

MMSZ52xxET1G Series, SZMMSZ52xxET1G 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
- Peak Power – 225 W (8 x 20 μ s)
- 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 μ s (Note 1) @ $T_L \leq 25^\circ\text{C}$	P_{pk}	225	W
Total Power Dissipation on FR-5 Board, (Note 3) @ $T_L = 75^\circ\text{C}$ Derated above 75°C	P_D	500 6.7	mW mW/ $^\circ\text{C}$
Thermal Resistance, (Note 2) Junction-to-Ambient	$R_{\theta JA}$	340	$^\circ\text{C}/\text{W}$
Thermal Resistance, (Note 2) Junction-to-Lead	$R_{\theta JL}$	150	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

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. 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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

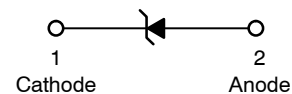


ON Semiconductor®

<http://onsemi.com>



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
MMSZ52xxET3G	SOD-123 (Pb-Free)	10,000 / 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.

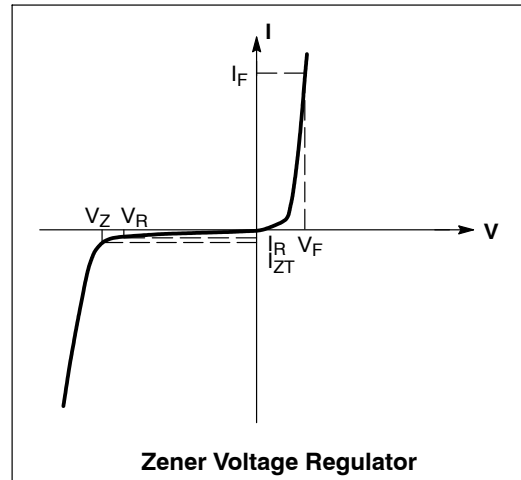
DEVICE MARKING INFORMATION

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

MMSZ52xxET1G Series, SZMMSZ52xxET1G 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



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 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

- 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.

*Include SZ-prefix devices where applicable

MMSZ52xxET1G Series, SZMMSZ52xxET1G 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 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 $\pm 5\%$ on the nominal Zener voltage.

5. Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_L = 30^\circ\text{C} \pm 1^\circ\text{C}$.

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

MMSZ52xxET1G Series, SZMMSZ52xxET1G Series

TYPICAL CHARACTERISTICS

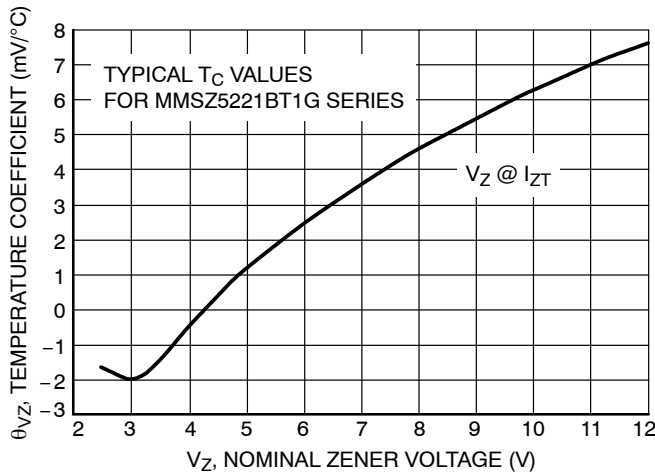


Figure 1. Temperature Coefficients
(Temperature Range -55°C to +150°C)

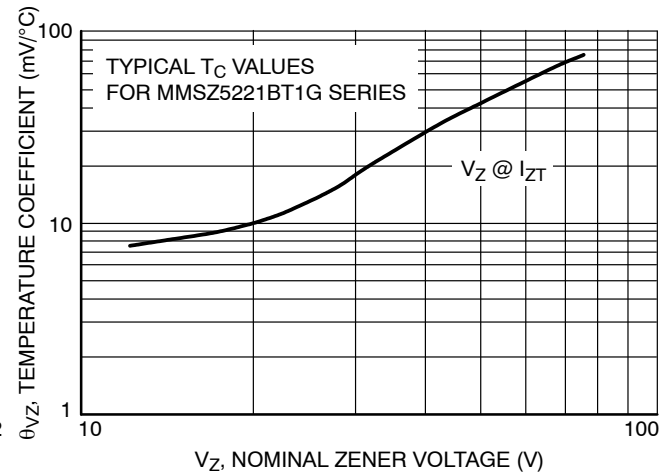


Figure 2. Temperature Coefficients
(Temperature Range -55°C to +150°C)

