

# Zener Voltage Regulators

## 300 mW SOD-323 Surface Mount Tight Tolerance Portfolio

### MM3ZxxxST1G Series, SZMM3ZxxxST1G 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 – 3.3 V to 36 V
- Steady State Power Rating of 300 mW
- Small Body Outline Dimensions:  
– 0.067" x 0.049" (1.7 mm x 1.25 mm)
- Low Body Height: 0.035" (0.9 mm)
- Package Weight: 4.507 mg/unit
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Tight Tolerance  $V_Z$
- 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, Halogen Free/BFR Free and are RoHS Compliant\*

#### Mechanical Characteristics:

**CASE:** Void-free, transfer-molded plastic

**FINISH:** All external surfaces are corrosion resistant

#### MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:

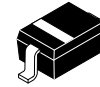
260°C for 10 Seconds

**LEADS:** Plated with Pb-Sn or Sn only (Pb-Free)

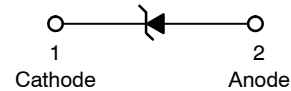
**POLARITY:** Cathode indicated by polarity band

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

**MOUNTING POSITION:** Any



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†
MM3ZxxxST1G	SOD-323 (Pb-Free)	3,000 / Tape & Reel
SZMM3ZxxxST1G	SOD-323 (Pb-Free)	3,000 / Tape & Reel
MM3ZxxxST3G	SOD-323 (Pb-Free)	10,000 / 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.

# MM3ZxxxST1G Series, SZMM3ZxxxST1G Series

## MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Total Device Dissipation FR-4 Board, (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	416	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-65 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.

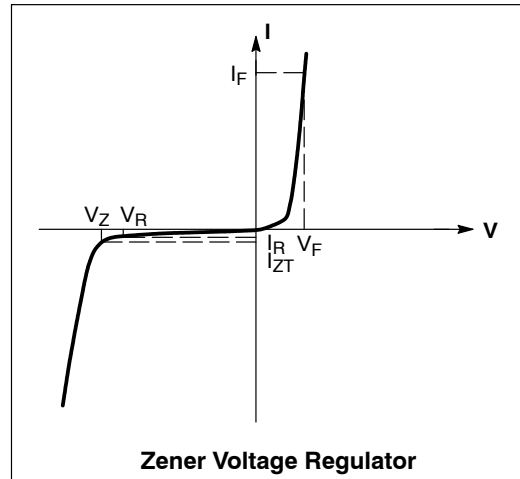
- FR-4 printed circuit board, single-sided copper, mounting pad  $1\text{ cm}^2$ .

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



## MM3ZxxxST1G Series, SZMM3ZxxxST1G Series

**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 VZ		$Z_{ZK} I_Z = 0.5 \text{ mA } \Omega \text{ Max}$	$Z_{ZT} I_Z = I_{ZT} @ 10\% \text{ Mod } \Omega \text{ Max}$	Max IR @ VR		$dV_Z/dt$ (mV/k) @ $I_{ZT1} = 5 \text{ mA}$		C pF Max @ $V_R = 0$ f = 1 MHz
			Min	Max			$\mu\text{A}$	V	Min	Max	
MM3Z2V4ST1G	T2	5.0	2.29	2.51	1000	100	50	1.0	-3.5	0	450
MM3Z2V7ST1G	T3	5.0	2.59	2.81	1000	100	20	1.0	-3.5	0	450
MM3Z3V0ST1G	T4	5.0	2.90	3.11	1000	100	10	1.0	-3.5	0	450
MM3Z3V3ST1G	T5	5.0	3.32	3.53	1000	95	5.0	1.0	-3.5	0	450
MM3Z3V6ST1G	T6	5.0	3.49	3.71	1000	90	5.0	1.0	-3.5	0	450
MM3Z3V9ST1G	T7	5.0	3.89	4.16	1000	90	3.0	1.0	-3.5	-2.5	450
MM3Z4V3ST1G	T8	5.0	4.17	4.43	1000	90	3.0	1.0	-3.5	0	450
MM3Z4V7ST1G	T9	5.0	4.55	4.75	800	80	3.0	2.0	-3.5	0.2	260
MM3Z5V1ST1G	TA	5.0	4.98	5.2	500	60	2.0	2.0	-2.7	1.2	225
MM3Z5V6ST1G	TC	5.0	5.49	5.73	200	40	1.0	2.0	-2.0	2.5	200
MM3Z6V2ST1G	TE	5.0	6.06	6.33	100	10	3.0	4.0	0.4	3.7	185
MM3Z6V8ST1G	TF	5.0	6.65	6.93	160	15	2.0	4.0	1.2	4.5	155
MM3Z7V5ST1G	TG	5.0	7.28	7.6	160	15	1.0	5.0	2.5	5.3	140
MM3Z8V2ST1G	TH	5.0	8.02	8.36	160	15	0.7	5.0	3.2	6.2	135
MM3Z9V1ST1G	TK	5.0	8.85	9.23	160	15	0.5	6.0	3.8	7.0	130
MM3Z10VST1G	WB	5.0	9.80	10.20	160	15	0.5	6.0	4.5	8.0	130
MM3Z11VST1G	WC	5.0	10.78	11.22	160	20	0.1	8.0	5.4	9.0	130
MM3Z12VST1G	TN	5.0	11.74	12.24	80	25	0.1	8.0	6.0	10	130
MM3Z13VST1G	TQ	5.0	12.91	13.49	160	30	0.1	8.0	7.0	11	120
MM3Z15VST1G	TP	5.0	14.34	14.98	80	40	0.1	11	8.8	12.7	130
MM3Z16VST1G	TU	5.0	15.85	16.51	80	40	0.05	11.2	10.4	14	105
MM3Z18VST1G	TW	5.0	17.56	18.35	80	45	0.05	12.6	12.4	16	100
MM3Z20VST1G	U8	5.0	19.48	20.46	100	55	0.05	14.0	14.4	18	85
MM3Z22VST1G	WP	5.0	21.54	22.47	100	55	0.05	15.4	16.4	20	85
MM3Z24VST1G	WT	5.0	23.72	24.78	120	70	0.05	16.8	18.4	22	80
MM3Z27VST1G	WQ	5.0	26.19	27.53	300	80	0.05	18.9	21.4	25.3	70
MM3Z30VST1G	WV	5.0	29.19	30.69	300	80	0.05	21.0	24.4	29.4	70
MM3Z33VST1G	WR	5.0	32.15	33.79	300	80	0.05	23.2	27.4	33.4	70
MM3Z36VST1G	WU	5.0	35.07	36.87	500	90	0.05	25.2	30.4	37.4	70
MM3Z39VST1G	WN	2.0	38.22	39.78	500	130	0.05	27.3	33.4	41.2	45

