Zener Voltage Regulators

500 mW SOD-123 Surface Mount

MMSZxxxET1G Series, SZMMSZxxxET1G Series

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.

Specification Features

- 500 mW Rating on FR-4 or FR-5 Board
- Wide Zener Reverse Voltage Range – 2.4 V to 56 V
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Peak Power – 225 W (8 X 20 μs)
- 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
Peak Power Dissipation @ 20 μs (Note 1) @ $T_L \le 25$ °C	P_{pk}	225	W
Total Power Dissipation on FR-5 Board, (Note 2) @ $T_L = 75$ °C Derated above 75 °C	P_D	500 6.7	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 3)	$R_{\theta JA}$	340	°C/W
Thermal Resistance, Junction-to-Lead (Note 3)	$R_{\theta JL}$	150	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

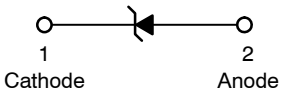
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Nonrepetitive current pulse per Figure 11
2. FR-5 = 3.5 X 1.5 inches, using the ON minimum recommended footprint
3. Thermal Resistance measurement obtained via infrared Scan Method

* 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
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MMSZxxxET1G	SOD-123 (Pb-Free)	3,000 / Tape & Reel
SZMMSZxxxET1G	SOD-123 (Pb-Free)	3,000 / Tape & Reel
MMSZxxxET3G	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 Specification Brochure, BRD8011/D.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 3.

