Powermite

Plastic Surface-Mount Power Package

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The Powermite Family

Introduction

Powermite is our patented low-profile architecture for packaging surface-mount devices with the industry's highest power density in the smallest possible footprint.

Microchip'ss surface mount Powermite packages provide high power handling capability in thermally enhanced packages with very small footprints: Powermite 1 = 0.16 × 0.10 inches (4.07 × 2.54 mm) Powermite 3 = 0.26 × 0.161 inches (6.61 × 4.09 mm). The bottom side is full metal, which combined with a unique internal locking tab on the die provides a low resistance thermal path for heat out of the device. It also eliminates the possibility of flux entrapment during assembly. They are fully compatible with automatic insertion equipment.

The current portfolio includes:

- 1A through 10A Schottky rectifiers up to 200V
- 1A through 8A ultra-fast rectifiers up to 800V
- 150W (10×1000) and 1500 W (10×1000) TVS diodes
- 2.5W Pin diodes up to 400V
- 1.8–200V low-noise Zener diodes
- 3.3–200V 3W Zener diodes
- High-speed silicon-controlled rectifiers

Outperforms Conventional SMT

With no wire bonds and non-magnetic materials, Powermite reduces high-frequency losses and provides dramatically higher surge ratings compared to conventional wire-bonded SMT packages. With a large, full-metal bottom, all Powermite devices deliver superior heat dissipation and thermal capabilities. Mechanical strength is excellent due to a metal-lock design that permanently bonds metal electrodes to the plastic housing.

Benefits include:

- Reduced high frequency losses
- Built-in heat sink and superior heat dissipation
- High mechanical strength
- One-third the size of comparably rated products

Powermite 1

The original two-lead Powermite package provides a breakthrough high-density design for handheld and thermally sensitive power supply and battery charging applications. In addition to its unique full-metal bottom that provides an optimal path for dissipating junction heat, the Powermite package's patented wrap-around interlocking construction allows solder fillets to form during the surface-mount reflow process for superior heat dissipation and mechanical strength. Measuring less than 1 mm high and 2 mm square, Powermite packaging provides a dramatic one-third reduction in size compared with two-leaded devices in conventional SMA packages, and compared with similarly sized SOT-23 devices, Powermite delivers superior thermal and power-handling capability.

- 1 mm high × 2 mm square
- 1/3 smaller than SMA
- Superior performance compared to SOT-23

Powermite 1 Transient Voltage Suppressors

DEVICE TYPE		RATED STANDOFF VOLTAGE VWM	MINIMUM BREAKDOWN VOLTAGE V(BR) @ 1 mA	MAXIMUM STANDBY CURRENT ID @ VWM	MAXIMUM PEAK PULSE CURRENT* IPP @ 10/1000 µs	MAXIMUM CLAMPING VOLTAGE VC @ IPP	MAXIMUM TEMPERATURE COEFFICIENT of V(BR) αV(BR)
Unidirectional	**Bi-directional**	V	V	µA	A	V	%/oC
UPT5	**UPTB5**	5	6.0	50	15.7	9.5	0.030
UPT8 & UPT8R	**UPTB8**	8	9.0	2	10.9	13.7	0.040
UPT10 & UPT10R	**UPTB10**	10	11.0	2	8.33	18.0	0.045
UPT12 & UPT12R	**UPTB12**	12	13.8	1	6.94	21.6	0.050
UPT15 & UPT15R	**UPTB15**	15	16.7	1	5.77	26.0	0.055
UPT17 & UPT17R	**UPTB17**	17	19.0	1	5.14	29.2	0.060
UPT24 & UPT24R	**UPTB24**	24	28.4	1	3.47	43.2	0.070
UPT28 & UPT28R	**UPTB28**	28	31.0	1	3.13	47.8	0.075
UPT33 & UPT33R	**UPTB33**	33	36.8	1	2.65	56.7	0.080
UPT48 & UPT48R	**UPTB48**	48	54.0	1	1.78	84.3	0.090

Note: "R" denotes "Reverse Polarity".

