

MBR0540T1, MBR0540T3

Surface Mount Schottky Power Rectifier

SOD-123 Power Surface Mount Package

The Schottky Power Rectifier employs the Schottky Barrier principle with a barrier metal that produces optimal forward voltage drop–reverse current tradeoff. Ideally suited for low voltage, high frequency rectification, or as a free wheeling and polarity protection diodes in surface mount applications where compact size and weight are critical to the system. This package provides an alternative to the leadless 34 MELF style package. These state-of-the-art devices have the following features:

- Guardring for Stress Protection
- Very Low Forward Voltage
- Epoxy Meets UL94, VO at 1/8"
- Package Designed for Optimal Automated Board Assembly

Mechanical Characteristics:

- Reel Options: 3,000 per 7 inch reel/8 mm tape
- Reel Options: 10,000 per 13 inch reel/8 mm tape
- Device Marking: B4
- Polarity Designator: Cathode Band
- Weight: 11.7 mg (approximately)
- Case: Epoxy Molded
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C max. 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	40	V
Average Rectified Forward Current (At Rated V_R , $T_C = 115^\circ\text{C}$)	I_O	0.5	A
Peak Repetitive Forward Current (At Rated V_R , Square Wave, 20 kHz, $T_C = 115^\circ\text{C}$)	I_{FRM}	1.0	A
Non-Repetitive Peak Surge Current (Surge Applied at Rated Load Conditions Halfwave, Single Phase, 60 Hz)	I_{FSM}	5.5	A
Storage/Operating Case Temperature Range	T_{stg} , T_C	-55 to +150	°C
Operating Junction Temperature	T_J	-55 to +150	°C
Voltage Rate of Change (Rated V_R , $T_J = 25^\circ\text{C}$)	dv/dt	1000	V/ μs



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SCHOTTKY BARRIER RECTIFIER 0.5 AMPERES 40 VOLTS



SOD-123
CASE 425
STYLE 1

MARKING DIAGRAM



B4 = Device Code

ORDERING INFORMATION

Device	Package	Shipping
MBR0540T1	SOD-123	3000/Tape & Reel
MBR0540T3	SOD-123	10,000/Tape & Reel

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THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal Resistance – Junction-to-Lead (Note 1.)	$R_{\theta j l}$	118	$^{\circ}\text{C/W}$
Thermal Resistance – Junction-to-Ambient (Note 2.)	$R_{\theta j a}$	206	

ELECTRICAL CHARACTERISTICS

Maximum Instantaneous Forward Voltage (Note 3.) ($i_F = 0.5\text{ A}$) ($i_F = 1\text{ A}$)	V_F	$T_J = 25^{\circ}\text{C}$	$T_J = 100^{\circ}\text{C}$	V
		0.51 0.62	0.46 0.61	
Maximum Instantaneous Reverse Current (Note 3.) ($V_R = 40\text{ V}$) ($V_R = 20\text{ V}$)	I_R	$T_J = 25^{\circ}\text{C}$	$T_J = 100^{\circ}\text{C}$	μA
		20 10	13,000 5,000	

1. Mounted with minimum recommended pad size, PC Board FR4.
2. 1 inch square pad size (1 X 0.5 inch for each lead) on FR4 board.
3. Pulse Test: Pulse Width $\leq 250\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

