

# MMSZ4678ET1 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

- Pb-Free Packages are Available
- 500 mW Rating on FR-4 or FR-5 Board
- Wide Zener Reverse Voltage Range – 1.8 V to 43 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  $\mu$ s)

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

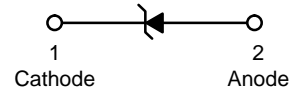
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

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



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SOD-123  
CASE 425  
STYLE 1

#### MARKING DIAGRAM



xxx = Specific Device Code  
M = Date Code

#### ORDERING INFORMATION

Device*	Package	Shipping†
MMSZ4xxxET1	SOD-123	3000/Tape & Reel
MMSZ4xxxET1G	SOD-123 (Pb-Free)	3000/Tape & Reel
MMSZ4xxxET3	SOD-123	10,000/Tape & Reel
MMSZ4xxxET3G	SOD-123 (Pb-Free)	10,000/Tape & Reel

\*The "T1" suffix refers to an 8 mm, 7 inch reel.  
The "T3" suffix refers to an 8 mm, 13 inch 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

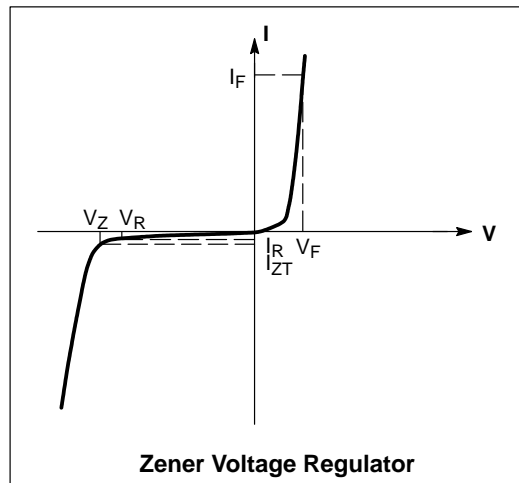
See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

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

## MMSZ4678ET1 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
$I_R$	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,  $V_F = 0.9\text{ V Max. @ } I_F = 10\text{ mA}$ )

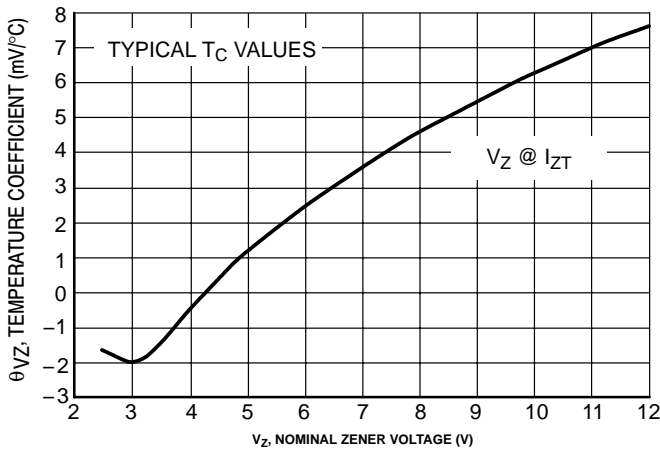
Device	Device Marking	Zener Voltage (Note 1)				Leakage Current	
		$V_Z$ (V)			@ $I_{ZT}$	$I_R$ @ $V_R$	
		Min	Nom	Max	$\mu\text{A}$	$\mu\text{A}$	V
MMSZ4684ET1	CG3	3.13	3.3	3.47	50	7.5	1.5
MMSZ4688ET1, G	CG7	4.47	4.7	4.94	50	10	3
MMSZ4689ET1	CG8	4.85	5.1	5.36	50	10	3
<b>MMSZ4690ET1</b>	<b>CG9</b>	<b>5.32</b>	<b>5.6</b>	<b>5.88</b>	<b>50</b>	<b>10</b>	<b>4</b>
MMSZ4691ET1	CH1	5.89	6.2	6.51	50	10	5
MMSZ4692ET1	CH2	6.46	6.8	7.14	50	10	5.1
MMSZ4693ET1	CH3	7.13	7.5	7.88	50	10	5.7
MMSZ4697ET1	CH7	9.50	10	10.50	50	1	7.6
MMSZ4699ET1	CH9	11.40	12	12.60	50	0.05	9.1
MMSZ4701ET1	CJ2	13.3	14	14.7	50	0.05	10.6
MMSZ4702ET1	CJ3	14.25	15	15.75	50	0.05	11.4
MMSZ4703ET1	CJ4	15.20	16	16.80	50	0.05	12.1
MMSZ4705ET1	CJ6	17.10	18	18.90	50	0.05	13.6
MMSZ4709ET1	CK1	22.80	24	25.20	50	0.01	18.2
MMSZ4711ET1	CK3	25.65	27	28.35	50	0.01	20.4
MMSZ4717ET1	CK9	40.85	43	45.15	50	0.01	32.6