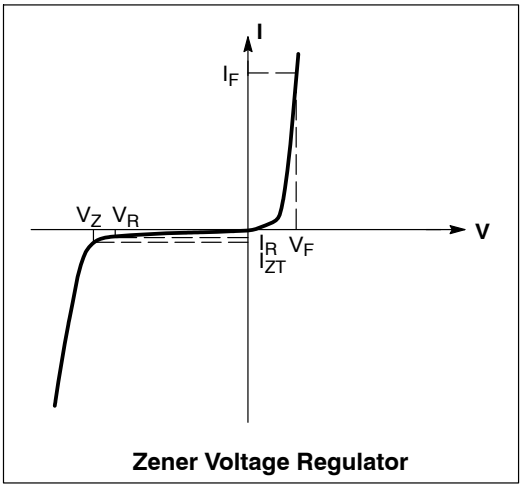
DEVICE MARKING INFORMATION

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_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	V_{Z1} (V) (Notes 4 and 5) @ I_{ZT1} = 5 mA			Z_{ZT1} (Note 6)	V_{Z2} (V) (Notes 4 and 5) @ I_{ZT2} = 1 mA		Z_{ZT2} (Note 6)	Max Reverse Leakage Current I_R @ V_R	
		Min	Nom	Max	Ω	Min	Max	Ω	μA	V
MMSZ3V0ET1G	CL3	2.85	3.0	3.15	95	2.1	2.7	600	10	1
MMSZ3V3ET1G	CL4	3.14	3.3	3.47	95	2.3	2.9	600	5	1
MMSZ3V6ET1G	CL5	3.42	3.6	3.78	90	2.7	3.3	600	5	1
MMSZ3V9ET1G	CL6	3.71	3.9	4.10	90	2.9	3.5	600	3	1
MMSZ4V3ET1G	CL7	4.09	4.3	4.52	90	3.3	4.0	600	3	1
MMSZ4V7ET1G	CL8	4.47	4.7	4.94	80	3.7	4.7	500	3	2
MMSZ5V1ET1G	***CL9***	***4.85***	***5.1***	***5.36***	***60***	***4.2***	***5.3***	***480***	***2***	***2***
MMSZ5V6ET1G	***CM1***	***5.32***	***5.6***	***5.88***	***40***	***4.8***	***6.0***	***400***	***1***	***2***
MMSZ6V2ET1G	***CM2***	***5.89***	***6.2***	***6.51***	***10***	***5.6***	***6.6***	***150***	***3***	***4***
MMSZ6V8ET1G	CM3	6.46	6.8	7.14	15	6.3	7.2	80	2	4
MMSZ7V5ET1G	CM4	7.13	7.5	7.88	15	6.9	7.9	80	1	5
MMSZ8V2ET1G	CM5	7.79	8.2	8.61	15	7.6	8.7	80	0.7	5
MMSZ9V1ET1G	CM6	8.65	9.1	9.56	15	8.4	9.6	100	0.5	6
MMSZ10ET1G	CM7	9.50	10	10.50	20	9.3	10.6	150	0.2	7
MMSZ11ET1G	CM8	10.45	11	11.55	20	10.2	11.6	150	0.1	8
MMSZ12ET1G	CM9	11.40	12	12.60	25	11.2	12.7	150	0.1	8
MMSZ13ET1G	CN1	12.35	13	13.65	30	12.3	14.0	170	0.1	8
MMSZ15ET1G	CN2	14.25	15	15.75	30	13.7	15.5	200	0.05	10.5
MMSZ16ET1G	CN3	15.20	16	16.80	40	15.2	17.0	200	0.05	11.2
MMSZ18ET1G	***CN4***	***17.10***	***18***	***18.90***	***45***	***16.7***	***19.0***	***225***	***0.05***	***12.6***
MMSZ20ET1G	CN5	19.00	20	21.00	55	18.7	21.1	225	0.05	14
MMSZ22ET1G	CN6	20.90	22	23.10	55	20.7	23.2	250	0.05	15.4
MMSZ24ET1G	CN7	22.80	24	25.20	70	22.7	25.5	250	0.05	16.8

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted, V_F = 0.9 V Max. @ I_F = 10 mA) (continued)

Device*	Device Marking	V_{Z1} (V) (Notes 4 and 5) @ I_{ZT1} = 5 mA			Z_{ZT1} (Note 6)	V_{Z2} (V) (Notes 4 and 5) @ I_{ZT2} = 1 mA		Z_{ZT2} (Note 6)	Max Reverse Leakage Current I_R @ V_R	
		Min	Nom	Max	Ω	Min	Max	Ω	μA	V
DISCONTINUED (Note 7)										
MMSZ2V4ET1G	CL1	2.28	2.4	2.52	100	1.7	2.1	600	50	1
MMSZ2V7ET1G	CL2	2.57	2.7	2.84	100	1.9	2.4	600	20	1

Devices listed in ***bold, italic*** are **onsemi Preferred** devices. **Preferred** devices are recommended choices for future use and best overall value.

* Include SZ-prefix devices where applicable.

4. The type numbers shown have a standard tolerance of ±5% on the nominal Zener Voltage.
5. Tolerance and Voltage Designation: Zener Voltage (VZ) is measured with the Zener Current applied for PW = 1 ms.
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.
7. **DISCONTINUED:** These devices are not available. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted, V_F = 0.9 V Max. @ I_F = 10 mA)

Device*	Device Marking	V_{Z1} (V) (Notes 8 and 9) @ I_{ZT1} = 2 mA			Z_{ZT1} (Note 10)	V_{Z2} (V) (Notes 8 and 9) @ I_{ZT2} = 0.1 mA		Z_{ZT2} (Note 10) @ I_{ZT2} = 0.5 mA	Max Reverse Leakage Current I_R @ V_R	
		Min	Nom	Max	Ω	Min	Max	Ω	μA	V
MMSZ27ET1G	CN8	25.65	27	28.35	80	25	28.9	300	0.05	18.9
MMSZ30ET1G	CN9	28.50	30	31.50	80	27.8	32	300	0.05	21
MMSZ33ET1G	CP1	31.35	33	34.65	80	30.8	35	325	0.05	23.1
MMSZ36ET1G	CP2	34.20	36	37.80	90	33.8	38	350	0.05	25.2
MMSZ39ET1G	***CP3***	***37.05***	***39***	***40.95***	***130***	***36.7***	***41***	***350***	***0.05***	***27.3***
MMSZ43ET1G	CP4	40.85	43	45.15	150	39.7	46	375	0.05	30.1
MMSZ47ET1G	CP5	44.65	47	49.35	170	43.7	50	375	0.05	32.9
MMSZ51ET1G	CP6	48.45	51	53.55	180	47.6	54	400	0.05	35.7
MMSZ56ET1G	CP7	53.20	56	58.80	200	51.5	60	425	0.05	39.2

