

# Zener Voltage Regulators

## 300 mW SOD-523 Surface Mount

- We declare that the material of product compliance with RoHS requirements.

### ORDERING INFORMATION

Device	Package	Shipping
M5ZxxP Series	SOD-523	3000/Tape&Reel

This series of Zener diodes is packaged in a SOD-523 surface mount package. They are designed to provide voltage regulation protection and are especially attractive in situations where space is at a premium. They are well suited for applications such as cellular phones, hand held portables, and high density PC boards.

### Specification Features:

- Standard Zener Breakdown Voltage Range – 2.0 V to 75 V
- Steady State Power Rating of 300 mW
- Small Body Outline Dimensions: 0.047" x 0.032" (1.20 mm x 0.80 mm)
- Low Body Height: 0.028" (0.7 mm)
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

### Mechanical Characteristics:

**CASE:** Void-free, transfer-molded, thermosetting plastic  
Epoxy Meets UL 94 V-0

**LEAD FINISH:** 100% Matte Sn (Tin)

**QUALIFIED MAX REFLOW TEMPERATURE:** 260°C

Device Meets MSL 1 Requirements

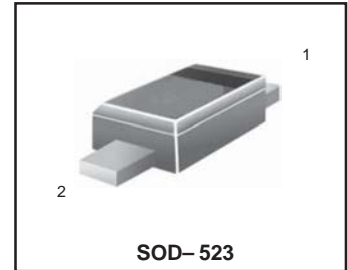
**MOUNTING POSITION:** Any

### MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, @ $T_A = 25^\circ\text{C}$	$P_D$	300	mW
Junction and Storage Temperature Range	$T_J, T_{stg}$	-65 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.

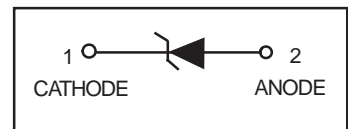
## M5ZxxP Series S-M5ZxxP Series



### MARKING DIAGRAM



xx = Specific Device Code  
M = Month Code

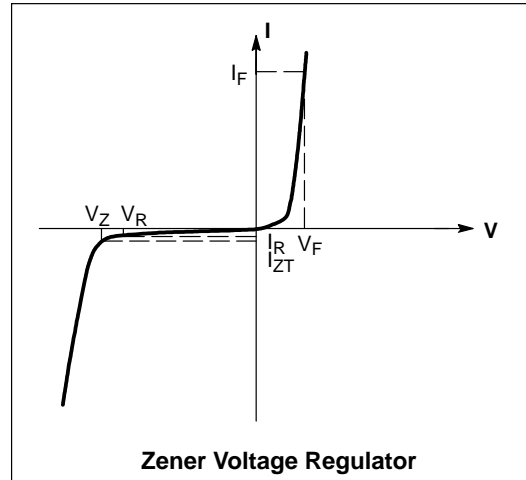


**ELECTRICAL CHARACTERISTICS**

( $T_A = 25^\circ\text{C}$  unless otherwise noted,

$V_F = 0.9\text{ V Max. @ } I_F = 10\text{ mA}$  for all types)

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 @ $I_F$
$\Theta V_Z$	Maximum Temperature Coefficient of $V_Z$
C	Max. Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$



## M5ZxxP Series, S-M5ZxxP Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V Max.}$  @  $I_F = 10\text{ mA}$  for all types)

