



# MMSZ5221BG THRU MMSZ5272BG

Zener Voltage Regulator Dildes

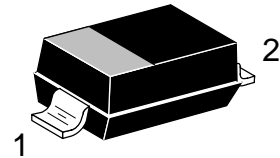
## 500 mW SOD-123 Surface Mount

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.

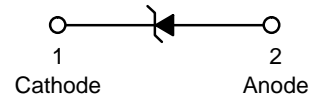
### Features

- 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

## MMSZ52xxBG SERIES



SOD-123



### 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:** UL94 V-0

### Maximum Ratings

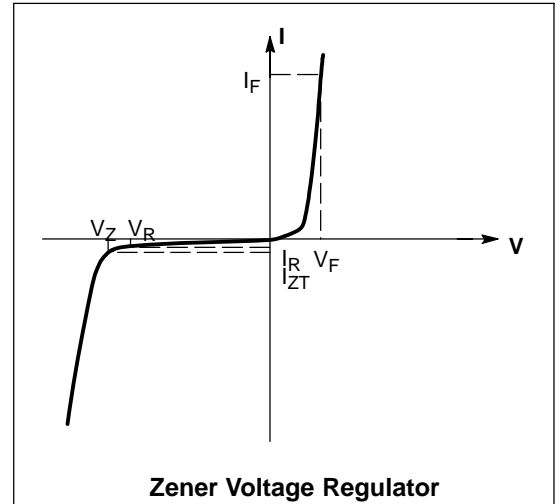
Rating	Symbol	Max	Unit
Total Power Dissipation on FR-5 Board, (Note 1) @ $T_L = 75^\circ\text{C}$ Derated above $75^\circ\text{C}$	$P_D$	500 6.7	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	340	°C/W
Thermal Resistance, Junction-to-Lead (Note 2)	$R_{\theta JL}$	150	°C/W
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +125	°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.

**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 @ $I_{ZT}$
$I_{ZK}$	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 @ $I_F$





# MMSZ5221BG THRU MMSZ5272BG

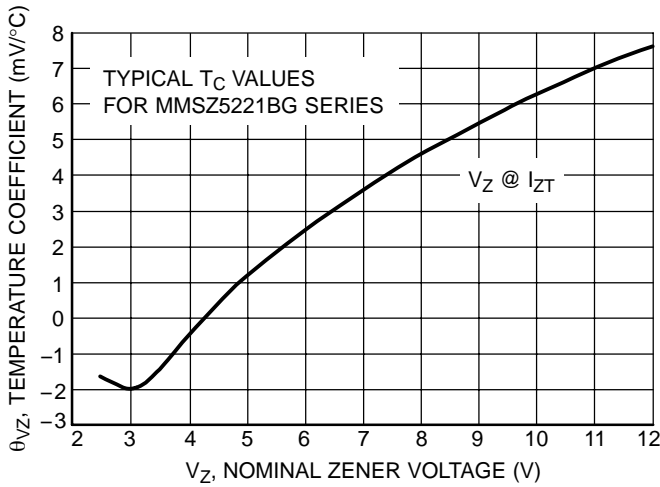
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V Max.}$  @  $I_F = 10\text{ mA}$ )

