Zener Voltage Regulators

500 mW SOD−123 Surface Mount

MMSZ52xxET1G Series, SZMMSZ52xxET1G Series

Two 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
- Peak Power − 225 W (8 x 20 μs)
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- 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

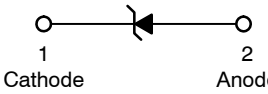
Rating	Symbol	Max	Units
Peak Power Dissipation @ 20 μs (Note 1) @ $T_L \le 25°C$	P_{pk}	225	W
Total Power Dissipation on FR−5 Board, (Note 3) @ T_L = 75°C Derated above 75°C	P_D	500 6.7	mW mW/°C
Thermal Resistance, (Note 2) Junction−to−Ambient	$R_{\theta JA}$	340	°C/W
Thermal Resistance, (Note 2) Junction−to−Lead	$R_{\theta JL}$	150	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. Nonrepetitive current pulse per Figure 11.
2. Thermal Resistance measurement obtained via infrared Scan Method.
3. FR−5 = 3.5 x 1.5 inches, using the minimum recommended footprint.

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



SOD−123
CASE 425
STYLE 1



MARKING DIAGRAM



xxx = Device Code (Refer to page 2)
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MMSZ52xxET1G	SOD−123 (Pb−Free)	3,000 / Tape & Reel
SZMMSZ52xxET1G	SOD−123 (Pb−Free)	3,000 / 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.

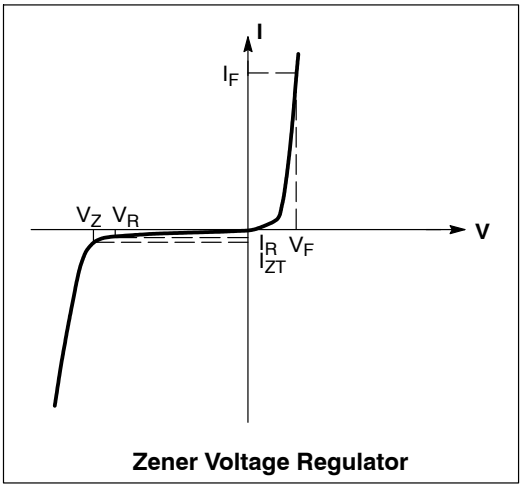
DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 0.95 V Max. @ I_F = 10 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



Zener Voltage Regulator

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 4 and 5)				Zener Impedance (Note 6)			Leakage Current	
		V_Z (V)			@ I_{ZT}	Z_{ZT} @ I_{ZT}	Z_{ZK} @ I_{ZK}		I_R @ V_R	
		Min	Nom	Max	mA	Ω	Ω	mA	μA	V
MMSZ5221ET1G	CA1	2.28	2.4	2.52	20	30	1200	0.25	100	1
MMSZ5223ET1G	CA3	2.57	2.7	2.84	20	30	1300	0.25	75	1
MMSZ5226ET1G	CA6	3.14	3.3	3.47	20	28	1600	0.25	25	1
MMSZ5228ET1G	CA8	3.71	3.9	4.10	20	23	1900	0.25	10	1
MMSZ5229ET1G	CA9	4.09	4.3	4.52	20	22	2000	0.25	5	1
MMSZ5231ET1G	CB2	4.85	5.1	5.36	20	17	1600	0.25	5	2
MMSZ5232ET1G	CB3	5.32	5.6	5.88	20	11	1600	0.25	5	3
MMSZ5234ET1G	CB5	5.89	6.2	6.51	20	7	1000	0.25	5	4
MMSZ5235ET1G	CB6	6.46	6.8	7.14	20	5	750	0.25	3	5
MMSZ5236ET1G	CB7	7.13	7.5	7.88	20	6	500	0.25	3	6
MMSZ5237ET1G	CB8	7.79	8.2	8.61	20	8	500	0.25	3	6.5
MMSZ5240ET1G	CC2	9.50	10	10.50	20	17	600	0.25	3	8
MMSZ5242ET1G	CC4	11.40	12	12.60	20	30	600	0.25	1	9.1
MMSZ5243ET1G	CC5	12.35	13	13.65	9.5	13	600	0.25	0.5	9.9
MMSZ5244ET1G	CC6	13.30	14	14.70	9.0	15	600	0.25	0.1	10
MMSZ5245ET1G	CC7	14.25	15	15.75	8.5	16	600	0.25	0.1	11
MMSZ5246ET1G	CC8	15.20	16	16.80	7.8	17	600	0.25	0.1	12
MMSZ5248ET1G	CD1	17.10	18	18.90	7.0	21	600	0.25	0.1	14
MMSZ5250ET1G	CD3	19.00	20	21.00	6.2	25	600	0.25	0.1	15
MMSZ5252ET1G	CD5	22.80	24	25.20	5.2	33	600	0.25	0.1	18