Powermite 1 Ultra-Fast Rectifiers

Part Number	Max Reverse Voltage	Max Average Output Current	Max Average Output Current	Non-Repetitive Sinusoidal Surge Current (8.3 mS)	Forward Voltage Drop	Max Reverse Current	Trr I_F = 0.5A I_R = 1.0A I_{REC} = 0.25A
	V	T_{TAB} = 75°C	T_{TAB} = 75°C	I	V_F @ I_F	I_R @ V_R	nSec
UPR5e3	50	2.5A	2.5A	25A	0.975V @ 2A	2.0 µA @ 50V	25 ns
UPR10e3	100	2.5A	2.5A	25A	0.975V @ 2A	2.0 µA @ 100V	25 ns
UPR15e3	150	2.5A	2.5A	25A	0.975V @ 2A	2.0 µA @ 150V	25 ns
UPR20e3	200	2.0A	2.0A	20A	1.25V @ 1.0A	10.0 µA @ 200V	50 ns
UPR30e3	300	2.0A	2.0A	20A	1.25V @ 1.0A	10.0 µA @ 300V	50 ns
UPR40e3	400	2.0A	2.0A	20A	1.25V @ 1.0A	10.0 µA @ 400V	50 ns

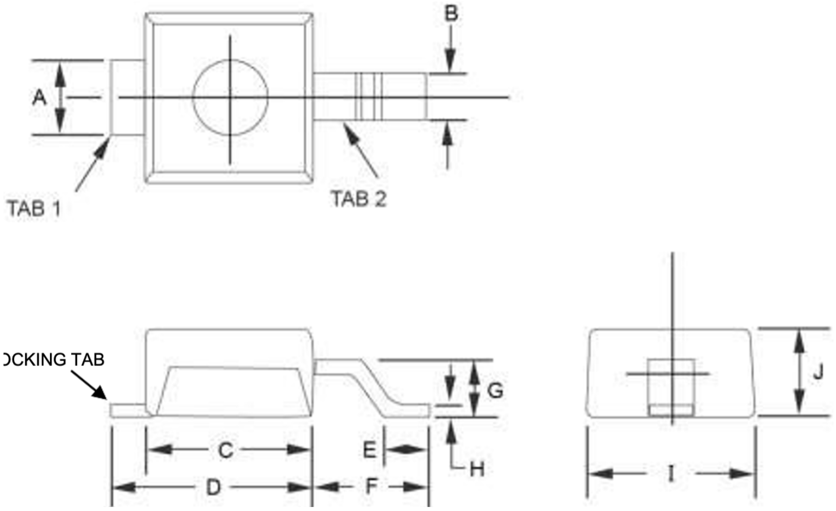
Powermite 1 2.5W Pin Diodes

Part Number	Max Reverse Voltage	Typical Series Resistance R_S	Typical Series Resistance R_S	Capacitance C_T	Typical Parallel Resistance R_P	Min Carrier Lifetime t	Max Forward Voltage V_F
	V	Ohms	Ohms	pF	KOhms	µS	V
UPP1001e3	100	0.75	0.75	1.2	8	2	1.0
UPP1002e3	200	0.75	0.75	1.2	8	2	1.0
UPP1004e3	400	0.75	0.75	1.2	8	2	1.0
UPP9401e3	50	0.75	0.75	0.75	10	1	1.0

Powermite 1 Schottkys

Part Number	Peak Repetitive Reverse Voltage	Max Average Rectified Current	Peak Forward Surge Current	Forward Voltage Drop	Max Reverse Current
	V_{RRM}	Io	I_{FSM}	V_F @ I_F	I_R @ V_R
UPS115Ue3	15	1.0A	50A	0.22V @ 1.0A	10 mA @ 15V
UPS120e3	20	1.0A	50A	0.45V @ 1.0A	0.4 mA @ 20V
UPS120e3	20	1.0A	50A	0.53V @ 1.0A	10 µA @ 20V
UPS5817e3	20	1.0A	50A	0.45V @ 1.0A	1.0 mA @ 20V
UPS140e3	40	1.0A	50A	0.45V @ 1.0A	0.4 mA @ 40V
UPS5819e3	40	1.0A	50A	0.55V @ 1.0A	1.0 mA @ 40V