Device	Device Marking	Zener Voltage (Note 1)			Zener Impedance			Leakage Current		$\theta_{VZ}$ (mV/k) @ $I_{ZT}$		C @ $V_R = 0$ f = 1 MHz	
		$V_Z$ (Volts)			$Z_{ZT}$ @ $I_{ZT}$	$Z_{ZK}$ @ $I_{ZK}$		$I_R$ @ $V_R$		Min	Max		
		Min	Nom	Max	mA	$\Omega$	$\Omega$	mA	$\mu\text{A}$	Volts	Min	Max	pF
M5Z2V0P	WY	1.91	2.0	2.09	5	100	600	1.0	150	1.0	-3.5	0	450
M5Z2V4P	00	2.2	2.4	2.6	5	100	1000	1.0	50	1.0	-3.5	0	450
M5Z2V7P	01	2.5	2.7	2.9	5	100	1000	1.0	20	1.0	-3.5	0	450
M5Z3V0P	02	2.8	3.0	3.2	5	100	1000	1.0	10	1.0	-3.5	0	450
M5Z3V3P	05	3.1	3.3	3.5	5	95	1000	1.0	5	1.0	-3.5	0	450
M5Z3V6P	06	3.4	3.6	3.8	5	90	1000	1.0	5	1.0	-3.5	0	450
M5Z3V9P	07	3.7	3.9	4.1	5	90	1000	1.0	3	1.0	-3.5	-2.5	450
M5Z4V3P	08	4.0	4.3	4.6	5	90	1000	1.0	3	1.0	-3.5	0	450
M5Z4V7P	09	4.4	4.7	5.0	5	80	800	1.0	3	2.0	-3.5	0.2	260
M5Z5V1P	0A	4.8	5.1	5.4	5	60	500	1.0	2	2.0	-2.7	1.2	225
M5Z5V6P	0C	5.2	5.6	6.0	5	40	400	1.0	1	2.0	-2.0	2.5	200
M5Z6V2P	0E	5.8	6.2	6.6	5	10	100	1.0	3	4.0	0.4	3.7	185
M5Z6V8P	0F	6.4	6.8	7.2	5	15	160	1.0	2	4.0	1.2	4.5	155
M5Z7V5P	0G	7.0	7.5	7.9	5	15	160	1.0	1	5.0	2.5	5.3	140
M5Z8V2P	0H	7.7	8.2	8.7	5	15	160	1.0	0.7	5.0	3.2	6.2	135
M5Z9V1P	0K	8.5	9.1	9.6	5	15	160	1.0	0.2	7.0	3.8	7.0	130
M5Z10VP	0L	9.4	10	10.6	5	20	160	1.0	0.1	8.0	4.5	8.0	130
M5Z11VP	0M	10.4	11	11.6	5	20	160	1.0	0.1	8.0	5.4	9.0	130
M5Z12VP	0N	11.4	12	12.7	5	25	80	1.0	0.1	8.0	6.0	10	130
M5Z13VP	0P	12.4	13.25	14.1	5	30	80	1.0	0.1	8.0	7.0	11	120
M5Z15VP	0T	14.3	15	15.8	5	30	200	1.0	0.05	10.5	9.2	13	110
M5Z16VP	0U	15.3	16.2	17.1	2	40	200	1.0	0.05	11.2	10.4	14	105
M5Z18VP	0W	16.8	18	19.1	2	45	225	1.0	0.05	12.6	12.4	16	100
M5Z20VP	0Z	18.8	20	21.2	2	55	225	1.0	0.05	14.0	14.4	18	85
M5Z22VP	10	20.8	22	23.3	2	55	250	1.0	0.05	15.4	16.4	20	85
M5Z24VP	11	22.8	24.2	25.6	2	70	120	1.0	0.05	16.8	18.4	22	80
M5Z27VP	12	25.1	27	28.9	2	80	300	1.0	0.05	18.9	21.4	25.3	70
M5Z30VP	14	28	30	32	2	80	300	1.0	0.05	21.0	24.4	29.4	70
M5Z33VP	18	31	33	35	2	80	300	1.0	0.05	23.2	27.4	33.4	70
M5Z36VP	19	34	36	38	2	90	500	1.0	0.05	25.2	30.4	37.4	70
M5Z39VP	20	37	39	41	2	130	500	1.0	0.05	27.3	33.4	41.2	45
M5Z43VP	21	40	43	46	2	150	500	1.0	0.05	30.1	37.6	46.6	40
M5Z47VP	1A	44	47	50	2	170	500	1.0	0.05	32.9	42.0	51.8	40
M5Z51VP	1C	48	51	54	2	180	500	1.0	0.05	35.7	46.6	57.2	40
M5Z56VP	1D	52	56	60	2	200	500	1.0	0.05	39.2	52.2	63.8	40
M5Z62VP	1E	58	62	66	2	215	500	1.0	0.05	43.4	58.8	71.6	35
M5Z68VP	1F	64	68	72	2	240	500	1.0	0.05	47.6	65.6	79.8	35
M5Z75VP	1G	70	75	79	2	255	500	1.0	0.05	52.5	73.4	88.6	35

1. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of  $25^\circ\text{C}$ .