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.

\*Include SZ-prefix devices where applicable.

TYPICAL CHARACTERISTICS

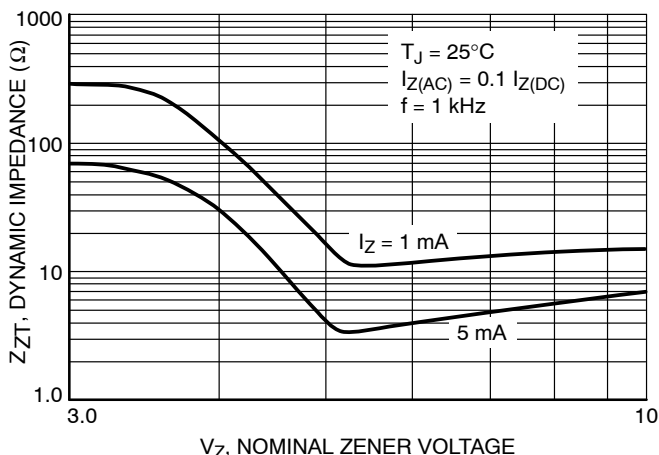


Figure 1. Effect of Zener Voltage on Zener Impedance

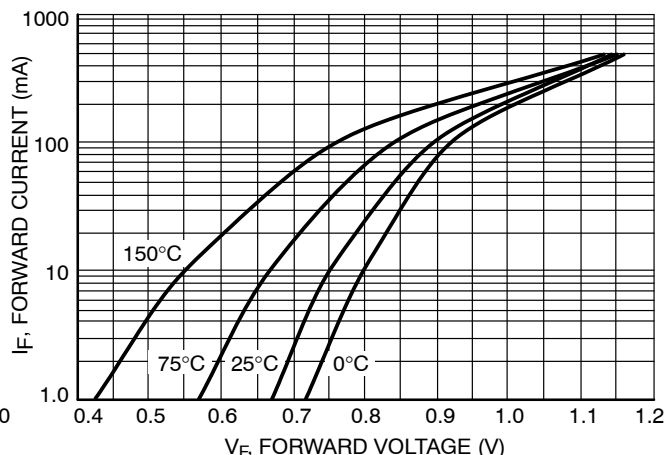


Figure 2. Typical Forward Voltage

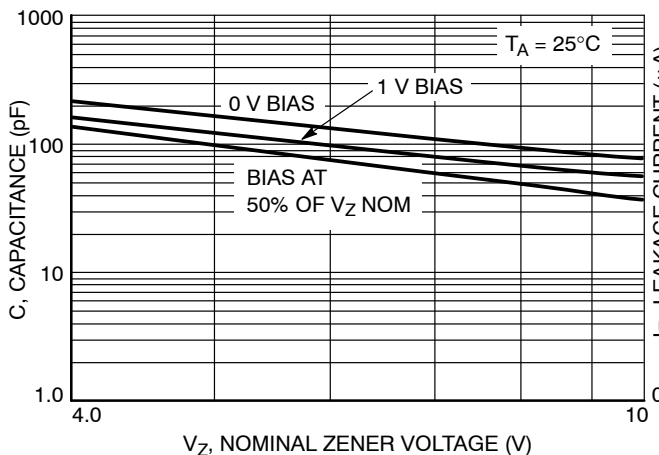


Figure 3. Typical Capacitance

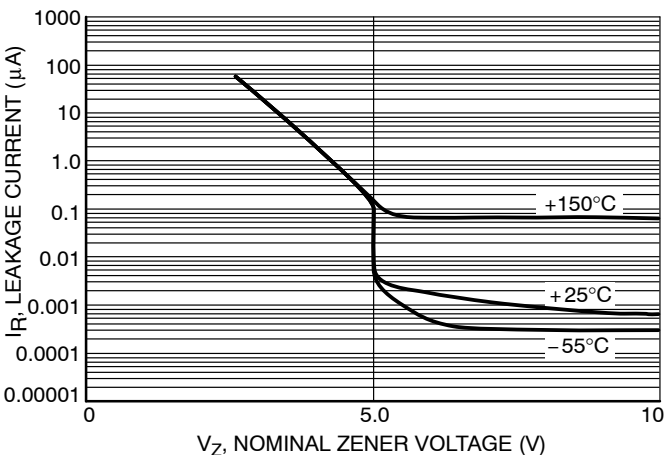


Figure 4. Typical Leakage Current

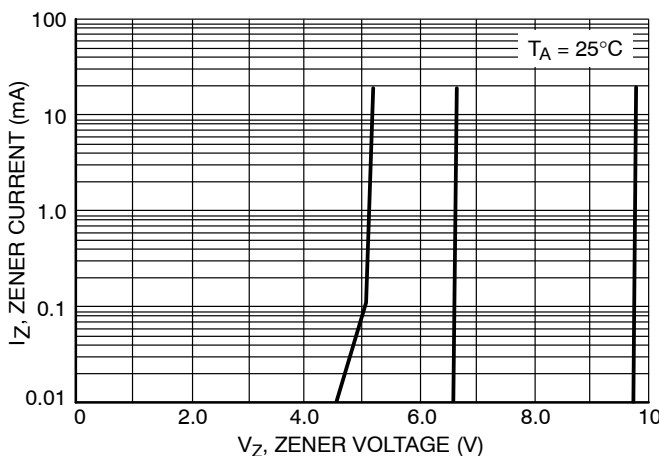


Figure 5. Zener Voltage versus Zener Current ( $V_Z$  Up to 9 V)

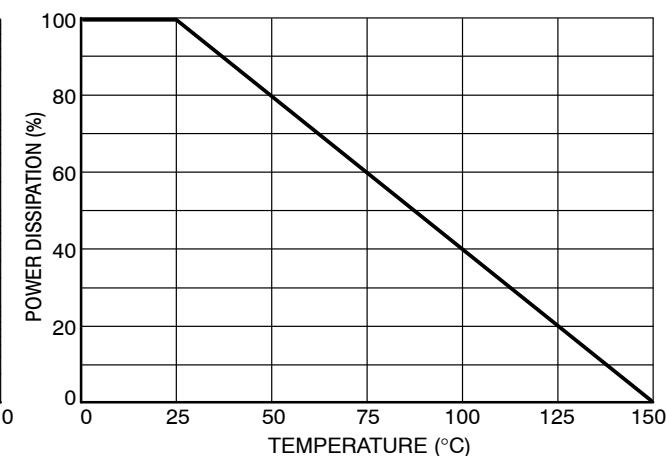


Figure 6. Steady State Power Derating

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



**SOD-323**  
CASE 477-02  
ISSUE H

DATE 13 MAR 2007



SCALE 4:1



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SOLDER PLATING.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DIMENSION L IS MEASURED FROM END OF RADIUS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.031	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.15 REF			0.006 REF		
b	0.25	0.32	0.4	0.010	0.012	0.016
C	0.089	0.12	0.177	0.003	0.005	0.007
D	1.60	1.70	1.80	0.062	0.066	0.070
E	1.15	1.25	1.35	0.045	0.049	0.053
L	0.08			0.003		
HE	2.30	2.50	2.70	0.090	0.098	0.105

**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.

**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.

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

STYLE 2:  
NO POLARITY

<b>DOCUMENT NUMBER:</b>	<b>98ASB17533C</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-323</b>	<b>PAGE 1 OF 1</b>

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor 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.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**onsemi Website:** [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

**North American Technical Support:**

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

**Europe, Middle East and Africa Technical Support:**

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative