

# MBRM140E

## Low Leakage Surface Mount Schottky Power Rectifier

### POWERMITE<sup>®</sup> 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 OR–ing of multiple supply voltages and any other application where performance and size are critical.

#### Features

- Low Leakage Current ( $I_R$ ) Provides Higher Efficiency and Extends Battery Life
- Low Profile – Maximum Height of 1.1 mm
- Small Footprint – Footprint Area of 8.45 mm<sup>2</sup>
- Low Thermal Resistance with Direct Thermal Path of Die on Exposed Cathode Heat Sink
- ESD Ratings: Machine Model, C  
Human Body Model, 3B

#### Mechanical Characteristics

- POWERMITE is JEDEC Registered as DO–216AA
- Case: Molded Epoxy
- Epoxy Meets UL 94 V–0 @ 0.125 in
- Weight: 62 mg (approximately)
- Lead and Mounting Surface Temperature for Soldering Purposes. 260°C Maximum for 10 Seconds

#### MAXIMUM RATINGS

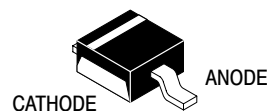
Please See the Table on the Following Page



ON Semiconductor<sup>®</sup>

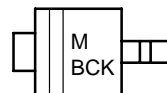
<http://onsemi.com>

### SCHOTTKY BARRIER RECTIFIER 1.0 AMPERES 40 VOLTS



POWERMITE  
PLASTIC  
CASE 457

#### MARKING DIAGRAM



BCK = Device Code  
M = Date Code

#### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MBRM140ET1	POWERMITE	3000 / Tape & Reel
MBRM140ET3	POWERMITE	12,000/Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	40	V
Average Rectified Forward Current (Rated $V_R$ , $T_C = 110^\circ\text{C}$ )	$I_O$	1.0	A
Peak Repetitive Forward Current (At Rated $V_R$ , Square Wave, 100 kHz, $T_C = 110^\circ\text{C}$ )	$I_{FRM}$	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	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	-55 to 150	$^\circ\text{C}$
Voltage Rate of Change (Rated $V_R$ , $T_J = 25^\circ\text{C}$ )	$dv/dt$	10,000	$\text{V}/\mu\text{s}$

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.

## THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal Resistance – Junction-to-Lead (Anode) (Note 1)	$R_{tjl}$	35	$^\circ\text{C}/\text{W}$
Thermal Resistance – Junction-to-Tab (Cathode) (Note 1)	$R_{tjtab}$	23	
Thermal Resistance – Junction-to-Ambient (Note 1)	$R_{tja}$	277	

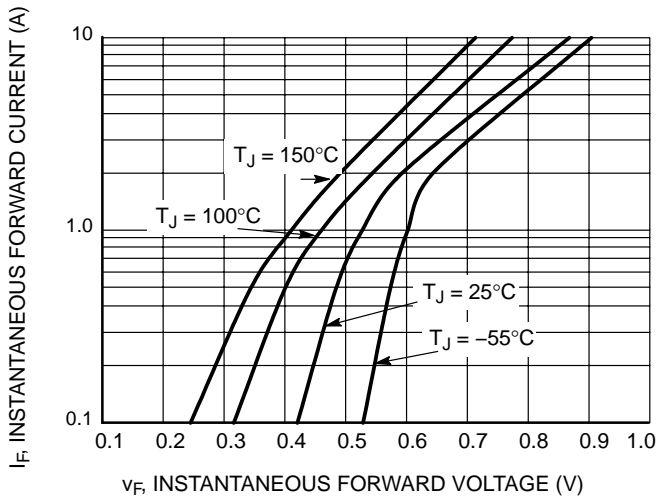
1. Mounted with minimum recommended pad size, PC Board FR4, See Figures 6 and 7.