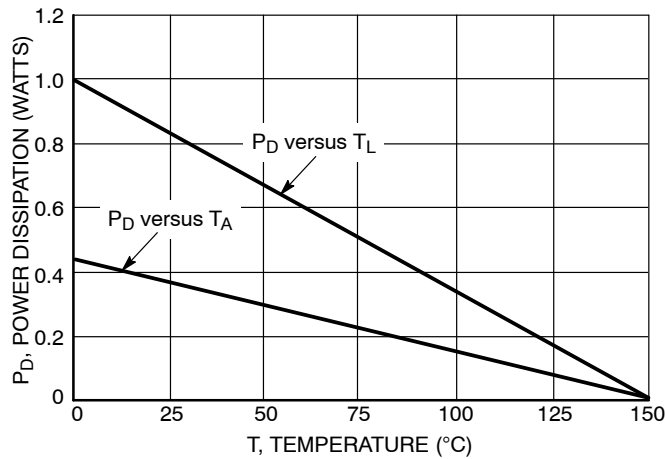


Figure 3. Steady State Power Derating

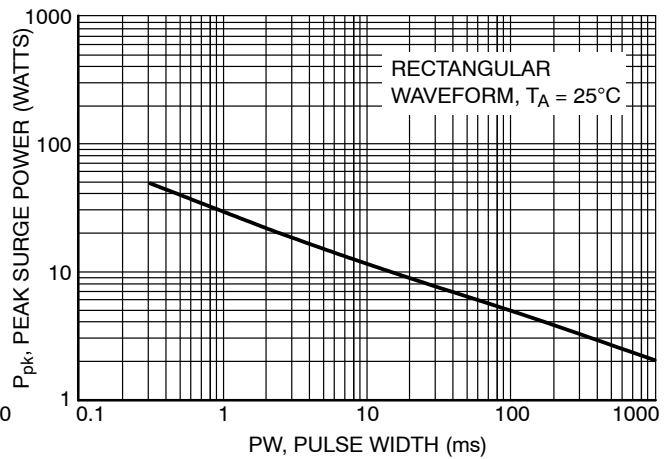


Figure 4. Maximum Nonrepetitive Surge Power

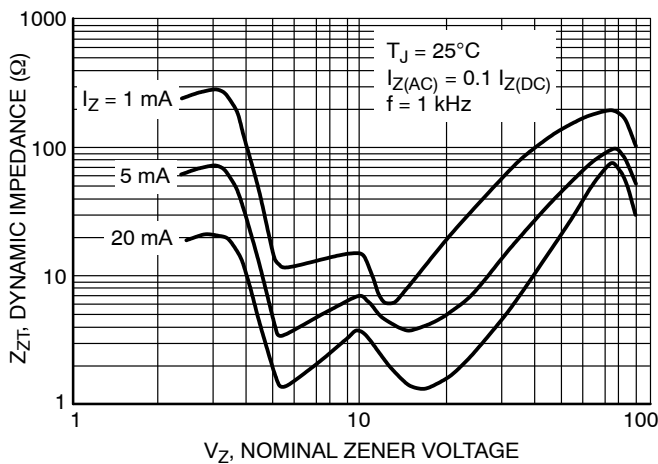


Figure 5. Effect of Zener Voltage on
Zener Impedance

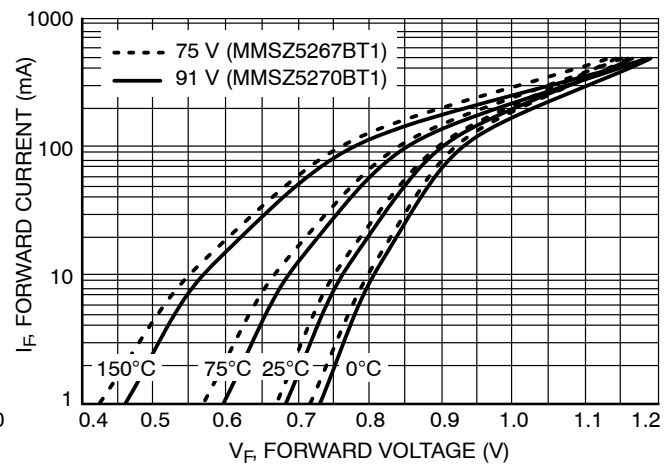