4. The type numbers shown have a standard tolerance of ±5% on the nominal Zener voltage.
5. Nominal Zener voltage is measured with the device junction in thermal equilibrium at T_L = 30°C ±1°C.
6. 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.

*Include SZ-prefix devices where applicable

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 4 and 5)				Zener Impedance (Note 6)			Leakage Current	
		V_Z (V)			@ I_{ZT}	Z_{ZT} @ I_{ZT}	Z_{ZK} @ I_{ZK}		I_R @ V_R	
		Min	Nom	Max	mA	Ω	Ω	mA	μA	V
MMSZ5253ET1G	CD6	23.75	25	26.25	5.0	35	600	0.25	0.1	19
MMSZ5254ET1G	CD7	25.65	27	28.35	4.6	41	600	0.25	0.1	21
MMSZ5255ET1G	CD8	26.60	28	29.40	4.5	44	600	0.25	0.1	21
MMSZ5256ET1G	CD9	28.50	30	31.50	4.2	49	600	0.25	0.1	23
MMSZ5257ET1G	CE1	31.35	33	34.65	3.8	58	700	0.25	0.1	25
MMSZ5258ET1G	CE2	34.20	36	37.80	3.4	70	700	0.25	0.1	27
MMSZ5259ET1G	CE3	37.05	39	40.95	3.2	80	800	0.25	0.1	30
MMSZ5262ET1G	CE6	48.45	51	53.55	2.5	125	1100	0.25	0.1	39
MMSZ5263ET1G	CE7	53.20	56	58.80	2.2	150	1300	0.25	0.1	43

4. The type numbers shown have a standard tolerance of ±5% on the nominal Zener voltage.
5. Nominal Zener voltage is measured with the device junction in thermal equilibrium at T_L = 30°C ±1°C.
6. 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.

*Include SZ-prefix devices where applicable

TYPICAL CHARACTERISTICS

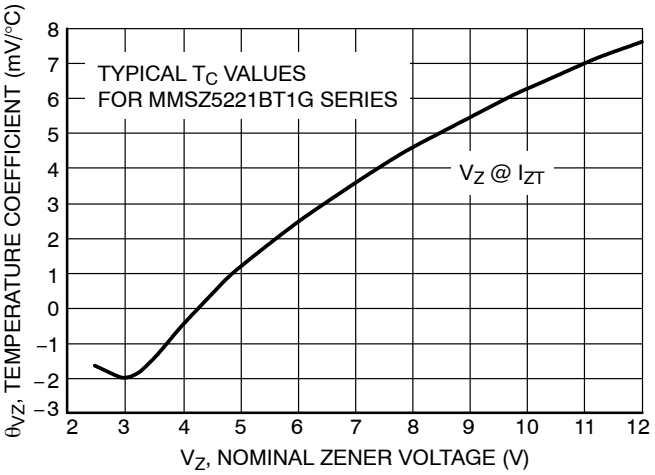


Figure 1. Temperature Coefficients (Temperature Range −55°C to +150°C)

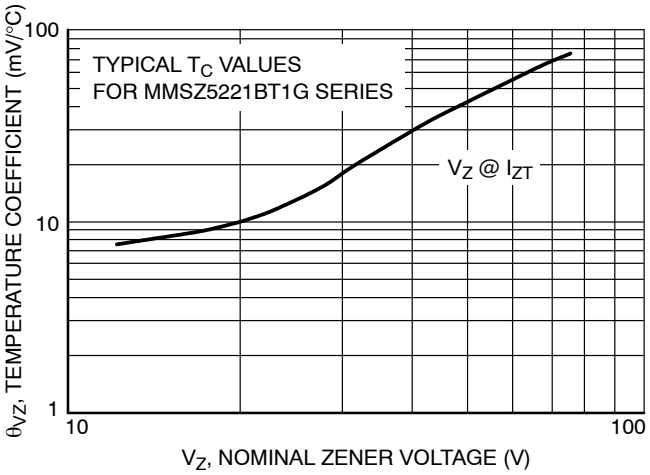


Figure 2. Temperature Coefficients (Temperature Range −55°C to +150°C)