## ELECTRICAL CHARACTERISTICS

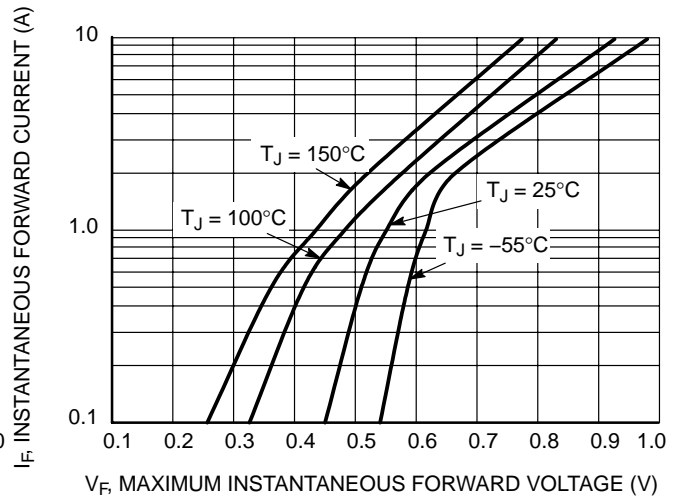
Characteristic	Symbol	Typ	Max	Unit
Instantaneous Forward Voltage ( $I_F = 0.1 \text{ A}$ , $T_C = 25^\circ\text{C}$ ) ( $I_F = 1.0 \text{ A}$ , $T_C = 25^\circ\text{C}$ ) ( $I_F = 0.1 \text{ A}$ , $T_C = 150^\circ\text{C}$ ) ( $I_F = 1.0 \text{ A}$ , $T_C = 150^\circ\text{C}$ )	$V_F$	0.42 0.52 0.24 0.41	0.45 0.58 0.26 0.47	V
Instantaneous Reverse Current (Rated $V_R$ ) $T_C = 25^\circ\text{C}$ $T_C = 150^\circ\text{C}$	$I_R$	0.3 1.4	15 20	$\mu\text{A}$ mA

