

## 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 $75^\circ\text{C}$	$P_D$	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	$^\circ\text{C}$

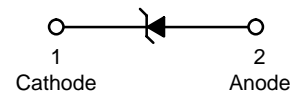
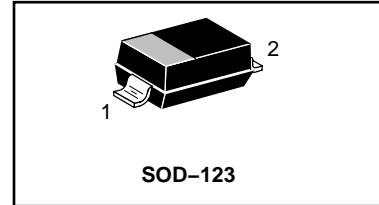
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

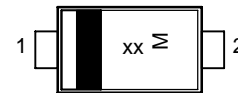
#### ORDERING INFORMATION

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

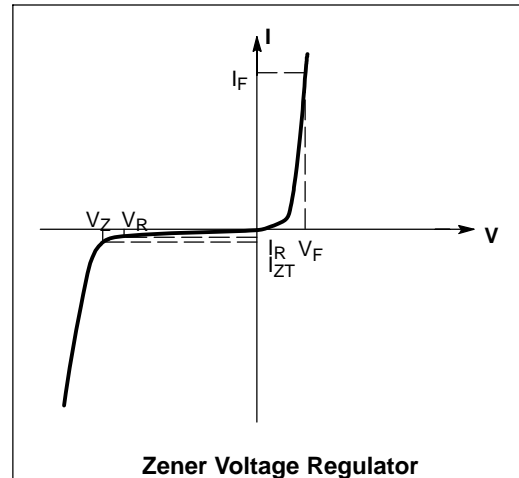


xx = Device Code  
M = Date Code

## 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

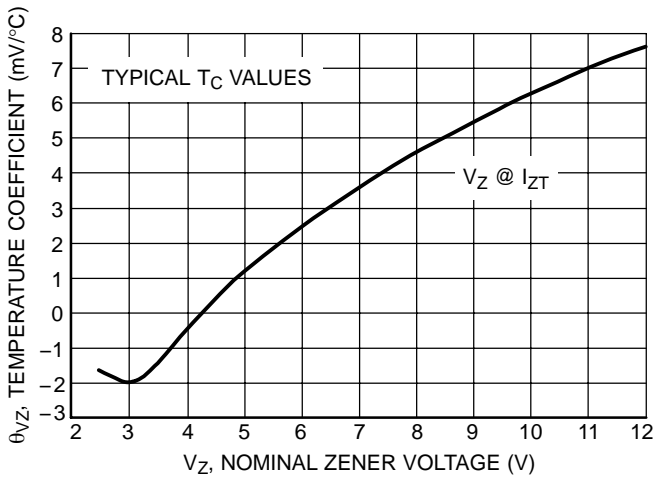
ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted, V<sub>F</sub> = 0.9 V Max. @ I<sub>F</sub> = 10 mA)

