## Zener Voltage Regulators <br> 300 mW SOD-323 Surface Mount MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

This series of Zener diodes is packaged in a SOD-323 surface mount package that has a power dissipation of 300 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 300 mW
- Small Body Outline Dimensions: 0.067 " $\times 0.049 "(1.7 \mathrm{~mm} \times 1.25 \mathrm{~mm})$
- Low Body Height: 0.035 " ( 0.9 mm )
- Package Weight: $4.507 \mathrm{mg} /$ Unit
- ESD Rating of Class 3 (> 16 kV ) per Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are $\mathrm{Pb}-$ Free Devices*


## Mechanical Characteristics:

CASE: Void-free, Transfer-Molded Plastic
FINISH: All External Surfaces are Corrosion Resistant
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:
$260^{\circ} \mathrm{C}$ for 10 Seconds
LEADS: Plated with $\mathrm{Pb}-\mathrm{Sn}$ or Sn Only ( $\mathrm{Pb}-$ 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-4 Board, | $\mathrm{P}_{\mathrm{D}}$ |  |  |
| (Note 1) @ $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ |  | 300 | mW |
| Derate above $25^{\circ} \mathrm{C}$ |  | 2.4 | $\mathrm{~mW} /{ }^{\circ} \mathrm{C}$ |
| Thermal Resistance, Junction-to-Ambient | $\mathrm{R}_{\theta \mathrm{JA}}$ | 416 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| Junction and Storage Temperature Range | $\mathrm{T}_{\mathrm{J}}, \mathrm{T}_{\text {stg }}$ | -65 to +150 | ${ }^{\circ} \mathrm{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 printed circuit board, single-sided copper, mounting pad $1 \mathrm{~cm}^{2}$.

[^0]

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 $\dagger$ |
| :--- | :---: | :---: |
| MM3ZxxxT1G, <br> SZMM3ZxxxT1G | SOD-323 <br> (Pb-Free) | $3,000 /$ <br> Tape \& Reel |
| MM3ZxxxT3G, <br> SZMM3ZxxxT3G | SOD-323 <br> (Pb-Free) | $10,000 /$ <br> Tape \& Reel |

$\dagger$ 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.

## MM3ZxxxT1G Series, SZMM3ZxxxT1G Series

ELECTRICAL CHARACTERISTICS

| Symbol | Parameter |
| :---: | :--- |
| $\mathrm{V}_{\mathrm{Z}}$ | Reverse Zener Voltage @ $\mathrm{I}_{\mathrm{ZT}}$ |
| $\mathrm{I}_{\mathrm{ZT}}$ | Reverse Current |
| $\mathrm{Z}_{\mathrm{ZT}}$ | Maximum Zener Impedance @ $\mathrm{I}_{\mathrm{ZT}}$ |
| $\mathrm{I}_{\mathrm{ZK}}$ | Reverse Current |
| $\mathrm{Z}_{\mathrm{ZK}}$ | Maximum Zener Impedance @ $\mathrm{I}_{\mathrm{ZK}}$ |
| $\mathrm{I}_{\mathrm{R}}$ | Reverse Leakage Current @ $\mathrm{V}_{\mathrm{R}}$ |
| $\mathrm{V}_{\mathrm{R}}$ | Reverse Voltage |
| $\mathrm{I}_{\mathrm{F}}$ | Forward Current |
| $\mathrm{V}_{\mathrm{F}}$ | Forward Voltage @ $\mathrm{I}_{\mathrm{F}}$ |
| $\Theta \mathrm{V}_{\mathrm{Z}}$ | Maximum Temperature Coefficient of $\mathrm{V}_{\mathrm{Z}}$ |
| C | Max. Capacitance $@ \mathrm{~V}_{\mathrm{R}}=0$ and $\mathrm{f}=1 \mathrm{MHz}$ |

ELECTRICAL CHARACTERISTICS $\left(\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}\right.$ unless otherwise noted, $\mathrm{V}_{\mathrm{F}}=0.9 \mathrm{~V}$ Max. @ $\mathrm{I}_{\mathrm{F}}=10 \mathrm{~mA}$ for all types)

