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 2.4 V to 56 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
- 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
Total Power Dissipation on FR–5 Board, (Note 1) @ T _L = 75°C Derated above 75°C	P _D	500 6.7	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	340	°C/W
Thermal Resistance, Junction-to-Lead (Note 2)	$R_{ heta JL}$	150	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 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-5 = 3.5 X 1.5 inches.
- 2. Thermal Resistance measurement obtained via infrared Scan Method.



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SOD-123 CASE 425 STYLE 1



MARKING DIAGRAM



xx = Device CodeM = Date Code= Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]
MMSZxxxT1G	SOD-123 (Pb-Free)	3,000 / Tape & Reel
SZMMSZxxxT1G	SOD-123 (Pb-Free)	3,000 / Tape & Reel
MMSZxxxT3G	SOD-123 (Pb-Free)	10,000 / Tape & Reel
SZMMSZxxxT3G	SOD-123 (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.

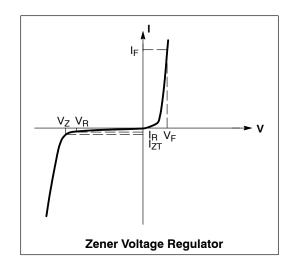
DEVICE MARKING INFORMATION

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

^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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

	. ,
Symbol	Parameter
VZ	Reverse Zener Voltage @ I _{ZT}
I _{ZT}	Reverse Current
Z _{ZT}	Maximum Zener Impedance @ I _{ZT}
I _R	Reverse Leakage Current @ V _R
V _R	Reverse Voltage
I _F	Forward Current
V _F	Forward Voltage @ I _F



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

				Z _{ZT1} (Note 5)	V _{Z2} (Vo (Notes 3 a		Z _{ZT2} (Note 5)		everse Current	
	Device	@ I _{ZT1} = 5 mA			I _R @ V _R					
Device*	Marking	Min	Nom	Max	Ω	Min	Max	Ω	μА	Volts
MMSZ2V4T1G	T1	2.28	2.4	2.52	100	1.7	2.1	600	50	1
MMSZ2V7T1G	T2	2.57	2.7	2.84	100	1.9	2.4	600	20	1
MMSZ3V0T1G	Т3	2.85	3.0	3.15	95	2.1	2.7	600	10	1
MMSZ3V3T1G	T4	3.14	3.3	3.47	95	2.3	2.9	600	5	1
MMSZ3V6T1G	T5	3.42	3.6	3.78	90	2.7	3.3	600	5	1
MMSZ3V9T1G	U1	3.71	3.9	4.10	90	2.9	3.5	600	3	1
MMSZ4V3T1G	U2	4.09	4.3	4.52	90	3.3	4.0	600	3	1
MMSZ4V7T1G	U3	4.47	4.7	4.94	80	3.7	4.7	500	3	2
MMSZ5V1T1G	U4	4.85	5.1	5.36	60	4.2	5.3	480	2	2
MMSZ5V6T1G/T3G	U5	5.32	5.6	5.88	40	4.8	6.0	400	1	2
MMSZ6V2T1G	V1	5.89	6.2	6.51	10	5.6	6.6	150	3	4
MMSZ6V8T1G	V2	6.46	6.8	7.14	15	6.3	7.2	80	2	4
MMSZ7V5T1G	V3	7.13	7.5	7.88	15	6.9	7.9	80	1	5
MMSZ8V2T1G	V4	7.79	8.2	8.61	15	7.6	8.7	80	0.7	5
MMSZ9V1T1G	V5	8.65	9.1	9.56	15	8.4	9.6	100	0.5	6
MMSZ10T1G/T3G	A1	9.50	10	10.50	20	9.3	10.6	150	0.2	7
MMSZ11T1G	A2	10.45	11	11.55	20	10.2	11.6	150	0.1	8
MMSZ12T1G	А3	11.40	12	12.60	25	11.2	12.7	150	0.1	8
MMSZ13T1G	A4	12.35	13	13.65	30	12.3	14.0	170	0.1	8
MMSZ15T1G	A5	14.25	15	15.75	30	13.7	15.5	200	0.05	10.5
MMSZ16T1G	X1	15.20	16	16.80	40	15.2	17.0	200	0.05	11.2
MMSZ18T1G/T3G	X2	17.10	18	18.90	45	16.7	19.0	225	0.05	12.6
MMSZ20T1G	ХЗ	19.00	20	21.00	55	18.7	21.1	225	0.05	14
MMSZ22T1G	X4	20.90	22	23.10	55	20.7	23.2	250	0.05	15.4
MMSZ24T1G	X5	22.80	24	25.20	70	22.7	25.5	250	0.05	16.8

The type numbers shown have a standard tolerance of ±5% on the nominal Zener Voltage.
 Tolerance and Voltage Designation: Zener Voltage (V_Z) is measured with the Zener Current applied for PW = 1 ms.
 Z_{ZT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the AC current applied.
 The specified limits are for I_{Z(AC)} = 0.1 I_{Z(DC)}, with the AC frequency = 1 kHz.

 *Include SZ-prefix devices where applicable.