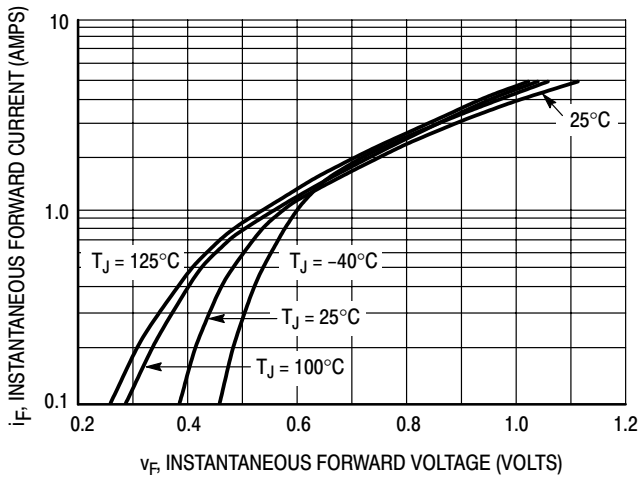


Figure 1. Typical Forward Voltage

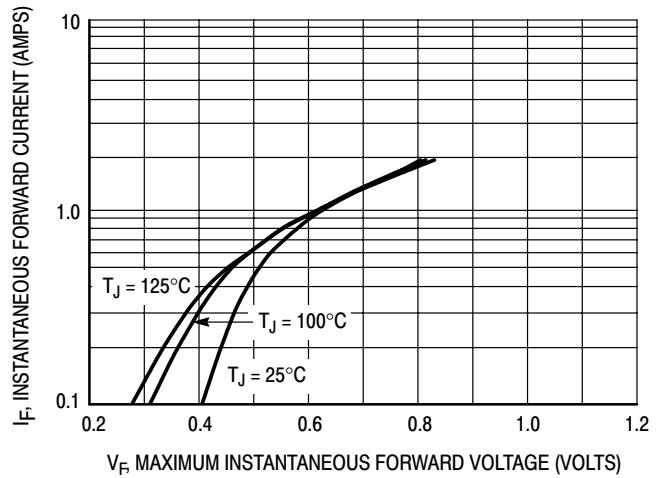


Figure 2. Maximum Forward Voltage

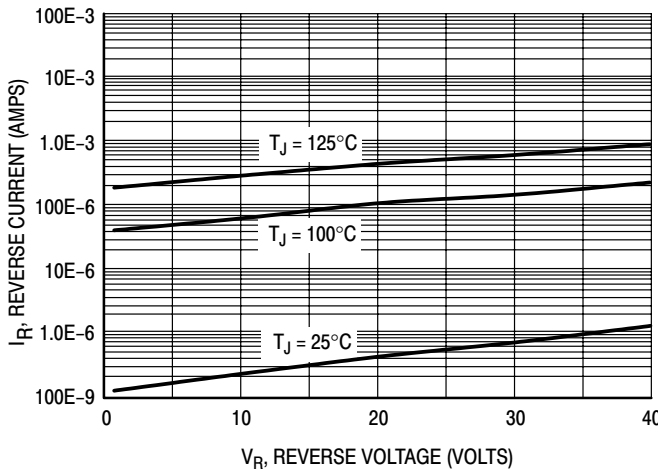


Figure 3. Typical Reverse Current

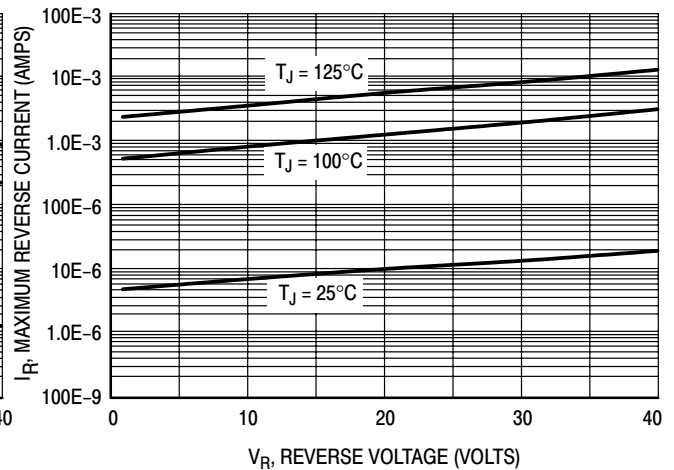


Figure 4. Maximum Reverse Current

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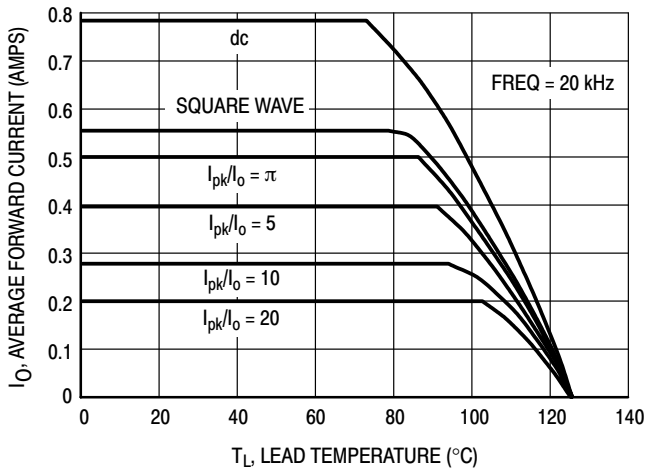


