | 4.6  | 5          | 90                     | 1000                | 1.0           | 3               | 1.0   | -3.5                              | 0    | 450                           |
| MM5Z4V7T1G | 09             | 4.4                    | 4.7   | 5.0  | 5          | 80                     | 800                 | 1.0           | 3               | 2.0   | -3.5                              | 0.2  | 260                           |
| MM5Z5V1T1G | 0A             | 4.8                    | 5.1   | 5.4  | 5          | 60                     | 500                 | 1.0           | 2               | 2.0   | -2.7                              | 1.2  | 225                           |
| MM5Z5V6T1G | 0C             | 5.2                    | 5.6   | 6.0  | 5          | 40                     | 200                 | 1.0           | 1               | 2.0   | -2.0                              | 2.5  | 200                           |
| MM5Z6V2T1G | 0E             | 5.8                    | 6.2   | 6.6  | 5          | 10                     | 100                 | 1.0           | 3               | 4.0   | 0.4                               | 3.7  | 185                           |
| MM5Z6V8T1G | 0F             | 6.4                    | 6.8   | 7.2  | 5          | 15                     | 160                 | 1.0           | 2               | 4.0   | 1.2                               | 4.5  | 155                           |
| MM5Z7V5T1G | 0G             | 7.0                    | 7.5   | 7.9  | 5          | 15                     | 160                 | 1.0           | 1               | 5.0   | 2.5                               | 5.3  | 140                           |
| MM5Z8V2T1G | 0H             | 7.7                    | 8.2   | 8.7  | 5          | 15                     | 160                 | 1.0           | 0.7             | 5.0   | 3.2                               | 6.2  | 135                           |
| MM5Z9V1T1G | 0K             | 8.5                    | 9.1   | 9.6  | 5          | 15                     | 160                 | 1.0           | 0.2             | 7.0   | 3.8                               | 7.0  | 130                           |
| MM5Z10VT1G | 0L             | 9.4                    | 10    | 10.6 | 5          | 20                     | 160                 | 1.0           | 0.1             | 8.0   | 4.5                               | 8.0  | 130                           |
| MM5Z11VT1G | 0M             | 10.4                   | 11    | 11.6 | 5          | 20                     | 160                 | 1.0           | 0.1             | 8.0   | 5.4                               | 9.0  | 130                           |
| MM5Z12VT1G | 0N             | 11.4                   | 12    | 12.7 | 5          | 25                     | 80                  | 1.0           | 0.1             | 8.0   | 6.0                               | 10   | 130                           |
| MM5Z13VT1G | 0P             | 12.4                   | 13.25 | 14.1 | 5          | 30                     | 80                  | 1.0           | 0.1             | 8.0   | 7.0                               | 11   | 120                           |
| MM5Z15VT1G | 0T             | 14.3                   | 15    | 15.8 | 5          | 30                     | 80                  | 1.0           | 0.05            | 10.5  | 9.2                               | 13   | 110                           |
| MM5Z16VT1G | 0U             | 15.3                   | 16.2  | 17.1 | 5          | 40                     | 80                  | 1.0           | 0.05            | 11.2  | 10.4                              | 14   | 105                           |
| MM5Z18VT1G | 0W             | 16.8                   | 18    | 19.1 | 5          | 45                     | 80                  | 1.0           | 0.05            | 12.6  | 12.4                              | 16   | 100                           |
| MM5Z20VT1G | 0Z             | 18.8                   | 20    | 21.2 | 5          | 55                     | 100                 | 1.0           | 0.05            | 14.0  | 14.4                              | 18   | 85                            |
| MM5Z22VT1G | 10             | 20.8                   | 22    | 23.3 | 5          | 55                     | 100                 | 1.0           | 0.05            | 15.4  | 16.4                              | 20   | 85                            |
| MM5Z24VT1G | 11             | 22.8                   | 24.2  | 25.6 | 5          | 70                     | 120                 | 1.0           | 0.05            | 16.8  | 18.4                              | 22   | 80                            |
| MM5Z27VT1G | 12             | 25.1                   | 27    | 28.9 | 2          | 80                     | 300                 | 1.0           | 0.05            | 18.9  | 21.4                              | 25.3 | 70                            |
| MM5Z30VT1G | 14             | 28                     | 30    | 32   | 2          | 80                     | 300                 | 1.0           | 0.05            | 21.0  | 24.4                              | 29.4 | 70                            |
| MM5Z33VT1G | 18             | 31                     | 33    | 35   | 2          | 80                     | 300                 | 1.0           | 0.05            | 23.2  | 27.4                              | 33.4 | 70                            |
| MM5Z36VT1G | 19             | 34                     | 36    | 38   | 2          | 90                     | 500                 | 1.0           | 0.05            | 25.2  | 30.4                              | 37.4 | 70                            |
| MM5Z39VT1G | 20             | 37                     | 39    | 41   | 2          | 130                    | 500                 | 1.0           | 0.05            | 27.3  | 33.4                              | 41.2 | 45                            |
| MM5Z43VT1G | 21             | 40                     | 43    | 46   | 2          | 150                    | 500                 | 1.0           | 0.05            | 30.1  | 37.6                              | 46.6 | 40                            |
| MM5Z47VT1G | 1A             | 44                     | 47    | 50   | 2          | 170                    | 500                 | 1.0           | 0.05            | 32.9  | 42.0                              | 51.8 | 40                            |
| MM5Z51VT1G | 1C             | 48                     | 51    | 54   | 2          | 180                    | 500                 | 1.0           | 0.05            | 35.7  | 46.6                              | 57.2 | 40                            |
| MM5Z56VT1G | 1D             | 52                     | 56    | 60   | 2          | 200                    | 500                 | 1.0           | 0.05            | 39.2  | 52.2                              | 63.8 | 40                            |
| MM5Z62VT1G | 1E             | 58                     | 62    | 66   | 2          | 215                    | 500                 | 1.0           | 0.05            | 43.4  | 58.8                              | 71.6 | 35                            |
| MM5Z68VT1G | 1F             | 64                     | 68    | 72   | 2          | 240                    | 500                 | 1.0           | 0.05            | 47.6  | 65.6                              | 79.8 | 35                            |
| MM5Z75VT1G | 1G             | 70                     | 75    | 79   | 2          | 255                    | 500                 | 1.0           | 0.05            | 52.5  | 73.4                              | 88.6 | 35                            |

