

MMSZ52xxBT1 Series, SZMMSZ52xxBT1G Series

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
- AEC-Q101 Qualified and PPAP Capable
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb-Free Packages are Available

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

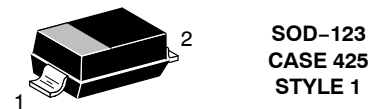
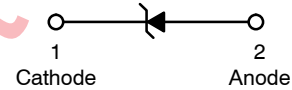
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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



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MARKING DIAGRAM



xx = Device Code (Refer to page 3)

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MMSZ52xxBT1	SOD-123	3000 / Tape & Reel
MMSZ52xxBT1G	SOD-123 (Pb-Free)	3000 / Tape & Reel
SZMMSZ52xxBT1G	SOD-123 (Pb-Free)	3000 / Tape & Reel
MMSZ52xxBT3	SOD-123	10000 / Tape & Reel
MMSZ52xxBT3G	SOD-123 (Pb-Free)	10000 / Tape & Reel
SZMMSZ52xxBT3G	SOD-123 (Pb-Free)	10000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

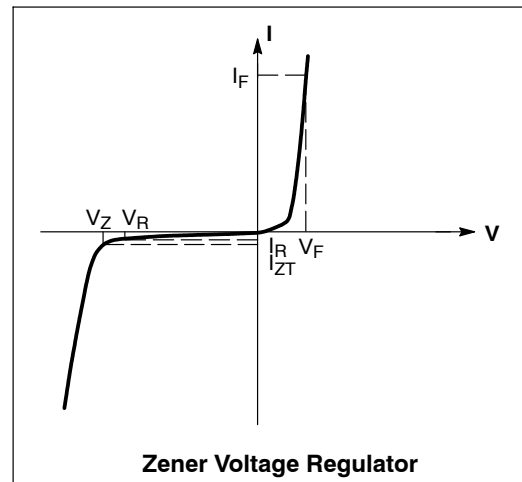
DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 3 of this data sheet.

MMSZ52xxBT1 Series, SZMMSZ52xxBT1G 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_{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