Figure 6. Typical Forward Voltage

TYPICAL CHARACTERISTICS

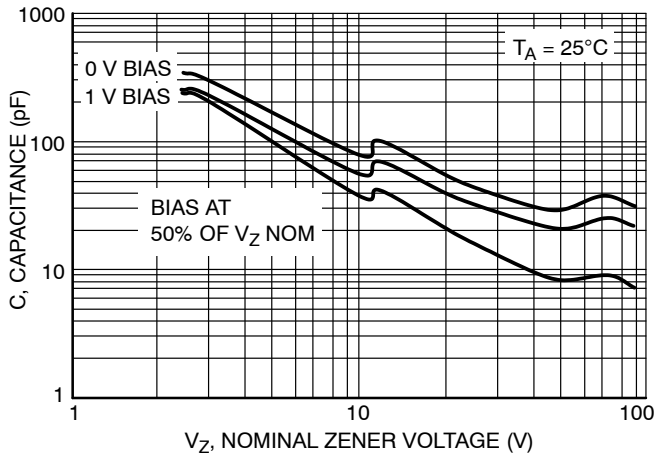


Figure 7. Typical Capacitance

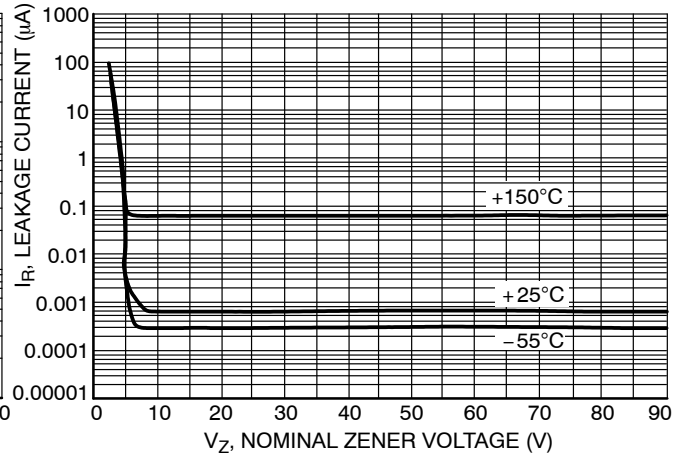


Figure 8. Typical Leakage Current

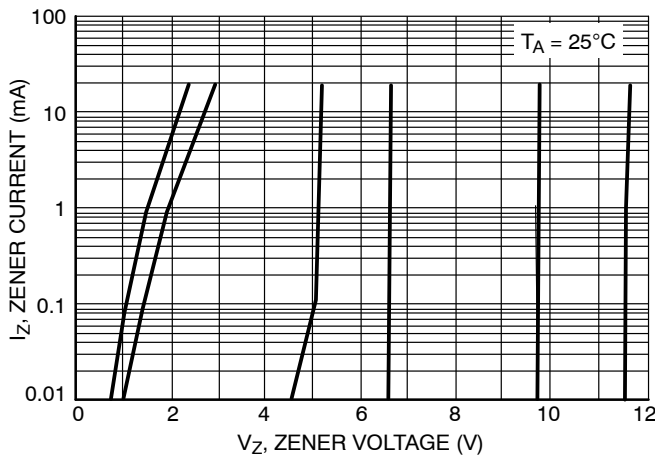


Figure 9. Zener Voltage versus Zener Current
(V_Z Up to 12 V)