Figure 5. Current Derating

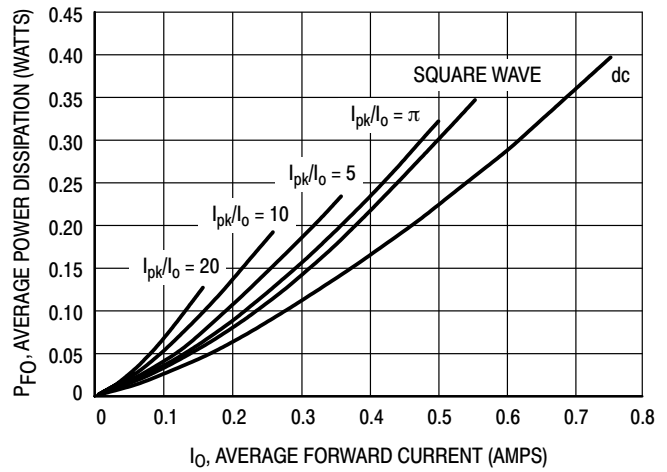


Figure 6. Forward Power Dissipation

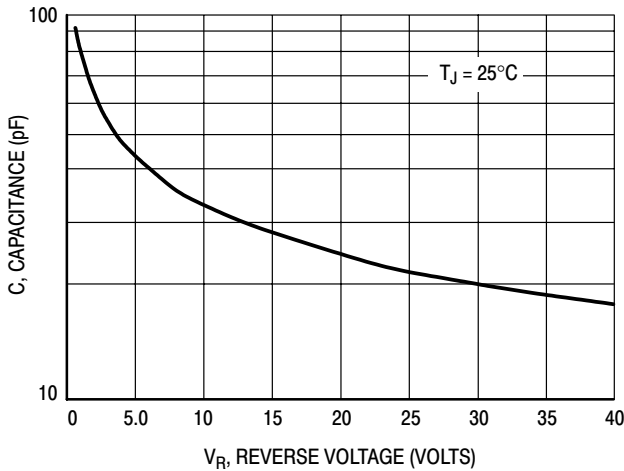


Figure 7. Capacitance

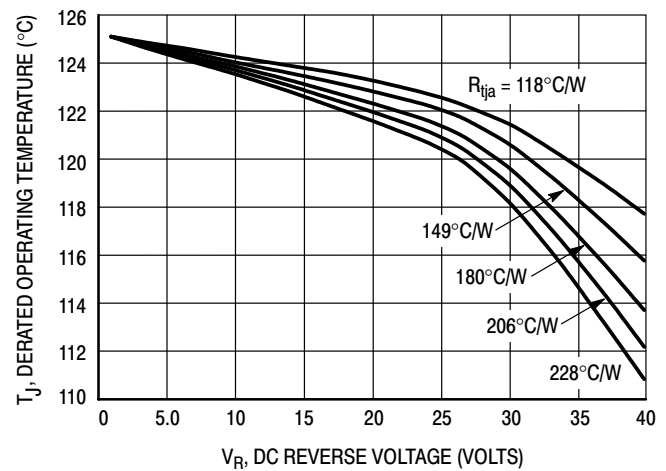


Figure 8. Typical Operating Temperature Derating*

* 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 $r(t) = R_{\theta JA}$. For other power applications further calculations must be performed.

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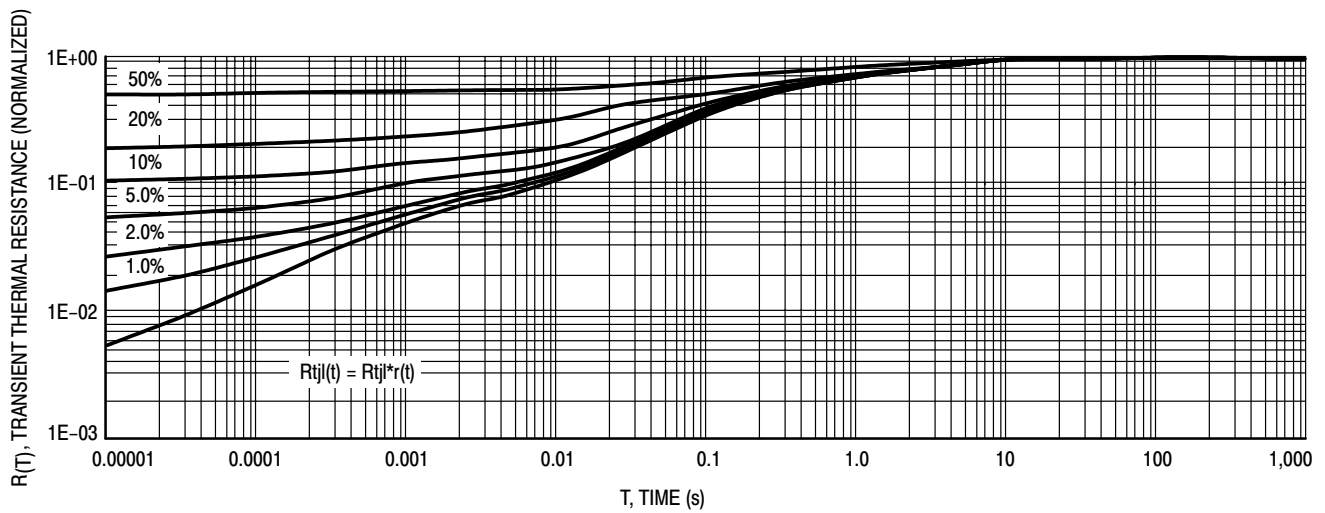