Device	Device Marking	Zener Voltage (Notes 3 and 4)			Zener Impedance (Note 5)			Leakage Current		
		V <sub>Z</sub> (Volts)			@ I <sub>ZT</sub>	Z <sub>ZT</sub> @ I <sub>ZT</sub>	Z <sub>ZK</sub> @ I <sub>ZK</sub>		I <sub>R</sub> @ V <sub>R</sub>	
		Min	Nom	Max	mA	Ω	Ω	mA	μA	Volts
<b>LMSZ5221BT1G</b>	<b>C1</b>	<b>2.28</b>	<b>2.4</b>	<b>2.52</b>	<b>20</b>	<b>30</b>	<b>1200</b>	<b>0.25</b>	<b>100</b>	<b>1</b>
<b>LMSZ5222BT1G</b>	<b>C2</b>	<b>2.38</b>	<b>2.5</b>	<b>2.63</b>	<b>20</b>	<b>30</b>	<b>1250</b>	<b>0.25</b>	<b>100</b>	<b>1</b>
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
<b>LMSZ5225BT1G</b>	<b>C5</b>	<b>2.85</b>	<b>3.0</b>	<b>3.15</b>	<b>20</b>	<b>29</b>	<b>1600</b>	<b>0.25</b>	<b>50</b>	<b>1</b>
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
<b>LMSZ5229BT1G</b>	<b>D4</b>	<b>4.09</b>	<b>4.3</b>	<b>4.52</b>	<b>20</b>	<b>22</b>	<b>2000</b>	<b>0.25</b>	<b>5</b>	<b>1</b>
<b>LMSZ5230BT1G</b>	<b>D5</b>	<b>4.47</b>	<b>4.7</b>	<b>4.94</b>	<b>20</b>	<b>19</b>	<b>1900</b>	<b>0.25</b>	<b>5</b>	<b>2</b>
<b>LMSZ5231BT1G</b>	<b>E1</b>	<b>4.85</b>	<b>5.1</b>	<b>5.36</b>	<b>20</b>	<b>17</b>	<b>1600</b>	<b>0.25</b>	<b>5</b>	<b>2</b>
<b>LMSZ5232BT1G</b>	<b>E2</b>	<b>5.32</b>	<b>5.6</b>	<b>5.88</b>	<b>20</b>	<b>11</b>	<b>1600</b>	<b>0.25</b>	<b>5</b>	<b>3</b>
LMSZ5233BT1G	E3	5.70	6.0	6.30	20	7	1600	0.25	5	3.5
<b>LMSZ5234BT1G</b>	<b>E4</b>	<b>5.89</b>	<b>6.2</b>	<b>6.51</b>	<b>20</b>	<b>7</b>	<b>1000</b>	<b>0.25</b>	<b>5</b>	<b>4</b>
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
<b>LMSZ5240BT1G</b>	<b>F5</b>	<b>9.50</b>	<b>10</b>	<b>10.50</b>	<b>20</b>	<b>17</b>	<b>600</b>	<b>0.25</b>	<b>3</b>	<b>8</b>
LMSZ5241BT1G	H1	10.45	11	11.55	20	22	600	0.25	2	8.4
<b>LMSZ5242BT1G</b>	<b>H2</b>	<b>11.40</b>	<b>12</b>	<b>12.60</b>	<b>20</b>	<b>30</b>	<b>600</b>	<b>0.25</b>	<b>1</b>	<b>9.1</b>
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
<b>LMSZ5245BT1G</b>	<b>H5</b>	<b>14.25</b>	<b>15</b>	<b>15.75</b>	<b>8.5</b>	<b>16</b>	<b>600</b>	<b>0.25</b>	<b>0.1</b>	<b>11</b>
<b>LMSZ5246BT1G</b>	<b>J1</b>	<b>15.20</b>	<b>16</b>	<b>16.80</b>	<b>7.8</b>	<b>17</b>	<b>600</b>	<b>0.25</b>	<b>0.1</b>	<b>12</b>
LMSZ5247BT1G	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
<b>LMSZ5248BT1G</b>	<b>J3</b>	<b>17.10</b>	<b>18</b>	<b>18.90</b>	<b>7.0</b>	<b>21</b>	<b>600</b>	<b>0.25</b>	<b>0.1</b>	<b>14</b>
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
<b>LMSZ5252BT1G</b>	<b>K2</b>	<b>22.80</b>	<b>24</b>	<b>25.20</b>	<b>5.2</b>	<b>33</b>	<b>600</b>	<b>0.25</b>	<b>0.1</b>	<b>18</b>
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
<b>LMSZ5261BT1G</b>	<b>N1</b>	<b>44.65</b>	<b>47</b>	<b>49.35</b>	<b>2.7</b>	<b>105</b>	<b>1000</b>	<b>0.25</b>	<b>0.1</b>	<b>36</b>
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