MMSZ52xxBT1 Series, SZMMSZ52xxBT1G 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	Ω	Ω	mA	μA	Volts
SZ/MMSZ5221BT1, G	C1	2.28	2.4	2.52	20	30	1200	0.25	100	1
SZ/MMSZ5222BT1, G	C2	2.38	2.5	2.63	20	30	1250	0.25	100	1
SZ/MMSZ5223BT1, G	C3	2.57	2.7	2.84	20	30	1300	0.25	75	1
MMSZ5224BT1, G	C4	2.66	2.8	2.94	20	30	1400	0.25	75	1
SZ/MMSZ5225BT1, G	C5	2.85	3.0	3.15	20	29	1600	0.25	50	1
SZ/MMSZ5226BT1, G	D1	3.14	3.3	3.47	20	28	1600	0.25	25	1
SZ/MMSZ5227BT1, G	D2	3.42	3.6	3.78	20	24	1700	0.25	15	1
SZ/MMSZ5228BT1, G	D3	3.71	3.9	4.10	20	23	1900	0.25	10	1
SZ/MMSZ5229BT1, G	D4	4.09	4.3	4.52	20	22	2000	0.25	5	1
SZ/MMSZ5230BT1, G	D5	4.47	4.7	4.94	20	19	1900	0.25	5	2
SZ/MMSZ5231BT1, G	E1	4.85	5.1	5.36	20	17	1600	0.25	5	2
SZ/MMSZ5232BT1, G	E2	5.32	5.6	5.88	20	11	1600	0.25	5	3
SZ/MMSZ5233BT1, G	E3	5.70	6.0	6.30	20	7	1600	0.25	5	3.5
SZ/MMSZ5234BT1, G	E4	5.89	6.2	6.51	20	7	1000	0.25	5	4
SZ/MMSZ5235BT1, G	E5	6.46	6.8	7.14	20	5	750	0.25	3	5
SZ/MMSZ5236BT1, G	F1	7.13	7.5	7.88	20	6	500	0.25	3	6
SZ/MMSZ5237BT1, G	F2	7.79	8.2	8.61	20	8	500	0.25	3	6.5
SZ/MMSZ5238BT1, G	F3	8.27	8.7	9.14	20	8	600	0.25	3	6.5
SZ/MMSZ5239BT1, G	F4	8.65	9.1	9.56	20	10	600	0.25	3	7
SZ/MMSZ5240BT1, G	F5	9.50	10	10.50	20	17	600	0.25	3	8
SZ/MMSZ5241BT1, G	H1	10.45	11	11.55	20	22	600	0.25	2	8.4
SZ/MMSZ5242BT1/T3, G	H2	11.40	12	12.60	20	30	600	0.25	1	9.1
SZ/MMSZ5243BT1, G	H3	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
SZ/MMSZ5244BT1, G	H4	13.30	14	14.70	9.0	15	600	0.25	0.1	10
SZ/MMSZ5245BT1, G	H5	14.25	15	15.75	8.5	16	600	0.25	0.1	11
SZ/MMSZ5246BT1, G	J1	15.20	16	16.80	7.8	17	600	0.25	0.1	12
SZ/MMSZ5247BT1, G	J2	16.15	17	17.85	7.4	19	600	0.25	0.1	13
SZ/MMSZ5248BT1, G	J3	17.10	18	18.90	7.0	21	600	0.25	0.1	14
SZ/MMSZ5249BT1, G	J4	18.05	19	19.95	6.6	23	600	0.25	0.1	14
SZ/MMSZ5250BT1, G	J5	19.00	20	21.00	6.2	25	600	0.25	0.1	15
SZ/MMSZ5251BT1, G	K1	20.90	22	23.10	5.6	29	600	0.25	0.1	17
SZ/MMSZ5252BT1, G	K2	22.80	24	25.20	5.2	33	600	0.25	0.1	18
MMSZ5253BT1, G	K3	23.75	25	26.25	5.0	35	600	0.25	0.1	19
SZ/MMSZ5254BT1, G	K4	25.65	27	28.35	4.6	41	600	0.25	0.1	21
SZ/MMSZ5255BT1, G	K5	26.60	28	29.40	4.5	44	600	0.25	0.1	21
SZ/MMSZ5256BT1, G	M1	28.50	30	31.50	4.2	49	600	0.25	0.1	23
SZ/MMSZ5257BT1, G	M2	31.35	33	34.65	3.8	58	700	0.25	0.1	25
SZ/MMSZ5258BT1/T3, G	M3	34.20	36	37.80	3.4	70	700	0.25	0.1	27
SZ/MMSZ5259BT1, G	M4	37.05	39	40.95	3.2	80	800	0.25	0.1	30
SZ/MMSZ5260BT1, G	M5	40.85	43	45.15	3.0	93	900	0.25	0.1	33
SZ/MMSZ5261BT1, G	N1	44.65	47	49.35	2.7	105	1000	0.25	0.1	36
SZ/MMSZ5262BT1, G	N2	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
MMSZ5263BT1, G	N3	53.20	56	58.80	2.2	150	1300	0.25	0.1	43
MMSZ5264BT1, G	N4	57.00	60	63.00	2.1	170	1400	0.25	0.1	46
SZ/MMSZ5265BT1, G	N5	58.90	62	65.10	2.0	185	1400	0.25	0.1	47
SZ/MMSZ5266BT1, G	P1	64.60	68	71.40	1.8	230	1600	0.25	0.1	52
SZ/MMSZ5267BT1, G	P2	71.25	75	78.75	1.7	270	1700	0.25	0.1	56
MMSZ5268BT1, G	P3	77.90	82	86.10	1.5	330	2000	0.25	0.1	62
MMSZ5269BT1	P4	82.65	87	91.35	1.4	370	2200	0.25	0.1	68
SZ/MMSZ5270BT1, G	P5	86.45	91	95.55	1.4	400	2300	0.25	0.1	69
MMSZ5272BT1, G	R2	104.5	110	115.5	1.1	750	3000	0.25	0.1	84

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 $T_L = 30^\circ\text{C} \pm 1^\circ\text{C}$.

