

# 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	$^\circ\text{C}$

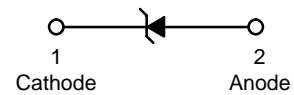
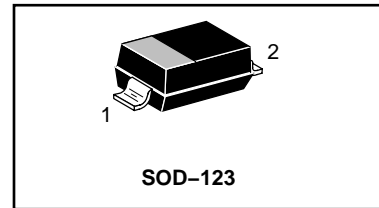
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

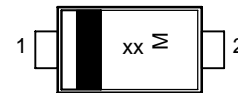
### ORDERING INFORMATION

Device	Package	Shipping
MSZ52xxB Series	SOD-123	3000/Tape & Reel

**MSZ52xxB Series**  
**S-MSZ52xxB Series**



### MARKING DIAGRAM



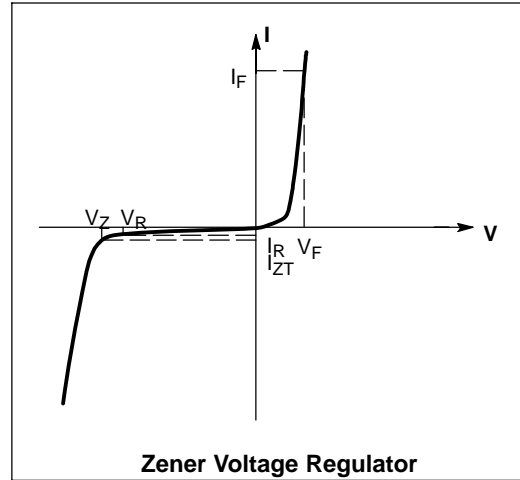
xx = Device Code  
M = Date Code



## MSZ52xxB Series , S-MSZ52xxB 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 @ $I_F$



## MSZ52xxB Series , S-MSZ52xxB Series

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

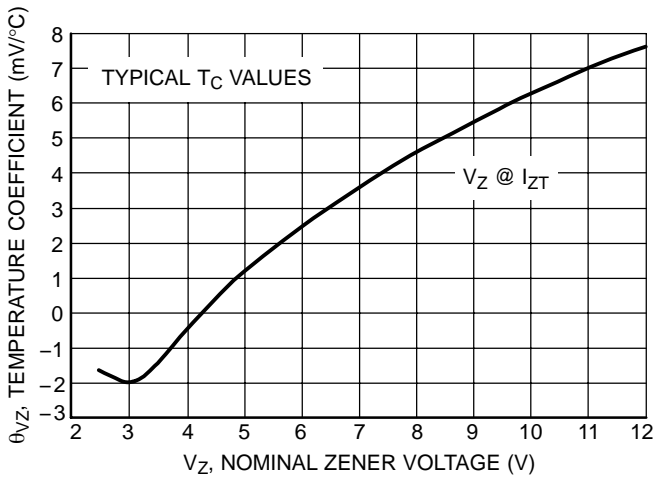
Device	Device Marking	Zener Voltage (Notes 3 and 4)				Zener Impedance (Note 5)			Leakage Current	
		$V_Z$ (Volts)			@ $I_{ZT}$	$Z_{ZT}$ @ $I_{ZT}$	$Z_{ZK}$ @ $I_{ZK}$		$I_R$ @ $V_R$	
		Min	Nom	Max	mA	$\Omega$	$\Omega$	mA	$\mu\text{A}$	Volts
<b>MSZ5221B</b>	<b>C1</b>	<b>2.28</b>	<b>2.4</b>	<b>2.52</b>	<b>20</b>	<b>30</b>	<b>1200</b>	<b>0.25</b>	<b>100</b>	<b>1</b>
<b>MSZ5222B</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>
MSZ5223B	C3	2.57	2.7	2.84	20	30	1300	0.25	75	1
MSZ5224B	C4	2.66	2.8	2.94	20	30	1400	0.25	75	1
<b>MSZ5225B</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>
MSZ5226B	D1	3.14	3.3	3.47	20	28	1600	0.25	25	1
MSZ5227B	D2	3.42	3.6	3.78	20	24	1700	0.25	15	1
MSZ5228B	D3	3.71	3.9	4.10	20	23	1900	0.25	10	1
<b>MSZ5229B</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>MSZ5230B</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>MSZ5231B</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>MSZ5232B</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>
MSZ5233B	E3	5.70	6.0	6.30	20	7	1600	0.25	5	3.5
<b>MSZ5234B</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>
MSZ5235B	E5	6.46	6.8	7.14	20	5	750	0.25	3	5
MSZ5236B	F1	7.13	7.5	7.88	20	6	500	0.25	3	6
MSZ5237B	F2	7.79	8.2	8.61	20	8	500	0.25	3	6.5
MSZ5238B	F3	8.27	8.7	9.14	20	8	600	0.25	3	6.5
MSZ5239B	F4	8.65	9.1	9.56	20	10	600	0.25	3	7
<b>MSZ5240B</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>
MSZ5241B	H1	10.45	11	11.55	20	22	600	0.25	2	8.4
<b>MSZ5242B</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>
MSZ5243B	H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
MSZ5244B	H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
<b>MSZ5245B</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>MSZ5246B</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>
MSZ5247B	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
<b>MSZ5248B</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>
MSZ5250B	J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
MSZ5251B	K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
<b>MSZ5252B</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>
MSZ5253B	K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
MSZ5254B	K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
MSZ5255B	K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
MSZ5256B	M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
MSZ5257B	M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
MSZ5258B	M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
MSZ5259B	M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
MSZ5260B	M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
<b>MSZ5261B</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>
MSZ5262B	N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
MSZ5263B	N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
MSZ5264B	N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
MSZ5265B	N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
MSZ5266B	P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
MSZ5267B	P2	71.25	75	78.75	1.7	270	1700	0.25	0.1	56