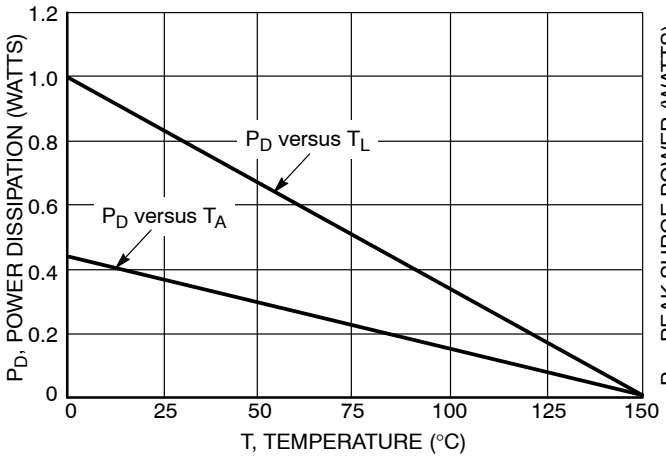


Figure 3. Steady State Power Derating

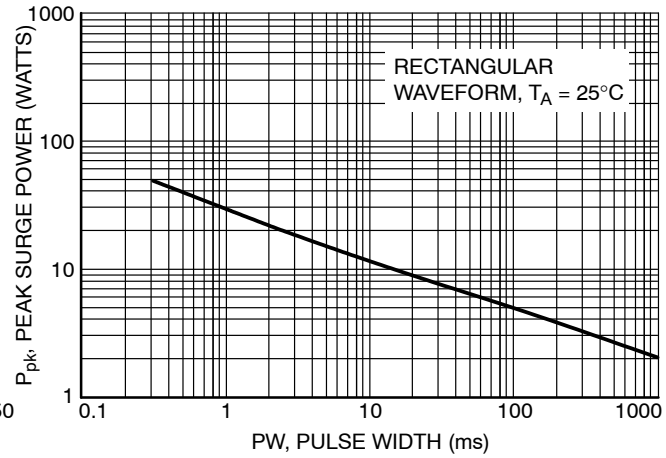


Figure 4. Maximum Nonrepetitive Surge Power

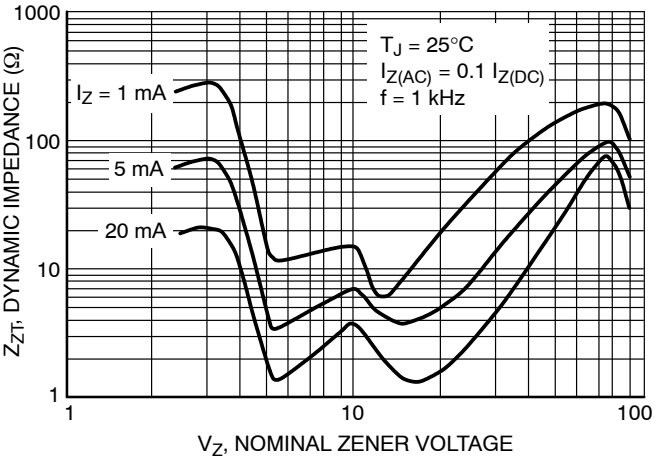


Figure 5. Effect of Zener Voltage on Zener Impedance

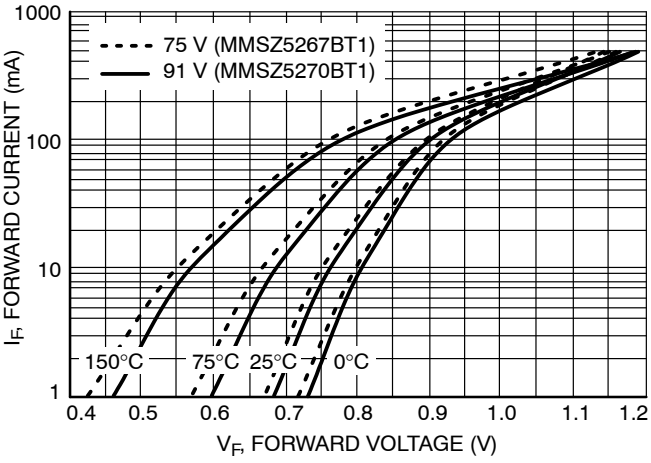