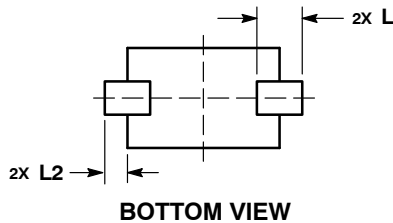
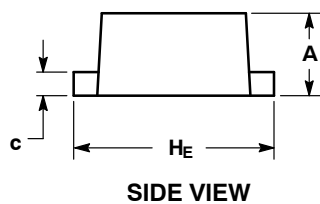
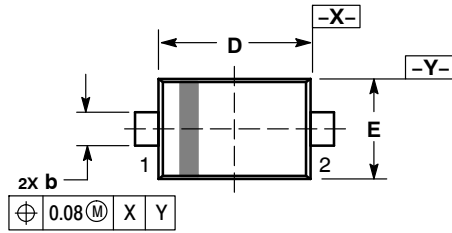
1. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of  $25^\circ\text{C}$ .

\*Include SZ-prefix devices where applicable.

# MM5ZxxxT1G Series, SZMM5ZxxxT1G Series

## PACKAGE DIMENSIONS

**SOD-523**  
CASE 502  
ISSUE E



### NOTES:

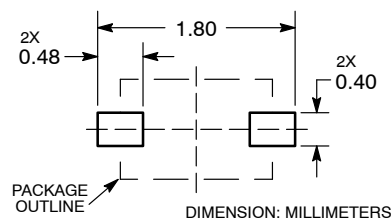
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN         | NOM  | MAX  |
| A   | 0.50        | 0.60 | 0.70 |
| b   | 0.25        | 0.30 | 0.35 |
| c   | 0.07        | 0.14 | 0.20 |
| D   | 1.10        | 1.20 | 1.30 |
| E   | 0.70        | 0.80 | 0.90 |
| H E | 1.50        | 1.60 | 1.70 |
| L   | 0.30 REF    |      |      |
| L2  | 0.15        | 0.20 | 0.25 |

### STYLE 1:

- PIN 1. CATHODE (POLARITY BAND)  
2. ANODE

### RECOMMENDED 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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105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

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