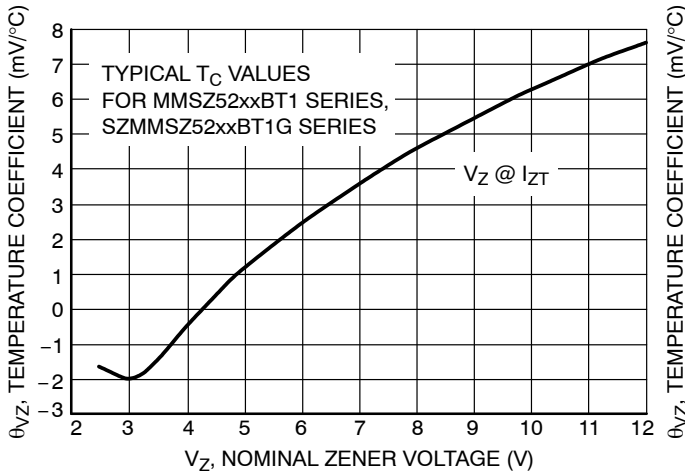
5. Z_{ZT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the ac current applied.

The specified limits are for $I_{Z(AC)} = 0.1 I_{Z(dc)}$ with the AC frequency = 1 KHz.

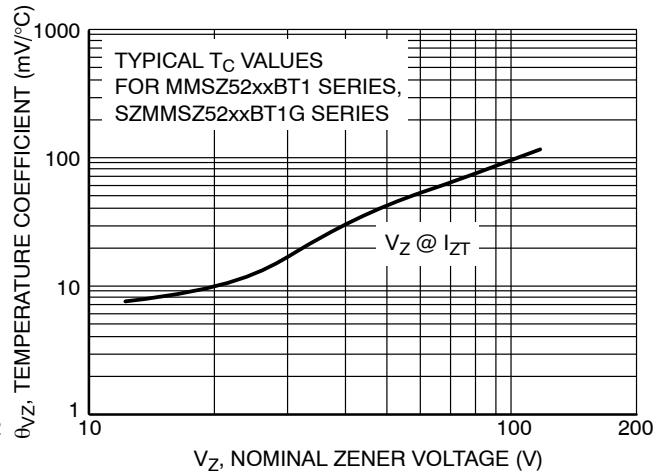
*The "G" suffix indicates Pb-Free package available.