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Devices listed in ***bold, italic*** are **onsemi Preferred** devices. **Preferred** devices are recommended choices for future use and best overall value.

* Include SZ-prefix devices where applicable.

8. The type numbers shown have a standard tolerance of ±5% on the nominal Zener Voltage.
9. Tolerance and Voltage Designation: Zener Voltage (VZ) is measured with the Zener Current applied for PW = 1 ms.
10. 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.

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TYPICAL CHARACTERISTICS

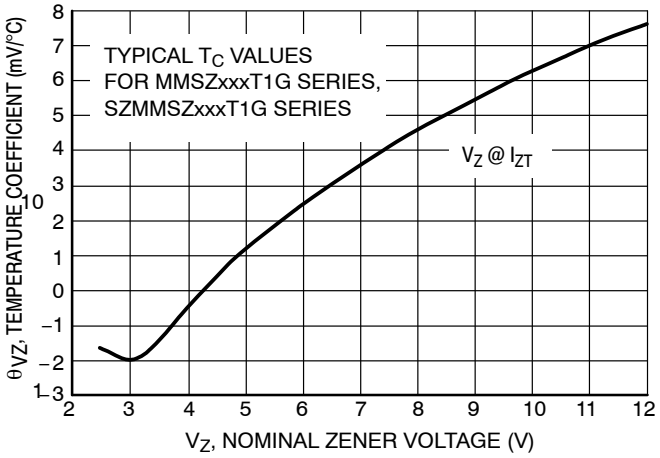


Figure 1. Temperature Coefficients (Temperature Range −55 °C to +150 °C)

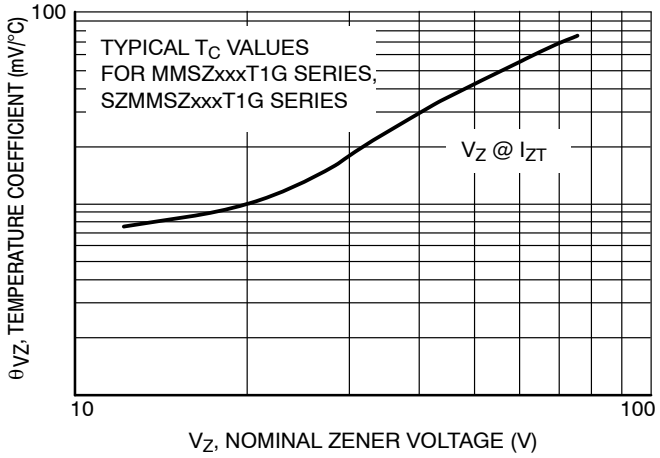


Figure 2. Temperature Coefficients (Temperature Range −55 °C to +150 °C)