Typical Characteristics

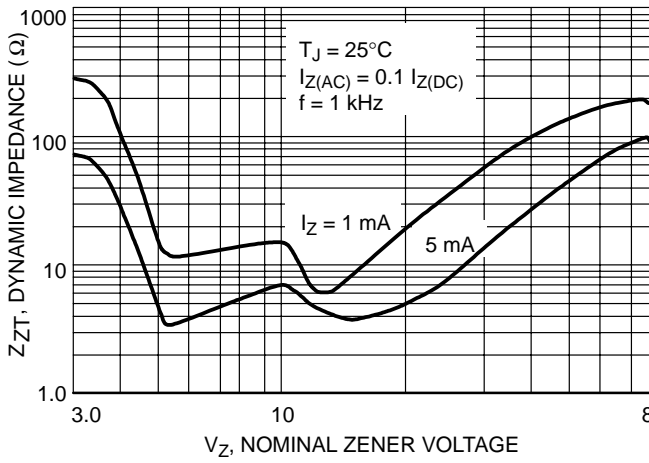


Figure 1. Effect of Zener Voltage on Zener Impedance

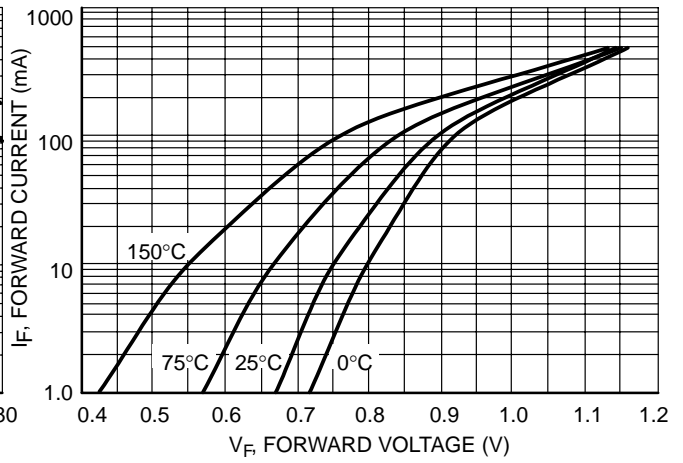


Figure 2. Typical Forward Voltage

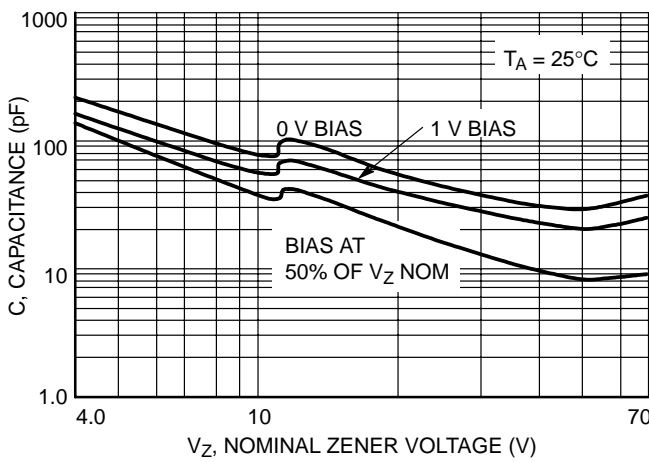


Figure 3. Typical Capacitance

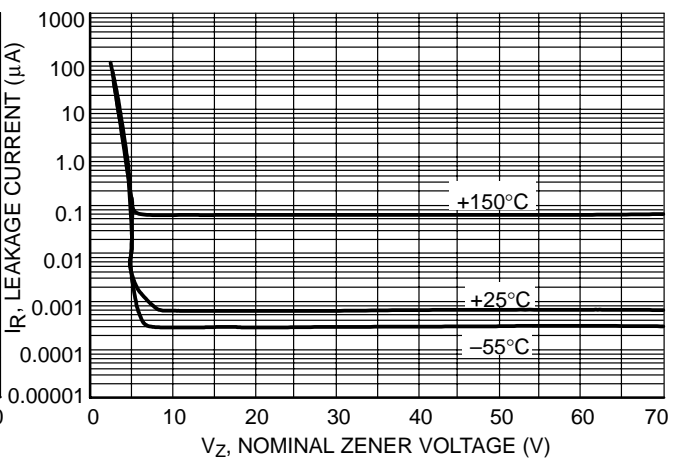
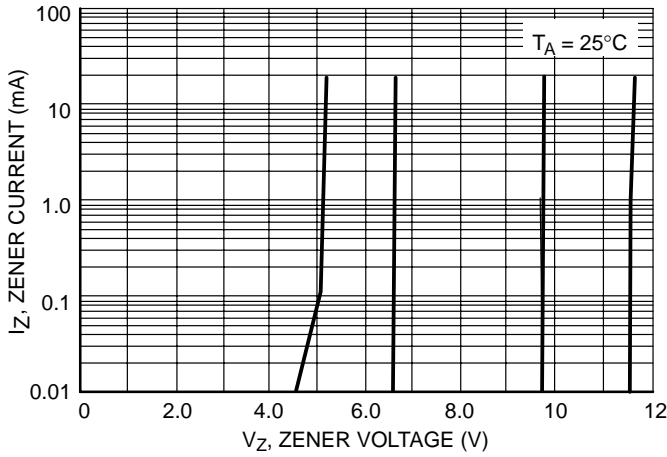


