

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 110 V
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications
- General Purpose, Medium Current
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

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/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	340	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Lead (Note 2)	$R_{\theta JL}$	150	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

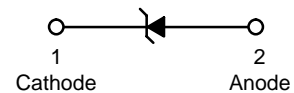
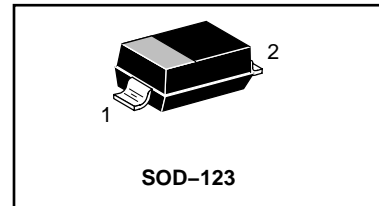
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

1. FR-5 = 3.5 X 1.5 inches, using the minimum recommended footprint.
2. Thermal Resistance measurement obtained via infrared Scan Method.

ORDERING INFORMATION

Device	Package	Shipping
LMSZ5221BT1G Series	SOD-123	3000/Tape & Reel
LMSZ5221BT3G Series	SOD-123	10,000/Tape & Reel

LMSZ5221BT1G Series
S-LMSZ5221BT1G Series



MARKING DIAGRAM

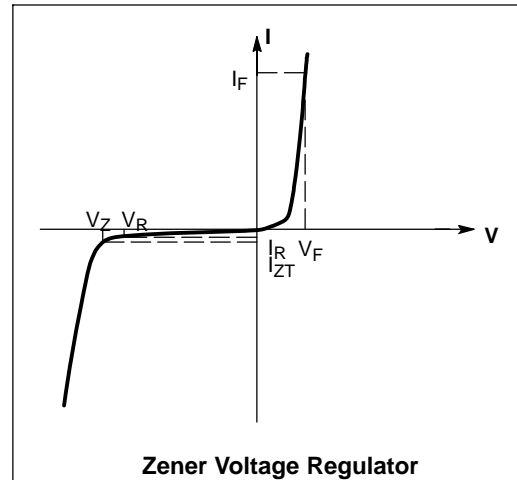


xx = Device Code
M = Date Code

LMSZ5221BT1G Series , S-LMSZ5221BT1G Series

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

Symbol	Parameter
V_Z	Reverse Zener Voltage @ I_{ZT}
I_{ZT}	Reverse Current
Z_{ZT}	Maximum Zener Impedance @ I_{ZT}
I_{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



LMSZ5221BT1G Series , S-LMSZ5221BT1G Series

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 0.9 V Max. @ I_F = 10 mA)