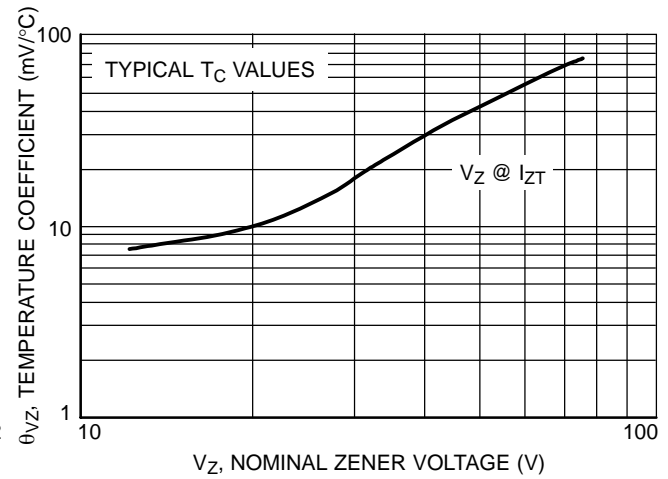
\* Not production

- 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<sub>L</sub> = 30°C ± 1°C.
- Z<sub>ZT</sub> and Z<sub>ZK</sub> are measured by dividing the AC voltage drop across the device by the ac current applied. The specified limits are for I<sub>Z(AC)</sub> = 0.1 I<sub>Z(dc)</sub> with the AC frequency = 1 KHz.

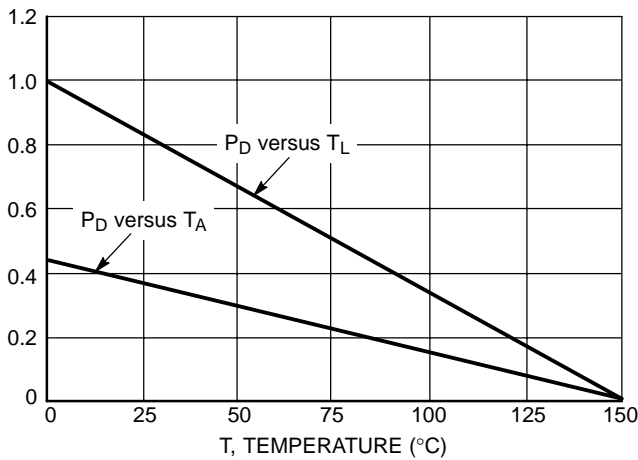
## LMSZ5221BT1G Series , S-LMSZ5221BT1G Series TYPICAL CHARACTERISTICS



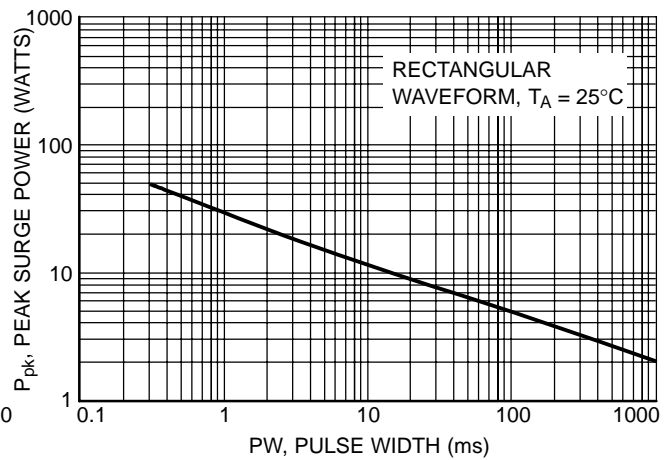
**Figure 1. Temperature Coefficients**  
(Temperature Range -55°C to +150°C)