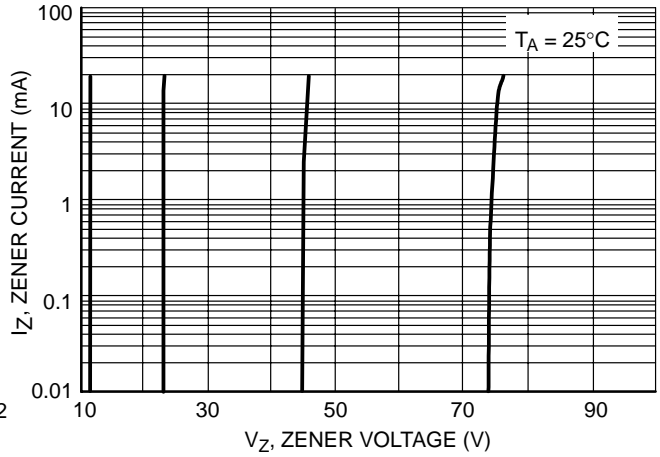
Figure 4. Typical Leakage Current



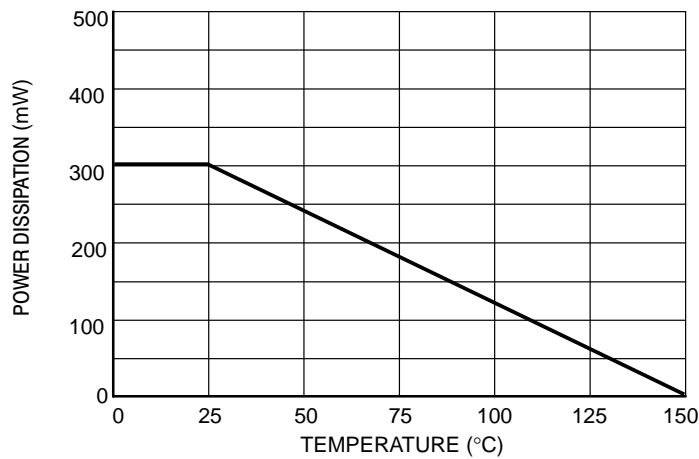
**Typical Characteristics**



**Figure 5. Zener Voltage versus Zener Current (V<sub>Z</sub> Up to 12 V)**



**Figure 6. Zener Voltage versus Zener Current (12 V to 75 V)**

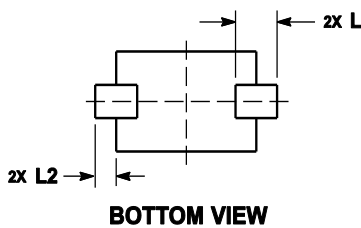
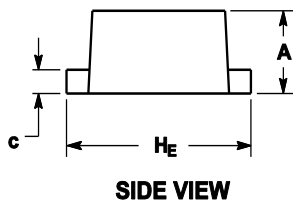
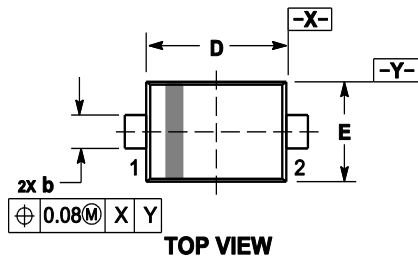


**Figure 7. Steady State Power Derating**



## M5ZxxP Series, S-M5ZxxP Series

### OUTLINE AND DIMENSIONS



#### Notes:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.60	0.70	0.020	0.024	0.028
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.07	0.14	0.20	0.003	0.006	0.008
D	1.10	1.20	1.30	0.043	0.047	0.051
E	0.70	0.80	0.90	0.028	0.031	0.035
H <sub>E</sub>	1.50	1.60	1.70	0.059	0.063	0.067
L	0.30 REF			0.012 REF		
L <sub>2</sub>	0.15	0.20	0.25	0.006	0.008	0.010

### SOLDERING FOOTPRINT