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

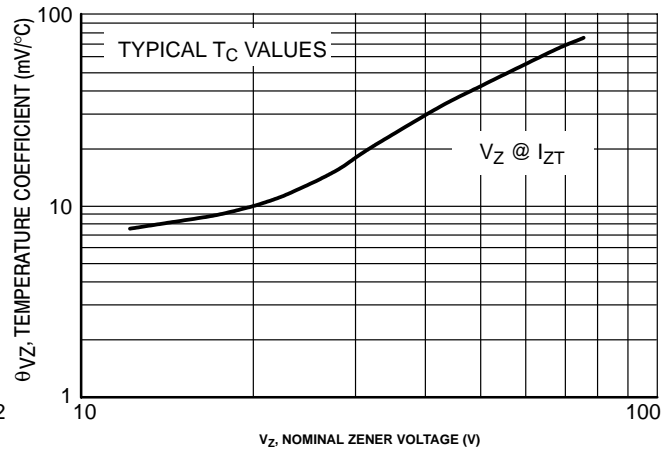
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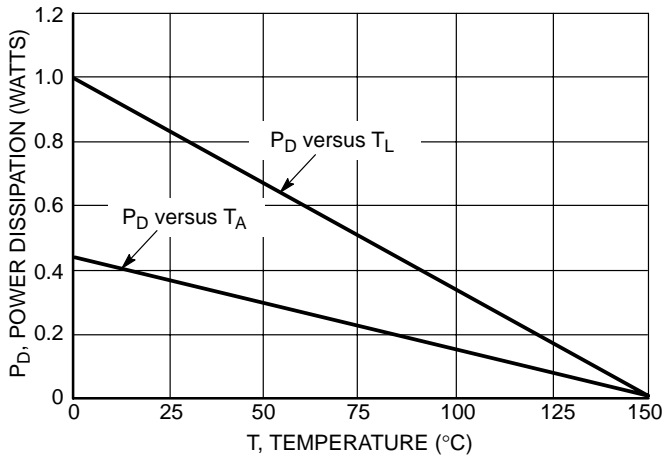
## TYPICAL CHARACTERISTICS



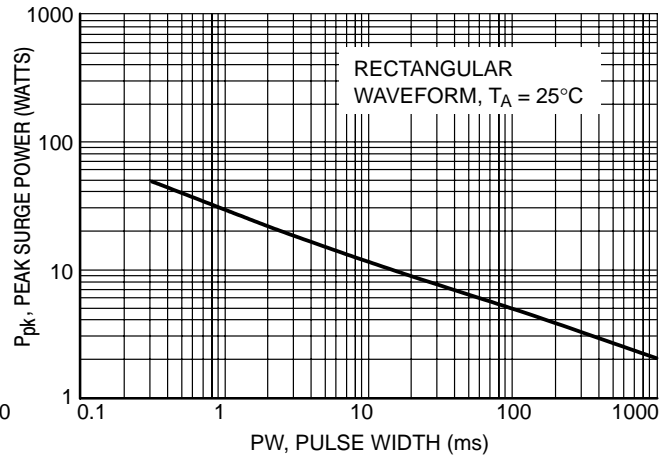
**Figure 1. Temperature Coefficients (Temperature Range -55°C to +150°C)**



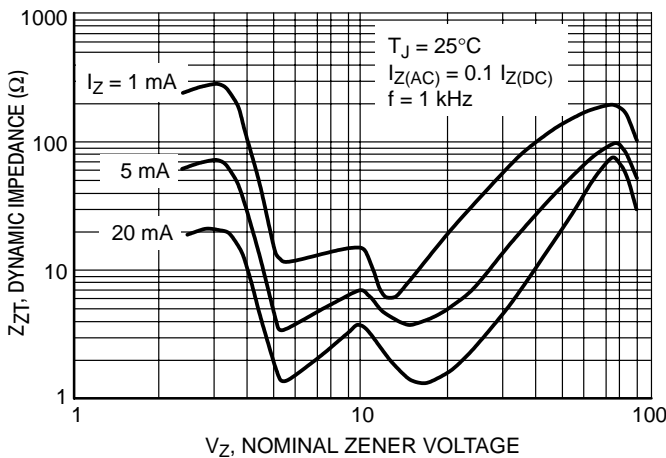
**Figure 2. Temperature Coefficients (Temperature Range -55°C to +150°C)**