Figure 9. Thermal Response Junction to Lead

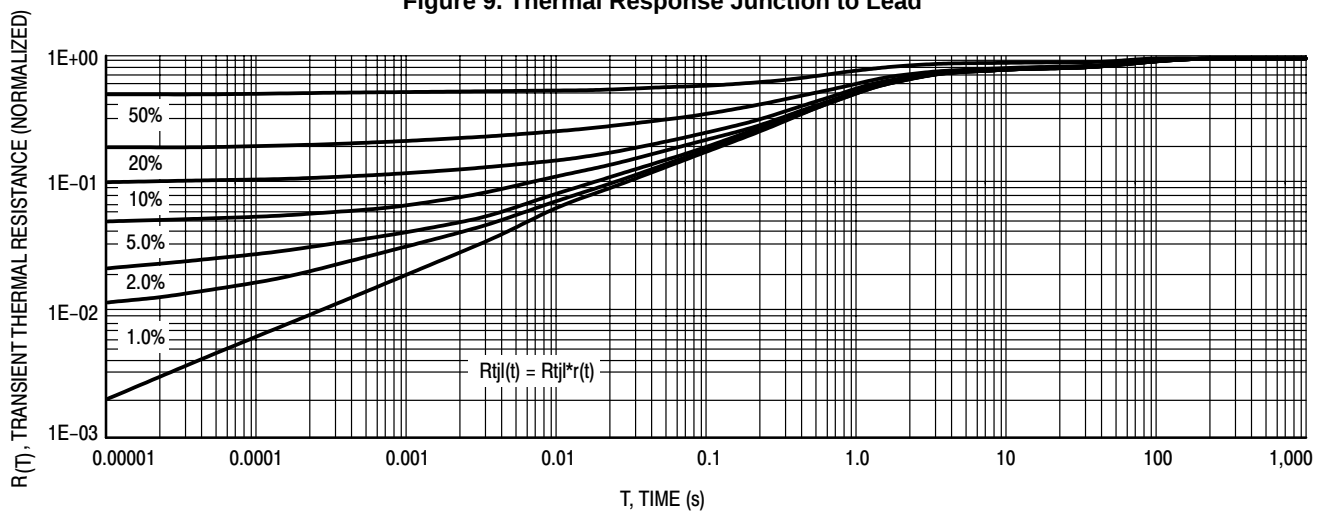
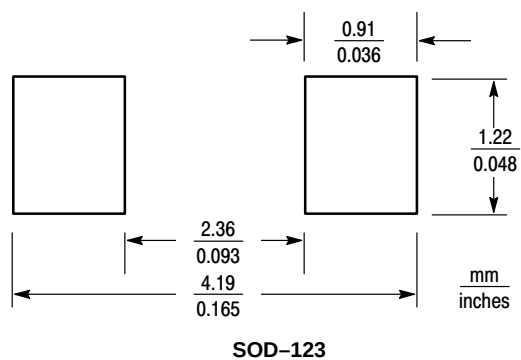


Figure 10. Thermal Response Junction to Ambient

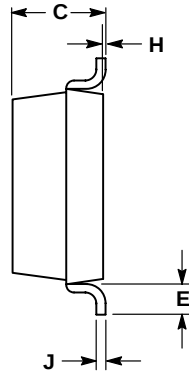
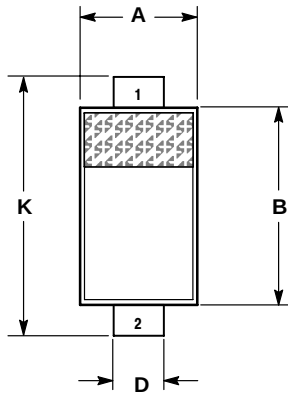
RECOMMENDED FOOTPRINT FOR SOD-123



MBR0540T1, MBR0540T3

PACKAGE DIMENSIONS

SOD-123
PLASTIC
CASE 425-04
ISSUE C



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.055	0.071	1.40	1.80
B	0.100	0.112	2.55	2.85
C	0.037	0.053	0.95	1.35
D	0.020	0.028	0.50	0.70
E	0.004	---	0.25	---
H	0.000	0.004	0.00	0.10
J	---	0.006	---	0.15
K	0.140	0.152	3.55	3.85

STYLE 1:
PIN 1. CATHODE
2. ANODE

Notes

Notes

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