Powermite Low Noise 1 Watt Zener Diodes

1PMT4625–1PMT4627Ce3, 1PMT4099–1PMT4135Ce3

Product Overview

This Microchip Powermite surface mount low noise 1 watt Zener package series provides a higher power handling capability. In addition to its size advantages, the Powermite package features include a full-metallic bottom that eliminates the possibility of solder flux entrapment during assembly, and a unique locking tab design serves as an integral heat sink with very low thermal resistance junction to case (bottom). Its innovative design makes this device ideal for use with automatic insertion equipment. RoHS compliant versions are also available.

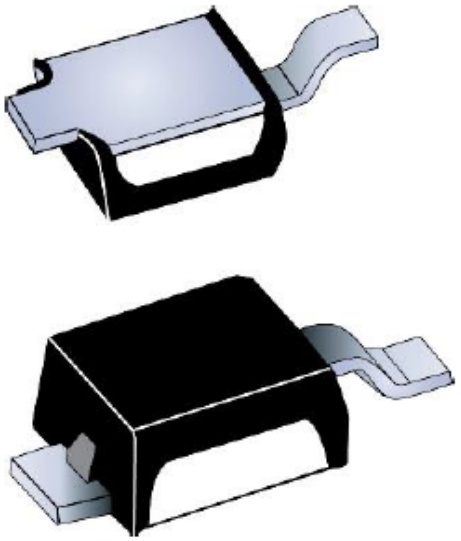
Features

- Surface mount equivalent to JEDEC registered 1N4099 through 1N4135 and 1N4625 through 1N4627 series except with additional power capability
- Extensive selection from 5.1 to 100V Zener voltage
- Regulates voltage over a broad operating current and temperature range
- Low $R_{\Theta JC}$ for cooler operation and better voltage regulation
- Low noise density (1–3 kHz frequency bandpass filter at I_{ZT})
- Low reverse leakage current
- RoHS compliant versions are available.
- Ideal for high-density and low-profile mounting

Applications/Benefits

- Available in Zener voltage tolerance of 5%, or C suffix tolerance of 2%
- Moisture classification Level 1 with no dry pack required per IPC/JEDEC J-STD-020F
- Non-sensitive to ESD per MIL-STD-750 method 1020
- Compatible with automatic insertion equipment
- Full metallic bottom eliminates flux entrapment

Figure 1. DO-216 Package



Also available in:

DO-35 package (axial-leaded)

1N4099–1N4135 and 1N4625–1N4627

DO-213AA package (surface mount)

1N4099UR–1N4135UR and 1N4625UR–1N4627UR

Table of Contents

1. Maximum Ratings

Table 1-1. Maximum Ratings at 25 °C Unless Otherwise Noted

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	T_J and T_{STG}	–55 to +150	°C
Thermal resistance, junction-to-ambient [1]	$R_{\Theta JA}$	240	°C/W
Thermal resistance junction-to-case	$R_{\Theta JC}$	30	°C/W
Steady-state power dissipation [2]	P_D	1.0	W
Solder temperature at 10 seconds	T_{SP}	260	°C

Notes:

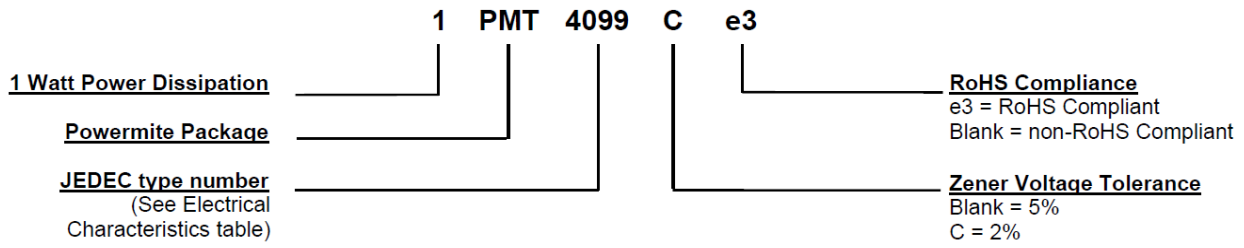
1. On FR4 PC board (1 oz copper) with recommended footprint
2. At T_C < 120 °C where T_C is case bottom temperature at mounting plane, or 0.5 watts at T_A = 30 °C (ambient temperature) when mounted on FR4 PC board as described for $R_{\Theta JA}$ (also see power deratings in Figure 4-2.)