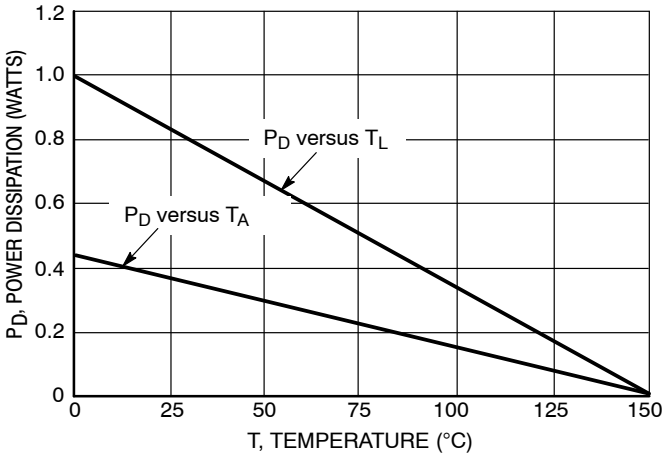


Figure 3. Steady State Power Derating

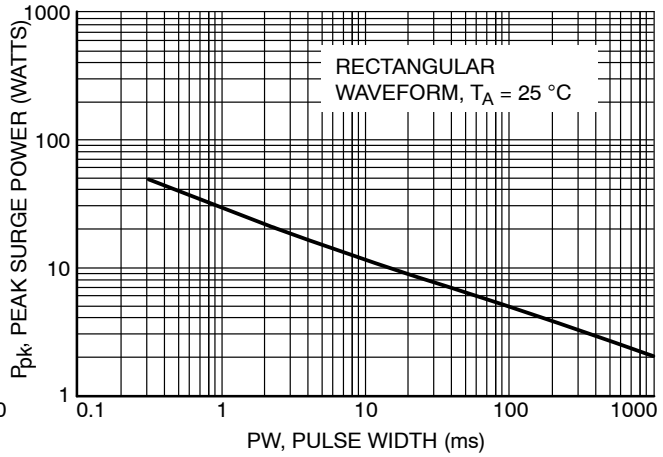


Figure 4. Maximum Nonrepetitive Surge Power

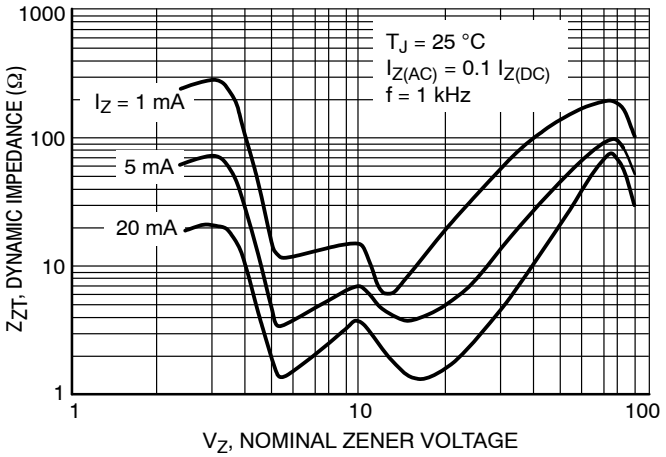


Figure 5. Effect of Zener Voltage on Zener Impedance

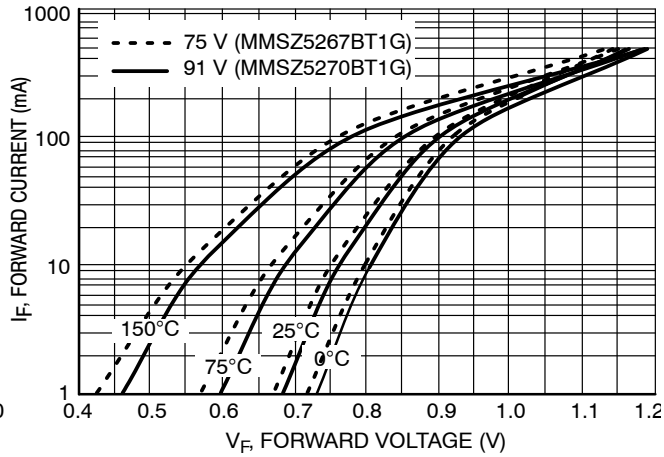


Figure 6. Typical Forward Voltage

