

# Zener Voltage Regulators

## 500 mW SOD-523, Standard Tolerance Series

### MM5ZxxxT1G Series, SZMM5ZxxxT1G 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.

#### Specification Features:

- Standard Zener Breakdown Voltage Range – 2.4 V to 75 V
- Standard Tolerance Series
- Steady State Power Rating of 500 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
- 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  
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-4 Board, (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	500 4.0	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	250	°C/W
Junction and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	°C

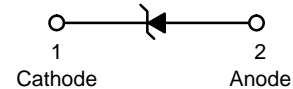
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 printed circuit board, single-sided copper, mounting pad 1 cm<sup>2</sup>.

\*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 upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
MM5ZxxxT1G	SOD-523 (Pb-Free)	3,000 / Tape & Reel
SZMM5ZxxxT1G	SOD-523 (Pb-Free)	3,000 / Tape & Reel
MM5ZxxxT5G	SOD-523 (Pb-Free)	8,000 / Tape & Reel
SZMM5ZxxxT5G	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 tables starting on page 3 of this data sheet.

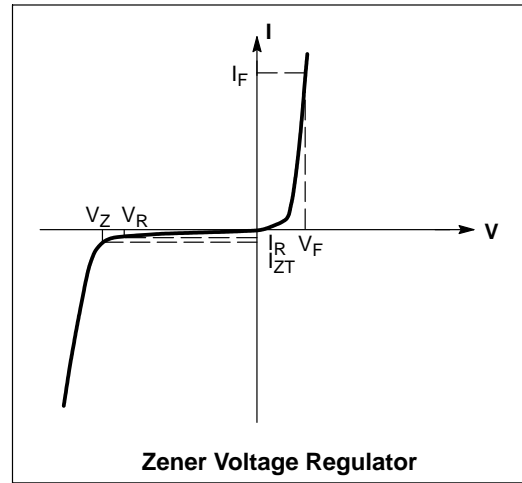
## MM5ZxxxT1G Series, SZMM5ZxxxT1G Series

### ELECTRICAL CHARACTERISTICS

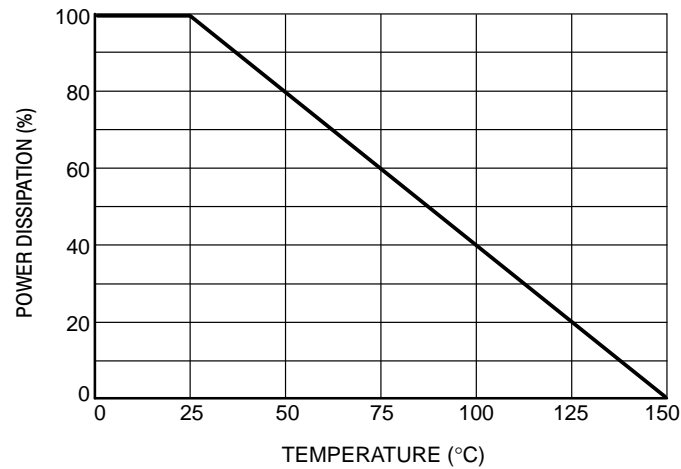
( $T_A = 25^\circ\text{C}$  unless otherwise noted,

$V_F = 0.9\text{ V Max. @ } I_F = 10\text{ mA}$  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 – Standard Tolerance Series

(T<sub>A</sub> = 25 °C unless otherwise noted, V<sub>F</sub> = 0.9 V Max. @ I<sub>F</sub> = 10 mA for all types)