1.1 Mechanical Packaging

- Case: Void-free transfer molded thermosetting epoxy compound meeting UL94V-0
- Finish: Annealed matte-tin plating over copper and readily solderable per MIL-STD-750 method 2026 (consult factory for tin-lead plating)
  NOTE: Tin-lead plated product is not RoHS compliant.
- Polarity: Cathode designated by Tab 1 (bottom)
- Tape And reel option: Standard per EIA-481-B (consult factory for quantities)
- Marking: Part number as 3 numerical digits (see Electrical Characteristics), V_Z tolerance level, a dot ● if e3 RoHS compliant, date code of package seal YYWW
- Weight: Approximately 0.016 grams
- See Package Dimensions

2. Part Nomenclature

Figure 2-1. Part Nomenclature



2.1 Symbols and Definitions

Table 2-1. Symbols and Definitions

Symbol	Definition
I_R	Reverse current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.
I_Z, I_{ZT}, I_{ZK}	Regulator current: The dc regulator current (I_Z), at a specified test point (I_{ZT}), near the breakdown knee (I_{ZK})
I_{ZM}	Maximum regulator (Zener) current: The maximum rated dc current for the specified power rating.
I_{ZSM}	Maximum Zener surge current: The peak reverse current in the breakdown region including all nonrepetitive transient currents but excluding all repetitive transients.
N_D	Noise density: The noise generated over a specified frequency bandwidth usually specified in terms of mV/√Hz
P_D	Steady-State power dissipation: The dc power resulting from the product of V_Z x I_{ZM}
V_R	Reverse voltage: The reverse voltage dc value, no alternating component.
V_Z	Zener voltage: The Zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region.
Z_{ZT} or Z_{ZK}	Dynamic impedance: The small signal impedance of the diode when biased to operate in its breakdown region at a specified rms current modulation (typically 10% of I_{ZT} or I_{ZK}) and superimposed on I_{ZT} or I_{ZK} respectively.

3. Electrical Characteristics

Table 3-1. Electrical Characteristics at 25 °C Unless Otherwise Stated

Part Number	Device Marking [1]	Nominal Zener Voltage [2] V_Z at I_{ZT}	Zener Test Current I_{ZT}	Maximum Zener Impedance [3] Z_{ZT} at I_{ZT}	Maximum Reverse Current I_R at V_R		Maximum Noise Density N_D at I_{ZT}	Maximum Zener Current [4] I_{ZM}	Maximum Temperature Coefficient Of Zener Voltage α_{VZ}
		Volts	µA	Ohms	µA	Volts	µV/√HZ	mA	%/°C
1PMT4625	625	5.1	250	1500	10	3.0	2	153.1	–0.045 +0.030
1PMT4626	626	5.6	250	1400	10	4.0	4	142.2	–0.020 +0.040
1PMT4627	627	6.2	250	1200	10	5.0	5	133.4	–0.010 +0.050
1PMT4099	099	6.8	250	200	10	5.17	40	122.5	0.040
1PMT4100	100	7.5	250	200	10	5.70	40	111.5	0.045
1PMT4101	101	8.2	250	200	1	6.24	40	100.6	0.048
1PMT4102	102	8.7	250	200	1	6.61	40	96.2	0.049
1PMT4103	103	9.1	250	200	1	6.92	40	91.9	0.050
1PMT4104	104	10	250	200	1	7.60	40	83.1	0.055
1PMT4105	105	11	250	200	0.05	8.44	40	76.5	0.060
1PMT4106	106	12	250	200	0.05	9.12	40	69.9	0.065
1PMT4107	107	13	250	200	0.05	9.87	40	63.4	0.065
1PMT4108	108	14	250	200	0.05	10.65	40	59.0	0.070
1PMT4109	109	15	250	100	0.05	11.40	40	54.8	0.070
1PMT4110	110	16	250	100	0.05	12.15	40	52.5	0.070
1PMT4111	111	17	250	100	0.05	12.92	40	48.1	0.075
1PMT4112	112	18	250	100	0.05	13.37	40	45.9	0.075
1PMT4113	113	19	250	150	0.05	14.44	40	43.7	0.075
1PMT4114	114	20	250	150	0.01	15.20	40	41.6	0.075
1PMT4115	115	22	250	150	0.01	16.72	40	37.2	0.080
1PMT4116	116	24	250	150	0.01	18.25	40	34.9	0.080
1PMT4117	117	25	250	150	0.01	19.00	40	32.8	0.080
1PMT4118	118	27	250	150	0.01	20.45	40	30.6	0.085
1PMT4119	119	28	250	200	0.01	21.28	40	30.6	0.085
1PMT4120	120	30	250	200	0.01	22.80	40	28.4	0.085
1PMT4121	121	33	250	200	0.01	25.08	40	26.2	0.085
1PMT4122	122	36	250	200	0.01	27.38	40	24.0	0.090
1PMT4123	123	39	250	200	0.01	29.65	40	21.4	0.090
1PMT4124	124	43	250	250	0.01	32.65	40	19.5	0.090
1PMT4125	125	47	250	250	0.01	35.75	40	17.7	0.090
1PMT4126	126	51	250	300	0.01	38.76	40	16.4	0.090
1PMT4127	127	56	250	300	0.01	42.60	40	14.7	0.090
1PMT4128	128	60	250	400	0.01	45.60	40	13.9	0.090

Table 3-1. Electrical Characteristics at 25 °C Unless Otherwise Stated (continued)

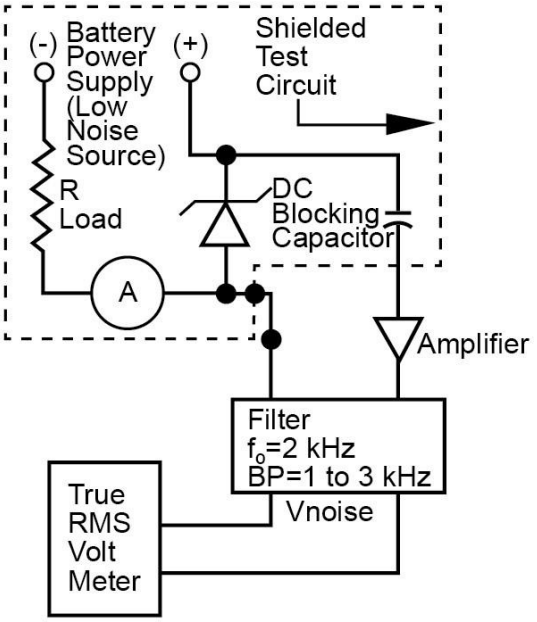
Part Number	Device Marking [1]	Nominal Zener Voltage [2] V_Z at I_{ZT}	Zener Test Current I_{ZT}	Maximum Zener Impedance [3] Z_{ZT} at I_{ZT}	Maximum Reverse Current I_R at V_R		Maximum Noise Density N_D at I_{ZT}	Maximum Zener Current [4] I_{ZM}	Maximum Temperature Coefficient Of Zener Voltage α_{VZ}
		Volts	µA	Ohms	µA	Volts	µV/√HZ	mA	%/°C
1PMT4129	129	62	250	500	0.01	47.10	40	13.3	0.090
1PMT4130	130	68	250	700	0.01	51.68	40	12.2	0.095
1PMT4131	131	75	250	700	0.01	57.00	40	11.2	0.095
1PMT4132	132	82	250	800	0.01	62.32	40	10.1	0.095
1PMT4133	133	87	250	1000	0.01	66.12	40	9.6	0.095
1PMT4134	134	91	250	1200	0.01	69.16	40	9.2	0.095
1PMT4135	135	100	250	1500	0.01	76.00	40	8.3	0.095

Notes:

1. Part numbers & marking shown have a standard tolerance of ±5% on the nominal Zener voltage. Include C suffix in device part number and marking (for example, 1PMT4625C and 625C) for ±2% tolerance part. Include • in marking for e3 parts (for example, 1PMT4625Ce3 and 625C•)
2. V_Z is measured at I_{ZT} with T_C (TAB 1) at 30 °C
3. Zener impedance is derived by superimposing on I_{ZT} a 60 Hz rms ac current equal to 10% of I_{ZT} (25 µA ac).
4. Based on 1W maximum power dissipation before any derating. Allowance has been made for higher voltage with operation at higher currents and temperature. For determination of voltage change with current deviations from I_{ZT} see MicroNote 202.
5. Forward voltage (V_F) is 0.87 volts maximum at 200 mA peak for 8.3 ms half-sine wave. Forward voltage (V_F) is 1.2 volts maximum at 3A peak for 8.3 ms half-sine wave.

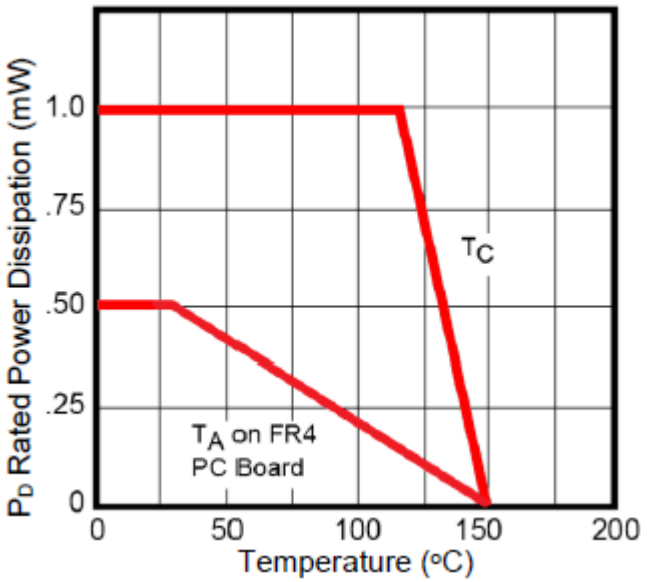
4. Graphs

Figure 4-1. Noise Density Measurement Circuit



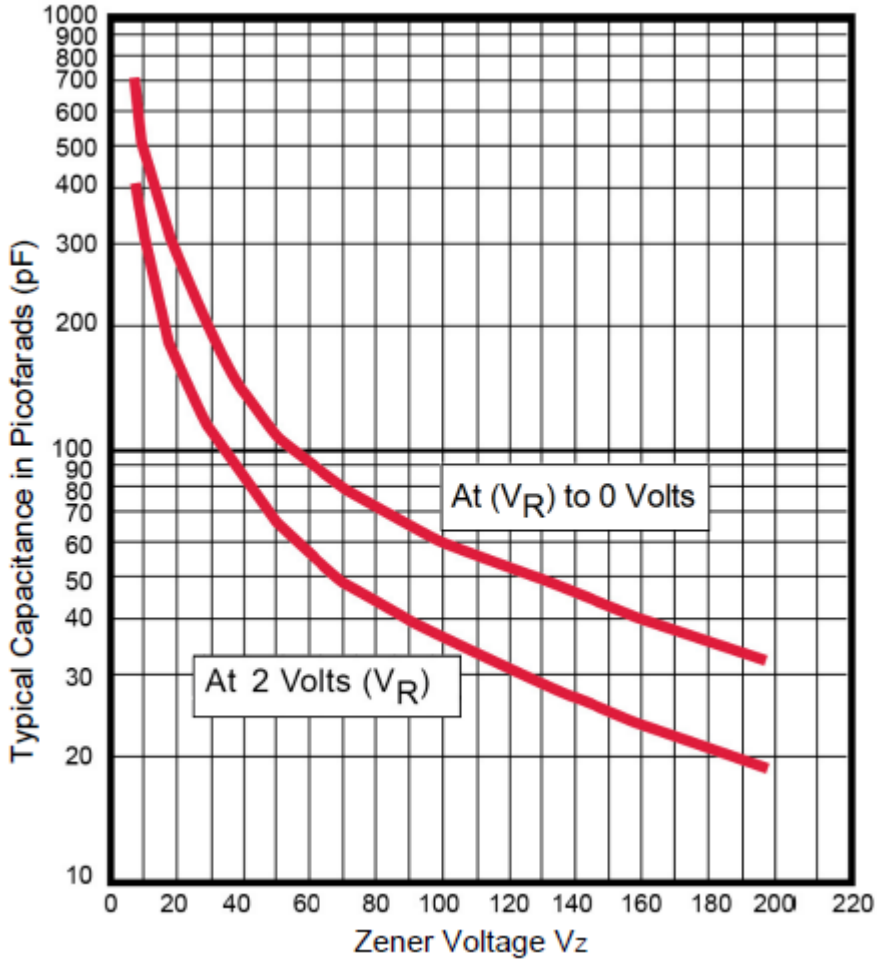
Noise density, (N_D) is specified in microvolt-rms per square-root-hertz. Actual measurement is performed using a 1 kHz to 3 kHz frequency bandpass filter at a constant Zener test current (I_{ZT}) at 25 °C ambient temperature. N_D is calculated from the formula.

Figure 4-2. Power Derating Curve



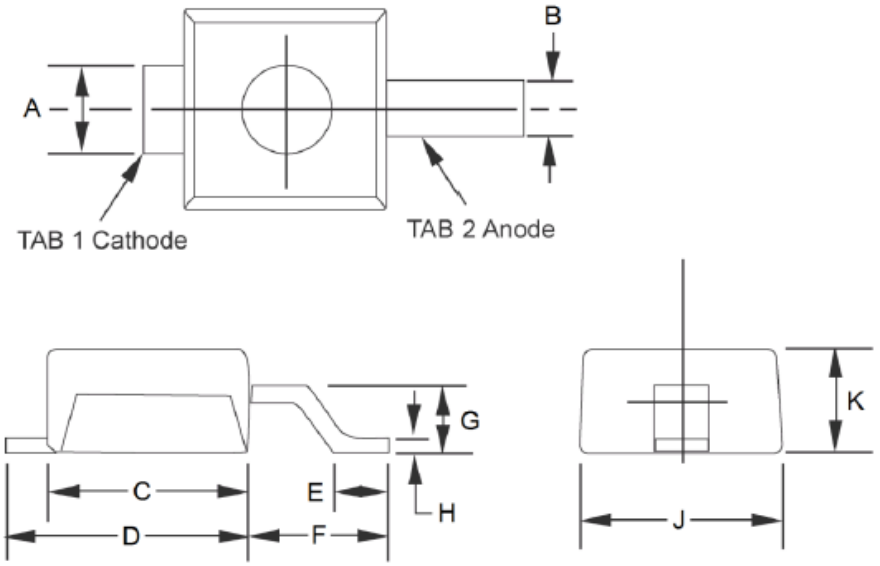
Where T_C is case (bottom) temperature and T_A is ambient temperature on FR4 PC board.

Figure 4-3. Capacitance Vs. Zener Voltage (Typical)



5. Package Dimensions

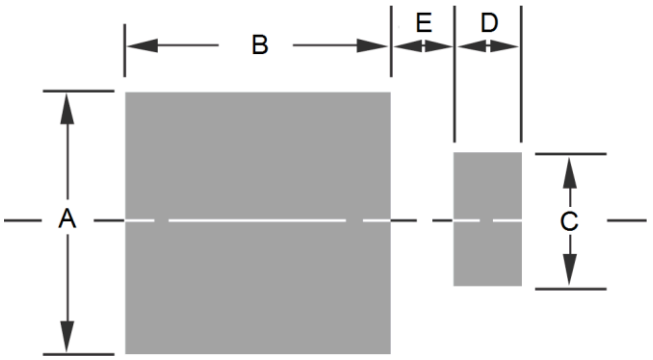
Figure 5-1. Package Dimensions



Ltr	Dimensions			
	Inch		Millimeters	
	Min.	Max.	Min.	Max.
A	0.029	0.039	0.73	0.99
B	0.016	0.026	0.40	0.66
C	0.070	0.080	1.77	2.03
D	0.087	0.097	2.21	2.46
E	0.020	0.030	0.50	0.76
F	0.051	0.061	1.29	1.54
G	0.021	0.031	0.53	0.78
H	0.004	0.008	0.10	0.20
J	0.070	0.080	1.77	2.03
K	0.035	0.045	0.89	1.14

6. Pad Layout

Figure 6-1. Pad Layout



Ltr	Dimensions	
	Inch	Millimeters
A	0.100	2.54
B	0.105	2.67
C	0.050	1.27
D	0.030	0.76
E	0.025	0.64

7. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	02/2025	Document was converted to Microchip format and assigned literature number DS00005773.
Rev. B	08/2024	Microsemi document was created and assigned literature number RF01097.

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