

# MM5ZxxxST1 Series, SZMM5ZxxxST1G Series

## Zener Voltage Regulators

### 200 mW SOD-523 Surface Mount

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 18 V
- Steady State Power Rating of 200 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
- Tight Tolerance  $V_Z$
- AEC-Q101 Qualified and PPAP Capable
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb-Free Devices

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

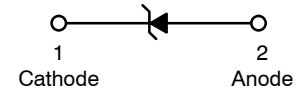
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 Minimum Pad.



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**SOD-523  
CASE 502  
PLASTIC**

#### 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†
MM5ZxxxST1	SOD-523*	3000 / Tape & Reel
MM5ZxxxST1G	SOD-523*	3000 / Tape & Reel
SZMM5ZxxxST1G	SOD-523*	3000 / Tape & Reel
SZMM5ZxxxST5G	SOD-523*	8000 / 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.

\*This package is inherently Pb-Free.

#### DEVICE MARKING INFORMATION

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

## MM5ZxxxST1 Series, SZMM5ZxxxST1G 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 $f = 1\text{ MHz}$

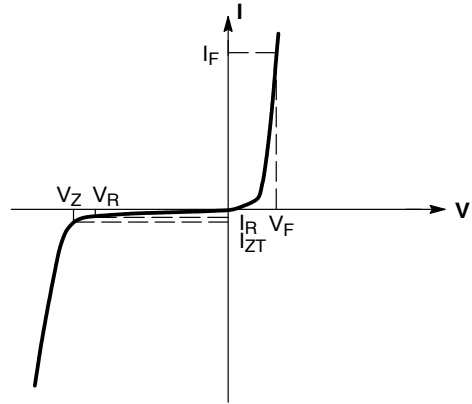


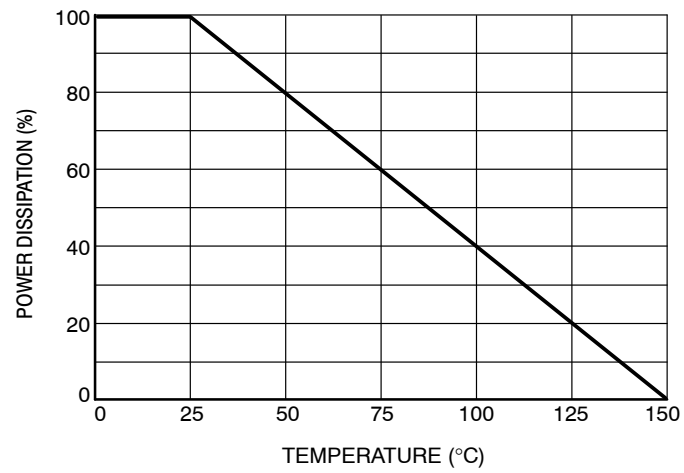
Figure 1. Zener Voltage Regulator

### 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 $V_Z$		$Z_{ZK}$ $I_Z = 1.0\text{ mA } \Omega$ Max	$Z_{ZT}$ $I_Z = I_{ZT}$ @ 10% Mod $\Omega$ Max	Max $I_R$ @ $V_R$		$dV_Z/dT$ (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	
MM5Z2V4ST1	T2	5.0	2.43	2.63	1000	100	120	1.0	-3.5	0	450
MM5Z2V7ST1	T3	5.0	2.67	2.91	1000	100	100	1.0	-3.5	0	450
MM5Z3V3ST1	T5	5.0	3.32	3.53	1000	95	5.0	1.0	-3.5	0	450
MM5Z3V6ST1	T6	5.0	3.60	3.85	1000	90	5.0	1.0	-3.5	0	450
MM5Z3V9ST1	T7	5.0	3.89	4.16	1000	90	3.0	1.0	-3.5	-2.5	450
MM5Z4V3ST1	T8	5.0	4.17	4.43	1000	90	3.0	1.0	-3.5	0	450
SZ/MM5Z4V7ST1/T5	T9	5.0	4.55	4.75	800	80	3.0	2.0	-3.5	0.2	260
MM5Z5V1ST1	TA	5.0	4.98	5.2	500	60	2.0	2.0	-2.7	1.2	225
SZ/MM5Z5V6ST1	TC	5.0	5.49	5.73	200	40	1.0	2.0	-2.0	2.5	200
SZ/MM5Z6V2ST1	TE	5.0	6.06	6.33	100	10	3.0	4.0	0.4	3.7	185
SZ/MM5Z6V8ST1	TF	5.0	6.65	6.93	160	15	2.0	4.0	1.2	4.5	155
MM5Z7V5ST1	TG	5.0	7.28	7.6	160	15	1.0	5.0	2.5	5.3	140
SZ/MM5Z8V2ST1	TH	5.0	8.02	8.36	160	15	0.7	5.0	3.2	6.2	135
MM5Z9V1ST1	TK	5.0	8.85	9.23	160	15	0.5	6.0	3.8	7.0	130
MM5Z12VST1	TN	5.0	11.74	12.24	80	25	0.1	8.0	6.0	10	130
MM5Z16VST1	TU	5.0	15.85	16.51	80	40	0.05	11.2	10.4	14	105
MM5Z18VST1	TW	5.0	17.56	18.35	80	45	0.05	12.6	12.4	16	100

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

## MM5ZxxxST1 Series, SZMM5ZxxxST1G Series

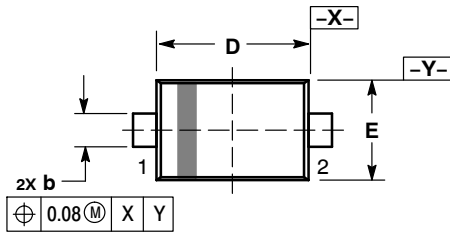


**Figure 2. Steady State Power Derating**

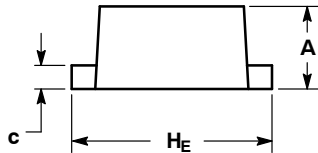
# MM5ZxxxST1 Series, SZMM5ZxxxST1G Series

## PACKAGE DIMENSIONS

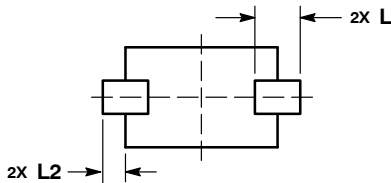
SOD-523  
CASE 502-01  
ISSUE E



TOP VIEW



SIDE VIEW



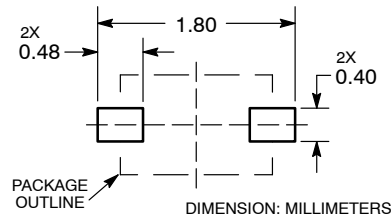
BOTTOM VIEW

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
HE	1.50	1.60	1.70
L	0.30 REF		
L2	0.15	0.20	0.25

### RECOMMENDED 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.

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