

# Zener Voltage Regulators

## 500 mW, Low $I_Z$ SOD-523 Surface Mount



ON Semiconductor®

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### 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  $\mu$ A
- 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

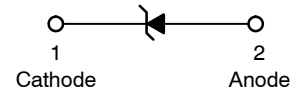
**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:**  
260°C for 10 Seconds

**POLARITY:** Cathode indicated by polarity band

**FLAMMABILITY RATING:** UL 94 V-0



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.

#### MAXIMUM RATINGS

Rating	Symbol	Max	Units
Total Power Dissipation on FR-5 Board, (Note 1) @ $T_L = 75^\circ\text{C}$ Derated above $75^\circ\text{C}$	$P_D$	500 4.0	mW mW/ $^\circ\text{C}$
Thermal Resistance, (Note 2) Junction-to-Ambient	$R_{\theta JA}$	250	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

#### 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

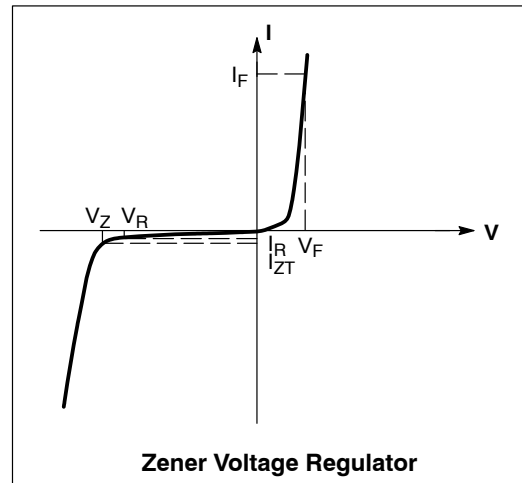
See specific marking information in the device marking column of the Electrical Characteristics table on page 3 of this data sheet.

## MM5Z4xxxTxG Series, SZMM5Z4xxxTxG Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V Max. @ } I_F = 10\text{ mA}$ )

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.



## MM5Z4xxxTxG Series, SZMM5Z4xxxTxG Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V Max.}$  @  $I_F = 10\text{ mA}$ )

Device*	Device Marking	Zener Voltage (Note 3)				Leakage Current	
		V <sub>Z</sub> (Volts)			@ I <sub>ZT</sub>	I <sub>R</sub> @ V <sub>R</sub>	
		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  $T_L = 30^\circ\text{C} \pm 1^\circ\text{C}$ .

\*Please Contact Sales.

TYPICAL CHARACTERISTICS

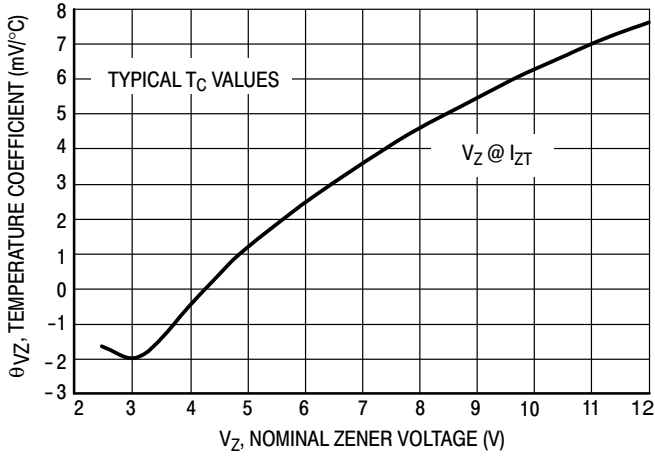


Figure 1. Temperature Coefficients (Temperature Range -55°C to +150°C)

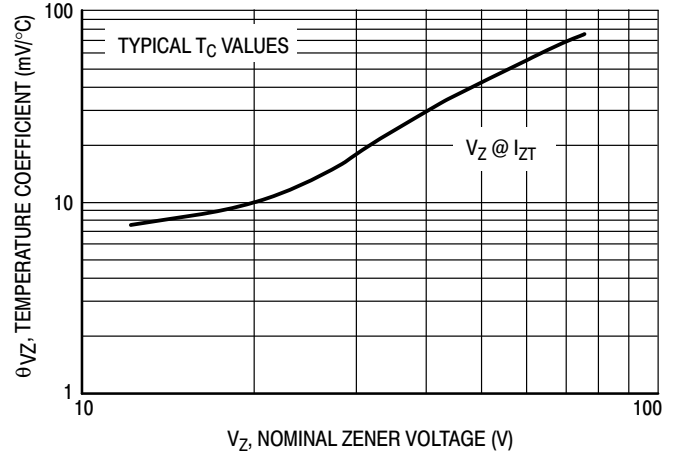


Figure 2. Temperature Coefficients (Temperature Range -55°C to +150°C)

