

# Designer's™ Data Sheet

## Surface Mount Schottky Power Rectifier

### POWERMITE® Power Surface Mount Package

The Schottky Powermite employs the Schottky Barrier principle with a barrier metal and epitaxial construction that produces optimal forward voltage drop–reverse current tradeoff. The advanced packaging techniques provide for a highly efficient micro miniature, space saving surface mount Rectifier. With its unique heatsink design, the Powermite has the same thermal performance as the SMA while being 50% smaller in footprint area, and delivering one of the lowest height profiles, < 1.1 mm in the industry. Because of its small size, it is ideal for use in portable and battery powered products such as cellular and cordless phones, chargers, notebook computers, printers, PDAs and PCMCIA cards. Typical applications are ac/dc and dc–dc converters, reverse battery protection, and “Oring” of multiple supply voltages and any other application where performance and size are critical.

#### Features:

- Low Profile — Maximum Height of 1.1 mm
- Small Footprint — Footprint Area of 8.45 mm<sup>2</sup>
- Low  $V_F$  Provides Higher Efficiency and Extends Battery Life
- Supplied in 12 mm Tape and Reel — 12,000 Units per Reel
- Low Thermal Resistance with Direct Thermal Path of Die on Exposed Cathode Heat Sink

#### Mechanical Characteristics:

- Powermite is JEDEC Registered as D0–216AA
- Case: Molded Epoxy
- Epoxy Meets UL94, VO at 1/8”
- Weight: 62 mg (approximately)
- Device Marking: BCF
- Lead and Mounting Surface Temperature for Soldering Purposes. 260°C Maximum for 10 Seconds

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	20	V
Average Rectified Forward Current (At Rated $V_R$ , $T_C = 135^\circ\text{C}$ )	$I_O$	1.0	A
Peak Repetitive Forward Current (At Rated $V_R$ , Square Wave, 100 kHz, $T_C = 135^\circ\text{C}$ )	$I_{FRM}$	2.0	A
Non–Repetitive Peak Surge Current (Non–Repetitive peak surge current, halfwave, single phase, 60 Hz)	$I_{FSM}$	50	A
Storage Temperature	$T_{stg}$	–55 to 150	°C
Operating Junction Temperature	$T_J$	–55 to 125	°C
Voltage Rate of Change (Rated $V_R$ , $T_J = 25^\circ\text{C}$ )	$dv/dt$	10,000	V/ $\mu\text{s}$

#### THERMAL CHARACTERISTICS

Thermal Resistance – Junction–to–Lead (Anode) (1)	$R_{tjl}$	35	°C/W
Thermal Resistance – Junction–to–Tab (Cathode) (1)	$R_{tjtab}$	23	
Thermal Resistance – Junction–to–Ambient (1)	$R_{tja}$	277	

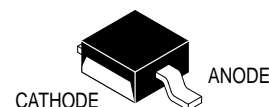
(1) Mounted with minimum recommended pad size, PC Board FR4, See Figures 9 & 10.

POWERMITE is a registered trademark of MicroSemi Corporation

**Designer's Data for “Worst Case” Conditions** — The Designer's Data Sheet permits the design of most circuits entirely from the information presented. SOA Limit curves — representing boundaries on device characteristics — are given to facilitate “worst case” design.

**MBRM120LT3**

**SCHOTTKY BARRIER  
RECTIFIER  
1.0 AMPERES  
20 VOLTS**



**CASE 457–04  
ISSUE C**

# MBRM120LT3

## ELECTRICAL CHARACTERISTICS

Maximum Instantaneous Forward Voltage (2), See Figure 2 ( $I_F = 0.1$ A) ( $I_F = 1.0$ A) ( $I_F = 3.0$ A)	$V_F$	$T_J = 25^\circ\text{C}$	$T_J = 85^\circ\text{C}$	V
		0.34	0.26	
		0.45	0.415	
Maximum Instantaneous Reverse Current, See Figure 4 ( $V_R = 20$ V) ( $V_R = 10$ V)	$I_R$	$T_J = 25^\circ\text{C}$	$T_J = 85^\circ\text{C}$	mA
		0.40	25	
		0.10	18	

(2) Pulse Test: Pulse Width  $\leq 250$   $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