3. The type numbers shown have a standard tolerance of  $\pm 5\%$  on the nominal Zener voltage.
4. Nominal Zener voltage is measured with the device junction in thermal equilibrium at  $T_L = 30^\circ\text{C} \pm 1^\circ\text{C}$ .
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.

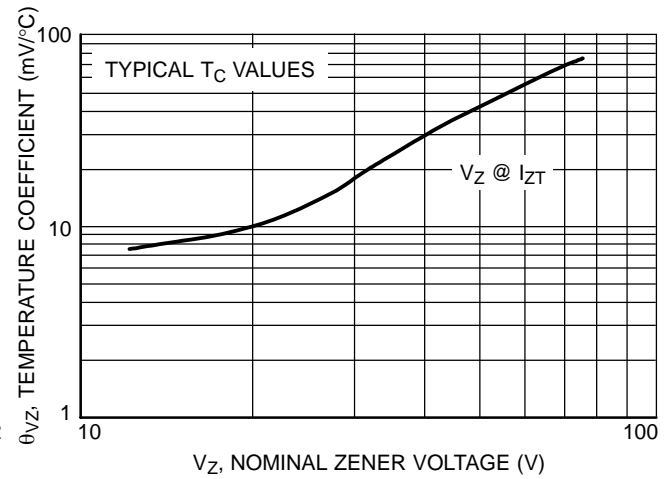


## MSZ52xxB Series , S-MSZ52xxB Series

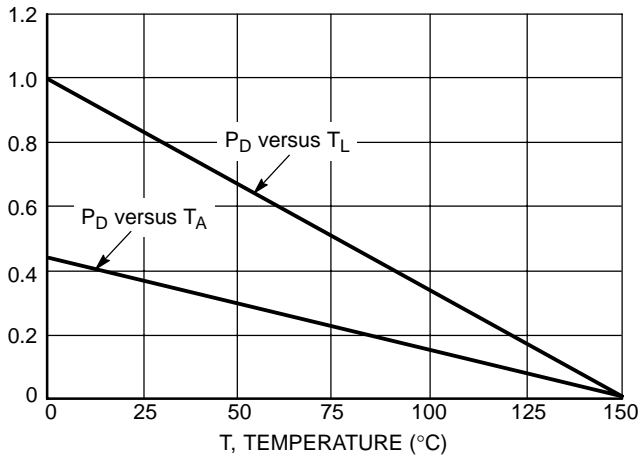
### TYPICAL CHARACTERISTICS



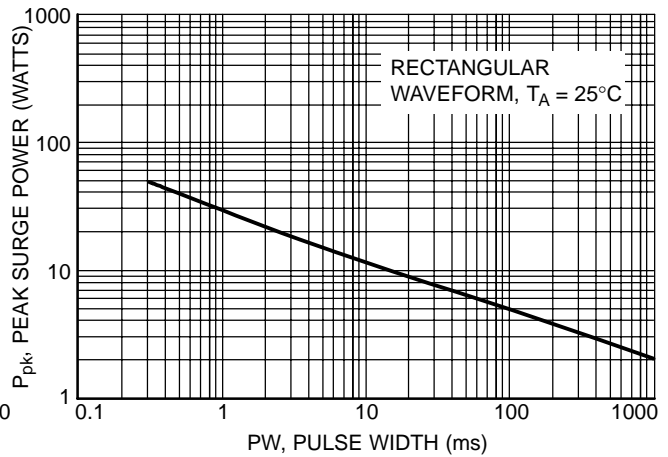
**Figure 1. Temperature Coefficients**  
(Temperature Range -55°C to +150°C)



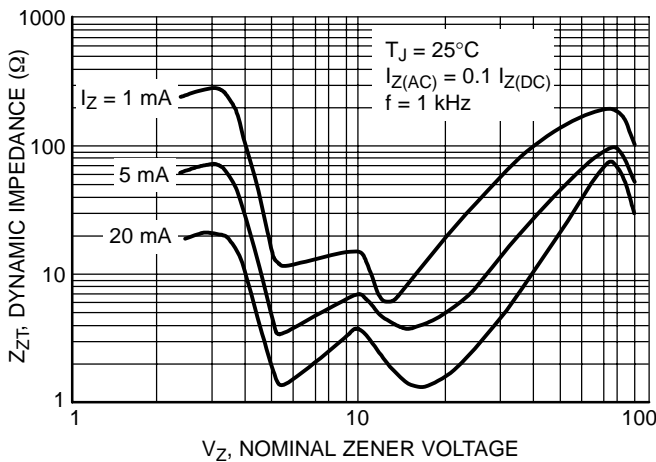
**Figure 2. Temperature Coefficients**  
(Temperature Range -55°C to +150°C)



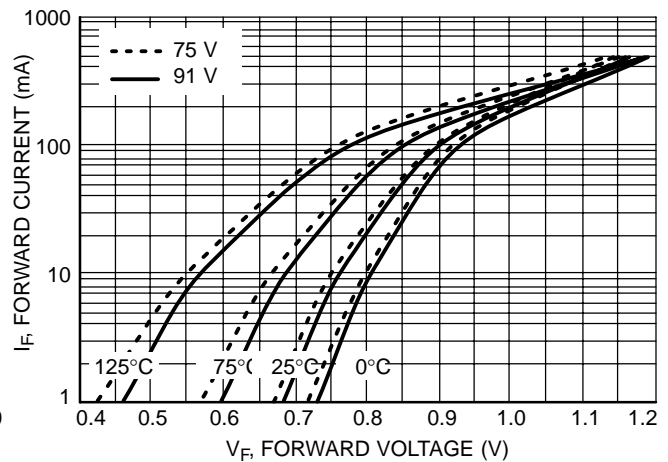
**Figure 3. Steady State Power Derating**



**Figure 4. Maximum Nonrepetitive Surge Power**



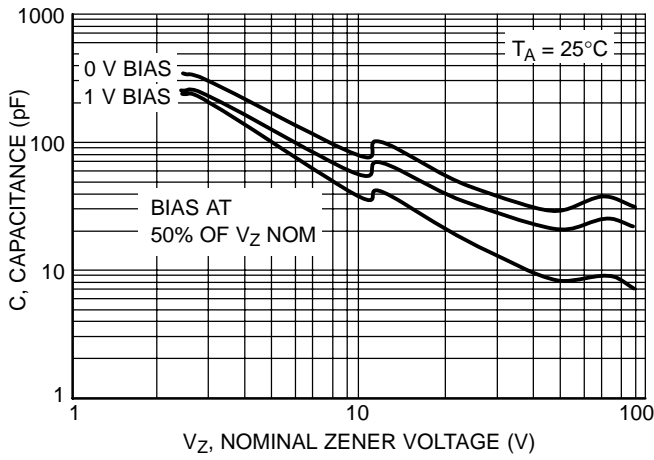
**Figure 5. Effect of Zener Voltage on Zener Impedance**



