

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
- We declare that the material of product compliance with RoHS requirements.

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) @ $T_L = 75^\circ\text{C}$ 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)	$R_{\theta JL}$	150	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

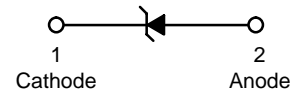
1. FR-5 = 3.5 X 1.5 inches.

2. Thermal Resistance measurement obtained via infrared Scan Method.

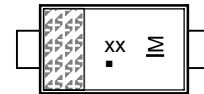
LMSZ2V4T1G Series



SOD-123



MARKING DIAGRAM



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

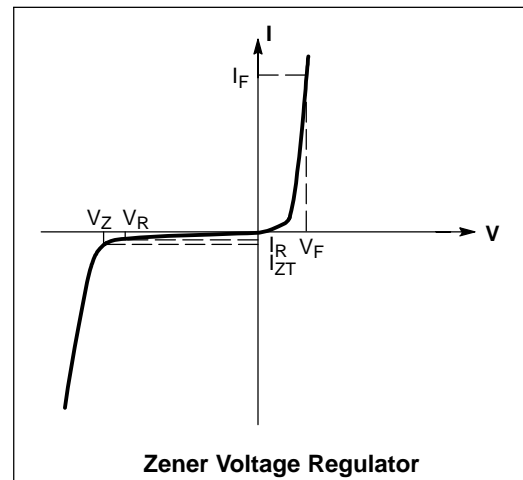
ORDERING INFORMATION

Device	Package	Shipping
LMSZxxxT1G	SOD-123	3000/Tape & Reel
LMSZxxxT3G	SOD-123	10,000/Tape & Reel

LMSZ2V4T1G 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
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



LMSZ2V4T1G Series

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	V _{Z1} (Volts) (Notes 3 and 4)			Z _{ZT1} (Note 5)	V _{Z2} (Volts) (Notes 3 and 4)		Z _{ZT2} (Note 5)	Max Reverse Leakage Current	
		@ I _{ZT1} = 5 mA				@ I _{ZT2} = 1 mA			I _R @ V _R	
		Min	Nom	Max	Ω	Min	Max	Ω	μA	Volts
LMSZ2V4T1G	T1	2.28	2.4	2.52	100	1.7	2.1	600	50	1
LMSZ2V7T1G	T2	2.57	2.7	2.84	100	1.9	2.4	600	20	1
LMSZ3V0T1G*	T3	2.85	3.0	3.15	95	2.1	2.7	600	10	1
LMSZ3V3T1G	T4	3.14	3.3	3.47	95	2.3	2.9	600	5	1
LMSZ3V6T1G	T5	3.42	3.6	3.78	90	2.7	3.3	600	5	1
LMSZ3V9T1G	U1	3.71	3.9	4.10	90	2.9	3.5	600	3	1
LMSZ4V3T1G	U2	4.09	4.3	4.52	90	3.3	4.0	600	3	1
LMSZ4V7T1G	U3	4.47	4.7	4.94	80	3.7	4.7	500	3	2
LMSZ5V1T1G	U4	4.85	5.1	5.36	60	4.2	5.3	480	2	2
LMSZ5V6T1G*	U5	5.32	5.6	5.88	40	4.8	6.0	400	1	2
LMSZ6V2T1G*	V1	5.89	6.2	6.51	10	5.6	6.6	150	3	4
LMSZ6V8T1G	V2	6.46	6.8	7.14	15	6.3	7.2	80	2	4
LMSZ7V5T1G	V3	7.13	7.5	7.88	15	6.9	7.9	80	1	5
LMSZ8V2T1G	V4	7.79	8.2	8.61	15	7.6	8.7	80	0.7	5
LMSZ9V1T1G	V5	8.65	9.1	9.56	15	8.4	9.6	100	0.5	6
LMSZ10T1G	A1	9.50	10	10.50	20	9.3	10.6	150	0.2	7
LMSZ11T1G	A2	10.45	11	11.55	20	10.2	11.6	150	0.1	8
LMSZ12T1G	A3	11.40	12	12.60	25	11.2	12.7	150	0.1	8
LMSZ13T1G	A4	12.35	13	13.65	30	12.3	14.0	170	0.1	8
LMSZ15T1G	A5	14.25	15	15.75	30	13.7	15.5	200	0.05	10.5
LMSZ16T1G	X1	15.20	16	16.80	40	15.2	17.0	200	0.05	11.2
LMSZ18T1G	X2	17.10	18	18.90	45	16.7	19.0	225	0.05	12.6
LMSZ20T1G	X3	19.00	20	21.00	55	18.7	21.1	225	0.05	14
LMSZ22T1G	X4	20.90	22	23.10	55	20.7	23.2	250	0.05	15.4
LMSZ24T1G	X5	22.80	24	25.20	70	22.7	25.5	250	0.05	16.8

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

4. Tolerance and Voltage Designation: Zener Voltage (V_Z) is measured with the Zener Current applied for $PW = 1\text{ ms}$.

