

# MM3Z2V4ST1 SERIES

## Zener Voltage Regulators 200 mW SOD-323 Surface Mount Tight Tolerance Portfolio

This series of Zener diodes is packaged in a SOD-323 surface mount package that has a power dissipation of 200 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 33 V
- Steady State Power Rating of 200 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  $V_Z$
- Pb-Free Packages are Available

### 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

### MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	200 1.5	mW mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	635	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

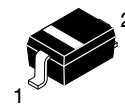
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 Minimum Pad.



ON Semiconductor®

<http://onsemi.com>



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†
MM3ZxxxST1	SOD-323	3000/Tape & Reel
MM3ZxxxST1G	SOD-323 (Pb-Free)	3000/Tape & Reel
MM3ZxxxST3	SOD-323	10,000/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

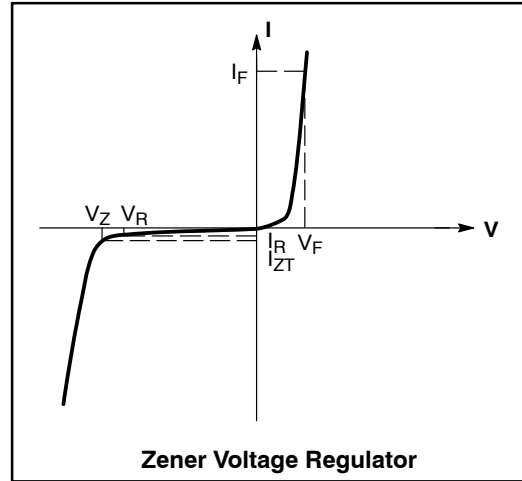
See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

# MM3Z2V4ST1 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 @ $I_F$
$\Theta_{VZ}$	Maximum Temperature Coefficient of $V_Z$
C	Max. Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$



## 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 $V_Z$		$Z_{ZK}$ $I_Z = 0.5\text{ mA } \Omega$ Max	$Z_{ZT}$ $I_Z = I_{ZT}$ @ 10% Mod $\Omega$ Max	Max IR @ $V_R$		$dV_Z/dt$ (mV/k) @ $I_{ZT1} = 5\text{ mA}$		C pF Max @ $V_R = 0$ $f = 1\text{ MHz}$
			Min	Max			$\mu\text{A}$	V	Min	Max	
MM3Z3V3ST1, G	T5	5.0	3.32	3.53	1000	95	5.0	1.0	-3.5	0	450
MM3Z3V9ST1, G	T7	5.0	3.89	4.16	1000	90	3.0	1.0	-3.5	-2.5	450
MM3Z4V3ST1, G	T8	5.0	4.17	4.43	1000	90	3.0	1.0	-3.5	0	450
MM3Z4V7ST1, G	T9	5.0	4.55	4.75	800	80	3.0	2.0	-3.5	0.2	260
MM3Z5V1ST1, G	TA	5.0	4.98	5.2	500	60	2.0	2.0	-2.7	1.2	225
MM3Z5V6ST1, G	TC	5.0	5.49	5.73	200	40	1.0	2.0	-2.0	2.5	200
MM3Z6V2ST1, G	TE	5.0	6.06	6.33	100	10	3.0	4.0	0.4	3.7	185
MM3Z6V8ST1, G	TF	5.0	6.65	6.93	160	15	2.0	4.0	1.2	4.5	155
MM3Z7V5ST1, G	TG	5.0	7.28	7.6	160	15	1.0	5.0	2.5	5.3	140
MM3Z8V2ST1, G	TH	5.0	8.02	8.36	160	15	0.7	5.0	3.2	6.2	135
MM3Z9V1ST1, G	TK	5.0	8.85	9.23	160	15	0.5	6.0	3.8	7.0	130
MM3Z10VST1, G	WB	5.0	9.80	10.20	160	15	0.5	6.0	4.5	8.0	130
MM3Z12VST1, G	TN	5.0	11.74	12.24	80	25	0.1	8.0	6.0	10	130
MM3Z15VST1, G	TP	5.0	14.34	14.98	80	40	0.1	11	8.8	12.7	130
MM3Z16VST1, G	TU	5.0	15.85	16.51	80	40	0.05	11.2	10.4	14	105
MM3Z18VST1, G	TW	5.0	17.56	18.35	80	45	0.05	12.6	12.4	16	100
MM3Z22VST1G	WP	5.0	21.54	22.47	100	55	0.05	15.4	16.4	20	85
MM3Z27VST1G	WQ	5.0	26.19	27.53	300	80	0.05	18.9	21.4	25.3	70
MM3Z33VST1G	WR	5.0	32.15	33.79	300	80	0.05	23.2	27.4	33.4	70

\*The "G" suffix indicates Pb-Free package available.

