1PMT5913BT3
through
1PMT5948BT3

Product Preview

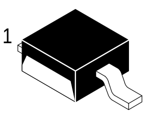
2.5 Watt Plastic Surface Mount Silicon Zener Diodes Powermite® Package

This complete new line of zener/tvs diodes offers a 2.5 watt series in a micro miniature, space saving surface mount package. The Powermite zener/tvs diodes are designed for use as a tvs or a regulation device in automotive and telecommunication applications where efficiency, low leakage, size/height and profile are important.

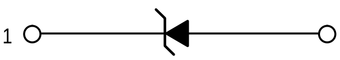
Features:

- Voltage Range – 3.3 to 91 V
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Low Profile – maximum height of 1.1mm
- Integral Heat Sink/Locking Tabs
- Full metallic bottom eliminates flux entrapment
- Small Footprint – Footprint area of 8.45mm^2
- Supplied in 12mm tape and reel – 12,000 units per reel
- Powermite is JEDEC Registered as DO–216AA

PLASTIC SURFACE MOUNT
ZENER DIODES
2.5 WATTS
3.3–91 VOLTS



CASE 457–01
PLASTIC



1: CATHODE
2: ANODE

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DC Power Dissipation @ T_L = 75°C, Measured at Zero Lead Length Derate above 75°C	P_D	2.5 40	Watts mW/°C
DC Power Dissipation @ T_A = 25°C(1) Derate above 25°C	P_D	380 2.8	mW mW/°C
Thermal Resistance from Junction to Lead	$R_{\theta JL}$	26	°C/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	324	°C/W
Operating and Storage Junction Temperature Range	T_J, T_{stg}	– 65 to +150	°C
Typical P_{pk} Dissipation @ T_L < 25°C, (PW–10/1000 µs per Figure 8)(2)	P_{pk}	200	Watts
Typical P_{pk} Dissipation @ T_L < 25°C, (PW–8/20 µs per Figure 9)(2)	P_{pk}	1000	Watts

(1)FR4 Board, within 1" to device, using Motorola minimum recommended footprint, as shown in case 403A outline dimensions spec.
(2)Non–repetitive current pulse.

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Powermite is a registered trademark of Microsemi Corporation.
Thermal Clad is a trademark of the Bergquist Company.

ELECTRICAL CHARACTERISTICS (V_F = 1.5 Volts Max @ I_F = 200 mAdc for all types.)

Device*	Nominal Zener Voltage V_Z @ I_{ZT} Volts (Note 1)	Test Current I_{ZT} mA	Max Zener Impedance (Note 2)			Max Reverse Leakage Current		Maximum DC Zener Current I_{ZM} mAdc	Device Marking
			Z_{ZT} @ I_{ZT} Ohms	Z_{ZK} Ohms @	I_{ZK} mA	I_R µA @	V_R Volts		
1PMT5913BT3	3.3	113.6	10	500	1	100	1	454	913B
1PMT5914BT3	3.6	104.2	9	500	1	75	1	416	914B
1PMT5915BT3	***3.9***	***96.1***	***7.5***	***500***	***1***	***25***	***1***	***384***	***915B***
1PMT5916BT3	***4.3***	***87.2***	***6***	***500***	***1***	***5***	***1***	***348***	***916B***
1PMT5917BT3	***4.7***	***79.8***	***5***	***500***	***1***	***5***	***1.5***	***319***	***917B***
1PMT5918BT3	***5.1***	***73.5***	***4***	***350***	***1***	***5***	***2***	***294***	***918B***
1PMT5919BT3	***5.6***	***66.9***	***2***	***250***	***1***	***5***	***3***	***267***	***919B***
1PMT5920BT3	***6.2***	***60.5***	***2***	***200***	***1***	***5***	***4***	***241***	***920B***
1PMT5921BT3	6.8	55.1	2.5	200	1	5	5.2	220	921B
1PMT5922BT3	7.5	50	3	400	0.5	5	6.8	200	922B
1PMT5923BT3	***8.2***	***45.7***	***3.5***	***400***	***0.5***	***5***	***6.5***	***182***	***923B***
1PMT5924BT3	9.1	41.2	4	500	0.5	5	7	164	924B
1PMT5925BT3	***10***	***37.5***	***4.5***	***500***	***0.25***	***5***	***8***	***150***	***925B***
1PMT5926BT3	***11***	***34.1***	***5.5***	***550***	***0.25***	***1***	***8.4***	***136***	***926B***
1PMT5927BT3	***12***	***31.2***	***6.5***	***550***	***0.25***	***1***	***9.1***	***125***	***927B***
1PMT5928BT3	13	28.8	7	550	0.25	1	9.9	115	928B
1PMT5929BT3	***15***	***25***	***9***	***600***	***0.25***	***1***	***11.4***	***100***	***929B***
1PMT5930BT3	16	23.4	10	600	0.25	1	12.2	93	930B
1PMT5931BT3	***18***	***20.8***	***12***	***650***	***0.25***	***1***	***13.7***	***83***	***931B***
1PMT5932BT3	20	18.7	14	650	0.25	1	15.2	75	932B
1PMT5933BT3	22	17	17.5	650	0.25	1	16.7	68	933B
1PMT5934BT3	***24***	***15.6***	***19***	***700***	***0.25***	***1***	***18.2***	***62***	***934B***
1PMT5935BT3	***27***	***13.9***	***23***	***700***	***0.25***	***1***	***20.6***	***55***	***935B***
1PMT5936BT3	***30***	***12.5***	***26***	***750***	***0.25***	***1***	***22.8***	***50***	***936B***
1PMT5937BT3	33	11.4	33	800	0.25	1	25.1	45	937B
1PMT5938BT3	***36***	***10.4***	***38***	***850***	***0.25***	***1***	***27.4***	***41***	***938B***
1PMT5939BT3	39	9.6	45	900	0.25	1	29.7	38	939B
1PMT5940BT3	43	8.7	53	950	0.25	1	32.7	34	940B
1PMT5941BT3	47	8	67	1000	0.25	1	35.8	31	941B
1PMT5942BT3	51	7.3	70	1100	0.25	1	38.8	29	942B
1PMT5943BT3	56	6.7	86	1300	0.25	1	42.6	26	943B
1PMT5944BT3	62	6	100	1500	0.25	1	47.1	24	944B
1PMT5945BT3	68	5.5	120	1700	0.25	1	51.7	22	945B
1PMT5946BT3	75	5	140	2000	0.25	1	56	20	946B
1PMT5947BT3	82	4.6	160	2500	0.25	1	62.2	18	947B
1PMT5948BT3	91	4.1	200	3000	0.25	1	69.2	16	948B

* TOLERANCE AND VOLTAGE DESIGNATION Tolerance designation — The type numbers listed indicate a tolerance of ±5%.

Devices listed in bold, italic are Motorola preferred devices.

TYPICAL CHARACTERISTICS

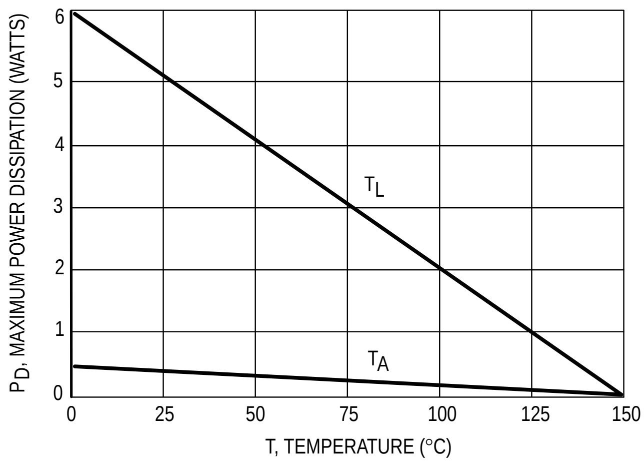


Figure 1. Steady State Power Derating

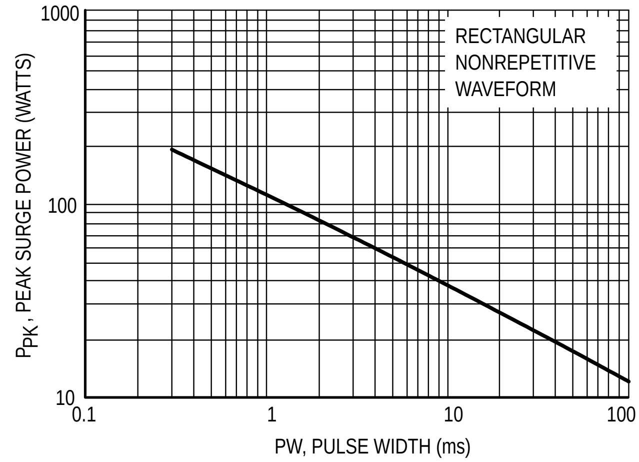


Figure 2. Maximum Surge Power

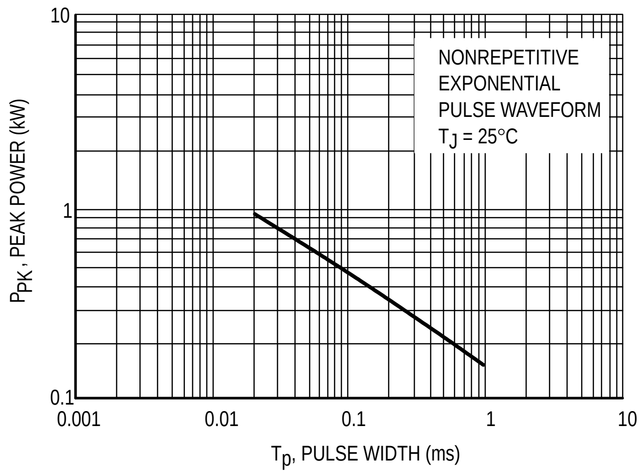


Figure 3. Maximum Surge Power

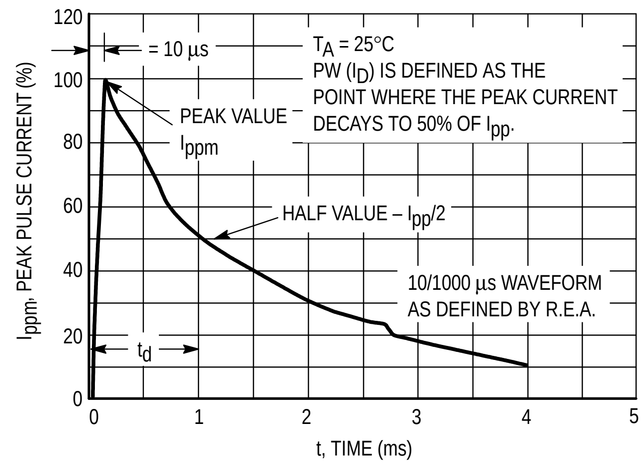


Figure 4. Pulse Waveform 10/1000

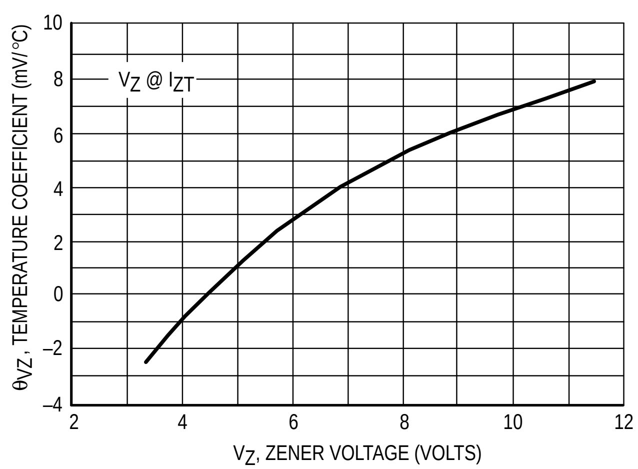


Figure 5. Zener Voltage – To 12 Volts

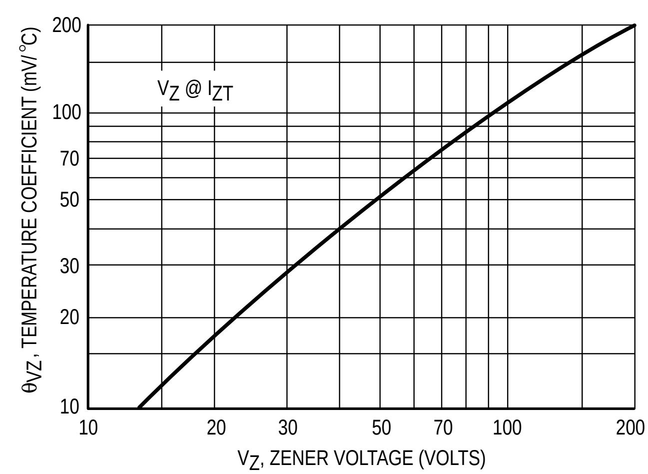


Figure 6. Zener Voltage – 14 To 200 Volts

NOTE 1. ZENER VOLTAGE (V_Z) MEASUREMENT
Nominal zener voltage is measured with the device junction in thermal equilibrium with ambient temperature at 25°C