Device	Device Marking	Zener Voltage (Notes 3 and 4)			Zener Impedance (Note 5)			Leakage Current		
		V _Z (Volts)			@ I _{ZT}	Z _{ZT} @ I _{ZT}	Z _{ZK} @ I _{ZK}		I _R @ V _R	
		Min	Nom	Max	mA	Ω	Ω	mA	μA	Volts
LMSZ5221BT1G	C1	2.28	2.4	2.52	20	30	1200	0.25	100	1
LMSZ5222BT1G	C2	2.38	2.5	2.63	20	30	1250	0.25	100	1
LMSZ5223BT1G	C3	2.57	2.7	2.84	20	30	1300	0.25	75	1
LMSZ5224BT1G	C4	2.66	2.8	2.94	20	30	1400	0.25	75	1
LMSZ5225BT1G	C5	2.85	3.0	3.15	20	29	1600	0.25	50	1
LMSZ5226BT1G	D1	3.14	3.3	3.47	20	28	1600	0.25	25	1
LMSZ5227BT1G	D2	3.42	3.6	3.78	20	24	1700	0.25	15	1
LMSZ5228BT1G	D3	3.71	3.9	4.10	20	23	1900	0.25	10	1
LMSZ5229BT1G	D4	4.09	4.3	4.52	20	22	2000	0.25	5	1
LMSZ5230BT1G	D5	4.47	4.7	4.94	20	19	1900	0.25	5	2
LMSZ5231BT1G	E1	4.85	5.1	5.36	20	17	1600	0.25	5	2
LMSZ5232BT1G	E2	5.32	5.6	5.88	20	11	1600	0.25	5	3
LMSZ5233BT1G	E3	5.70	6.0	6.30	20	7	1600	0.25	5	3.5
LMSZ5234BT1G	E4	5.89	6.2	6.51	20	7	1000	0.25	5	4
LMSZ5235BT1G	E5	6.46	6.8	7.14	20	5	750	0.25	3	5
LMSZ5236BT1G	F1	7.13	7.5	7.88	20	6	500	0.25	3	6
LMSZ5237BT1G	F2	7.79	8.2	8.61	20	8	500	0.25	3	6.5
LMSZ5238BT1G	F3	8.27	8.7	9.14	20	8	600	0.25	3	6.5
LMSZ5239BT1G	F4	8.65	9.1	9.56	20	10	600	0.25	3	7
LMSZ5240BT1G	F5	9.50	10	10.50	20	17	600	0.25	3	8
LMSZ5241BT1G	H1	10.45	11	11.55	20	22	600	0.25	2	8.4
LMSZ5242BT1G	H2	11.40	12	12.60	20	30	600	0.25	1	9.1
LMSZ5243BT1G	H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
LMSZ5244BT1G	H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
LMSZ5245BT1G	H5	14.25	15	15.75	8.5	16	600	0.25	0.1	11
LMSZ5246BT1G	J1	15.20	16	16.80	7.8	17	600	0.25	0.1	12
LMSZ5247BT1G	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
LMSZ5248BT1G	J3	17.10	18	18.90	7.0	21	600	0.25	0.1	14
LMSZ5250BT1G	J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
LMSZ5251BT1G	K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
LMSZ5252BT1G	K2	22.80	24	25.20	5.2	33	600	0.25	0.1	18
LMSZ5253BT1G	K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
LMSZ5254BT1G	K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
LMSZ5255BT1G	K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
LMSZ5256BT1G	M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
LMSZ5257BT1G	M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
LMSZ5258BT1G	M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
LMSZ5259BT1G	M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
LMSZ5260BT1G	M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
LMSZ5261BT1G	N1	44.65	47	49.35	2.7	105	1000	0.25	0.1	36
LMSZ5262BT1G	N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
LMSZ5263BT1G	N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
LMSZ5264BT1G	N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
LMSZ5265BT1G	N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
LMSZ5266BT1G	P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
LMSZ5267BT1G	P2	71.25	75	78.75	1.7	270	1700	0.25	0.1	56
LMSZ5268BT1G*	P3	77.90	82	86.10	1.5	330	2000	0.25	0.1	62
LMSZ5269BT1G*	P4	82.65	87	91.35	1.4	370	2200	0.25	0.1	68
LMSZ5270BT1G*	P5	86.45	91	95.55	1.4	400	2300	0.25	0.1	69
LMSZ5272BT1G*	R2	104.5	110	115.5	1.1	750	3000	0.25	0.1	84

* Not production

- The type numbers shown have a standard tolerance of ±5% on the nominal Zener voltage.
- Nominal Zener voltage is measured with the device junction in thermal equilibrium at T_L = 30°C ± 1°C.
- 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.

LMSZ5221BT1G Series , S-LMSZ5221BT1G Series TYPICAL CHARACTERISTICS

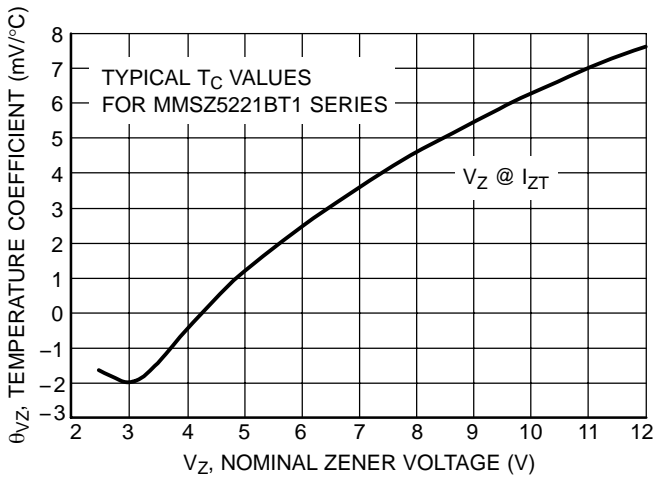


Figure 1. Temperature Coefficients (Temperature Range -55°C to $+150^{\circ}\text{C}$)