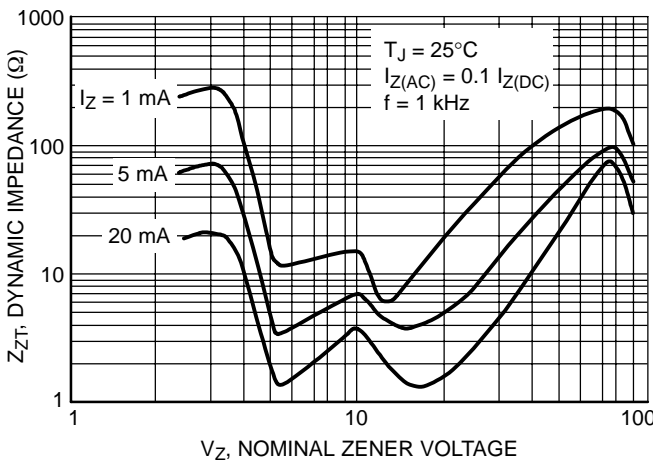
**Figure 2. Temperature Coefficients**  
(Temperature Range -55°C to +150°C)



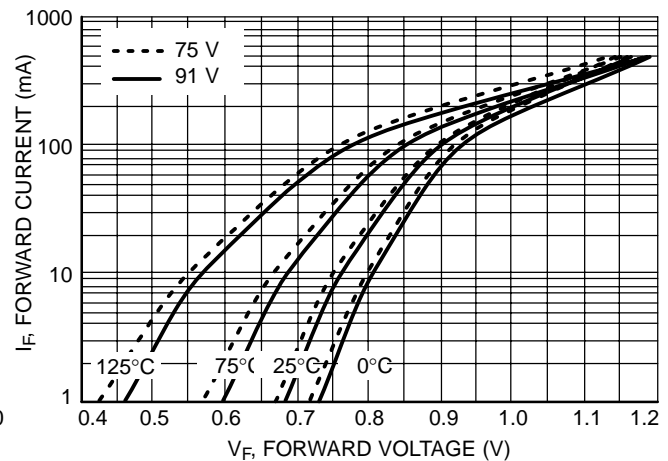
**Figure 3. Steady State Power Derating**