Figure 6. Typical Forward Voltage

TYPICAL CHARACTERISTICS

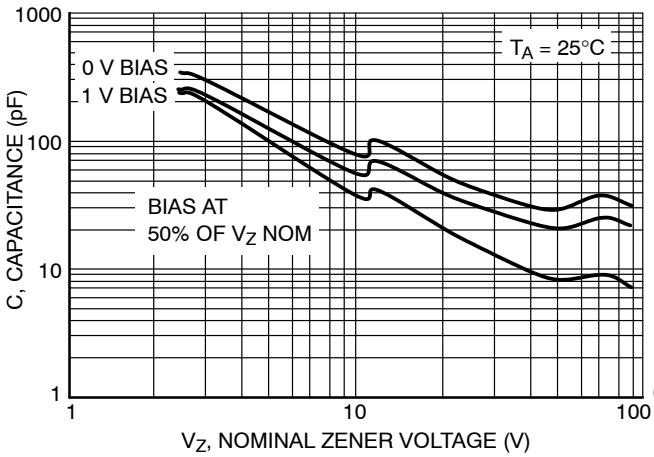


Figure 7. Typical Capacitance

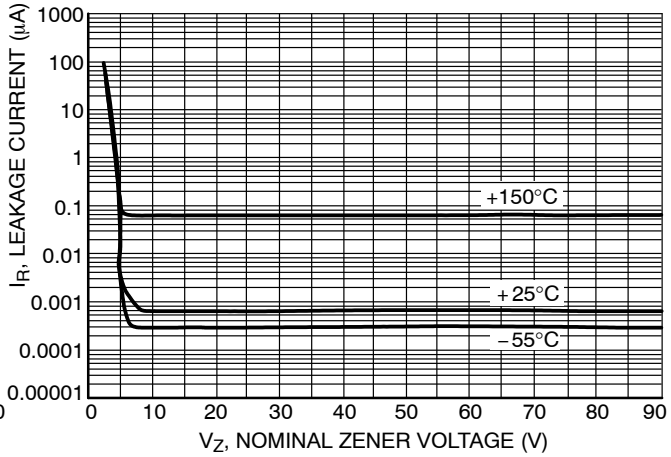


Figure 8. Typical Leakage Current

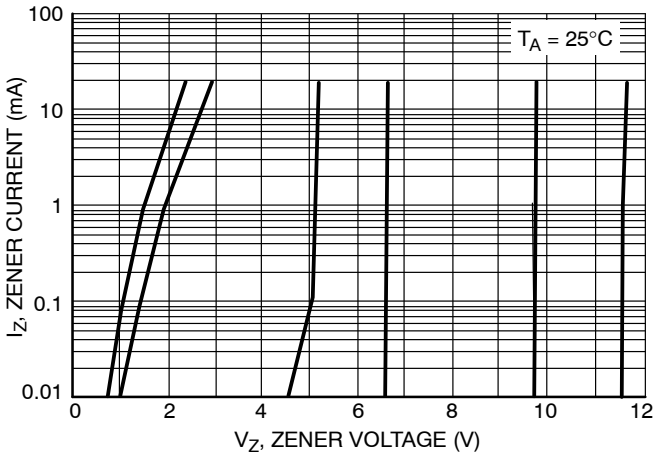


Figure 9. Zener Voltage versus Zener Current (V_Z Up to 12 V)