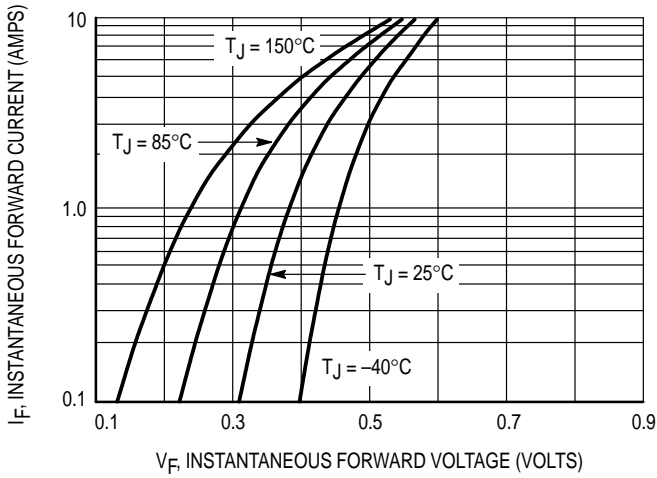


Figure 1. Typical Forward Voltage

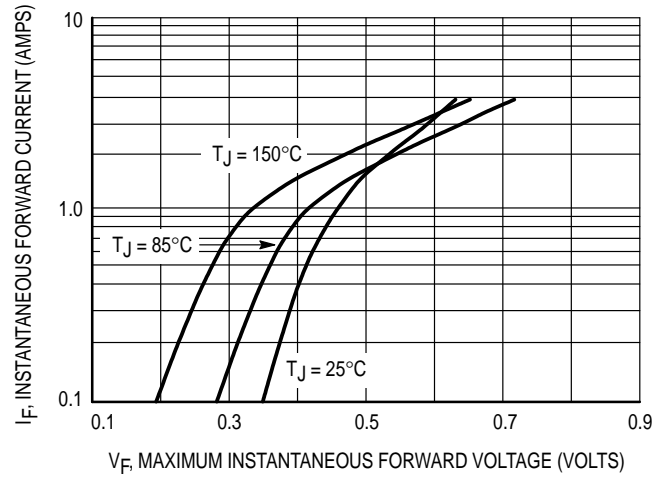


Figure 2. Maximum Forward Voltage

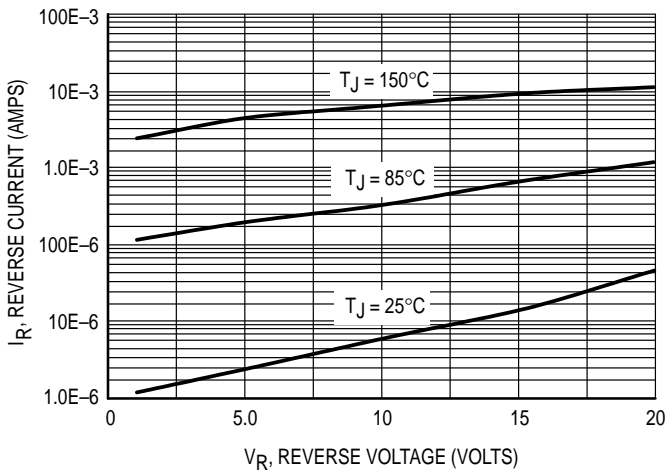