Powermite 1 Secifications



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
I	**0.070**	0.080	1.77	2.03
J	**0.035**	0.045	0.89	1.14

Powermite 3® Package: Small Size, Greater Power

With three leads and a slightly larger footprint, our Powermite 3 package provides all of the thermal impedance and thermal resistance advantages of the original Powermite in a 1.1 mm × 5.3 mm × 4.8 mm design with power capabilities previously available only in much larger DPAK and TO-220 devices. Powermite 3 package devices include eight-amp power Schottkys and ultra-fast rectifiers, 500V and 1000V single-amp MOSFETs, high-speed silicon-controlled rectifiers and 1500W Zener diodes.

UPS1040 High-Density 10-Amp Power Schottkys

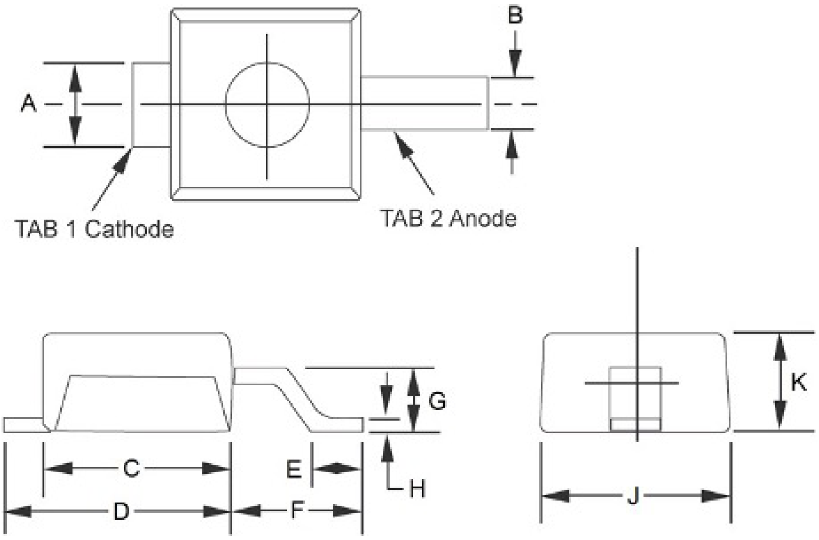
Features:

- 10-Amp, 40V Schottky barrier rectifier
- Low 1.1 mm profile (max)
- 16.51 mm2 footprint
- Low VF for higher efficiency
- Low thermal resistance
- Patented heat sink design

Applications:

- DC-DC converters
- Battery charge regulation
- Low-voltage/high-frequency inverters
- Freewheeling and steering diodes

Powermite 3 Package



Package Dimensions

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MUPT Powermite

Microchip's high-reliability program also provides for date coding and lot traceabilty of all devices, continuous reliability monitoring, and controlled foundry, assembly, and test locations. Customers are also provided a full Certificate of Conformance with every lot. Any product changes are made only under a process/product change notification process with the customer.

We offer 3 levels of cost effective up-screening for more robust applications, such as avionics flight hardware, where even a very low level of device mortality is unacceptable. The available screening processes are described in the accompanying tables and are defined as MA, MXL and MX screening processes. These screening processes are recommended for all robust or harsh environmental applications, and for all power levels. You do not need to create source control drawings nor define screening flows to specify these up-screening options.

Device Type		Rated Standoff Voltage V_{WM}	Minimum Breakdown Voltage V(BR) @ 1 mA	Maximum Standby Current I_D @ V_{WM}	Maximum Peak Pulse Current* I_{PP} @ 10/1000 μS	Maximum Clamping Voltage V_C @ I_{PP}	Maximum Temperature Coefficient of $V_{(br)}$ aV(BR)
Uni-directional	**Bi-directional**	**V**	**V**	**μA**	**A**	**V**	**%/°C**
MUPT5	**MUPTB5**	5	6.0	50	15.7	9.5	0.030
MUPT8	**MUPTB8**	8	9.0	2	10.9	13.7	0.040
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