5. 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.

*Not Available in the 10,000/Tape & Reel.

LMSZ2V4T1G Series

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	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	
		@ I _{ZT1} = 2 mA					@ I _{ZT2} = 0.1 mA		@ I _{ZT2} = 0.5 mA	I _R @ V _R	
		Min	Nom	Max	Ω		Min	Max	Ω	μA	Volts
LMSZ27T1G	Y1	25.65	27	28.35	80		25	28.9	300	0.05	18.9
LMSZ30T1G*	Y2	28.50	30	31.50	80		27.8	32	300	0.05	21
LMSZ33T1G	Y3	31.35	33	34.65	80		30.8	35	325	0.05	23.1
LMSZ36T1G*	Y4	34.20	36	37.80	90		33.8	38	350	0.05	25.2
LMSZ39T1G*	Y5	37.05	39	40.95	130		36.7	41	350	0.05	27.3
LMSZ43T1G*	Z1	40.85	43	45.15	150		39.7	46	375	0.05	30.1
LMSZ47T1G	Z2	44.65	47	49.35	170		43.7	50	375	0.05	32.9
LMSZ51T1G*	Z3	48.45	51	53.55	180		47.6	54	400	0.05	35.7
LMSZ56T1G	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.

7. Tolerance and Voltage Designation: Zener Voltage (V_Z) is measured with the Zener Current applied for $PW = 1\text{ ms}$.

8. 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.

*Not Available in the 10,000/Tape & Reel.

TYPICAL CHARACTERISTICS

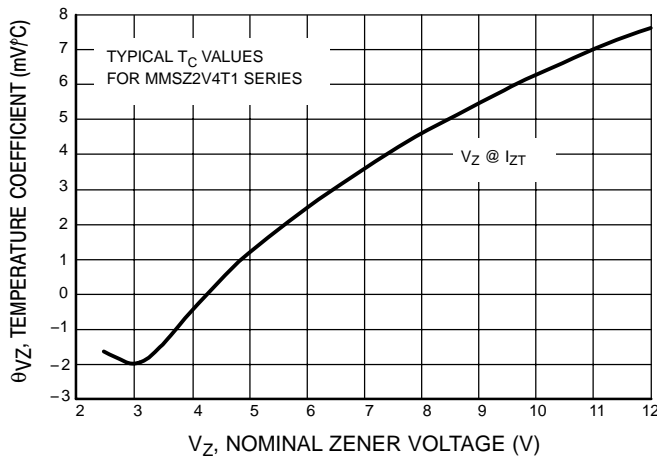


Figure 1. Temperature Coefficients
(Temperature Range -55°C to +150°C)

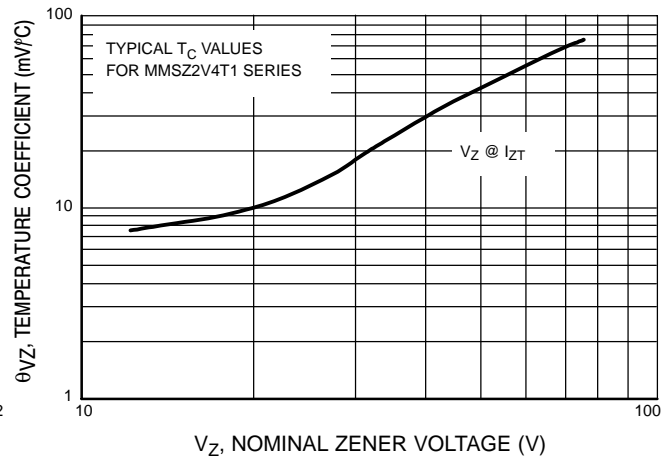


Figure 2. Temperature Coefficients
(Temperature Range -55°C to +150°C)