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

		V _{Z1} (Volts) (Notes 6 and 7)			Z _{ZT1} (Note 8)	V _{Z2} (Volts) (Notes 6 and 7)		Z _{ZT2} (Note 8)		Max Reverse Leakage Current	
	Device	@ I _{ZT1} = 2 mA		@ I _{ZT2} = 0.1 mA		@ I _{ZT2} = 0.5 mA	I _R @ V _R				
Device*	Marking	Min	Nom	Max	Ω	Min	Max	Ω	μΑ	Volts	
MMSZ27T1G/T3G	Y1	25.65	27	28.35	80	25	28.9	300	0.05	18.9	
MMSZ30T1G	Y2	28.50	30	31.50	80	27.8	32	300	0.05	21	
MMSZ33T1G	Y3	31.35	33	34.65	80	30.8	35	325	0.05	23.1	
MMSZ36T1G	Y4	34.20	36	37.80	90	33.8	38	350	0.05	25.2	
MMSZ39T1G	Y5	37.05	39	40.95	130	36.7	41	350	0.05	27.3	
MMSZ43T1G	Z1	40.85	43	45.15	150	39.7	46	375	0.05	30.1	
MMSZ47T1G	Z2	44.65	47	49.35	170	43.7	50	375	0.05	32.9	
MMSZ51T1G	Z3	48.45	51	53.55	180	47.6	54	400	0.05	35.7	
MMSZ56T1G/T3G	Z4	53.20	56	58.80	200	51.5	60	425	0.05	39.2	

^{6.} The type numbers shown have a standard tolerance of $\pm 5\%$ on the nominal Zener Voltage.

Tolerance and Voltage Designation: Zener Voltage (V_Z) is measured with the Zener Current applied for PW = 1 ms.
 Z_{ZT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the AC current applied.
 The specified limits are for I_{Z(AC)} = 0.1 I_{Z(DC)}, with the AC frequency = 1 kHz.

 *Include SZ-prefix devices where applicable.

TYPICAL CHARACTERISTICS

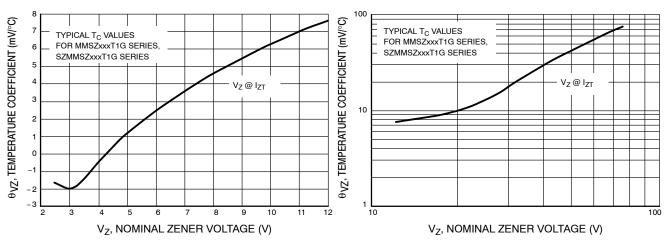


Figure 1. Temperature Coefficients (Temperature Range –55°C to +150°C)

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

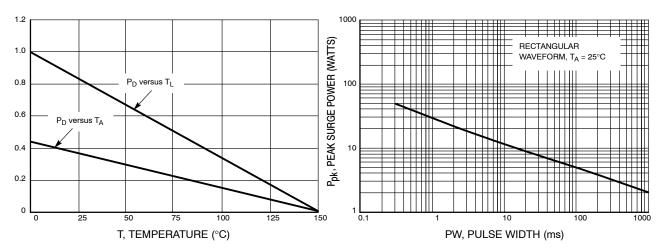


Figure 3. Steady State Power Derating

Figure 4. Maximum Nonrepetitive Surge Power

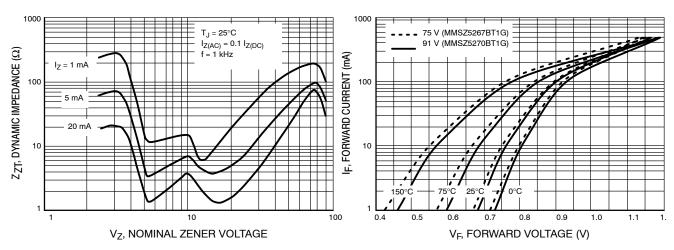


Figure 5. Effect of Zener Voltage on Zener Impedance

Figure 6. Typical Forward Voltage

TYPICAL CHARACTERISTICS

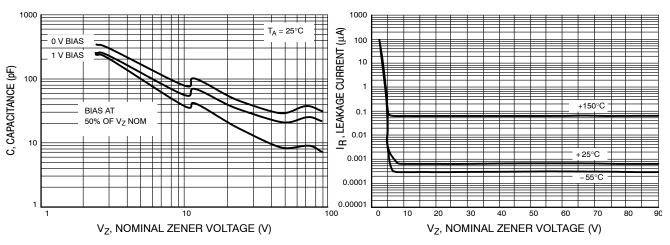


Figure 7. Typical Capacitance

Figure 8. Typical Leakage Current

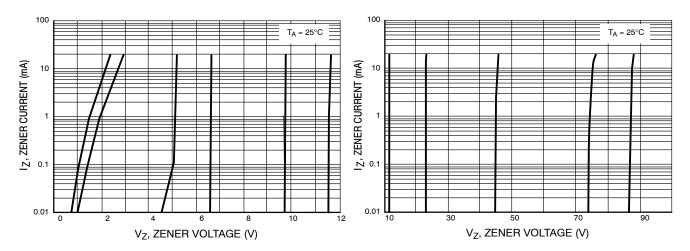


Figure 9. Zener Voltage versus Zener Current (V_Z Up to 12 V)

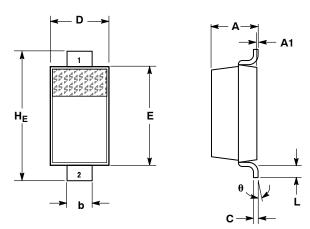
Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)



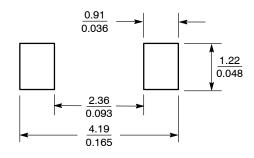
SOD-123 CASE 425-04 ISSUE G

DATE 07 OCT 2009





SOLDERING FOOTPRINT*



SCALE 10:1

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

	M	ILLIMETE	RS	INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX	
Α	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	
С			0.15			0.006	
D	1.40	1.60	1.80	0.055	0.063	0.071	
Е	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°	

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code

= Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

*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.

STYLE 1: PIN 1. CATHODE 2. ANODE

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DESCRIPTION:	SOD-123		PAGE 1 OF 1		

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^{*}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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