**Figure 4. Maximum Nonrepetitive Surge Power**



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



**Figure 6. Typical Forward Voltage**

## LMSZ5221BT1G Series , S-LMSZ5221BT1G Series TYPICAL CHARACTERISTICS

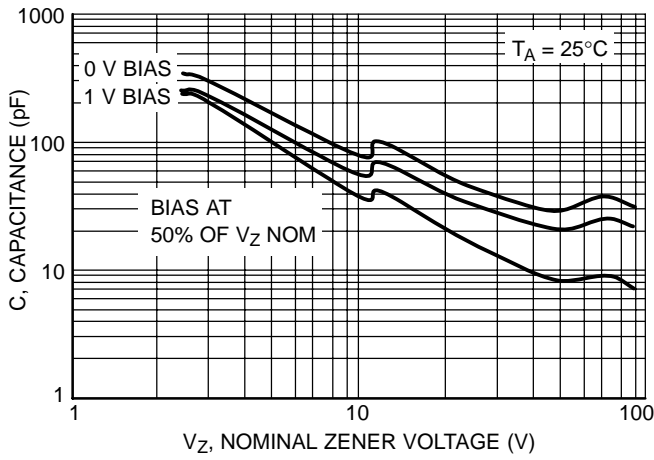


Figure 7. Typical Capacitance

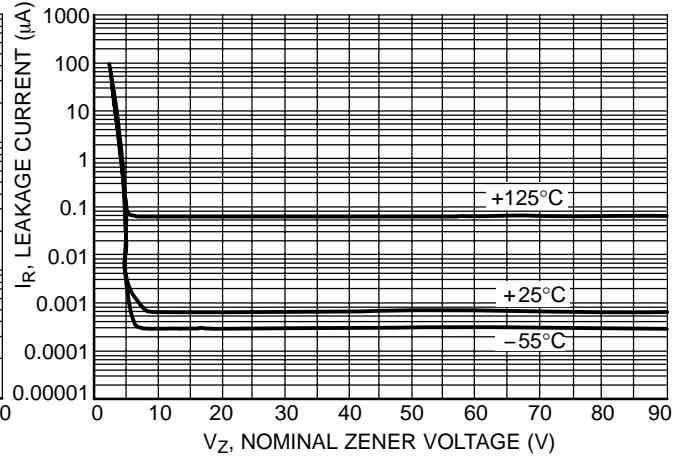


Figure 8. Typical Leakage Current

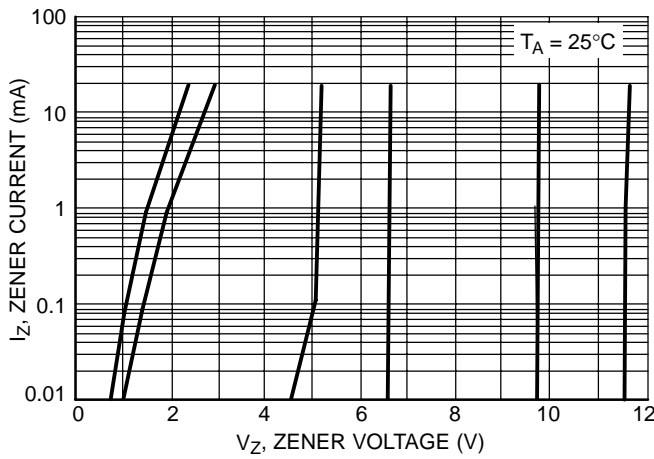


Figure 9. Zener Voltage versus Zener Current  
( $V_Z$  Up to 12 V)

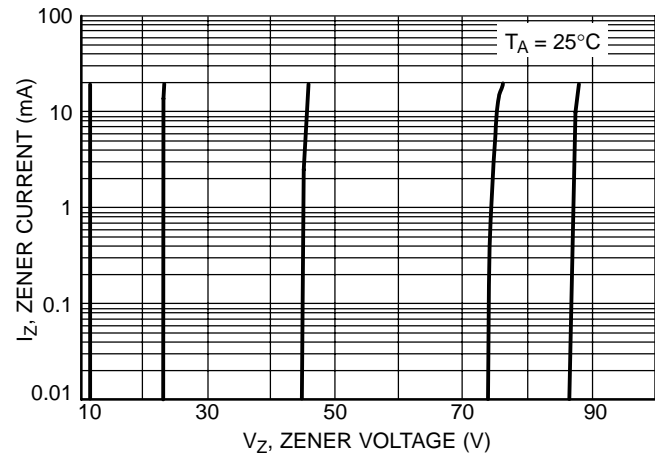
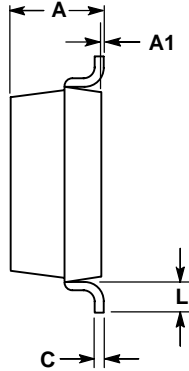
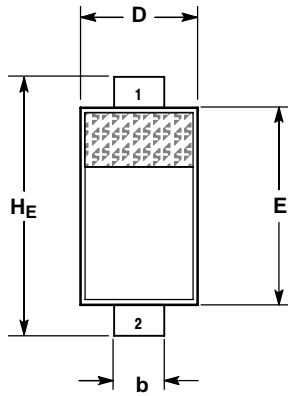


Figure 10. Zener Voltage versus Zener Current  
(12 V to 91 V)

## LMSZ5221BT1G Series , S-LMSZ5221BT1G Series

SOD-123



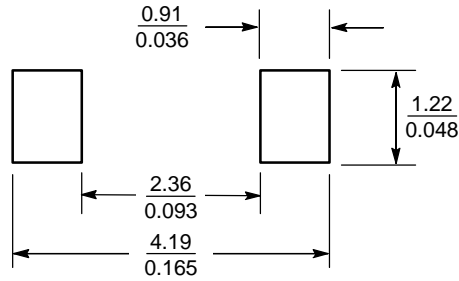
NOTES:

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 (mm/inches)

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