# MM3Z2V4ST1 SERIES

## TYPICAL CHARACTERISTICS

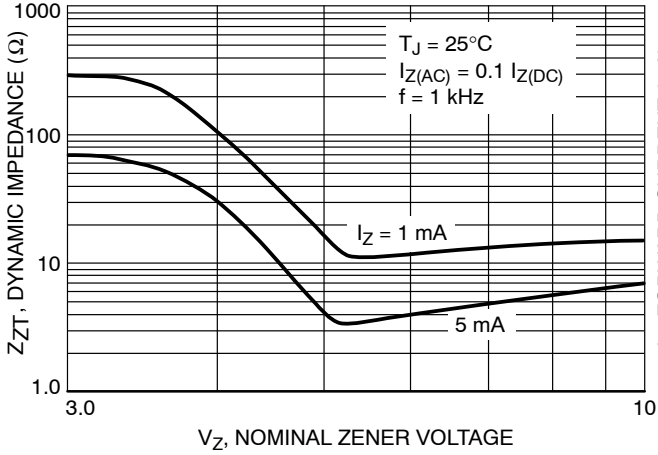


Figure 1. Effect of Zener Voltage on Zener Impedance

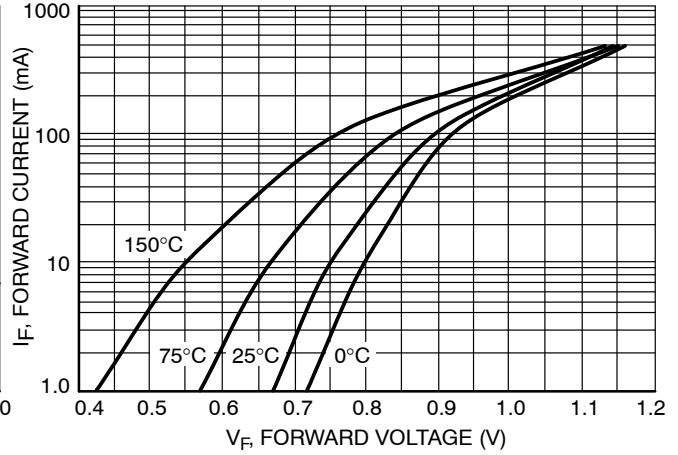


Figure 2. Typical Forward Voltage

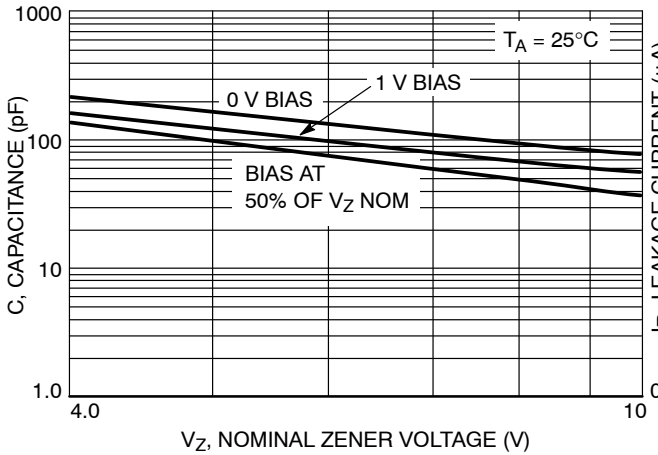


Figure 3. Typical Capacitance

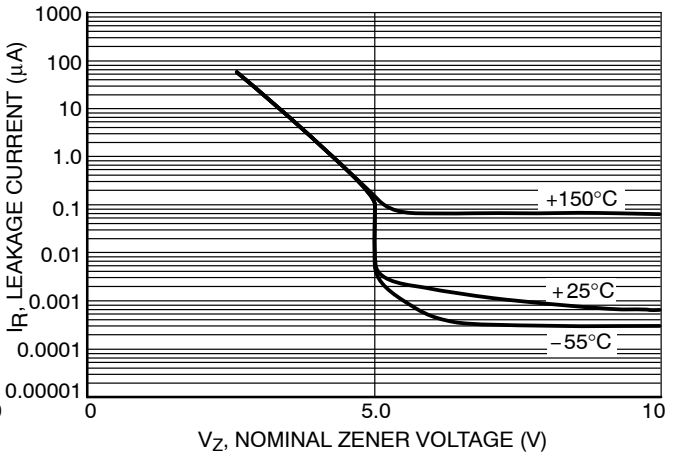


Figure 4. Typical Leakage Current

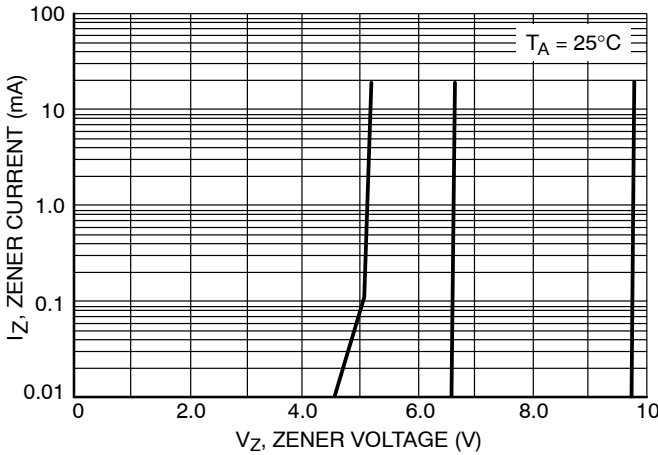


Figure 5. Zener Voltage versus Zener Current ( $V_Z$  Up to 9 V)

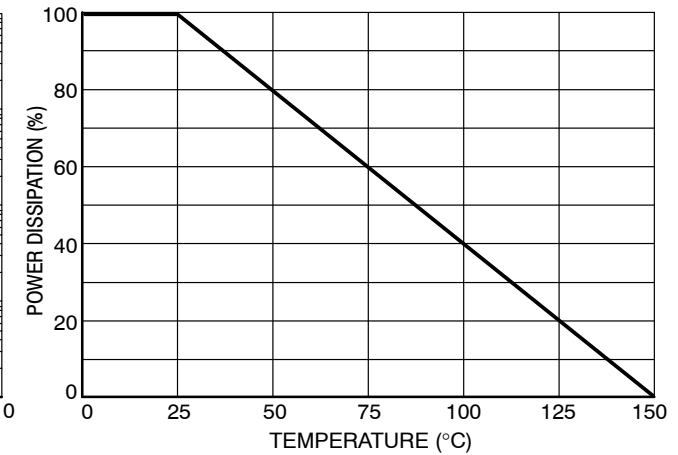
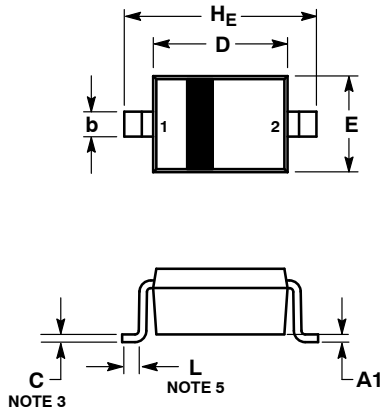


Figure 6. Steady State Power Derating

# MM3Z2V4ST1 SERIES

## PACKAGE DIMENSIONS

SOD-323  
CASE 477-02  
ISSUE G



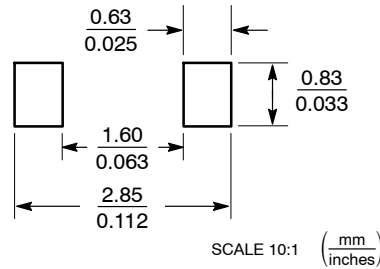
NOTES:

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

STYLE 1:  
PIN 1. CATHODE  
2. ANODE

### 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.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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:**  
Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5773-3850

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
For additional information, please contact your local Sales Representative