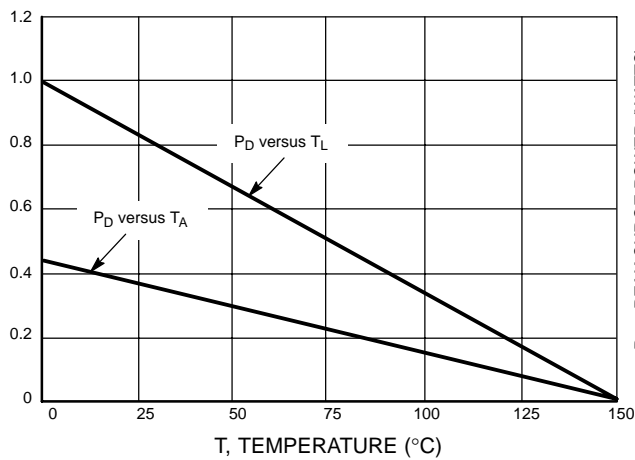


Figure 3. Steady State Power Derating

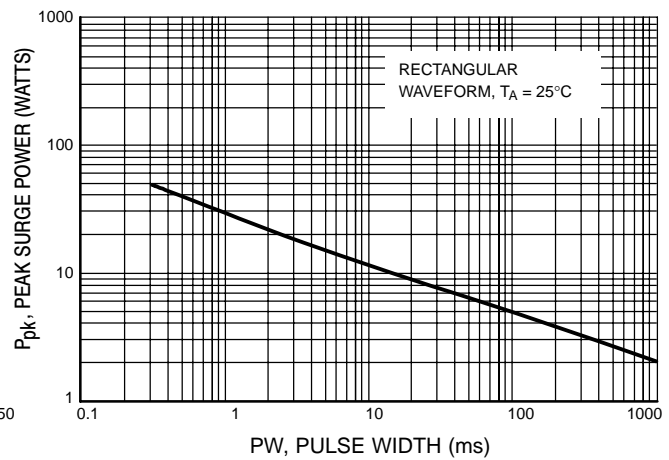


Figure 4. Maximum Nonrepetitive Surge Power

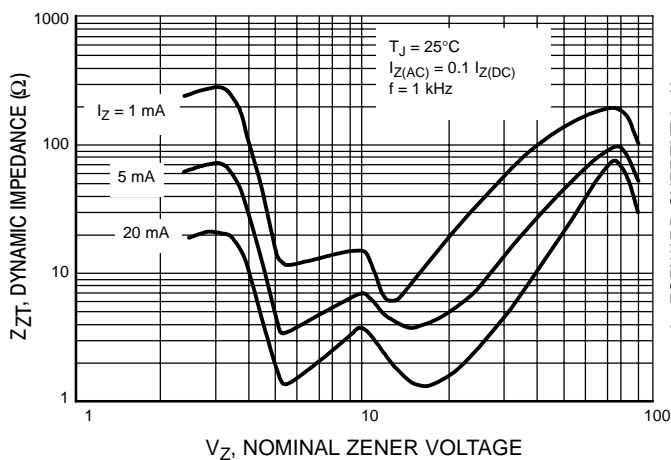


Figure 5. Effect of Zener Voltage on
Zener Impedance

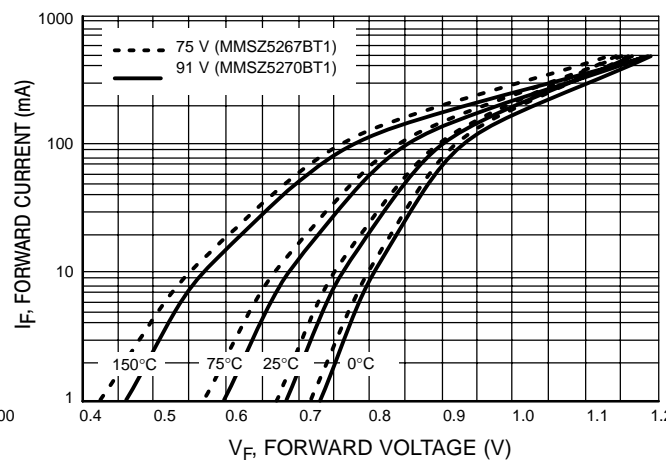


Figure 6. Typical Forward Voltage

LMSZ2V4T1G Series

TYPICAL CHARACTERISTICS

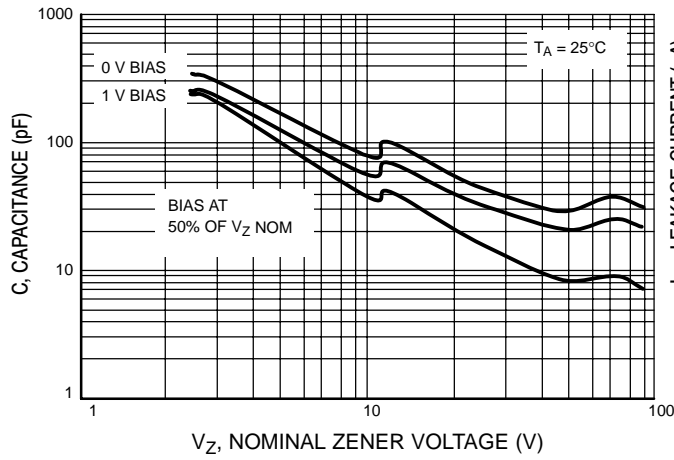


Figure 7. Typical Capacitance

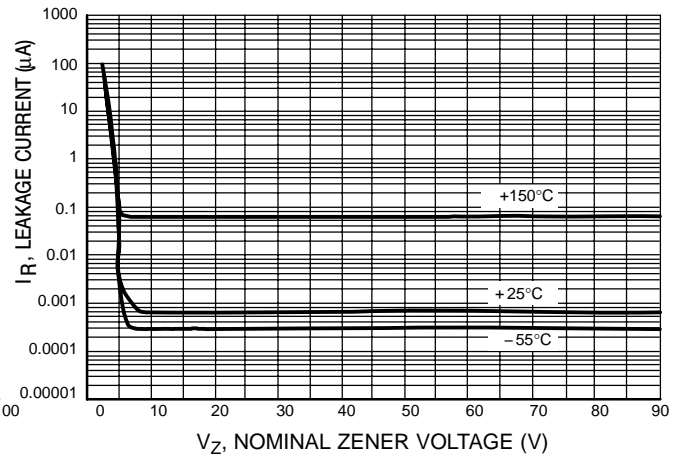


Figure 8. Typical Leakage Current

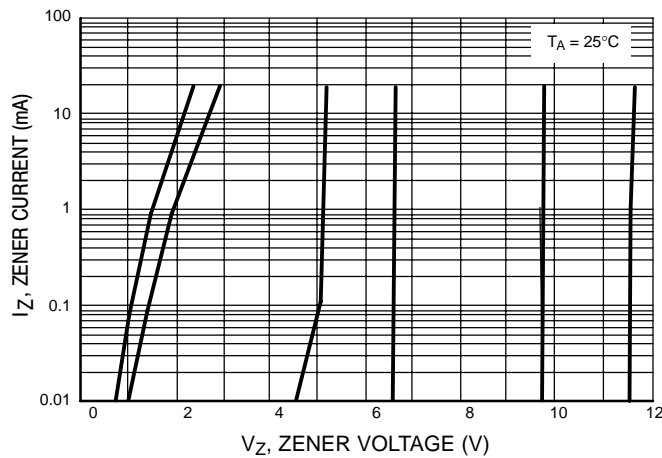


