

# MM5ZxxxST1G Series, SZMM5ZxxxST1G 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 18 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
- Tight Tolerance  $V_Z$
- AEC-Q101 Qualified and PPAP Capable
- 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>(Note 1) @ $T_A = 25^\circ\text{C}$<br>Derate above 25°C | $P_D$           | 200<br>1.5     | mW<br>mW/°C |
| Thermal Resistance from<br>Junction-to-Ambient   | $R_{\theta JA}$ | 635            | °C/W        |
| Junction and Storage Temperature Range   | $T_J, T_{stg}$  | -65 to<br>+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.

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

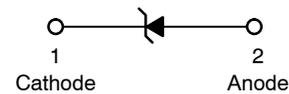


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SOD-523  
CASE 502  
PLASTIC



#### 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†              |
|---------------|-----------|------------------------|
| MM5ZxxxST1G   | SOD-523** | 3,000 /<br>Tape & Reel |
| SZMM5ZxxxST1G | SOD-523** | 3,000 /<br>Tape & Reel |
| SZMM5ZxxxST5G | SOD-523** | 8,000 /<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.

\*\*This package is inherently Pb-Free.

#### DEVICE MARKING INFORMATION

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

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## 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 $f = 1\text{ MHz}$ |

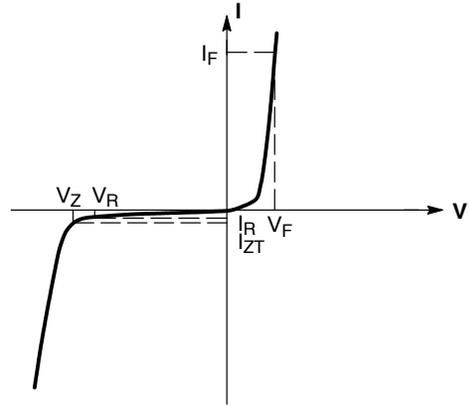


Figure 1. Zener Voltage Regulator

## 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 $V_Z$ |       | $Z_{ZK}$ $I_Z = 1.0\text{ mA } \Omega$ 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  |   |
| MM5Z2V4ST1G     | T2             | 5.0                      | 2.43                | 2.63  | 1000                                       | 100  | 120               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM5Z2V7ST1G     | T3             | 5.0                      | 2.67                | 2.91  | 1000                                       | 100  | 100               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM5Z3V3ST1G     | T5             | 5.0                      | 3.32                | 3.53  | 1000                                       | 95   | 5.0               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM5Z3V6ST1G     | T6             | 5.0                      | 3.60                | 3.85  | 1000                                       | 90   | 5.0               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM5Z3V9ST1G     | T7             | 5.0                      | 3.89                | 4.16  | 1000                                       | 90   | 3.0               | 1.0  | -3.5                                       | -2.5 | 450                                     |
| MM5Z4V3ST1G     | T8             | 5.0                      | 4.17                | 4.43  | 1000                                       | 90   | 3.0               | 1.0  | -3.5                                       | 0    | 450                                     |
| MM5Z4V7ST1G/T5G | T9             | 5.0                      | 4.55                | 4.75  | 800  | 80   | 3.0               | 2.0  | -3.5                                       | 0.2  | 260                                     |
| MM5Z5V1ST1G     | TA             | 5.0                      | 4.98                | 5.2   | 500  | 60   | 2.0               | 2.0  | -2.7                                       | 1.2  | 225                                     |
| MM5Z5V6ST1G     | TC             | 5.0                      | 5.49                | 5.73  | 200  | 40   | 1.0               | 2.0  | -2.0                                       | 2.5  | 200                                     |
| MM5Z6V2ST1G     | TE             | 5.0                      | 6.06                | 6.33  | 100  | 10   | 3.0               | 4.0  | 0.4  | 3.7  | 185                                     |
| MM5Z6V8ST1G     | TF             | 5.0                      | 6.65                | 6.93  | 160  | 15   | 2.0               | 4.0  | 1.2  | 4.5  | 155                                     |
| MM5Z7V5ST1G     | TG             | 5.0                      | 7.28                | 7.6   | 160  | 15   | 1.0               | 5.0  | 2.5  | 5.3  | 140                                     |
| MM5Z8V2ST1G     | TH             | 5.0                      | 8.02                | 8.36  | 160  | 15   | 0.7               | 5.0  | 3.2  | 6.2  | 135                                     |
| MM5Z9V1ST1G     | TK             | 5.0                      | 8.85                | 9.23  | 160  | 15   | 0.5               | 6.0  | 3.8  | 7.0  | 130                                     |
| MM5Z12VST1G     | TN             | 5.0                      | 11.74               | 12.24 | 80   | 25   | 0.1               | 8.0  | 6.0  | 10   | 130                                     |
| MM5Z16VST1G     | TU             | 5.0                      | 15.85               | 16.51 | 80   | 40   | 0.05              | 11.2 | 10.4                                       | 14   | 105                                     |
| MM5Z18VST1G     | TW             | 5.0                      | 17.56               | 18.35 | 80   | 45   | 0.05              | 12.6 | 12.4                                       | 16   | 100                                     |

\*Include SZ-prefix devices where applicable.

TYPICAL CHARACTERISTICS

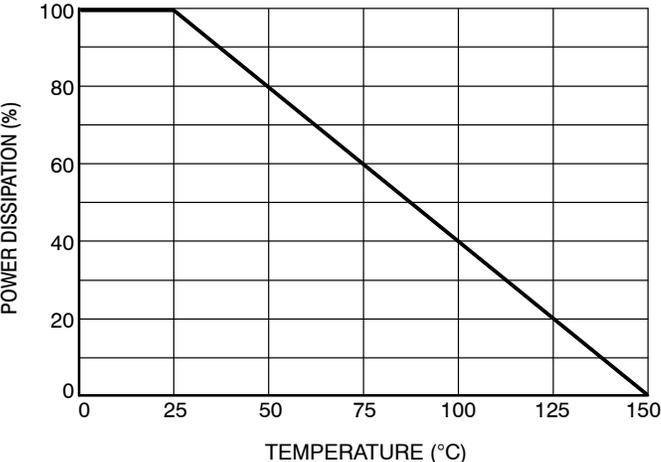
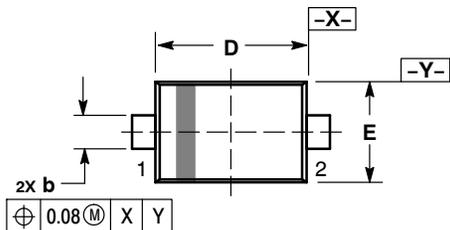


Figure 2. Steady State Power Derating

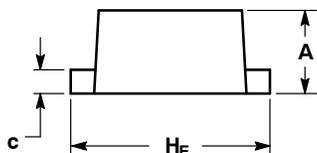
# MM5ZxxxST1G Series, SZMM5ZxxxST1G Series

## PACKAGE DIMENSIONS

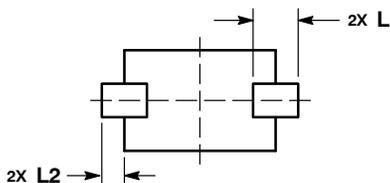
SOD-523  
CASE 502-01  
ISSUE E



TOP VIEW



SIDE VIEW



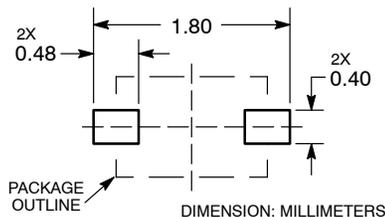
BOTTOM VIEW

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 |

### 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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