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

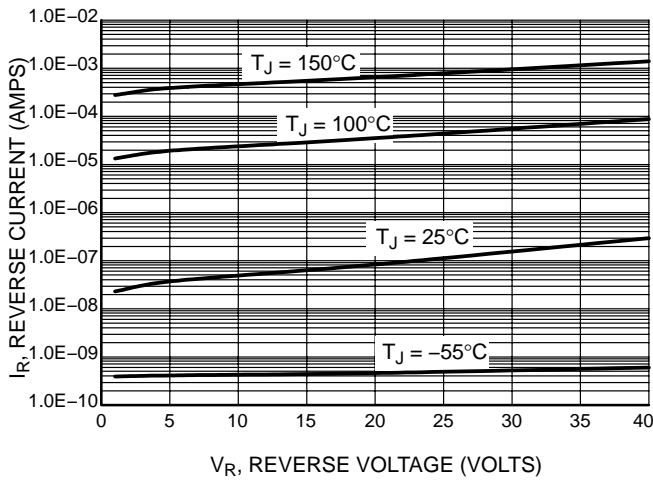
# MBRM140E



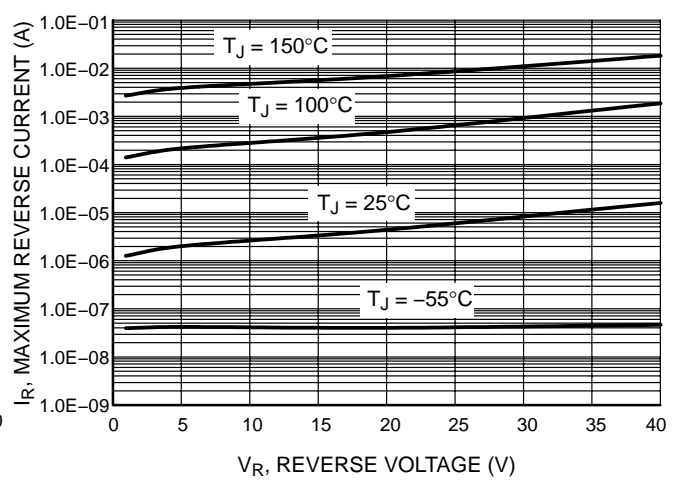
**Figure 1. Typical Forward Voltage**



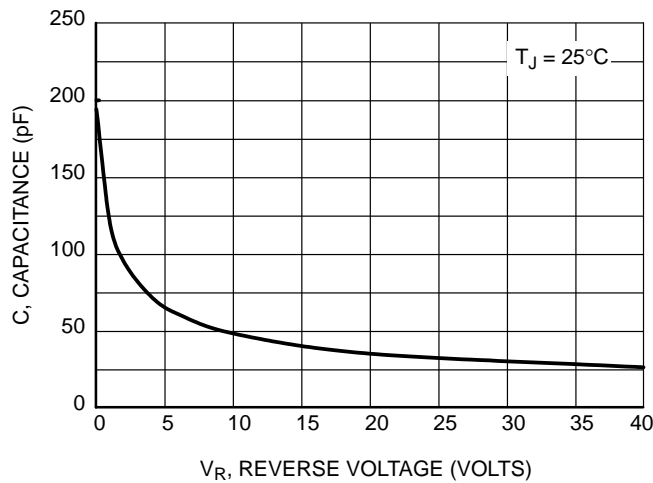
**Figure 2. Maximum Forward Voltage**



**Figure 3. Typical Reverse Current**



**Figure 4. Maximum Reverse Current**



**Figure 5. Capacitance**

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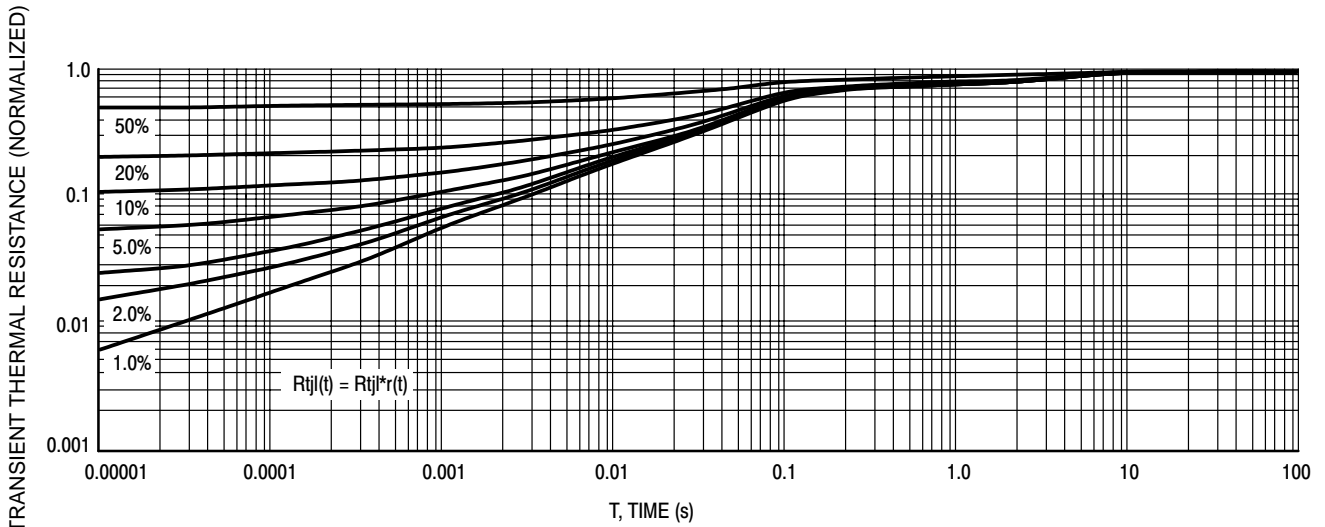