Figure 3. Typical Reverse Current

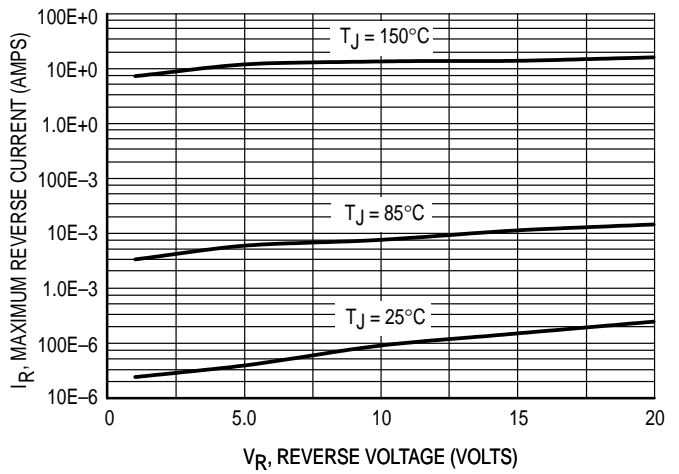
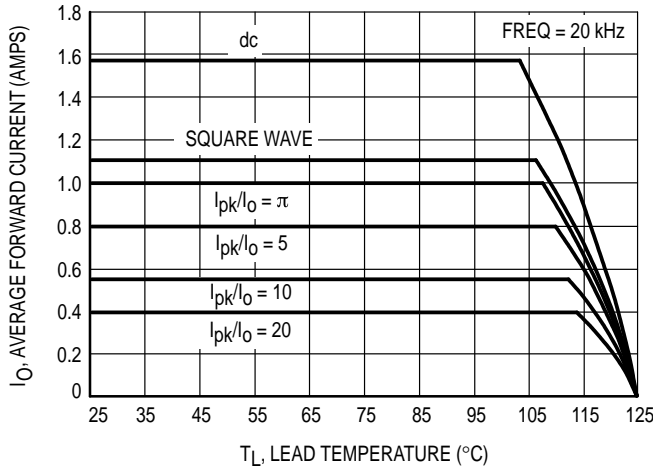
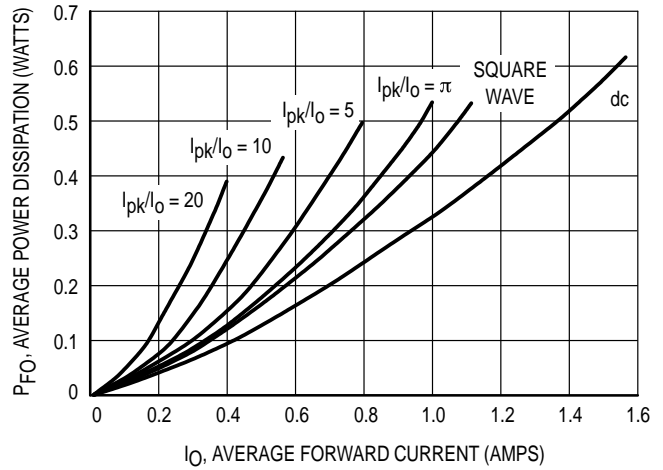