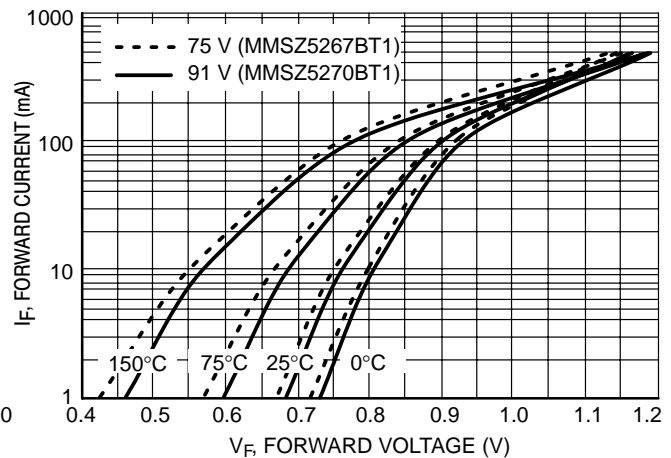
**Figure 3. Steady State Power Derating**



**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

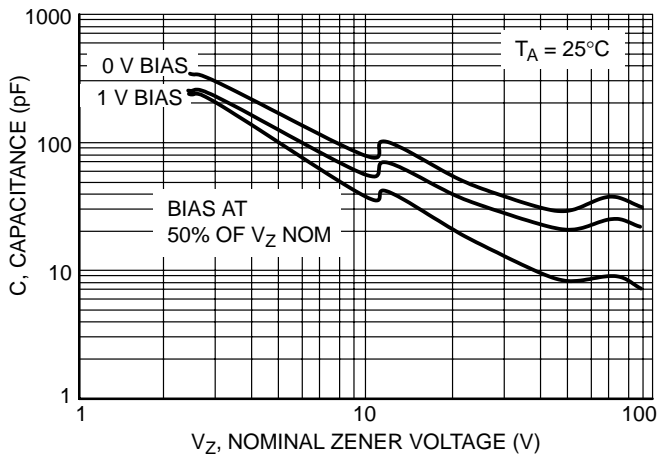


Figure 7. Typical Capacitance

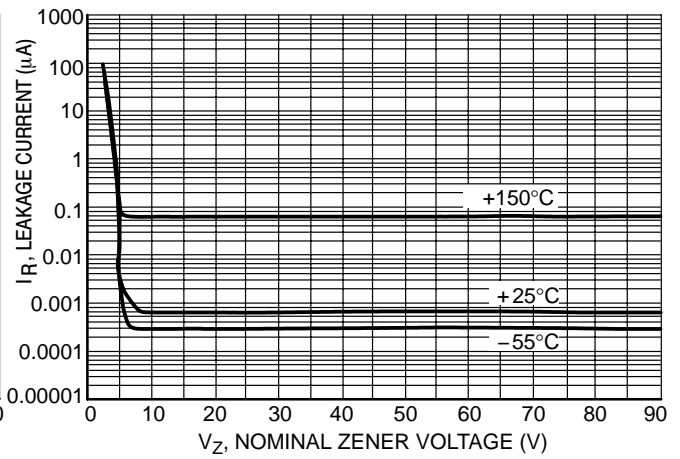


Figure 8. Typical Leakage Current

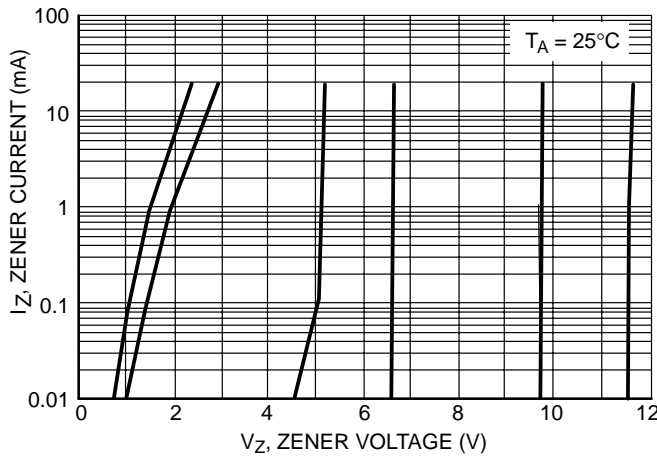


Figure 9. Zener Voltage versus Zener Current (V<sub>Z</sub> Up to 12 V)