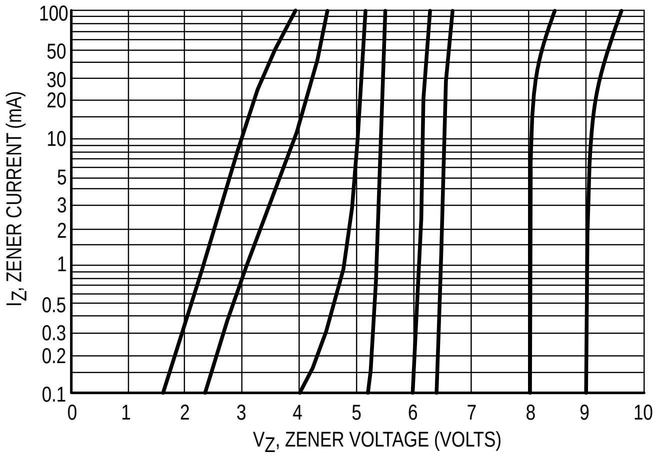


Figure 7. V_Z = 3.3 thru 10 Volts

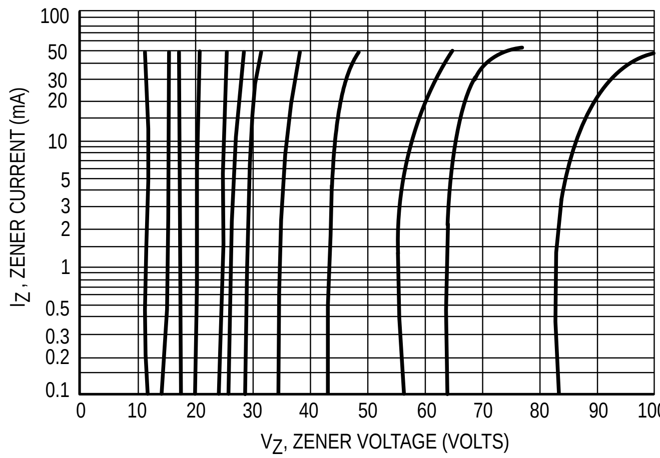


Figure 8. V_Z = 12 thru 82 Volts

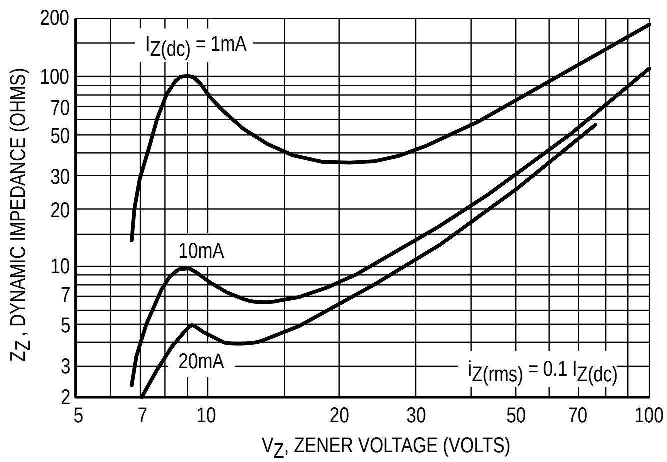


Figure 9. Effect of Zener Voltage

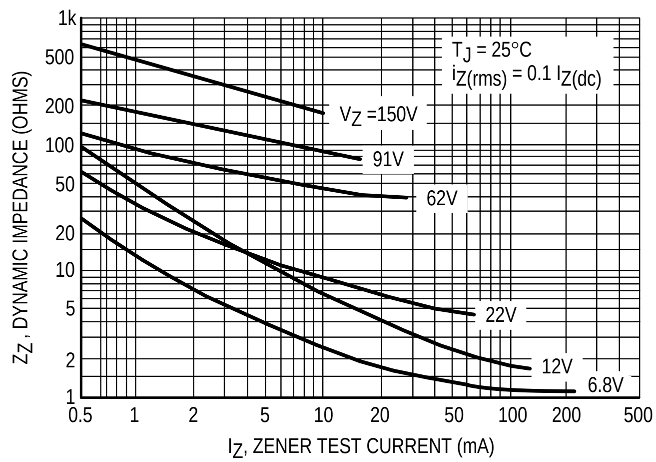


Figure 10. Effect of Zener Current

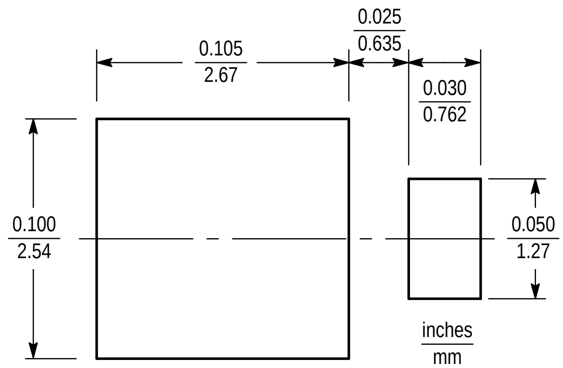
NOTE 2. ZENER IMPEDANCE (Z_Z) DERIVATION

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 = 60 Hz.

INFORMATION FOR USING THE POWERMITE SURFACE MOUNT PACKAGE

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



POWERMITE

POWERMITE POWER DISSIPATION

The power dissipation of the Powermite is a function of the drain pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, T_A. Using the values provided on the data sheet for the Powermite package, P_D can be calculated as follows:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature T_A of 25°C, one can calculate the power dissipation of the device which in this case is 386 milliwatts.