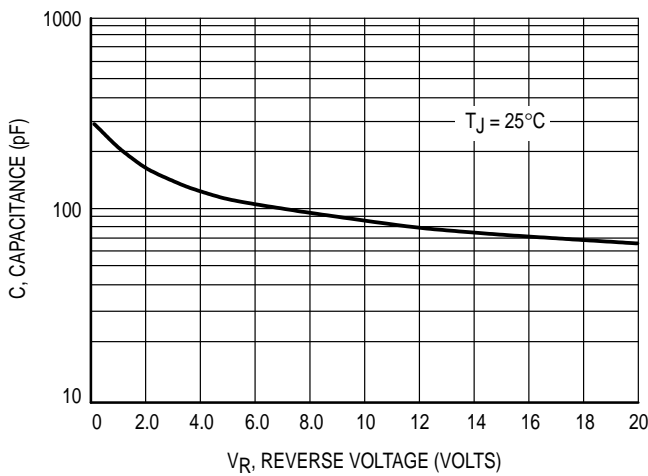
Figure 4. Maximum Reverse Current



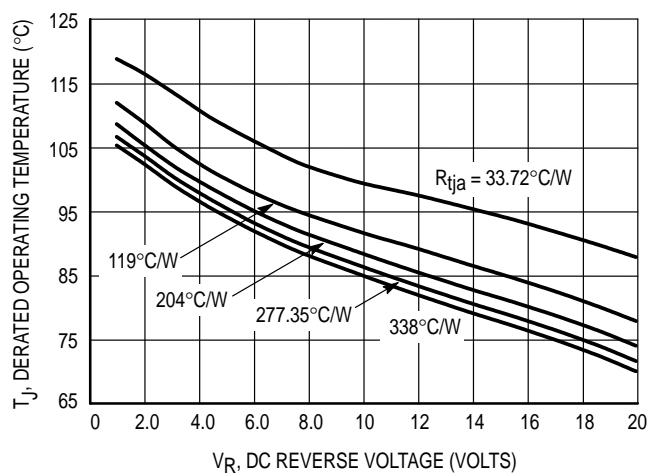
**Figure 5. Current Derating**



**Figure 6. Forward Power Dissipation**



**Figure 7. Capacitance**



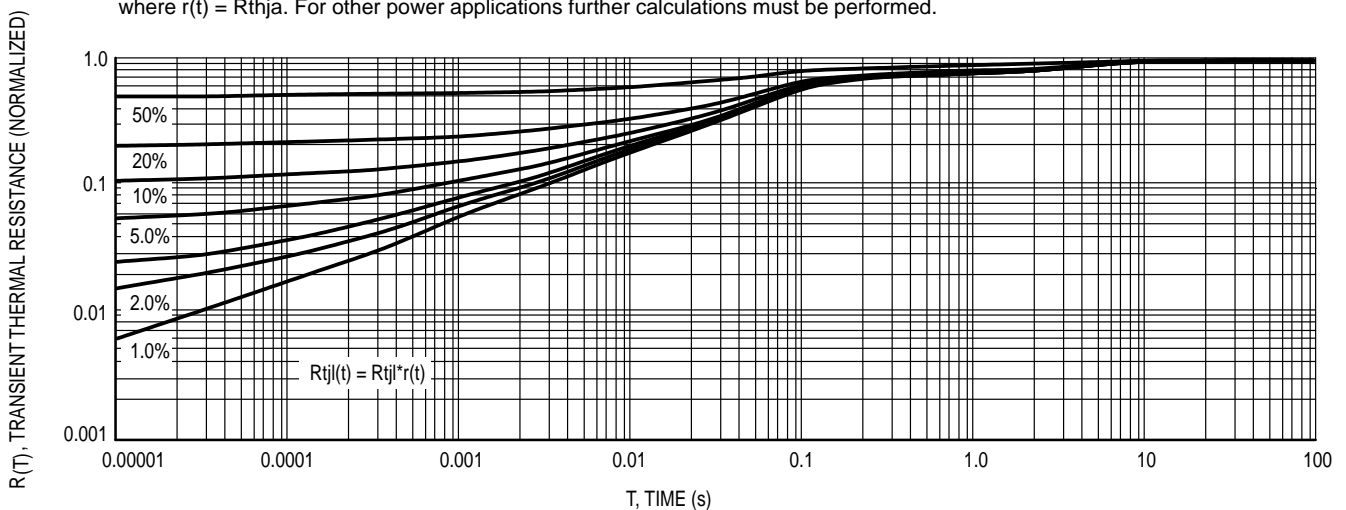
**Figure 8. Typical Operating Temperature Derating\***

\* Reverse power dissipation and the possibility of thermal runaway must be considered when operating this device under any reverse voltage conditions. Calculations of  $T_J$  therefore must include forward and reverse power effects. The allowable operating  $T_J$  may be calculated from the equation:

$$T_J = T_{Jmax} - r(t)(P_f + P_r) \text{ where}$$

$r(t)$  = thermal impedance under given conditions,  
 $P_f$  = forward power dissipation, and  
 $P_r$  = reverse power dissipation

This graph displays the derated allowable  $T_J$  due to reverse bias under DC conditions only and is calculated as  $T_J = T_{Jmax} - r(t)P_r$ , where  $r(t) = R_{thja}$ . For other power applications further calculations must be performed.