| Device* | Device Marking | Zener Voltage (Note 2) |  |  |  | Zener Impedance |  |  | Leakage Current |  | $\begin{gathered} \Theta V_{Z} \\ (\mathrm{mV} / \mathrm{k}) \\ @ \mathrm{I}_{\mathrm{ZT}} \end{gathered}$ |  | $\begin{gathered} c \\ @ V_{R}=0 \\ f=1 \mathrm{MHz} \\ \hline \mathrm{pF} \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\mathrm{V}_{\mathbf{Z}}$ (Volts) |  |  | @ $\mathbf{I V T}^{\text {L }}$ | $\begin{gathered} Z_{\mathrm{ZT}} \\ @ \mathrm{I}_{\mathrm{ZT}} \end{gathered}$ | $\mathrm{Z}_{\mathbf{Z K}}$ @ $\mathbf{I V K}^{\text {l }}$ |  | $\mathrm{I}_{\mathrm{R}}$ @ $\mathrm{V}_{\mathrm{R}}$ |  |  |  |  |
|  |  | Min | Nom | Max | mA | $\Omega$ | $\Omega$ | mA | $\mu \mathrm{A}$ | Volts | Min | Max |  |
| MM3Z2V4T1G | 00 | 2.2 | 2.4 | 2.6 | 5 | 100 | 1000 | 0.5 | 50 | 1.0 | -3.5 | 0 | 450 |
| MM3Z2V7T1G | 01 | 2.5 | 2.7 | 2.9 | 5 | 100 | 1000 | 0.5 | 20 | 1.0 | -3.5 | 0 | 450 |
| MM3Z3V0T1G | 02 | 2.8 | 3.0 | 3.2 | 5 | 100 | 1000 | 0.5 | 10 | 1.0 | -3.5 | 0 | 450 |
| MM3Z3V3T1G | 05 | 3.1 | 3.3 | 3.5 | 5 | 95 | 1000 | 0.5 | 5 | 1.0 | -3.5 | 0 | 450 |
| MM3Z3V6T1G | 06 | 3.4 | 3.6 | 3.8 | 5 | 90 | 1000 | 0.5 | 5 | 1.0 | -3.5 | 0 | 450 |
| MM3Z3V9T1G | 07 | 3.7 | 3.9 | 4.1 | 5 | 90 | 1000 | 0.5 | 3 | 1.0 | -3.5 | -2.5 | 450 |
| MM3Z4V3T1G | 08 | 4.0 | 4.3 | 4.6 | 5 | 90 | 1000 | 0.5 | 3 | 1.0 | -3.5 | 0 | 450 |
| MM3Z4V7T1G | 09 | 4.4 | 4.7 | 5.0 | 5 | 80 | 800 | 0.5 | 3 | 2.0 | -3.5 | 0.2 | 260 |
| MM3Z5V1T1G | OA | 4.8 | 5.1 | 5.4 | 5 | 60 | 500 | 0.5 | 2 | 2.0 | -2.7 | 1.2 | 225 |
| MM3Z5V6T1G | OC | 5.2 | 5.6 | 6.0 | 5 | 40 | 200 | 0.5 | 1 | 2.0 | -2.0 | 2.5 | 200 |
| MM3Z6V2T1G | OE | 5.8 | 6.2 | 6.6 | 5 | 10 | 100 | 0.5 | 3 | 4.0 | 0.4 | 3.7 | 185 |
| MM3Z6V8T1G | OF | 6.4 | 6.8 | 7.2 | 5 | 15 | 160 | 0.5 | 2 | 4.0 | 1.2 | 4.5 | 155 |
| MM3Z7V5T1G | OG | 7.0 | 7.5 | 7.9 | 5 | 15 | 160 | 0.5 | 1 | 5.0 | 2.5 | 5.3 | 140 |
| MM3Z8V2T1G | OH | 7.7 | 8.2 | 8.7 | 5 | 15 | 160 | 0.5 | 0.7 | 5.0 | 3.2 | 6.2 | 135 |
| MM3Z9V1T1G | OK | 8.5 | 9.1 | 9.6 | 5 | 15 | 160 | 0.5 | 0.2 | 7.0 | 3.8 | 7.0 | 130 |
| MM3Z10VT1G | OL | 9.4 | 10 | 10.6 | 5 | 20 | 160 | 0.5 | 0.1 | 8.0 | 4.5 | 8.0 | 130 |
| MM3Z11VT1G | OM | 10.4 | 11 | 11.6 | 5 | 20 | 160 | 0.5 | 0.1 | 8.0 | 5.4 | 9.0 | 130 |
| MM3Z12VT1G | ON | 11.4 | 12 | 12.7 | 5 | 25 | 80 | 0.5 | 0.1 | 8.0 | 6.0 | 10 | 130 |
| MM3Z13VT1G | OP | 12.4 | 13.25 | 14.1 | 5 | 30 | 80 | 0.5 | 0.1 | 8.0 | 7.0 | 11 | 120 |
| MM3Z15VT1G | OT | 14.3 | 15 | 15.8 | 5 | 30 | 80 | 0.5 | 0.05 | 10.5 | 9.2 | 13 | 110 |
| MM3Z16VT1G | OU | 15.3 | 16.2 | 17.1 | 5 | 40 | 80 | 0.5 | 0.05 | 11.2 | 10.4 | 14 | 105 |
| MM3Z18VT1G | OW | 16.8 | 18 | 19.1 | 5 | 45 | 80 | 0.5 | 0.05 | 12.6 | 12.4 | 16 | 100 |
| MM3Z20VT1G | OZ | 18.8 | 20 | 21.2 | 5 | 55 | 100 | 0.5 | 0.05 | 14.0 | 14.4 | 18 | 85 |
| MM3Z22VT1G | 10 | 20.8 | 22 | 23.3 | 5 | 55 | 100 | 0.5 | 0.05 | 15.4 | 16.4 | 20 | 85 |
| MM3Z24VT1G | 11 | 22.8 | 24.2 | 25.6 | 5 | 70 | 120 | 0.5 | 0.05 | 16.8 | 18.4 | 22 | 80 |
| MM3Z27VT1G | 12 | 25.1 | 27 | 28.9 | 2 | 80 | 300 | 0.5 | 0.05 | 18.9 | 21.4 | 25.3 | 70 |
| MM3Z30VT1G | 14 | 28 | 30 | 32 | 2 | 80 | 300 | 0.5 | 0.05 | 21.0 | 24.4 | 29.4 | 70 |
| MM3Z33VT1G | 18 | 31 | 33 | 35 | 2 | 80 | 300 | 0.5 | 0.05 | 23.2 | 27.4 | 33.4 | 70 |
| MM3Z36VT1G | 19 | 34 | 36 | 38 | 2 | 90 | 500 | 0.5 | 0.05 | 25.2 | 30.4 | 37.4 | 70 |
| MM3Z39VT1G | 20 | 37 | 39 | 41 | 2 | 130 | 500 | 0.5 | 0.05 | 27.3 | 33.4 | 41.2 | 45 |
| MM3Z43VT1G | 21 | 40 | 43 | 46 | 2 | 150 | 500 | 0.5 | 0.05 | 30.1 | 37.6 | 46.6 | 40 |
| MM3Z47VT1G | 1A | 44 | 47 | 50 | 2 | 170 | 500 | 0.5 | 0.05 | 32.9 | 42.0 | 51.8 | 40 |
| MM3Z51VT1G | 1 C | 48 | 51 | 54 | 2 | 180 | 500 | 0.5 | 0.05 | 35.7 | 46.6 | 57.2 | 40 |
| MM3Z56VT1G | 1D | 52 | 56 | 60 | 2 | 200 | 500 | 0.5 | 0.05 | 39.2 | 52.2 | 63.8 | 40 |
| MM3Z62VT1G | 2A | 58 | 62 | 66 | 2 | 215 | 500 | 0.5 | 0.05 | 43.4 | 58.9 | 71.8 | 35 |
| MM3Z68VT1G | 1F | 64 | 68 | 72 | 2 | 240 | 500 | 0.5 | 0.05 | 47.6 | 65.6 | 79.8 | 35 |
| MM3Z75VT1G | 1G | 70 | 75 | 79 | 2 | 255 | 500 | 0.5 | 0.05 | 52.5 | 73.4 | 88.6 | 35 |

[^1]2. Zener voltage is measured with a pulse test current $\mathrm{I}_{\mathrm{Z}}$ at an ambient temperature of $25^{\circ} \mathrm{C}$

## MM3ZxxxT1G Series, SZMM3ZxxxT1G 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 ( $\mathrm{V}_{\mathrm{Z}}$ Up to 12 V )


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

MM3ZxxxT1G Series, SZMM3ZxxxT1G Series
TYPICAL CHARACTERISTICS


Figure 7. Steady State Power Derating


SIDE VIEW


NDTES:

1. DIMENSIDNING AND TILERANCING AS PER ASME Y14.5M, 2018
2. CONTRaLLING DIMENSIDN: MILLIMETERS
3. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SULDER PLATING.
4. DIMENSIIDNS A AND B DD NDT INCLUDE MDLD FLASH, pRITRUSIDNS aR GATE BURRS
5. DIMENSIIN L IS MEASURE FRDM END DF RADIUS



## RECDMMENDED MDUNTING FIDTPRINT

*For additional information on our $\mathrm{Pb}-$ Free strategy and soldering details, please download the ZN Semiconductor Soldering and Mounting Techniques Reference manual, SOLDERRM/D.


$$
\begin{aligned}
& X X=\text { Specific Device Code } \\
& M \text { = Date Code }
\end{aligned}
$$

*This information is generic. Please refer to device data sheet for actual part marking. $\mathrm{Pb}-\mathrm{Free}$ indicator, " G " or microdot " "", may or may not be present. Some products may not follow the Generic Marking.
STYLE 1:
PIN 1. CATHODE (POLARITY BAND) $\quad$ STYLE 2:
NO POLARITY

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| :---: | :---: | :---: |
| DESCRIPTION: | SOD-323 1.70x1.25x0.85 | PAGE 1 OF 1 |

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[^0]:    *For additional information on our $\mathrm{Pb}-$ Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

[^1]:    *Includes SZ-prefix devices where applicable.

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