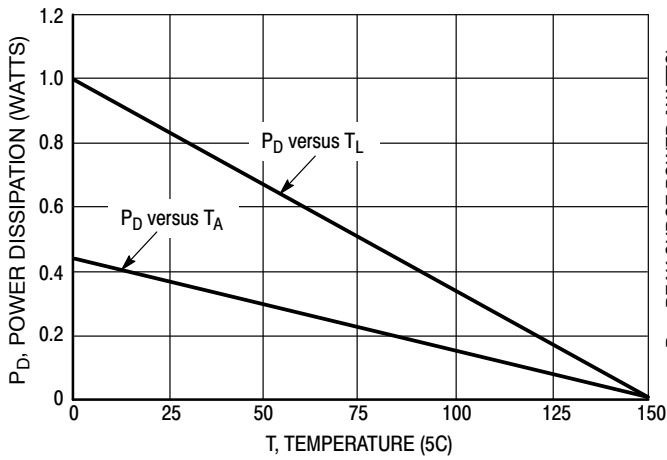


Figure 3. Steady State Power Derating

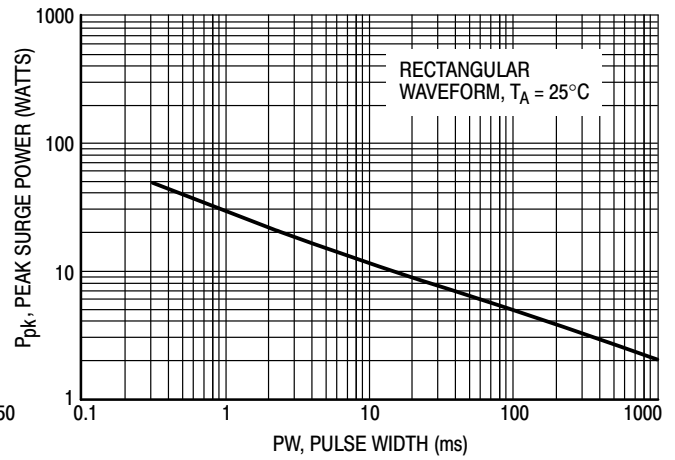


Figure 4. Maximum Nonrepetitive Surge Power

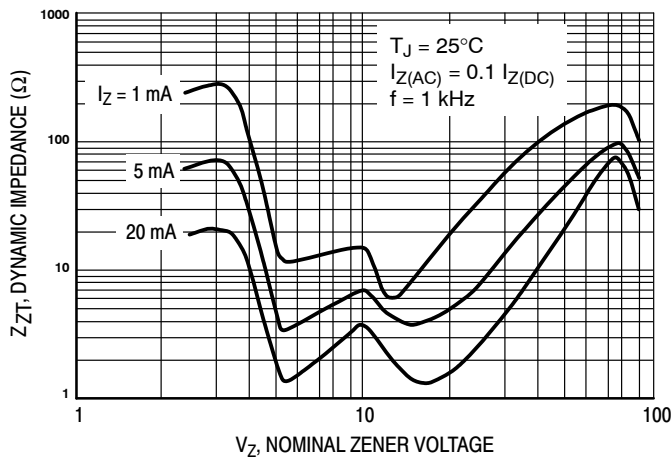


Figure 5. Effect of Zener Voltage on Zener Impedance

TYPICAL CHARACTERISTICS

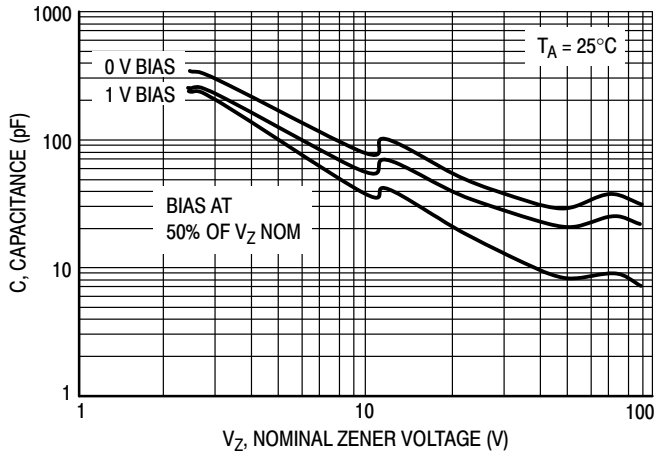


Figure 6. Typical Capacitance

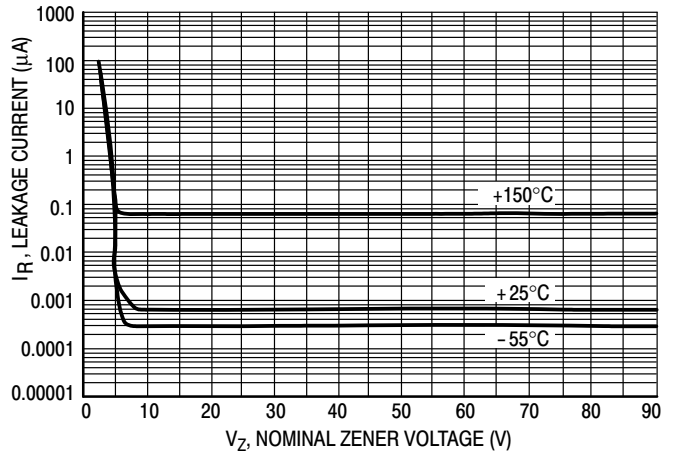


Figure 7. Typical Leakage Current



Figure 8. Zener Voltage versus Zener Current ( $V_Z$  Up to 12 V)

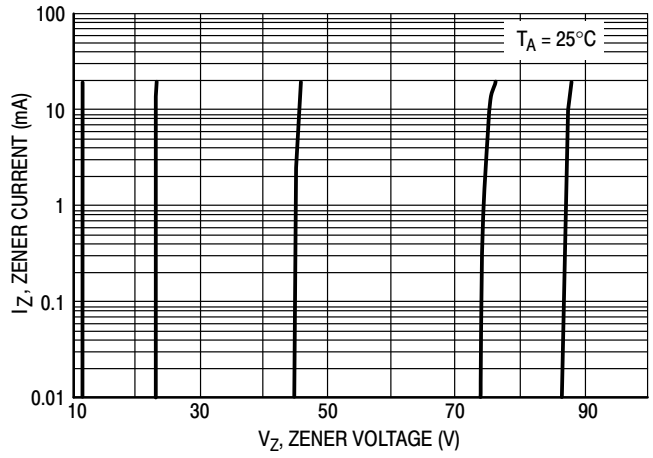
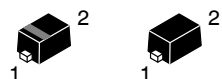


Figure 9. Zener Voltage versus Zener Current (12 V to 91 V)

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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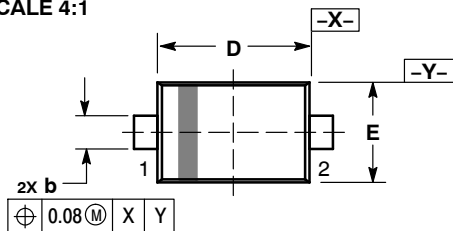