Device	Device Marking	Zener Voltage (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	$\Omega$	$\Omega$	mA	$\mu\text{A}$	Volts
<b>MMSZ5221BG</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>MMSZ5222BG</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>
MMSZ5223BG	C3	2.57	2.7	2.84	20	30	1300	0.25	75	1
MMSZ5224BG	C4	2.66	2.8	2.94	20	30	1400	0.25	75	1
<b>MMSZ5225BG</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>
MMSZ5226BG	D1	3.14	3.3	3.47	20	28	1600	0.25	25	1
MMSZ5227BG	D2	3.42	3.6	3.78	20	24	1700	0.25	15	1
MMSZ5228BG	D3	3.71	3.9	4.10	20	23	1900	0.25	10	1
<b>MMSZ5229BG</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>MMSZ5230BG</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>MMSZ5231BG</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>MMSZ5232BG</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>
MMSZ5233BG	E3	5.70	6.0	6.30	20	7	1600	0.25	5	3.5
<b>MMSZ5234BG</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>
MMSZ5235BG	E5	6.46	6.8	7.14	20	5	750	0.25	3	5
MMSZ5236BG	F1	7.13	7.5	7.88	20	6	500	0.25	3	6
MMSZ5237BG	F2	7.79	8.2	8.61	20	8	500	0.25	3	6.5
MMSZ5238BG	F3	8.27	8.7	9.14	20	8	600	0.25	3	6.5
MMSZ5239BG	F4	8.65	9.1	9.56	20	10	600	0.25	3	7
<b>MMSZ5240BG</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>
MMSZ5241BG	H1	10.45	11	11.55	20	22	600	0.25	2	8.4
<b>MMSZ5242BG</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>
MMSZ5243BG	H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
MMSZ5244BG	H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
<b>MMSZ5245BG</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>MMSZ5246BG</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>
MMSZ5247BG	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
<b>MMSZ5248BG</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>
MMSZ5250BG	J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
MMSZ5251BG	K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
<b>MMSZ5252BG</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>
MMSZ5253BG	K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
MMSZ5254BG	K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
MMSZ5255BG	K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
MMSZ5256BG	M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
MMSZ5257BG	M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
MMSZ5258BG	M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
MMSZ5259BG	M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
MMSZ5260BG	M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
<b>MMSZ5261BG</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>
MMSZ5262BG	N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
MMSZ5263BG	N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
MMSZ5264BG	N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
MMSZ5265BG	N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
MMSZ5266BG	P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
MMSZ5267BG	P2	71.25	75	78.75	1.7	270	1700	0.25	0.1	56
MMSZ5268BG	P3	77.90	82	86.10	1.5	330	2000	0.25	0.1	62
MMSZ5269BG	P4	82.65	87	91.35	1.4	370	2200	0.25	0.1	68
MMSZ5270BG	P5	86.45	91	95.55	1.4	400	2300	0.25	0.1	69
MMSZ5272BG	R2	104.5	110	115.5	1.1	750	3000	0.25	0.1	84

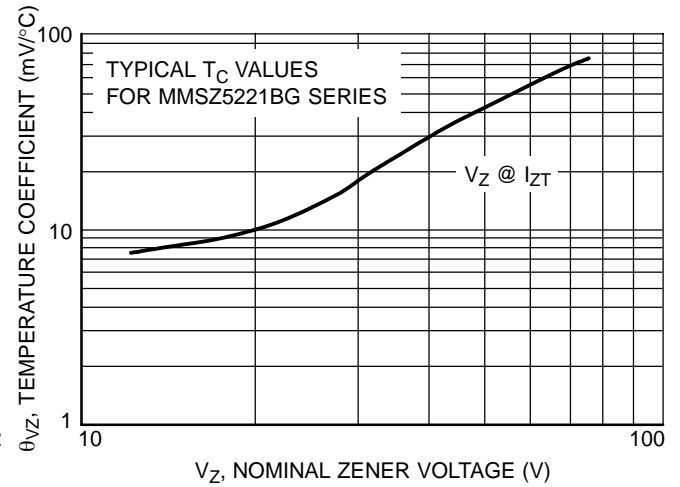
- The type numbers shown have a standard tolerance of  $\pm 5\%$  on the nominal Zener voltage.
- Nominal Zener voltage is measured with the device junction in thermal equilibrium at  $T_L = 30^\circ\text{C} \pm 1^\circ\text{C}$ .
- $Z_{ZT}$  and  $Z_{ZK}$  are measured by dividing the AC voltage drop 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.