$$P_D = \frac{150°C - 25°C}{324°C/W} = 386 \text{ milliwatts}$$

The 324°C/W for the Powermite package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 386 milliwatts. There are other alternatives to achieving higher power dissipation from the Powermite package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad™. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

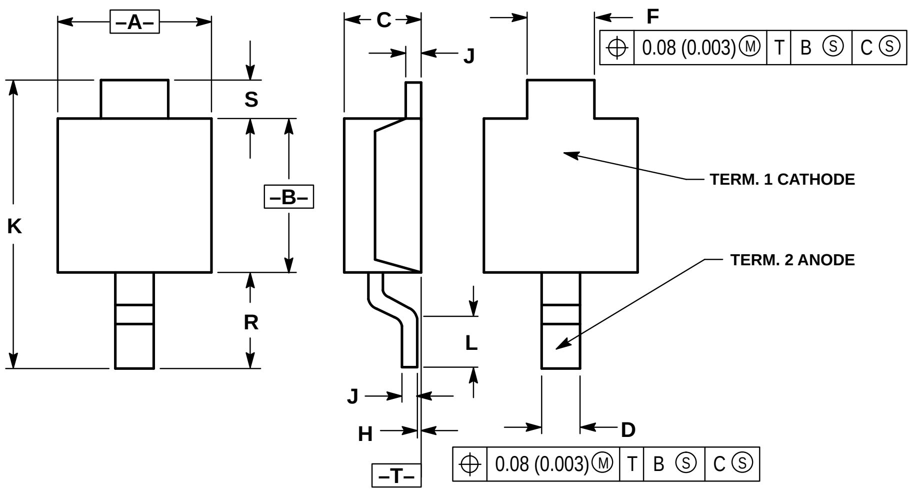
SOLDERING PRECAUTIONS

The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

OUTLINE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	1.75	2.15	0.069	0.081
B	1.75	2.15	0.069	0.086
C	0.85	1.15	0.033	0.045
D	0.40	0.65	0.016	0.026
F	0.70	1.00	0.028	0.039
H	–0.05	+0.10	–0.002	+0.004
J	0.10	0.25	0.004	0.010
K	3.60	4.15	0.142	0.163
L	0.50	0.80	0.020	0.031
R	1.20	1.50	0.047	0.059
S	0.50 REF		0.020	

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ISSUE O

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