Figure 6. Thermal Response Junction to Lead

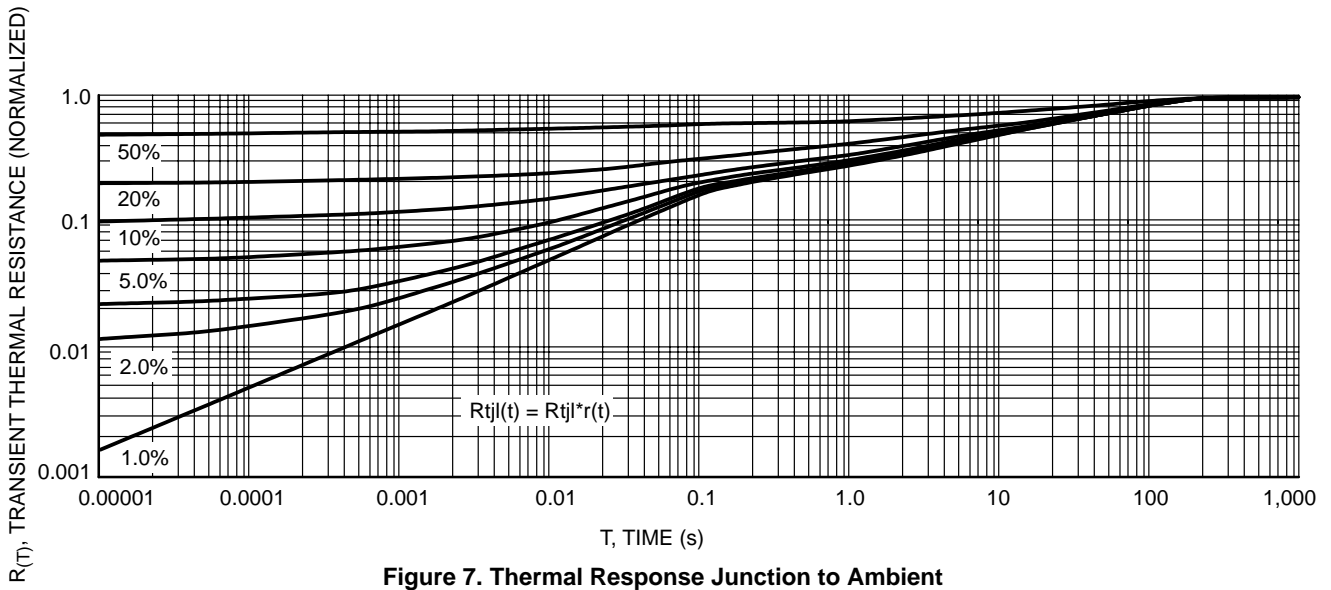
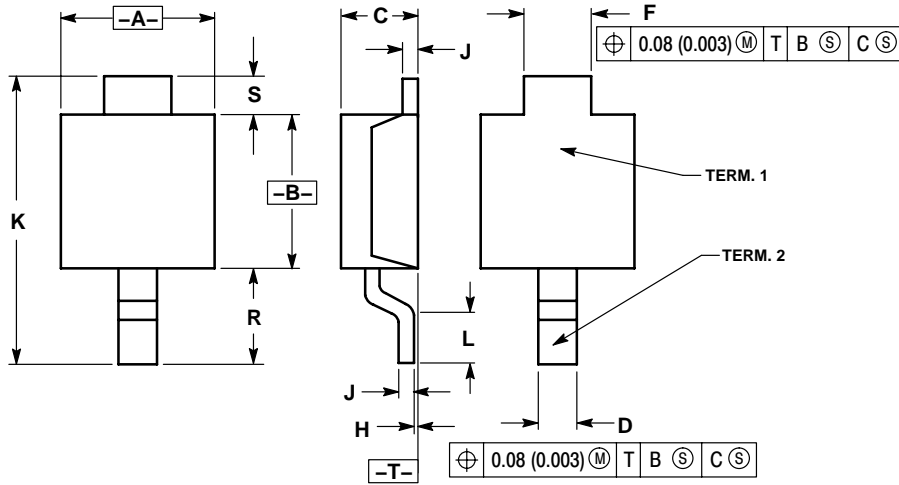


Figure 7. Thermal Response Junction to Ambient

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## PACKAGE DIMENSIONS

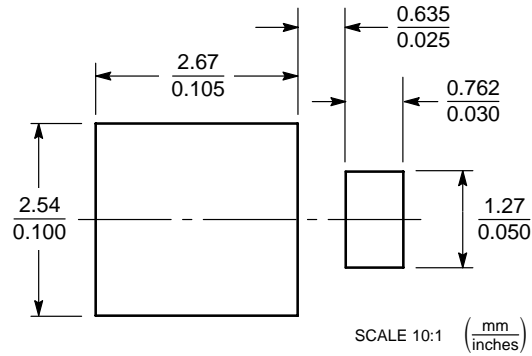
POWERMITE  
PLASTIC PACKAGE  
CASE 457-04  
ISSUE D



- 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.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.75	2.05	0.069	0.081
B	1.75	2.18	0.069	0.086
C	0.85	1.15	0.033	0.045
D	0.40	0.69	0.016	0.027
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	3.90	0.142	0.154
L	0.50	0.80	0.020	0.031
R	1.20	1.50	0.047	0.059
S	0.50	REF	0.019	REF

## SOLDERING FOOTPRINT



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