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TYPICAL CHARACTERISTICS

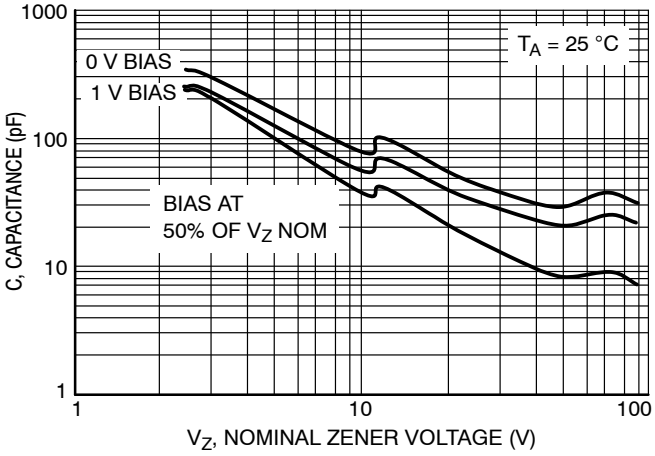


Figure 7. Typical Capacitance

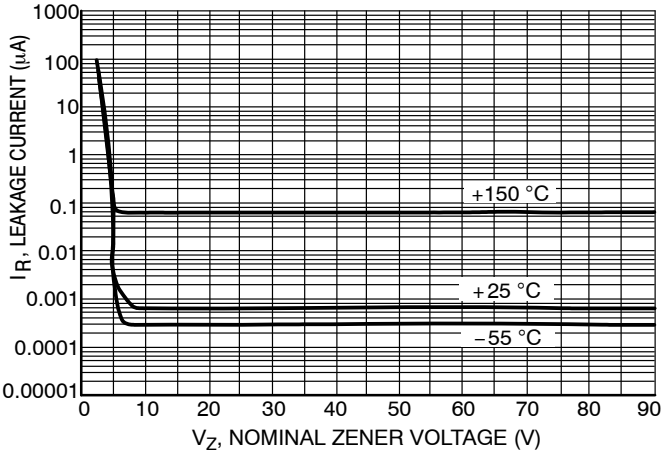


Figure 8. Typical Leakage Current

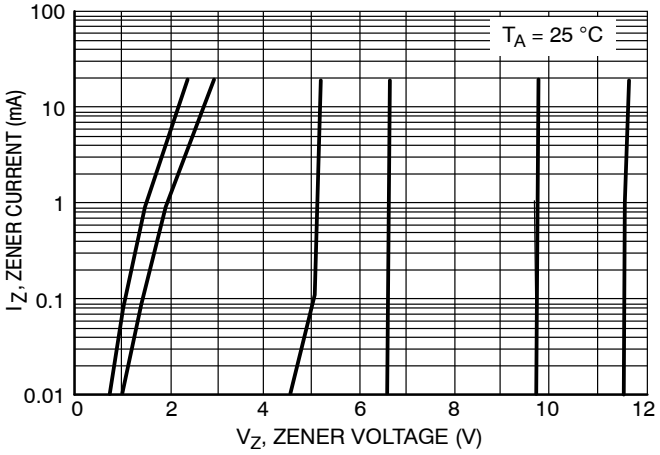


Figure 9. Zener Voltage versus Zener Current (V_Z Up to 12 V)

