WINSOURCE ELECTRONICS

# THE DATASHEET OF

# MBR0540T1

# 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.

### Features

- Guardring for Stress Protection
- Very Low Forward Voltage
- Epoxy Meets UL 94 V−0 @ 0.125 in
- Package Designed for Optimal Automated Board Assembly
- Pb−Free Packages are Available

### 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

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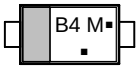
**http://onsemi.com**

**SCHOTTKY BARRIER RECTIFIER 0.5 AMPERES, 40 VOLTS**



**SOD−123**
**CASE 425**
**STYLE 1**

**MARKING DIAGRAM**




B4 = Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| MBR0540T1 | SOD−123 | 3000/Tape & Reel |
| MBR0540T1G | SOD−123 (Pb−Free) | 3000/Tape & Reel |
| MBR0540T3 | SOD−123 | 10,000/Tape & Reel |
| MBR0540T3G | SOD−123 (Pb−Free) | 10,000/Tape & Reel |

†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<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 40 | V |
| Average Rectified Forward Current<br>(At Rated $V_R$, $T_C$ = 115°C) | $I_O$ | 0.5 | A |
| Peak Repetitive Forward Current<br>(At Rated $V_R$, Square Wave, 20 kHz, $T_C$ = 115°C) | $I_{FRM}$ | 1.0 | A |
| Non−Repetitive Peak Surge Current<br>(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<br>(Rated $V_R$, $T_J$ = 25°C) | dv/dt | 1000 | V/μs |

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 (Note 1)<br>Thermal Resistance − Junction−to−Ambient (Note 2) | $R_{tjl}$<br>$R_{tja}$ | 118<br>206 | °C/W |

## ELECTRICAL CHARACTERISTICS

| | | | | |
|---|---|---|---|---|
| Maximum Instantaneous Forward Voltage (Note 3) | $v_F$ | **$T_J$ = 25°C** | **$T_J$ = 100°C** | V |
| ($i_F$ = 0.5 A)<br>($i_F$ = 1 A) | | 0.51<br>0.62 | 0.46<br>0.61 | |
| Maximum Instantaneous Reverse Current (Note 3) | $I_R$ | **$T_J$ = 25°C** | **$T_J$ = 100°C** | μA |
| ($V_R$ = 40 V)<br>($V_R$ = 20 V) | | 20<br>10 | 13,000<br>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 ≤ 250 μs, Duty Cycle ≤ 2.0%.