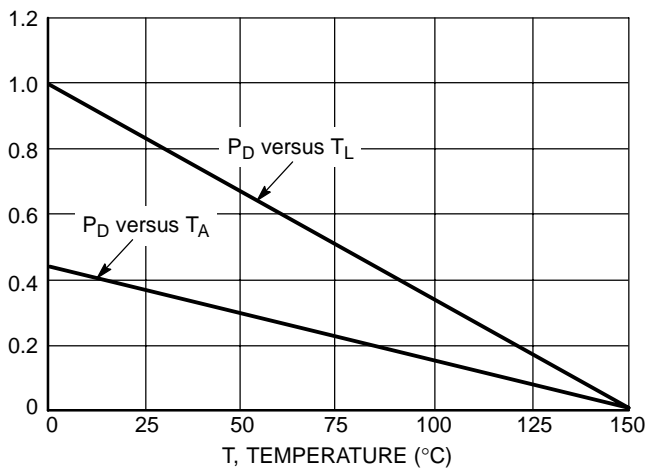
## Typical Characteristics



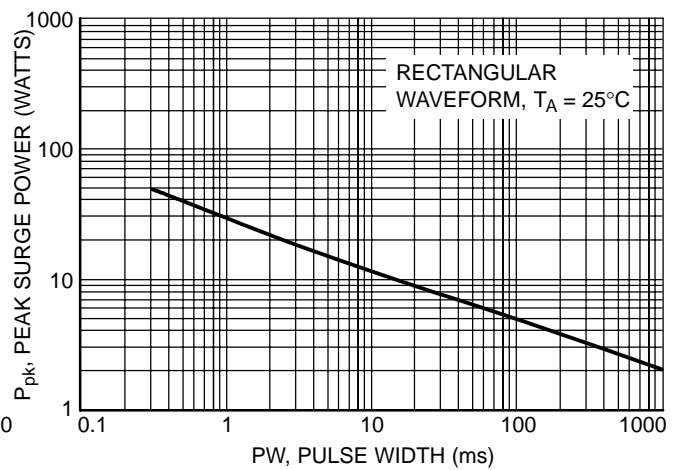
**Figure 1. Temperature Coefficients (Temperature Range -55°C to +150°C)**



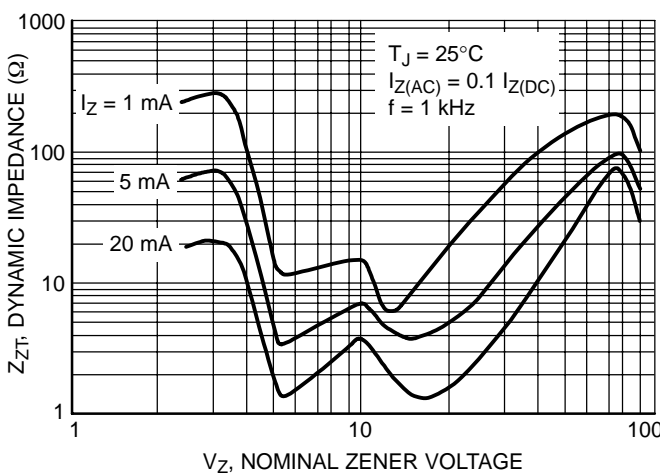
**Figure 2. Temperature Coefficients (Temperature Range -55°C to +150°C)**



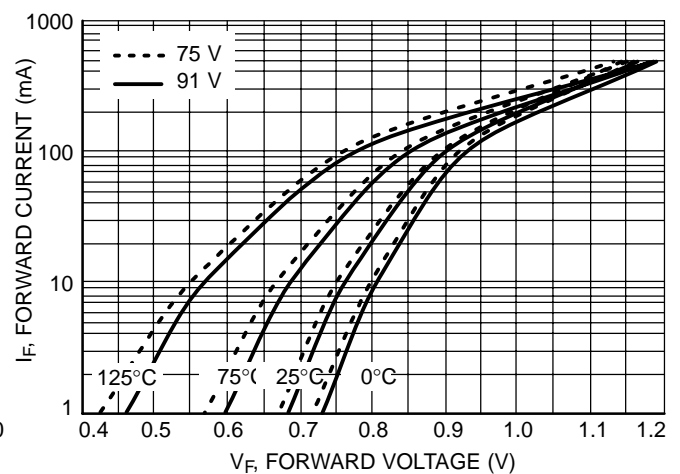
**Figure 3. Steady State Power Derating**