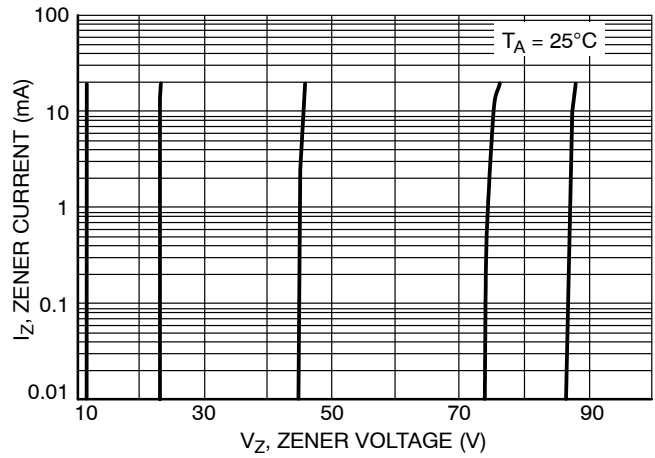


Figure 10. Zener Voltage versus Zener Current
(12 V to 91 V)

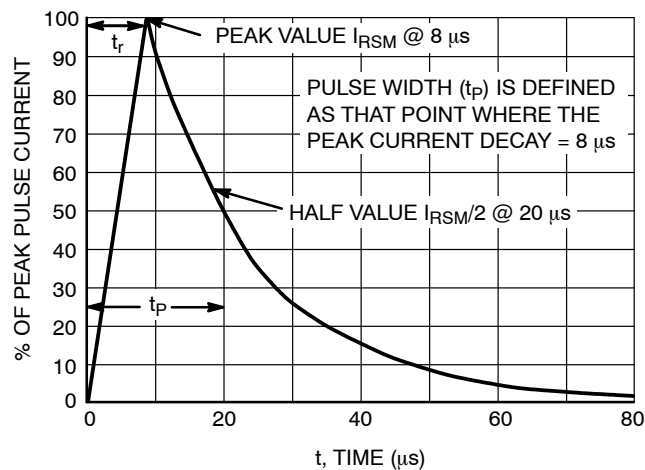


Figure 11. $8 \times 20 \mu s$ Pulse Waveform

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

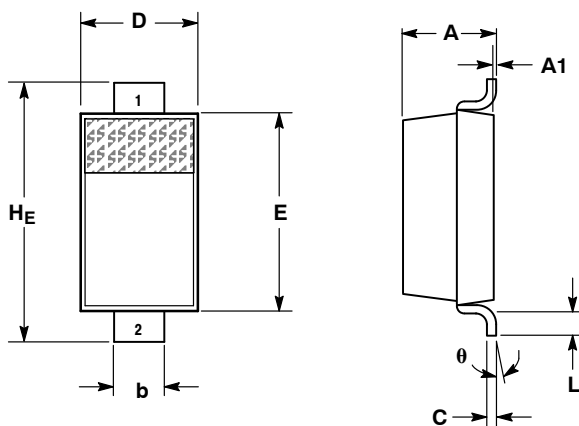
ON Semiconductor®



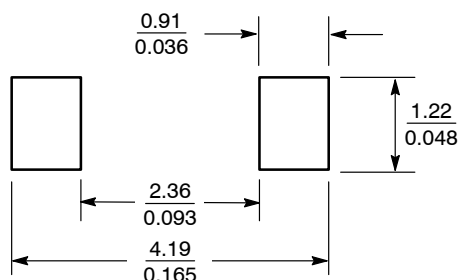
SCALE 5:1

SOD-123
CASE 425-04
ISSUE G

DATE 07 OCT 2009



SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}} \right)$

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
H _E	3.56	3.68	3.86	0.140	0.145	0.152
L	0.25	---	---	0.010	---	---
θ	0°	---	10°	0°	---	10°

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.


STYLE 1:

- PIN 1: CATHODE
- PIN 2: ANODE

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

DOCUMENT NUMBER:	98ASB42927B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOD-123	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative