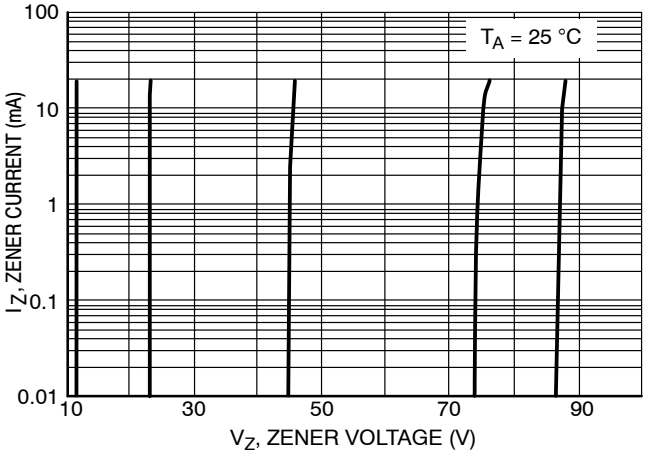


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

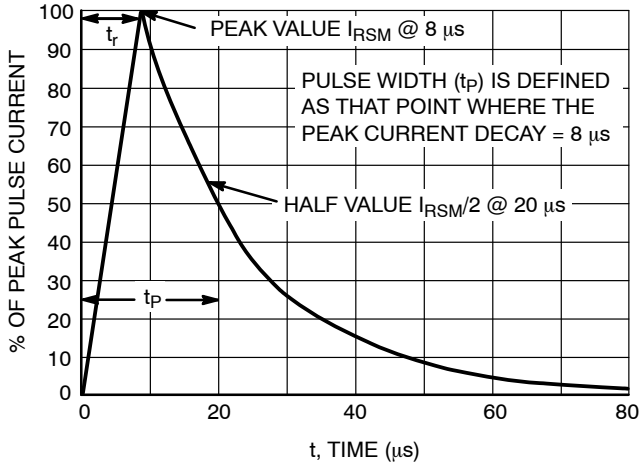


Figure 11. 8 × 20 μs Pulse Waveform

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REVISION HISTORY

Revision	Description of Changes	Date
8	Rebranded the Data Sheet to **onsemi** format. MMSZ2V7ET1G, MMSZ2V4ET1G OPNs Marked as Discontinued.	2/25/2026

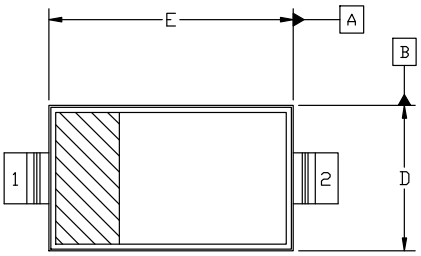
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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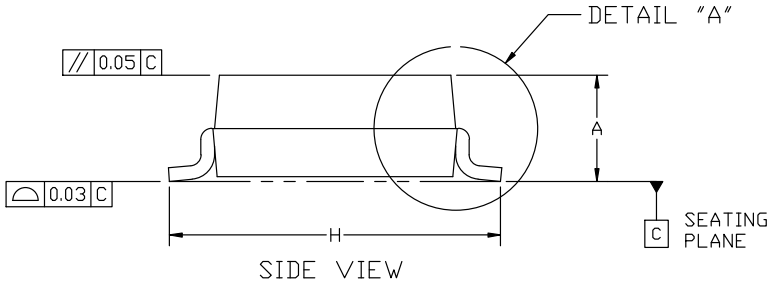


SOD−123 2−LEAD, 1.60x2.69x1.16
CASE 425
ISSUE H

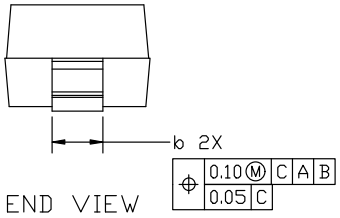
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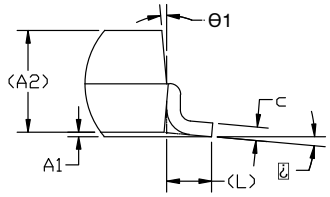
TOP VIEW



SIDE VIEW



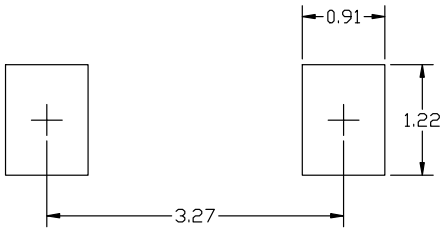
END VIEW



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 2−LEAD, 1.60x2.69x1.16**		**PAGE 1 OF 1**

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