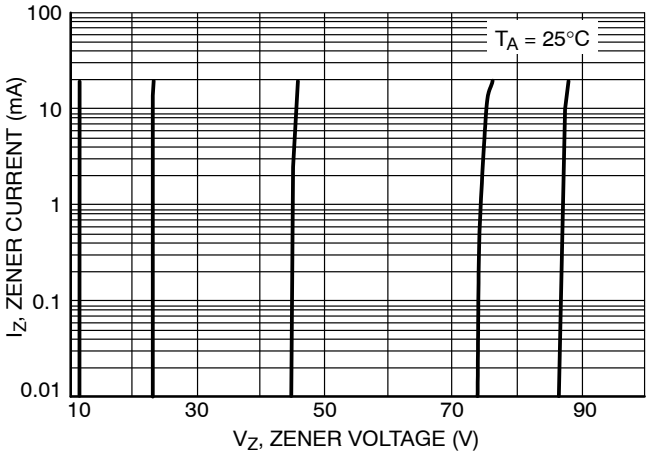


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

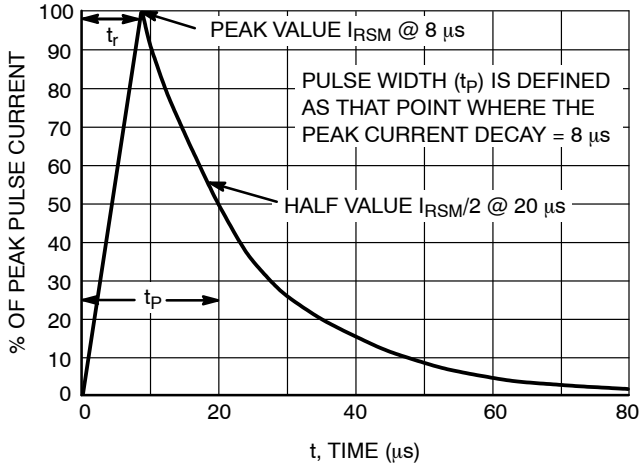
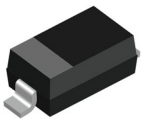


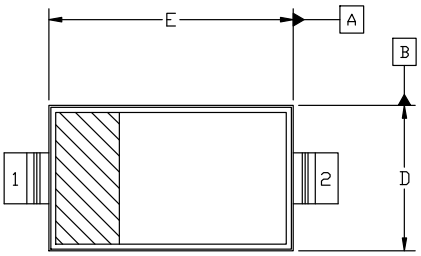
Figure 11. 8 × 20 μs Pulse Waveform

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

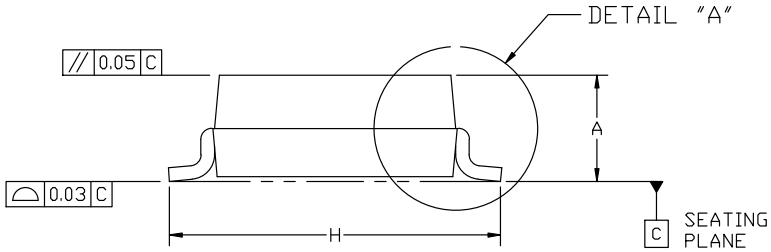


SOD−123 2L 1.60x2.69x1.16
CASE 425
ISSUE H

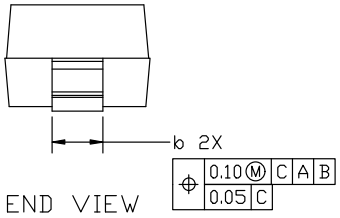
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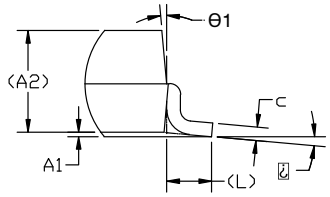
TOP VIEW



SIDE VIEW



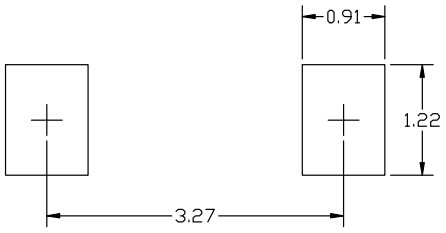
END VIEW



DETAIL "A"

NOTES:
1. DIMENSION AND TOLERANCING PER ASME Y14.5M, 2018
2. CONTROLLING DIMENSION: MILLIMETERS

	MILLIMETER		
DIM	MIN.	NOM.	MAX.
A	0.94	1.17	1.35
A1	0.00	0.05	0.10
A2		1.16 REF.	
b	0.51	0.61	0.71
c	–	–	0.15
D	1.40	1.60	1.80
E	2.54	2.69	2.84
H	3.56	3.68	3.86
L		0.25 REF.	
∠	0°		10°
θ1	0°		10°



RECOMMENDED MOUNTING FOOTPRINT

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

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLE 1:
PIN 1. CATHODE
2. ANODE

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DESCRIPTION:	**SOD−123 2L 1.60x2.69x1.16**	**PAGE 1 OF 1**

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