# Zener Voltage Regulators
## 500 mW, Low $I_Z$ SOD−523 Surface Mount

# MM5Z4xxxTxG Series, SZMM5Z4xxxTxG Series

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.

### Features

- 500 mW Rating on FR−4 or FR−5 Board
- Wide Zener Reverse Voltage Range − 1.8 V to 43 V
- Low Reverse Current ($I_{ZT}$) − 50 μA
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications
- 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 Devices are Pb−Free and are RoHS Compliant*

**Mechanical Characteristics:**
**CASE:** Void-free, transfer-molded, thermosetting plastic case
**FINISH:** Corrosion resistant finish, easily solderable
**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:** 260°C for 10 Seconds
**POLARITY:** Cathode indicated by polarity band
**FLAMMABILITY RATING:** UL 94 V−0

### MAXIMUM RATINGS

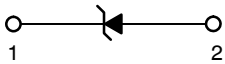
| Rating | Symbol | Max | Units |
|---|---|---|---|
| Total Power Dissipation on FR−5 Board, (Note 1) @ $T_L$ = 75°C<br>Derated above 75°C | $P_D$ | 500<br>4.0 | mW<br>mW/°C |
| Thermal Resistance, (Note 2)<br>Junction−to−Ambient | $R_{\theta JA}$ | 250 | °C/W |
| Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °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−5 = 3.5 X 1.5 inches, using the minimum recommended footprint.
2. Thermal Resistance measurement obtained via infrared Scan Method.

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



**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 up-on manufacturing location.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MM5Z4xxxT1G | SOD−523 (Pb−Free) | 3,000 / Tape & Reel |
| SZMM5Z4xxxT1G | SOD−523 (Pb−Free) | 3,000 / Tape & Reel |
| MM5Z4xxxT5G | SOD−523 (Pb−Free) | 8,000 / Tape & Reel |
| SZMM5Z4xxxT5G | SOD−523 (Pb−Free) | 8,000 / 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

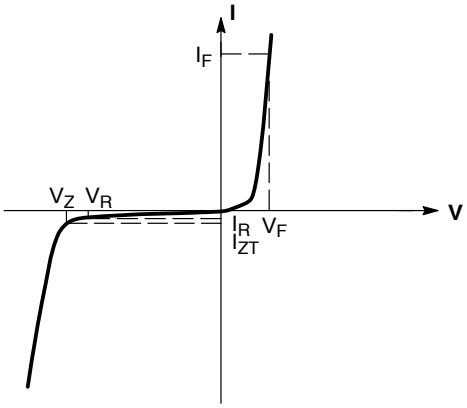
See specific marking information in the device marking column of the Electrical Characteristics table on page 3 of this data sheet.

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**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted, $V_F$ = 0.9 V Max. @ $I_F$ = 10 mA)

| Symbol | Parameter |
|---|---|
| $V_Z$ | Reverse Zener Voltage @ $I_{ZT}$ |
| $I_{ZT}$ | Reverse Current |
| $I_R$ | Reverse Leakage Current @ $V_R$ |
| $V_R$ | Reverse Voltage |
| $I_F$ | Forward Current |
| $V_F$ | Forward Voltage @ $I_F$ |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.




**Zener Voltage Regulator**



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**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted, $V_F$ = 0.9 V Max. @ $I_F$ = 10 mA)