**Figure 4. Maximum Nonrepetitive Surge Power**



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



**Figure 6. Typical Forward Voltage**

## Typical Characteristics

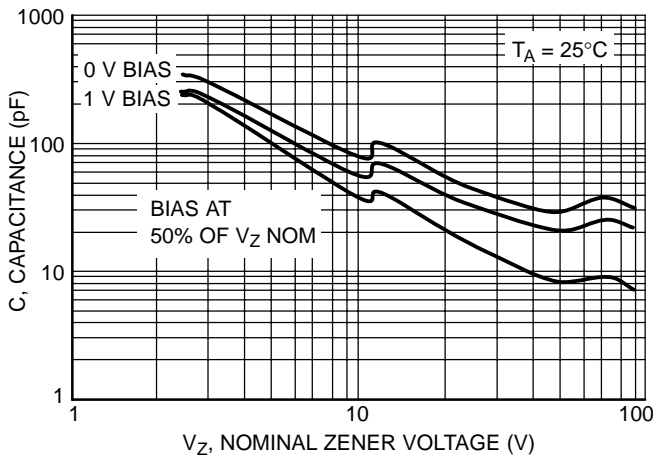


Figure 7. Typical Capacitance

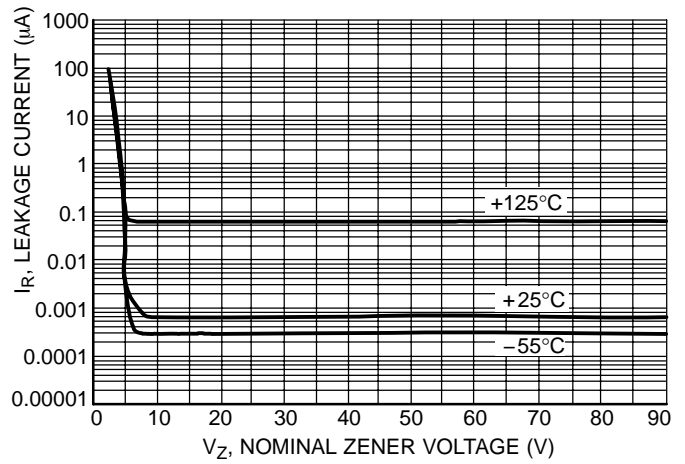


Figure 8. Typical Leakage Current

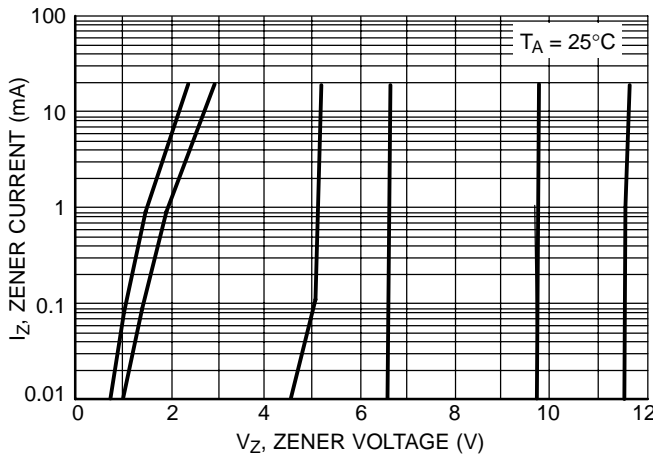


Figure 9. Zener Voltage versus Zener Current (V<sub>Z</sub> Up to 12 V)

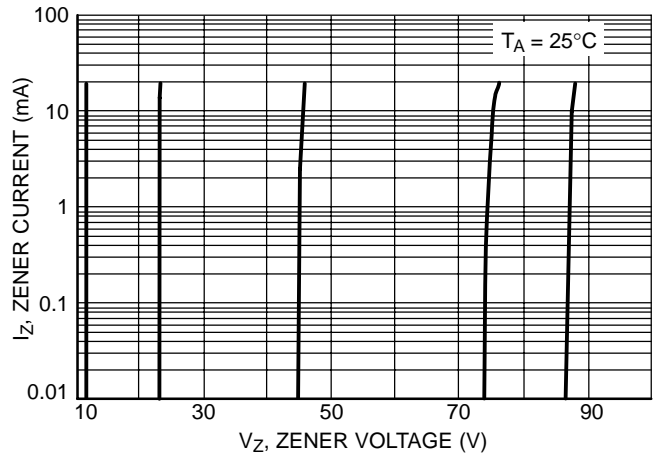
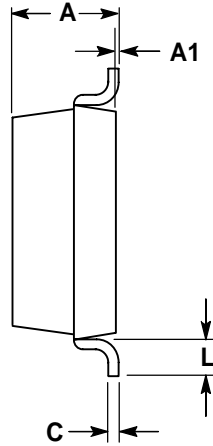
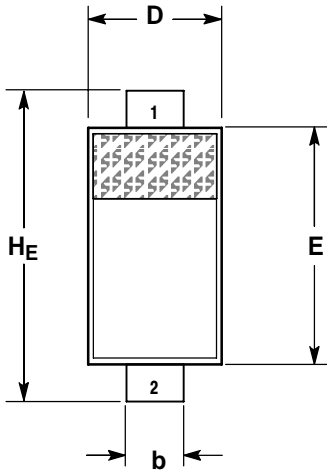


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

## Package Dimensions

### SOD-123



**NOTES:**

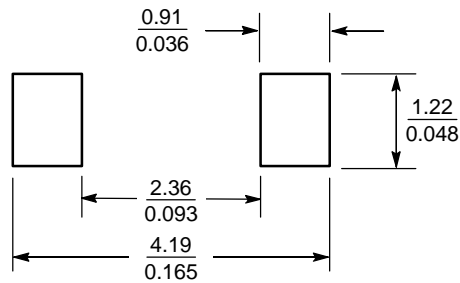
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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
- PIN 2. ANODE

### SOLDERING FOOTPRINT\*



SCALE 10:1 (mm/inches)