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TYPICAL CHARACTERISTICS



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



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

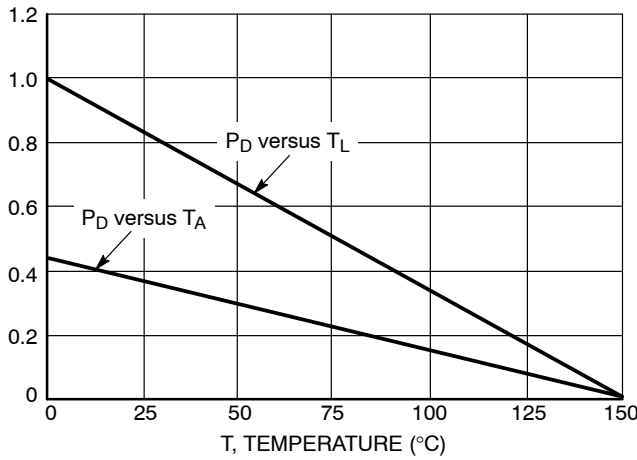


Figure 3. Steady State Power Derating

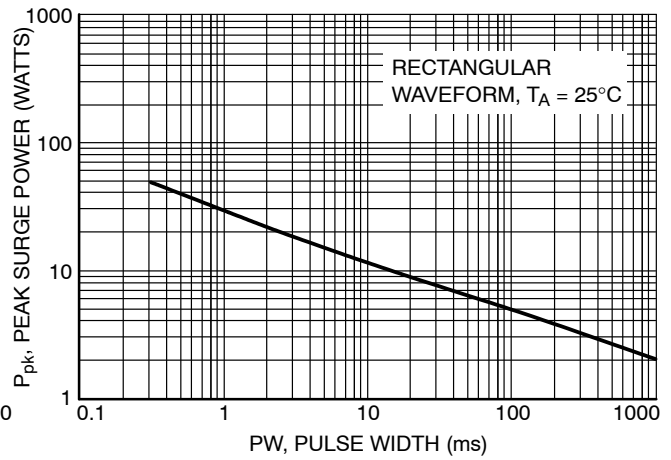
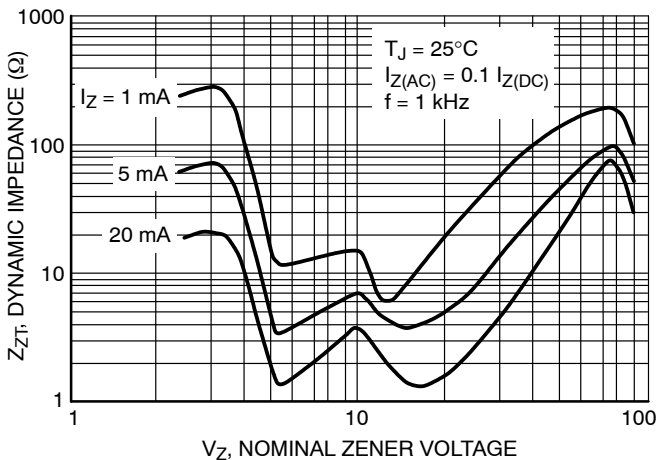