| Device* | Device Marking | Zener Voltage (Note 3) | | | | Leakage Current | |
|---|---|---|---|---|---|---|---|
| | | $V_Z$ (Volts) | | | @ $I_{ZT}$ | $I_R$ @ $V_R$ | |
| | | Min | Nom | Max | μA | μA | Volts |
| MM5Z4678T1G/T5G* | 4A | 1.71 | 1.8 | 1.89 | 50 | 7.5 | 1 |
| MM5Z4679T1G/T5G* | 42 | 1.90 | 2.0 | 2.10 | 50 | 5 | 1 |
| MM5Z4680T1G/T5G | 4C | 2.09 | 2.2 | 2.31 | 50 | 4 | 1 |
| MM5Z4681T1G/T5G* | 4D | 2.28 | 2.4 | 2.52 | 50 | 2 | 1 |
| MM5Z4682T5G | 4E | 2.565 | 2.7 | 2.835 | 50 | 1 | 1 |
| MM5Z4683T1G/T5G* | 4F | 2.85 | 3.0 | 3.15 | 50 | 0.8 | 1 |
| MM5Z4684T1G/T5G* | 4G | 3.13 | 3.3 | 3.47 | 50 | 7.5 | 1.5 |
| MM5Z4685T1G/T5G | 4H | 3.42 | 3.6 | 3.78 | 50 | 7.5 | 2 |
| MM5Z4686T1G/T5G | 43 | 3.70 | 3.9 | 4.10 | 50 | 5 | 2 |
| MM5Z4687T1G/T5G | 4J | 4.09 | 4.3 | 4.52 | 50 | 4 | 2 |
| MM5Z4688T1G/T5G | 4K | 4.47 | 4.7 | 4.94 | 50 | 10 | 3 |
| MM5Z4689T1G/T5G | 4L | 4.85 | 5.1 | 5.36 | 50 | 10 | 3 |
| MM5Z4690T1G/T5G | 4M | 5.32 | 5.6 | 5.88 | 50 | 10 | 4 |
| MM5Z4691T1G/T5G* | 4N | 5.89 | 6.2 | 6.51 | 50 | 10 | 5 |
| MM5Z4692T1G/T5G* | 44 | 6.46 | 6.8 | 7.14 | 50 | 10 | 5.1 |
| MM5Z4693T1G/T5G | 4P | 7.13 | 7.5 | 7.88 | 50 | 10 | 5.7 |
| MM5Z4694T5G | 4Q | 7.79 | 8.2 | 8.61 | 50 | 1 | 6.2 |
| MM5Z4695T1G/T5G* | 4R | 8.27 | 8.7 | 9.14 | 50 | 1 | 6.6 |
| MM5Z4696T1G/T5G* | 45 | 8.65 | 9.1 | 9.56 | 50 | 1 | 6.9 |
| MM5Z4697T1G/T5G | 4T | 9.50 | 10 | 10.50 | 50 | 1 | 7.6 |
| MM5Z4698T1G/T5G* | 4U | 10.45 | 11 | 11.55 | 50 | 0.05 | 8.4 |
| MM5Z4699T5G | 4V | 11.40 | 12 | 12.60 | 50 | 0.05 | 9.1 |
| MM5Z4700T1G/T5G* | 4W | 12.35 | 13 | 13.65 | 50 | 0.05 | 9.8 |
| MM5Z4701T1G/T5G* | 4X | 13.30 | 14 | 14.70 | 50 | 0.05 | 10.6 |
| MM5Z4702T5G | 4Y | 14.25 | 15 | 15.75 | 50 | 0.05 | 11.4 |
| MM5Z4703T1G/T5G* | 4Z | 15.20 | 16 | 16.80 | 50 | 0.05 | 12.1 |
| MM5Z4704T1G/T5G* | 46 | 16.15 | 17 | 17.85 | 50 | 0.05 | 12.9 |
| MM5Z4705T1G/T5G | 47 | 17.10 | 18 | 18.90 | 50 | 0.05 | 13.6 |
| MM5Z4706T1G/T5G* | 5A | 18.05 | 19 | 19.95 | 50 | 0.05 | 14.4 |
| MM5Z4707T1G/T5G* | 5C | 19.00 | 20 | 21.00 | 50 | 0.01 | 15.2 |
| MM5Z4708T1G/T5G* | 5F | 20.90 | 22 | 23.10 | 50 | 0.01 | 16.7 |
| MM5Z4709T1G/T5G | 5G | 22.80 | 24 | 25.20 | 50 | 0.01 | 18.2 |
| MM5Z4710T1G/T5G* | 5H | 23.75 | 25 | 26.25 | 50 | 0.01 | 19.0 |
| MM5Z4711T1G/T5G | 5K | 25.65 | 27 | 28.35 | 50 | 0.01 | 20.4 |
| MM5Z4712T1G/T5G* | 5L | 26.60 | 28 | 29.40 | 50 | 0.01 | 21.2 |
| MM5Z4713T1G/T5G* | 5N | 28.50 | 30 | 31.50 | 50 | 0.01 | 22.8 |
| MM5Z4714T1G/T5G | 5P | 31.35 | 33 | 34.65 | 50 | 0.01 | 25.0 |
| MM5Z4715T1G/T5G | 5Q | 34.20 | 36 | 37.80 | 50 | 0.01 | 27.3 |
| MM5Z4716T1G/T5G* | 5R | 37.05 | 39 | 40.95 | 50 | 0.01 | 29.6 |
| MM5Z4717T1G/T5G | 5T | 40.85 | 43 | 45.15 | 50 | 0.01 | 32.6 |

3. Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_L$ = 30°C ±1°C.
*Please Contact Sales.



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## TYPICAL CHARACTERISTICS

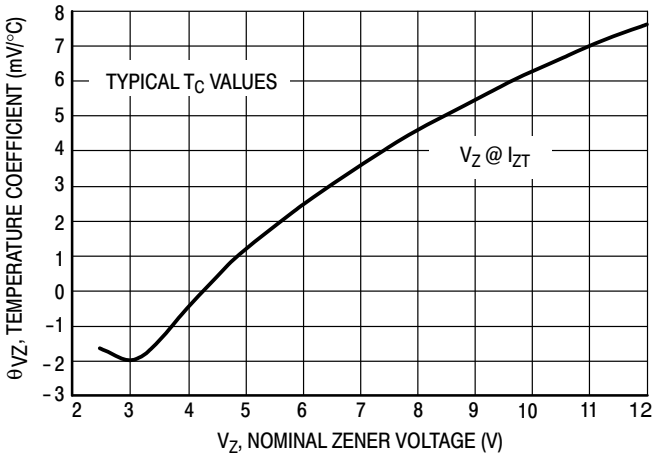



**Figure 1. Temperature Coefficients (Temperature Range −55°C to +150°C)**

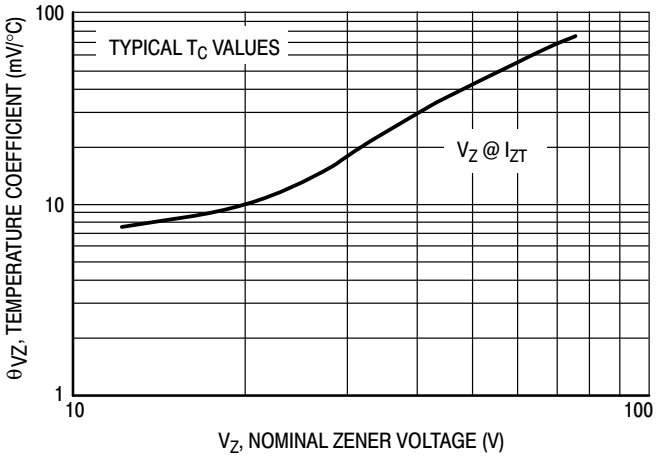



**Figure 2. Temperature Coefficients (Temperature Range −55°C to +150°C)**

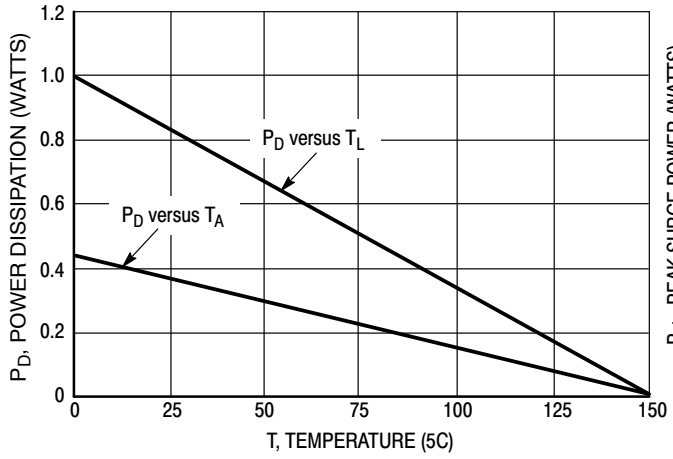



**Figure 3. Steady State Power Derating**

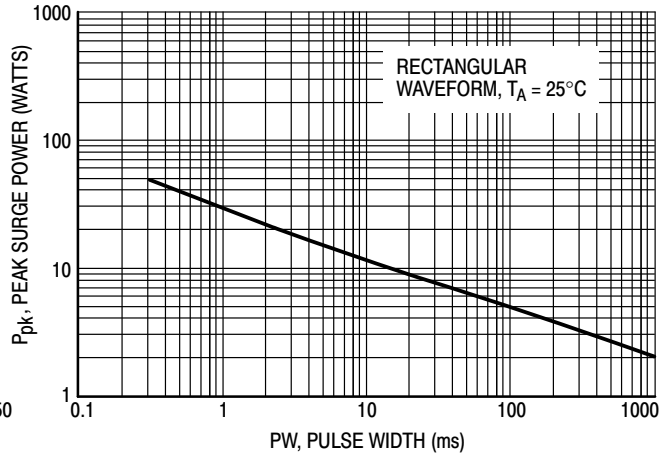



**Figure 4. Maximum Nonrepetitive Surge Power**



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## TYPICAL CHARACTERISTICS

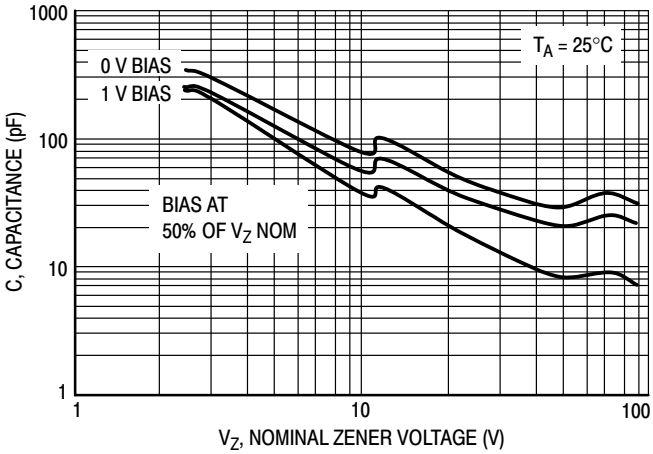



**Figure 5. Typical Capacitance**

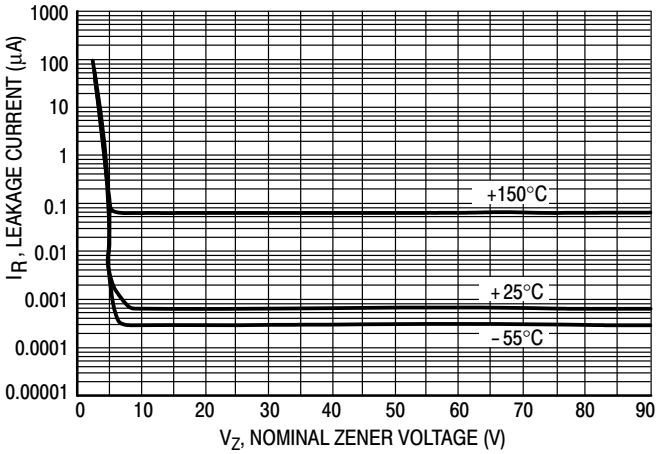



**Figure 6. Typical Leakage Current**

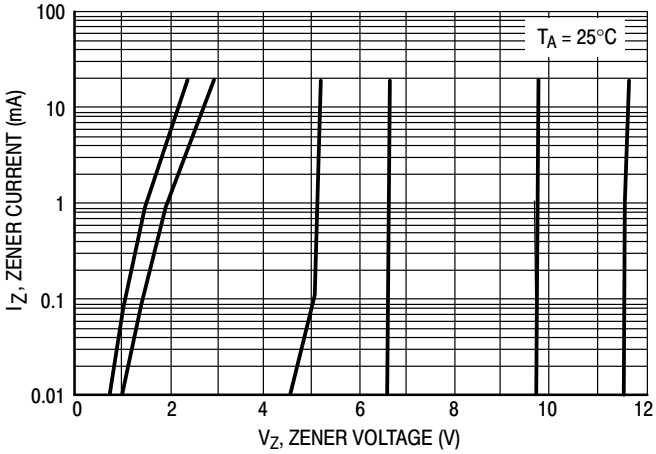



**Figure 7. Zener Voltage versus Zener Current ($V_Z$ Up to 12 V)**

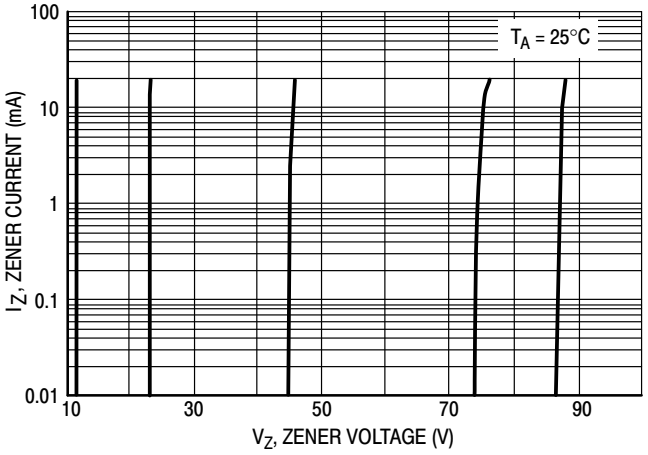
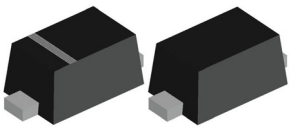



**Figure 8. Zener Voltage versus Zener Current (12 V to 91 V)**

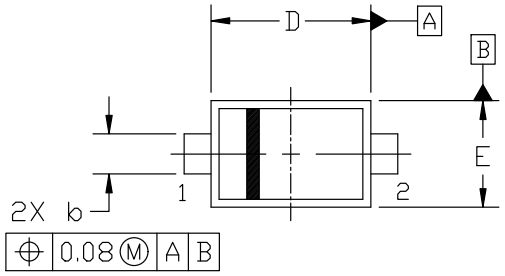


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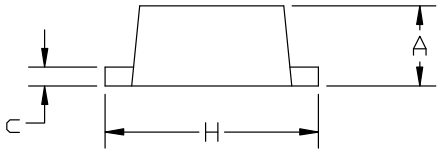


**SOD−523 1.20x0.80x0.60**
CASE 502
ISSUE F

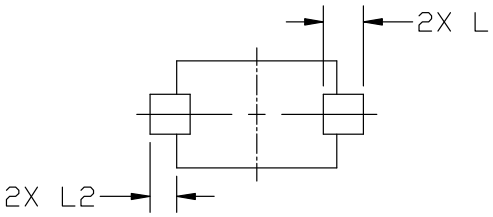
DATE 08 FEB 2024




TOP VIEW



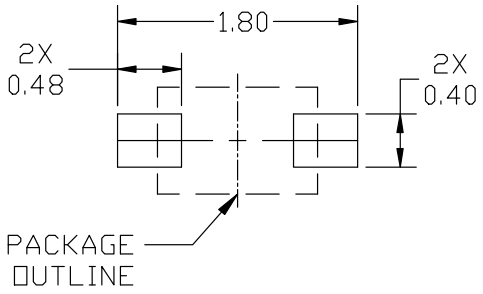

SIDE VIEW




BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
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.

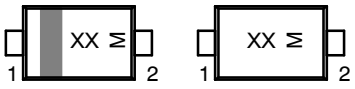
| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN. | NOM. | MAX. |
| A | 0.50 | 0.60 | 0.70 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.07 | 0.14 | 0.20 |
| D | 1.10 | 1.20 | 1.30 |
| E | 0.70 | 0.80 | 0.90 |
| H | 1.50 | 1.60 | 1.70 |
| L | 0.30 REF | | |
| L2 | 0.15 | 0.20 | 0.25 |




RECOMMENDED MOUNTING 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.

**GENERIC MARKING DIAGRAM***




STYLE 1 STYLE 2

XX = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−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)
2. ANODE

STYLE 2:
NO POLARITY

| | | | |
|---|---|---|---|
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| **DESCRIPTION:** | **SOD−523 1.20x0.80x0.60** | | **PAGE 1 OF 1** |

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