Device*	Device Marking	V <sub>Z1</sub> (V) @ (Note 1) (Note 2)			V <sub>Z2</sub> (V) @ (Note 1) (Note 2)		Zener Impedance			Leakage Current		θV <sub>Z</sub> (mV/k) @ I <sub>ZT</sub>		C @ V <sub>R</sub> = 0 f = 1 MHz
							Z <sub>1T</sub> @ I <sub>ZT</sub>	Z <sub>ZK</sub> @ I <sub>ZK</sub>		I <sub>R</sub> @ V <sub>R</sub>				
		Min	Nom	Max	Min	Max	Ω	Ω	mA	μA	Volts	Min	Max	pF
MM5Z2V4T1G/T5G	00	2.2	2.4	2.6	1.7	2.1	100	1000	1.0	50	1.0	-3.5	0	450
MM5Z2V7T1G/T5G	01	2.5	2.7	2.9	1.9	2.4	100	1000	1.0	20	1.0	-3.5	0	450
MM5Z3V0T1G/T5G	02	2.8	3.0	3.2	2.1	2.7	100	1000	1.0	10	1.0	-3.5	0	450
MM5Z3V3T1G/T5G	05	3.1	3.3	3.5	2.3	2.9	95	1000	1.0	5	1.0	-3.5	0	450
MM5Z3V6T1G/T5G	06	3.4	3.6	3.8	2.7	3.3	90	1000	1.0	5	1.0	-3.5	0	450
MM5Z3V9T1G/T5G	AJ	3.7	3.9	4.2	2.9	3.5	90	1000	1.0	3	1.0	-3.5	0	450
MM5Z4V3T1G/T5G	08	4.0	4.3	4.6	3.3	4	90	1000	1.0	3	1.0	-3.5	0	450
MM5Z4V7T1G/T5G	09	4.4	4.7	5.0	3.7	4.7	80	800	1.0	3	2.0	-3.5	0.2	260
MM5Z5V1T1G/T5G	0A	4.8	5.1	5.4	4.2	5.3	60	500	1.0	2	2.0	-2.7	1.2	225
MM5Z5V6T1G/T5G	0C	5.2	5.6	6.0	4.8	6	40	200	1.0	1	2.0	-2.0	2.5	200
MM5Z6V2T1G/T5G	0E	5.8	6.2	6.6	5.6	6.6	10	100	1.0	3	4.0	0.4	3.7	185
MM5Z6V8T1G/T5G	0F	6.4	6.8	7.2	6.3	7.2	15	160	1.0	2	4.0	1.2	4.5	155
MM5Z7V5T1G/T5G	0G	7.0	7.5	7.9	6.9	7.9	15	160	1.0	1	5.0	2.5	5.3	140
MM5Z8V2T1G/T5G	0H	7.7	8.2	8.7	7.6	8.7	15	160	1.0	0.7	5.0	3.2	6.2	135
MM5Z9V1T1G/T5G	0K	8.5	9.1	9.6	8.4	9.6	15	160	1.0	0.2	7.0	3.8	7.0	130
MM5Z10VT1G/T5G	0L	9.4	10	10.6	9.3	10.6	20	160	1.0	0.1	8.0	4.5	8.0	130
MM5Z11VT1G/T5G	0M	10.4	11	11.6	10.2	11.6	20	160	1.0	0.1	8.0	5.4	9.0	130
MM5Z12VT1G/T5G	0N	11.4	12	12.7	11.2	12.7	25	80	1.0	0.1	8.0	6.0	10	130
MM5Z13VT1G/T5G	0P	12.4	13.25	14.1	12.3	14	30	80	1.0	0.1	8.0	7.0	11	120
MM5Z15VT1G/T5G	0T	14.3	15	15.8	13.7	15.5	30	80	1.0	0.05	10.5	9.2	13	110
MM5Z16VT1G/T5G	0U	15.3	16.2	17.1	15.2	17	40	80	1.0	0.05	11.2	10.4	14	105
MM5Z18VT1G/T5G	0W	16.8	18	19.1	16.7	19	45	80	1.0	0.05	12.6	12.4	16	100
MM5Z20VT1G/T5G	0Z	18.8	20	21.2	18.7	21.1	55	100	1.0	0.05	14.0	14.4	18	85
MM5Z22VT1G/T5G	10	20.8	22	23.3	20.7	23.2	55	100	1.0	0.05	15.4	16.4	20	85
MM5Z24VT1G/T5G	11	22.8	24.2	25.6	22.7	25.5	70	120	1.0	0.05	16.8	18.4	22	80
MM5Z27VT1G/T5G	12	25.1	27	28.9	25	28.9	80	300	1.0	0.05	18.9	21.4	25.3	70
MM5Z30VT1G/T5G	14	28	30	32	27.8	32	80	300	1.0	0.05	21.0	24.4	29.4	70
MM5Z33VT1G/T5G	18	31	33	35	30.8	35	80	300	1.0	0.05	23.2	27.4	33.4	70
MM5Z36VT1G/T5G	19	34	36	38	33.8	38	90	500	1.0	0.05	25.2	30.4	37.4	70
MM5Z39VT1G/T5G	20	37	39	41	36.7	41	130	500	1.0	0.05	27.3	33.4	41.2	45
MM5Z43VT1G/T5G	21	40	43	46	39.7	46	150	500	1.0	0.05	30.1	37.6	46.6	40
MM5Z47VT1G/T5G	1A	44	47	50	43.7	50	170	500	1.0	0.05	32.9	42.0	51.8	40
MM5Z51VT1G**	1C	48	51	54	47.6	54	180	500	1.0	0.05	35.7	46.6	57.2	40
MM5Z56VT1G**	1D	52	56	60	51.5	60	200	500	1.0	0.05	39.2	52.2	63.8	40
MM5Z62VT1G**	1E	58	62	66	57.4	66	215	500	1.0	0.05	43.4	58.8	71.6	35
MM5Z68VT1G**	1F	64	68	72	63.4	72	240	500	1.0	0.05	47.6	65.6	79.8	35
MM5Z75VT1G**	1G	70	75	79	69.4	79	255	500	1.0	0.05	52.5	73.4	88.6	35