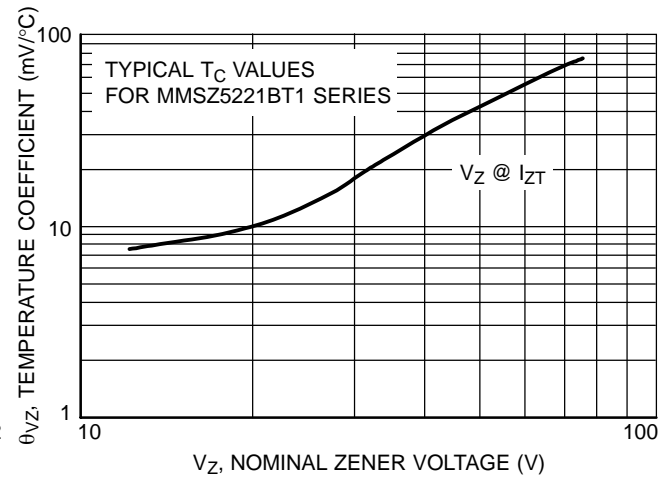


Figure 2. Temperature Coefficients (Temperature Range -55°C to $+150^{\circ}\text{C}$)

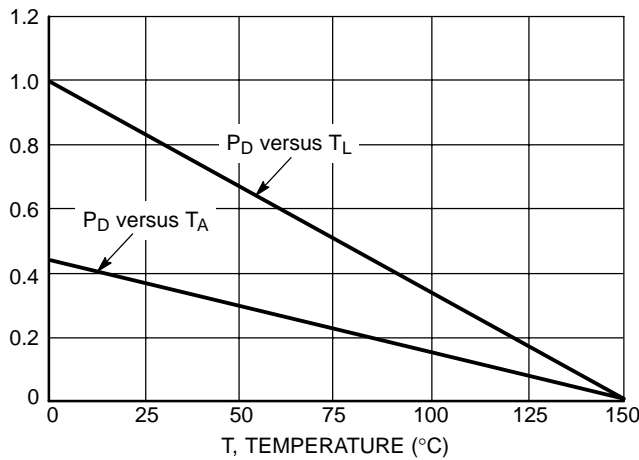


Figure 3. Steady State Power Derating

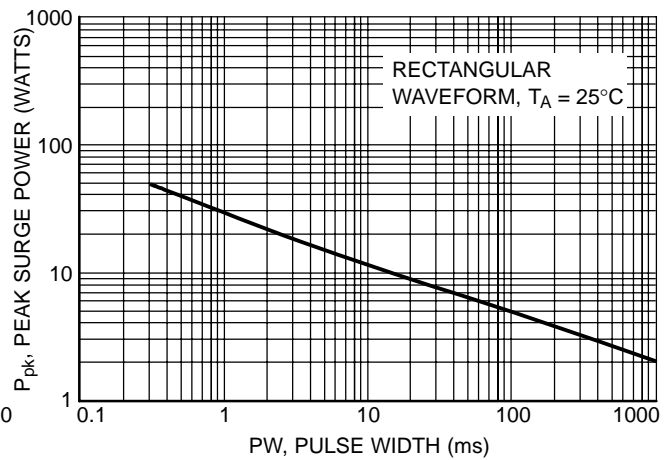


Figure 4. Maximum Nonrepetitive Surge Power

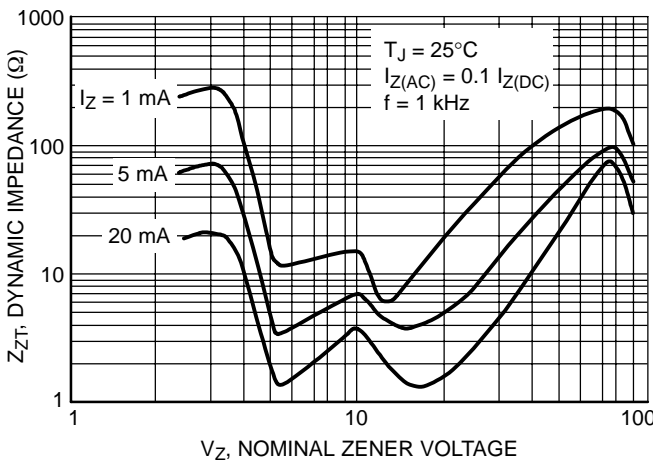


Figure 5. Effect of Zener Voltage on Zener Impedance

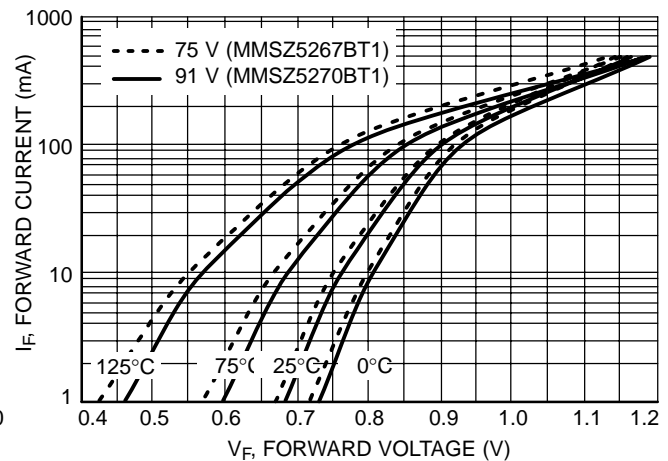


Figure 6. Typical Forward Voltage

LMSZ5221BT1G Series , S-LMSZ5221BT1G Series TYPICAL CHARACTERISTICS