STYLE 1      STYLE 2

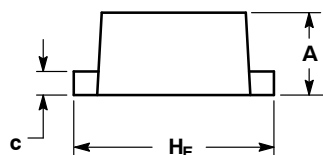
**SOD-523**  
CASE 502-01  
ISSUE E

DATE 28 SEP 2010

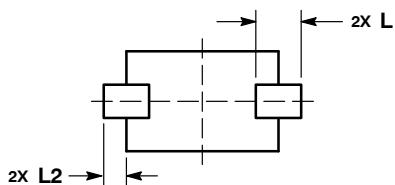
SCALE 4:1



TOP VIEW

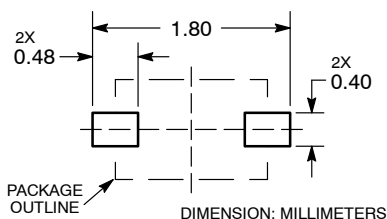


SIDE VIEW



BOTTOM VIEW

### RECOMMENDED SOLDERING FOOTPRINT\*

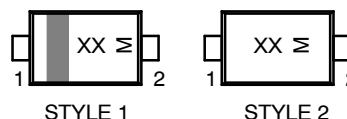


DIMENSION: MILLIMETERS

- 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 <sub>E</sub>	1.50	1.60	1.70
L	0.30 REF		
L2	0.15	0.20	0.25

### GENERIC MARKING DIAGRAM\*



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.

STYLE 1: PIN 1. CATHODE (POLARITY BAND)  
2. ANODE

STYLE 2: NO POLARITY

\*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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