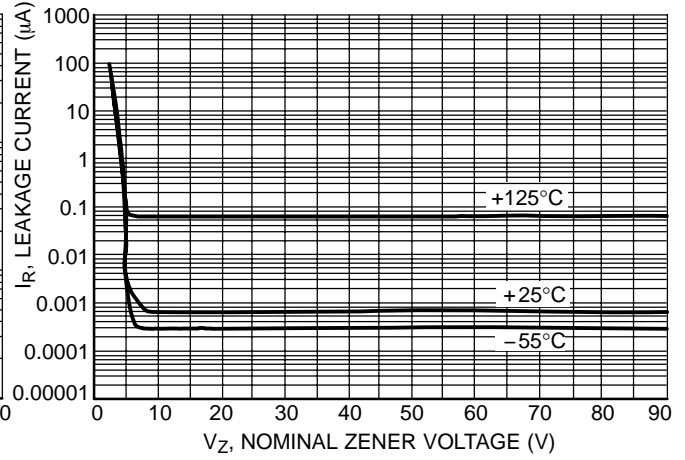
**Figure 6. Typical Forward Voltage**



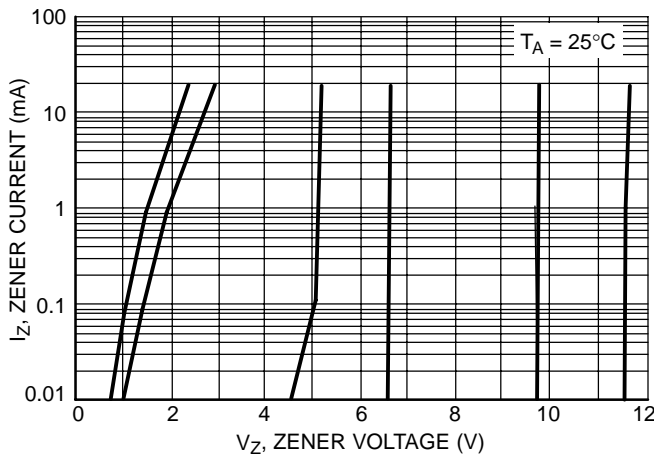
**MSZ52xxB Series , S-MSZ52xxB Series**  
**TYPICAL CHARACTERISTICS**



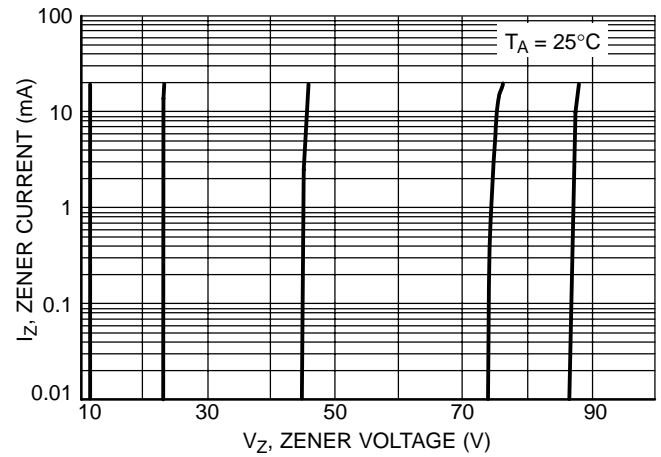
**Figure 7. Typical Capacitance**



**Figure 8. Typical Leakage Current**



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

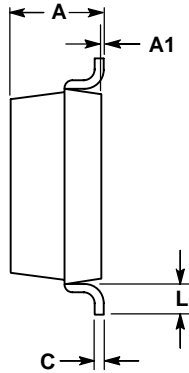
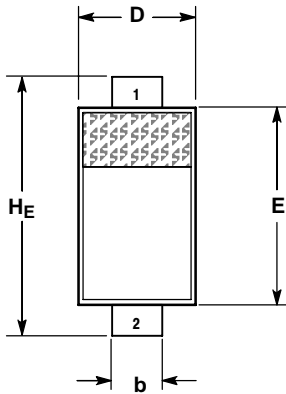


**Figure 10. Zener Voltage versus Zener Current  
 (12 V to 91 V)**



## MSZ52xxB Series , S-MSZ52xxB Series

SOD-123



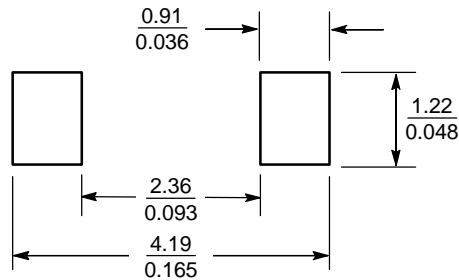
NOTES:

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 (  $\frac{\text{mm}}{\text{inches}}$  )