**Figure 9. Thermal Response Junction to Lead**

# MBRM120LT3

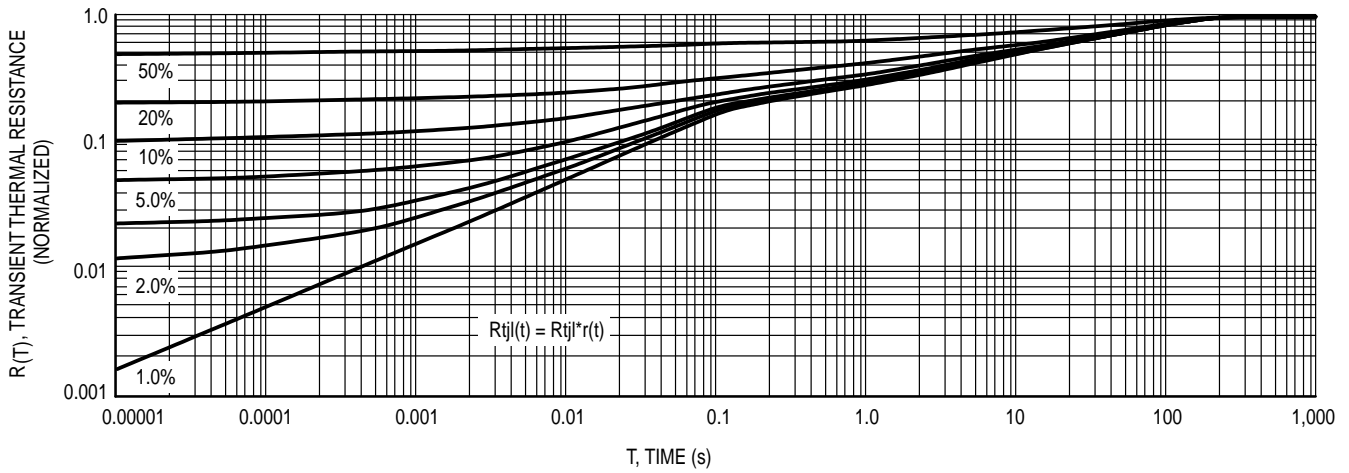
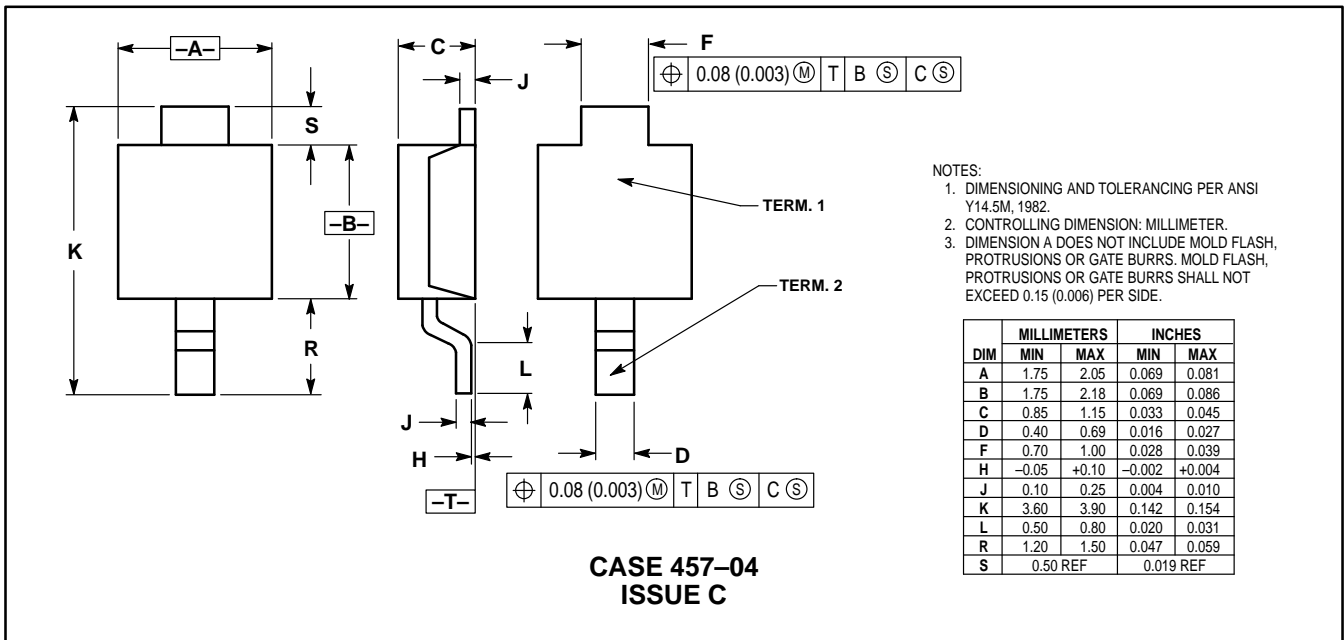


Figure 10. Thermal Response Junction to Ambient

## PACKAGE DIMENSIONS



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