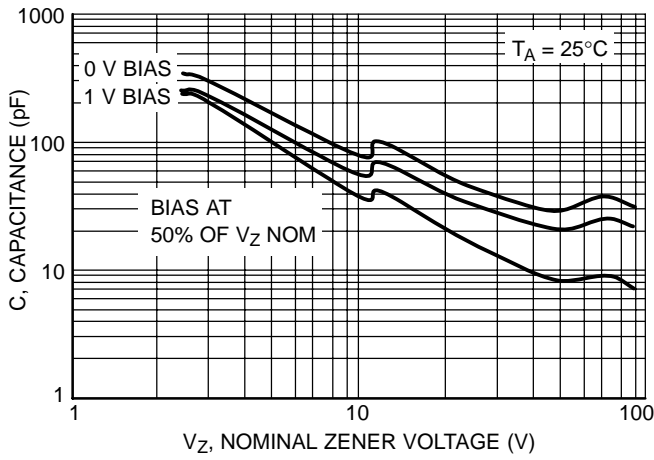


Figure 7. Typical Capacitance

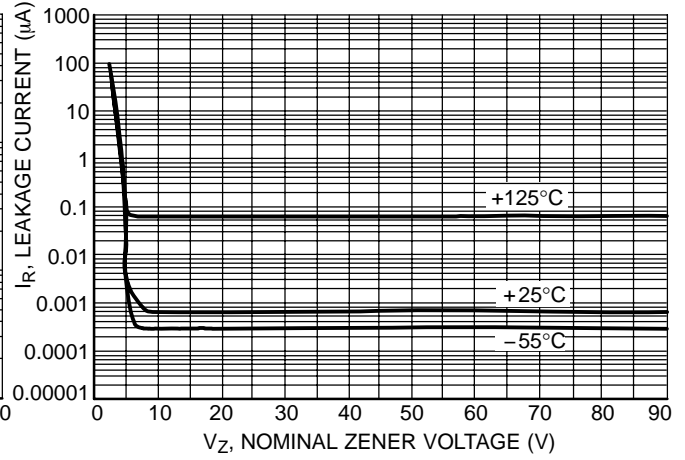


Figure 8. Typical Leakage Current

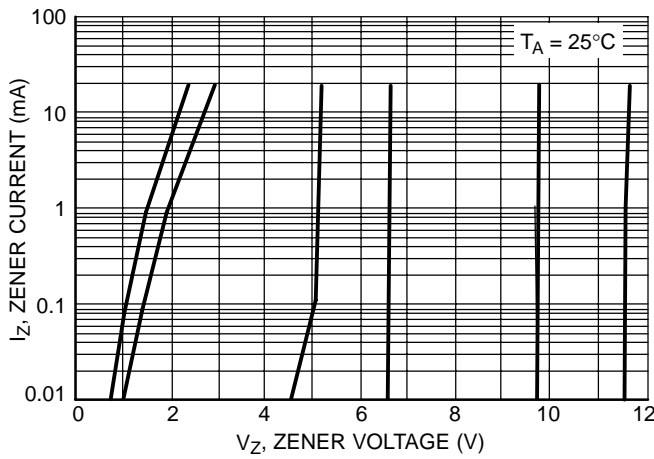


Figure 9. Zener Voltage versus Zener Current
(V_Z Up to 12 V)

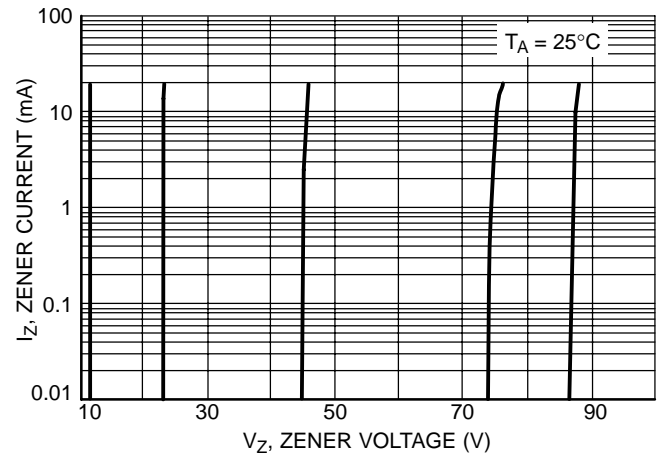
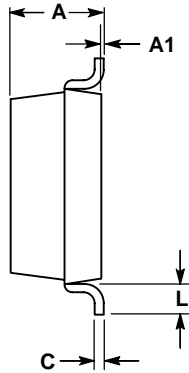
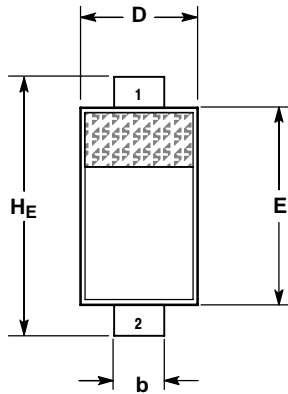


Figure 10. Zener Voltage versus Zener Current
(12 V to 91 V)

LMSZ5221BT1G Series , S-LMSZ5221BT1G Series

SOD-123



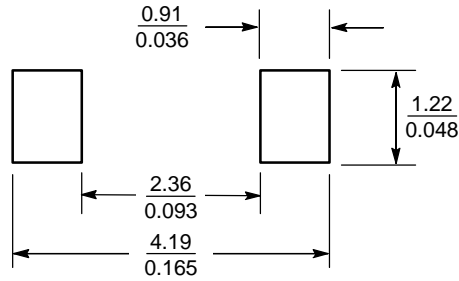
NOTES:

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	---	---

STYLE 1:
PIN 1. CATHODE
2. ANODE

SOLDERING FOOTPRINT*



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

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[1N4745ARL](#) [1N4752ARL](#) [1N4760ARL](#) [1N5221B](#) [1N5242BTR](#) [1N5350B](#) [1N5352B](#) [1N961BRR1](#) [1N964BRL](#) [RKZ5.1BKU#P6](#)
[3SMAJ5946B-TP](#) [3SMAJ5950B-TP](#) [3SMBJ5925B-TP](#) [MMSZ5230BQ-13-F](#) [MMSZ5232BQ-13-F](#) [BZX84C7V5](#) [3SMAJ5945B-TP](#)
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