

MMSZ4xxxET1 Series, SZMMSZ4xxxET1G Series

Zener Voltage Regulators

500 mW SOD-123 Surface Mount

Three complete series of Zener diodes are offered in the convenient, surface mount plastic SOD-123 package. These devices provide a convenient alternative to the leadless 34-package style.

Features

- 500 mW Rating on FR-4 or FR-5 Board
- Wide Zener Reverse Voltage Range – 1.8 V to 43 V
- 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
- Peak Power – 225 W (8 x 20 μ s)
- AEC-Q101 Qualified and PPAP Capable
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb-Free Packages are Available

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

MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Peak Power Dissipation @ 20 μ s (Note 1) @ $T_L \leq 25^\circ\text{C}$	P_{pk}	225	W
Total Power Dissipation on FR-5 Board, (Note 2) @ $T_L = 75^\circ\text{C}$ Derated above 75°C	P_D	500 6.7	mW mW/°C
Thermal Resistance, (Note 3) Junction-to-Ambient	$R_{\theta JA}$	340	°C/W
Thermal Resistance, (Note 3) Junction-to-Lead	$R_{\theta JL}$	150	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	°C

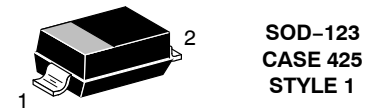
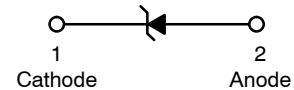
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Nonrepetitive current pulse per Figure 11.
2. FR-5 = 3.5 x 1.5 inches, using the minimum recommended footprint.
3. Thermal Resistance measurement obtained via infrared Scan Method.



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MARKING DIAGRAM



xxx = Device Code (Refer to page 2)

M = Date Code

■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MMSZ4xxxET1	SOD-123	3000 / Tape & Reel
MMSZ4xxxET1G	SOD-123 (Pb-Free)	3000 / Tape & Reel
SZMMSZ4xxxET1G	SOD-123 (Pb-Free)	3000 / Tape & Reel
MMSZ4xxxET3	SOD-123	10000 / Tape & Reel
MMSZ4xxxET3G	SOD-123 (Pb-Free)	10000 / 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.

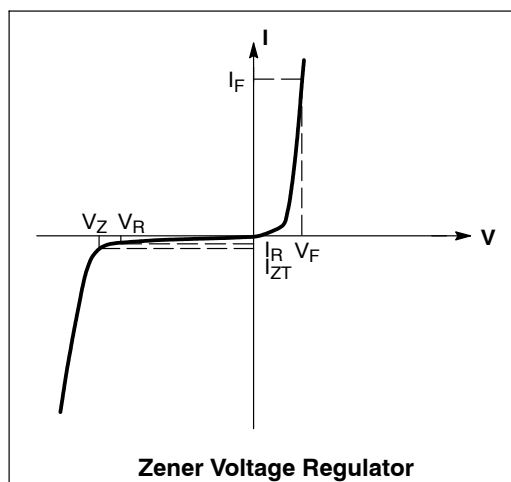
DEVICE MARKING INFORMATION

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

MMSZ4xxxET1 Series, SZMMSZ4xxxET1G Series

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 0.95\text{ V Max. @ } I_F = 10\text{ mA}$)

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



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

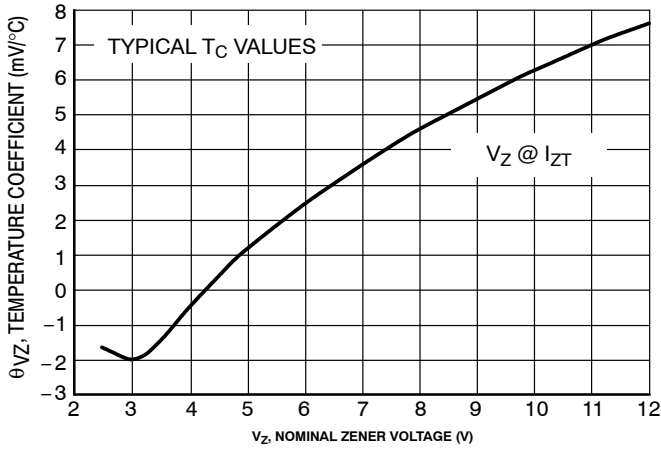
Device*	Device Marking	Zener Voltage (Note 1)				Leakage Current	
		V_Z (V)			@ I_{ZT}	I_R @ V_R	
		Min	Nom	Max	μA	μA	V
SZ/MMSZ4680ET1, G	CF8	2.09	2.2	2.31	50	4	1
MMSZ4684ET1	CG3	3.13	3.3	3.47	50	7.5	1.5
MMSZ4688ET1, G	CG7	4.47	4.7	4.94	50	10	3
SZ/MMSZ4689ET1, G	CG8	4.85	5.1	5.36	50	10	3
MMSZ4690ET1	CG9	5.32	5.6	5.88	50	10	4
MMSZ4691ET1	CH1	5.89	6.2	6.51	50	10	5
MMSZ4692ET1	CH2	6.46	6.8	7.14	50	10	5.1
MMSZ4693ET1	CH3	7.13	7.5	7.88	50	10	5.7
MMSZ4697ET1	CH7	9.50	10	10.50	50	1	7.6
MMSZ4699ET1	CH9	11.40	12	12.60	50	0.05	9.1
SZ/MMSZ4701ET1, G	CJ2	13.3	14	14.7	50	0.05	10.6
MMSZ4702ET1, G	CJ3	14.25	15	15.75	50	0.05	11.4
MMSZ4703ET1	CJ4	15.20	16	16.80	50	0.05	12.1
MMSZ4705ET1	CJ6	17.10	18	18.90	50	0.05	13.6
MMSZ4709ET1	CK1	22.80	24	25.20	50	0.01	18.2
MMSZ4711ET1	CK3	25.65	27	28.35	50	0.01	20.4
MMSZ4717ET1	CK9	40.85	43	45.15	50	0.01	32.6

1. Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_L = 30^\circ\text{C} \pm 1^\circ\text{C}$.

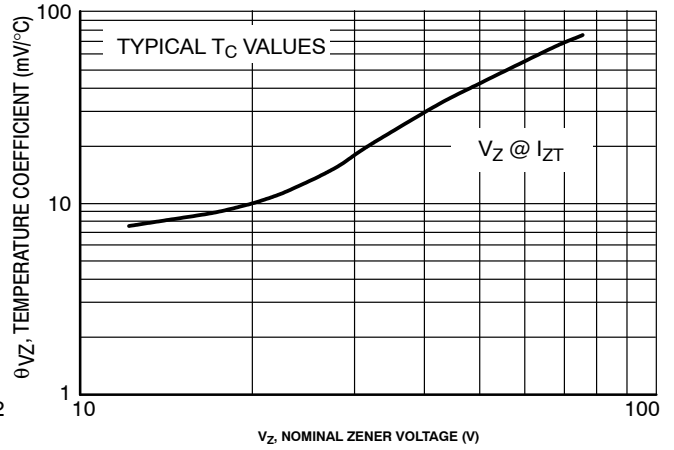
*The "G" suffix indicates Pb-Free package available.

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TYPICAL CHARACTERISTICS



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



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

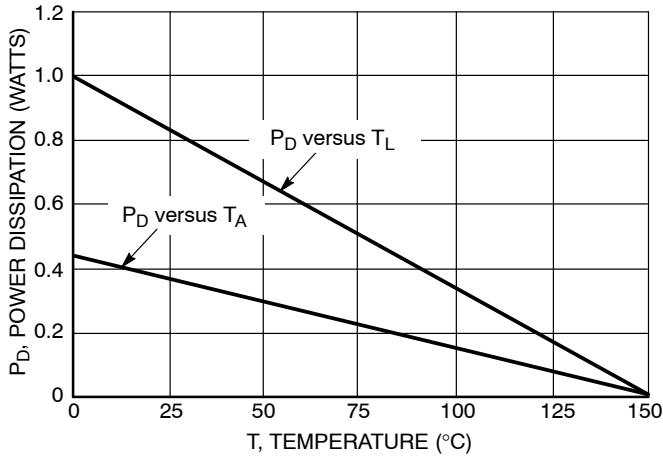


Figure 3. Steady State Power Derating

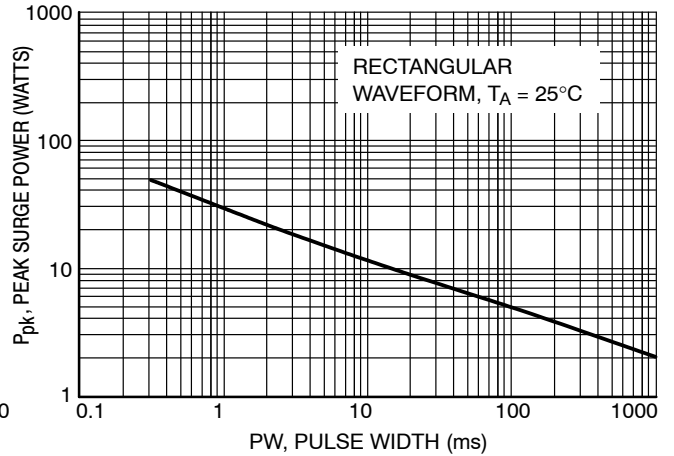
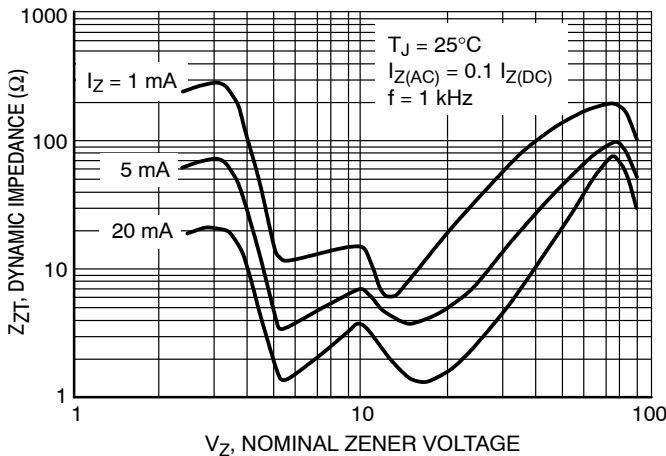


Figure 4. Maximum Nonrepetitive Surge Power



**Figure 5. Effect of Zener Voltage on
Zener Impedance**

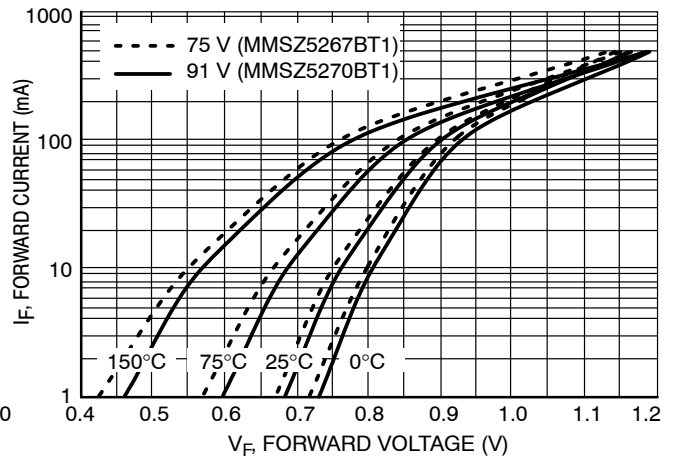


Figure 6. Typical Forward Voltage

TYPICAL CHARACTERISTICS

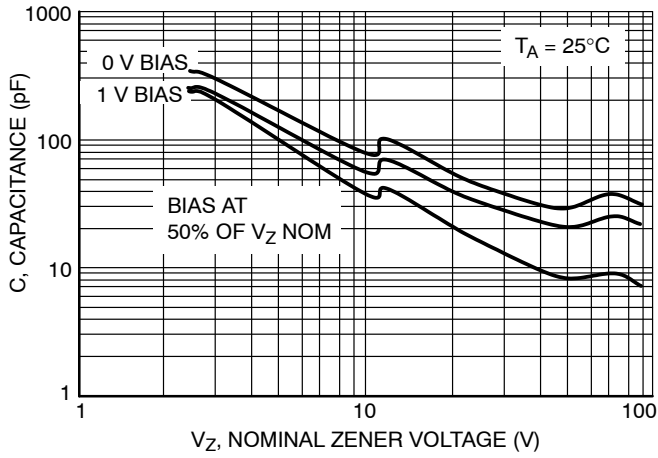


Figure 7. Typical Capacitance

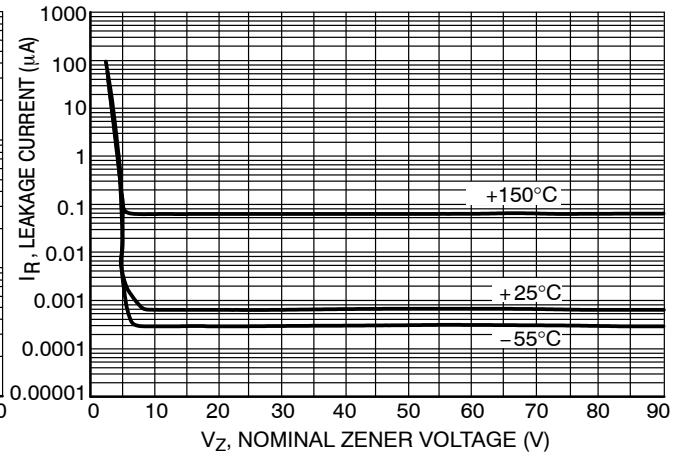


Figure 8. Typical Leakage Current

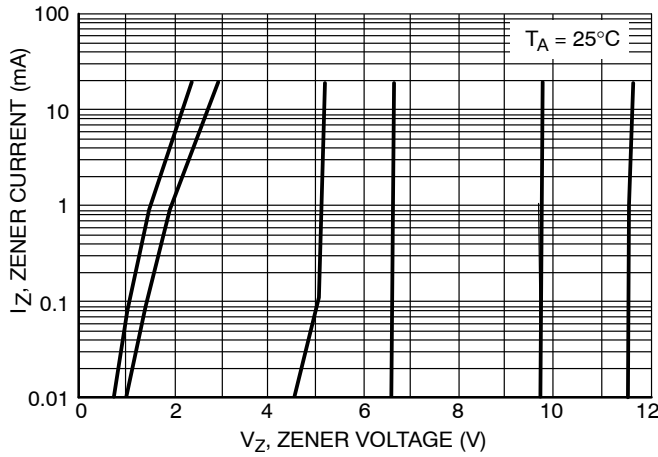


Figure 9. Zener Voltage versus Zener Current (V_Z Up to 12 V)

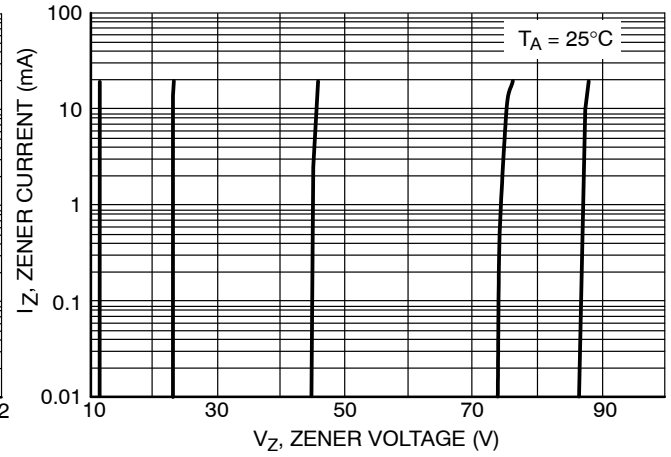


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

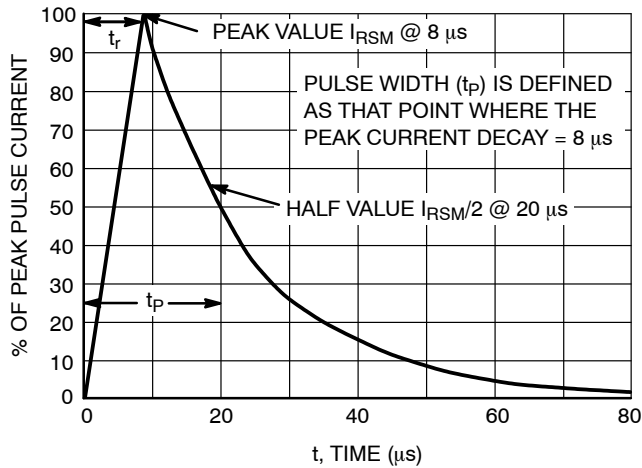
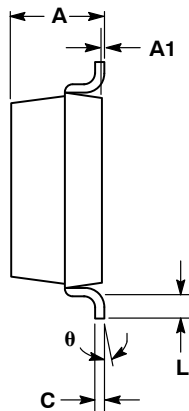
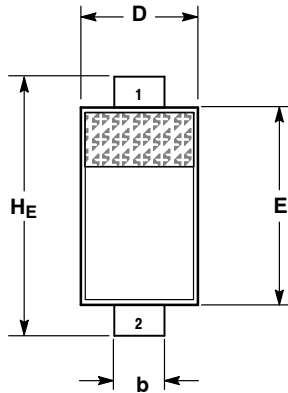


Figure 11. 8 × 20 μs Pulse Waveform

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PACKAGE DIMENSIONS

SOD-123
CASE 425-04
ISSUE G

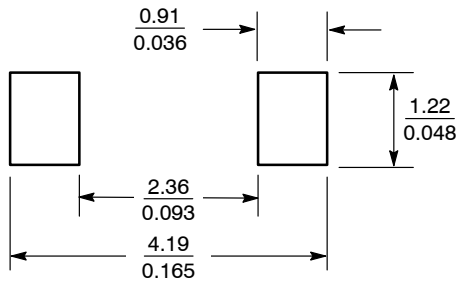


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.94	1.17	1.35	0.037	0.046	0.053
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.51	0.61	0.71	0.020	0.024	0.028
c	---	---	0.15	---	---	0.006
D	1.40	1.60	1.80	0.055	0.063	0.071
E	2.54	2.69	2.84	0.100	0.106	0.112
HE	3.56	3.68	3.86	0.140	0.145	0.152
L	0.25	---	---	0.010	---	---
θ	0°	---	10°	0°	---	10°


STYLE 1:
PIN 1. CATHODE
2. ANODE

SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*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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