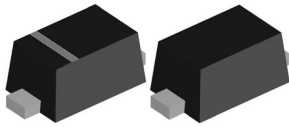
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. I<sub>ZT1</sub> = 5 mA: 2.4 to 24 V, I<sub>ZT1</sub> = 2 mA: 27 to 75 V; I<sub>ZT2</sub> = 1 mA: 2.4 to 24 V, I<sub>ZT2</sub> = 0.5 mA: 27 to 75 V.

2. Zener voltage is measured with a pulse test current I<sub>Z</sub> at an ambient temperature of 25 °C.

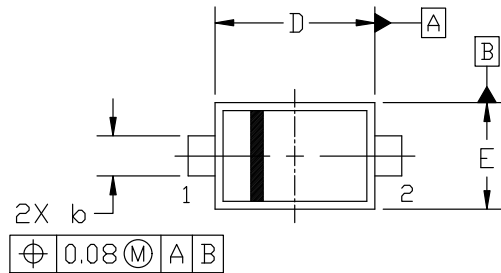
\*Includes SZ-prefix devices where applicable.

\*\*Contact Sales.

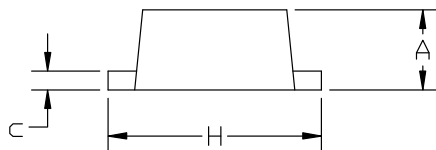


**SOD-523 1.20x0.80x0.60**  
**CASE 502**  
**ISSUE F**

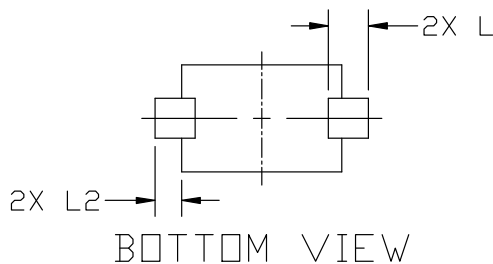
DATE 08 FEB 2024



TOP VIEW

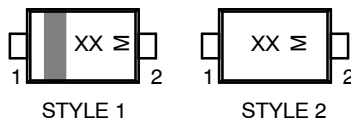


SIDE VIEW



BOTTOM VIEW

**GENERIC**  
**MARKING DIAGRAM\***



XX = Specific Device Code  
M Date Code

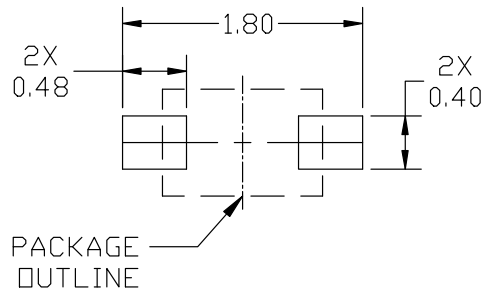
\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLE 1: PIN 1: CATHODE (POLARITY BAND)  
2: ANODE  
STYLE 2: NO POLARITY

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.

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	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.

<b>DOCUMENT NUMBER:</b>	<b>98AON11524D</b>	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
<b>DESCRIPTION:</b>	<b>SOD-523 1.20x0.80x0.60</b>	<b>PAGE 1 OF 1</b>

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)