Figure 9. Zener Voltage versus Zener Current (V_Z Up to 12 V)

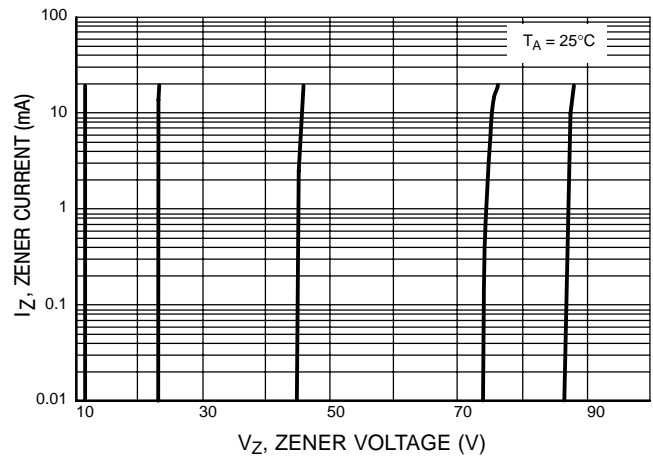
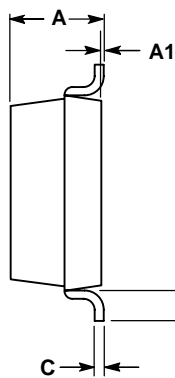
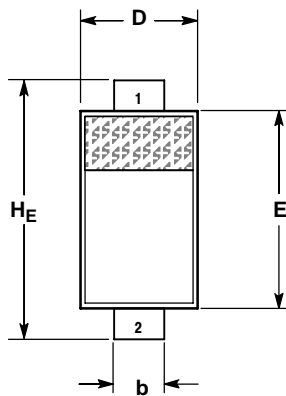


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

LMSZ2V4T1G Series

SOD-123
CASE 425-04
ISSUE E

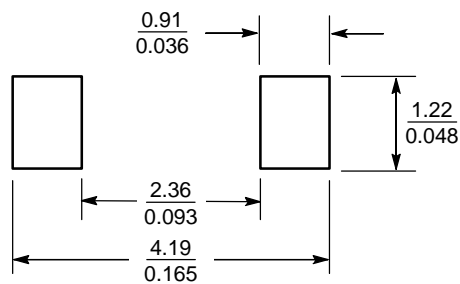


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI
Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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
H _E	3.56	3.68	3.86	0.140	0.145	0.152
L	0.25	---	---	0.010	---	---

STYLE 1:
PIN 1. CATHODE
2. ANODE

SOLDERING FOOTPRINT*



SCALE 10:1 (mm / inches)