Figure 4. Maximum Nonrepetitive Surge Power



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

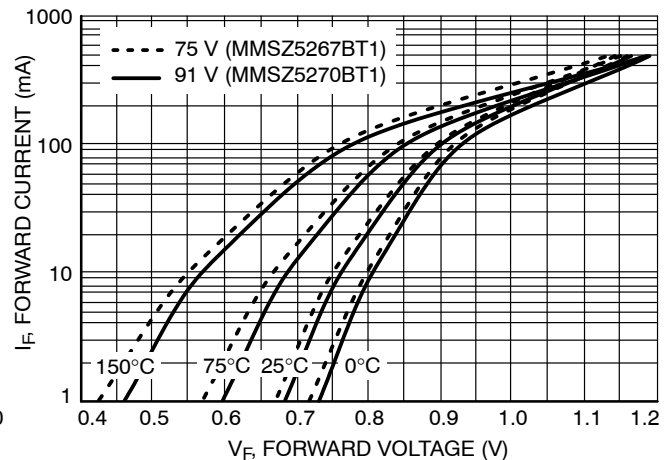


Figure 6. Typical Forward Voltage

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TYPICAL CHARACTERISTICS

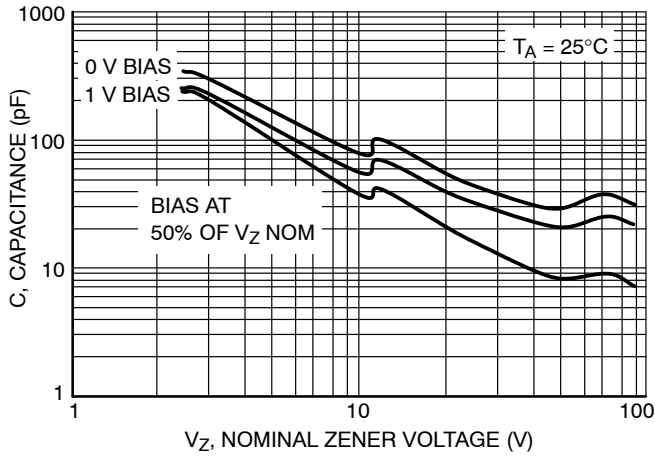


Figure 7. Typical Capacitance

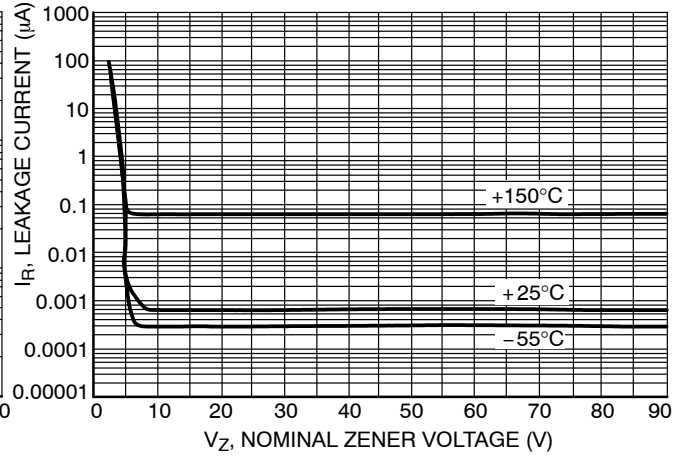


Figure 8. Typical Leakage Current

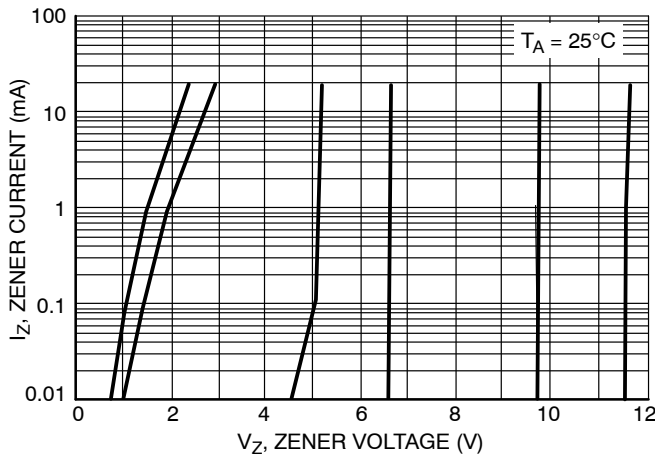


Figure 9. Zener Voltage versus Zener Current (V_Z Up to 12 V)

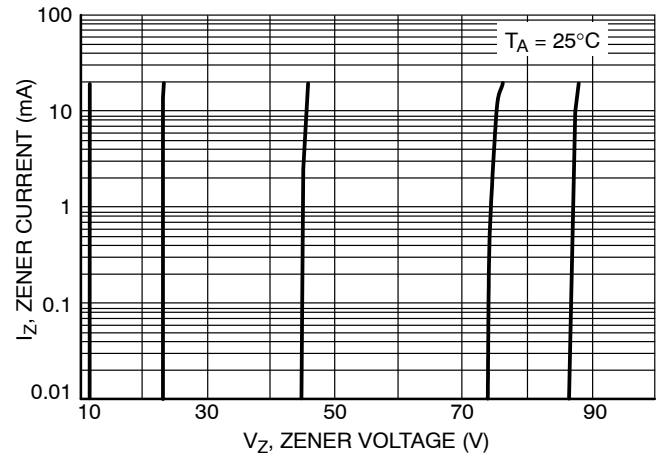
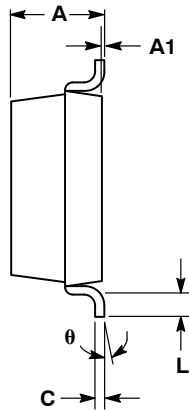
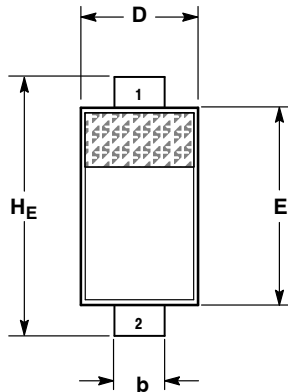


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

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PACKAGE DIMENSIONS

SOD-123
CASE 425-04
ISSUE G

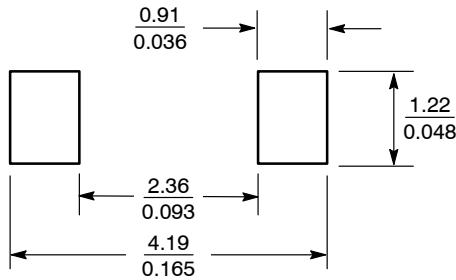


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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	---	---
θ	0°	---	10°	0°	---	10°

STYLE 1:
PIN 1. CATHODE
2. ANODE

SOLDERING FOOTPRINT*



SCALE 10:1 (mm/inches)

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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