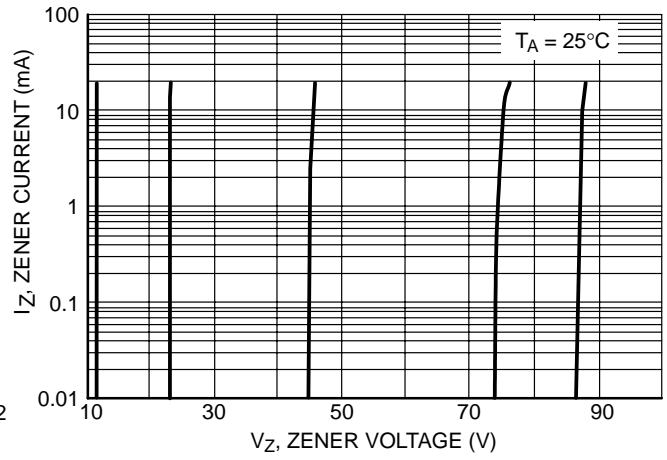


Figure 10. Zener Voltage versus Zener Current (12 V to 91 V)

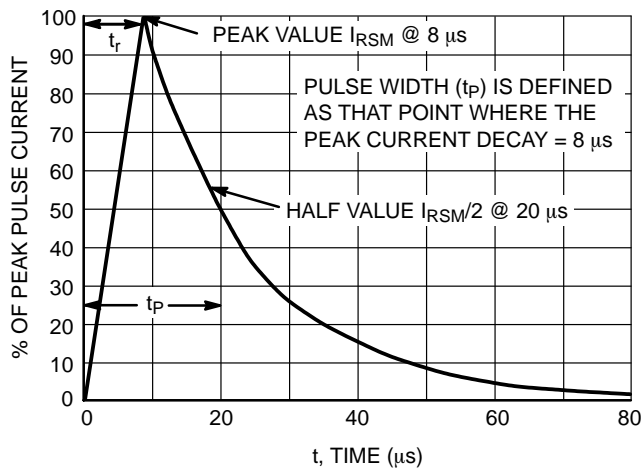


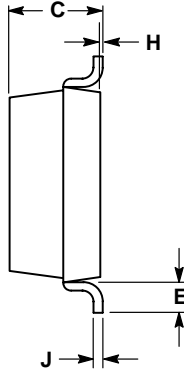
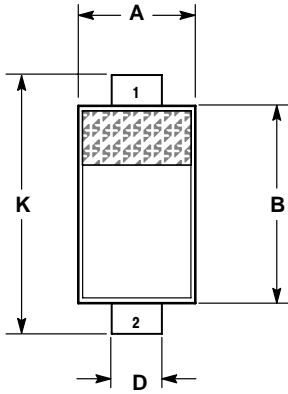
Figure 11. 8 × 20 μs Pulse Waveform

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## PACKAGE DIMENSIONS

SOD-123  
CASE 425-04  
ISSUE C

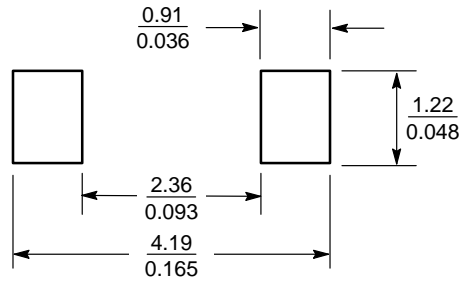


NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.055	0.071	1.40	1.80
B	0.100	0.112	2.55	2.85
C	0.037	0.053	0.95	1.35
D	0.020	0.028	0.50	0.70
E	0.01	---	0.25	---
H	0.000	0.004	0.00	0.10
J	---	0.006	---	0.15
K	0.140	0.152	3.55	3.85

STYLE 1:  
PIN 1. CATHODE  
2. ANODE

## SOLDERING FOOTPRINT\*




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

\*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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