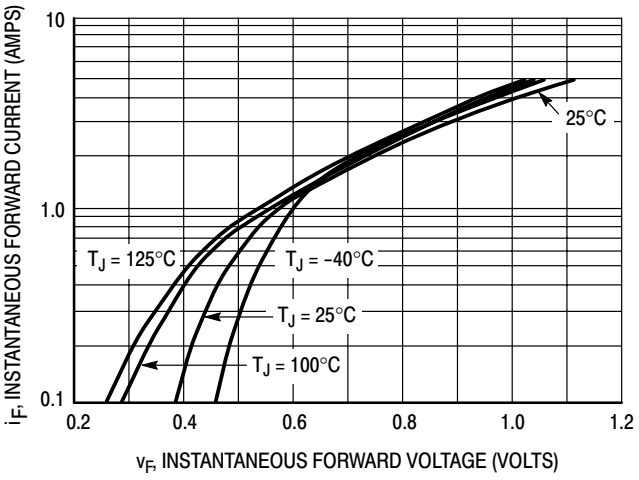



**Figure 1. Typical Forward Voltage**

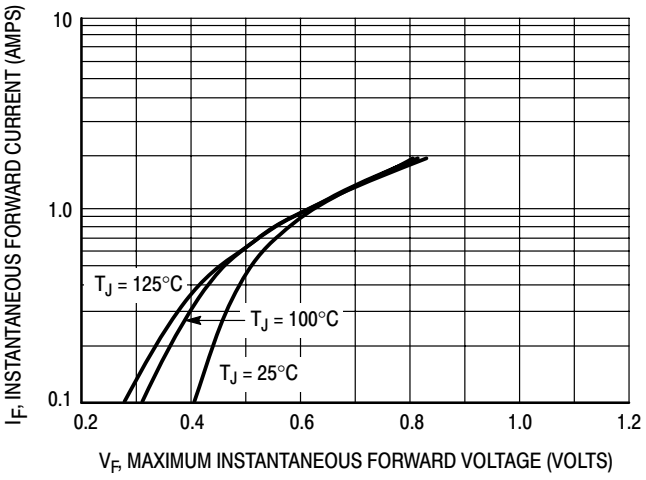



**Figure 2. Maximum Forward Voltage**

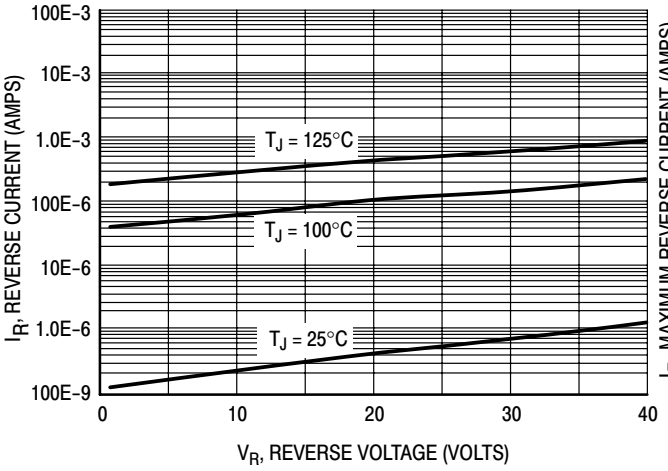



**Figure 3. Typical Reverse Current**

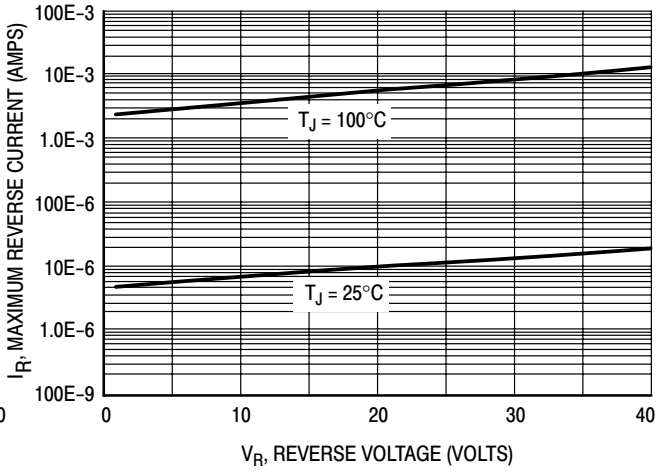



**Figure 4. Maximum Reverse Current**

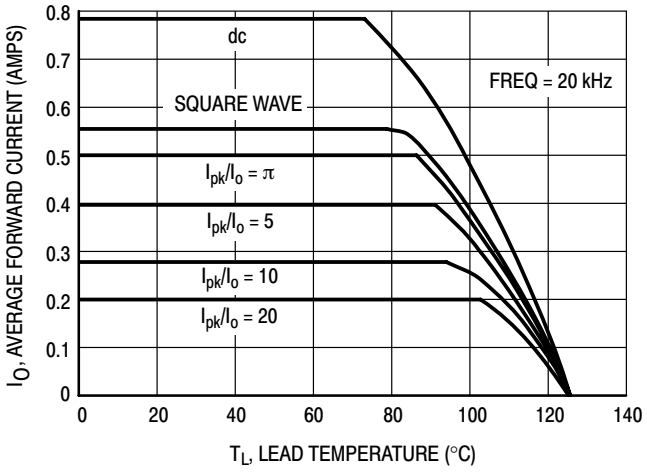



**Figure 5. Current Derating**

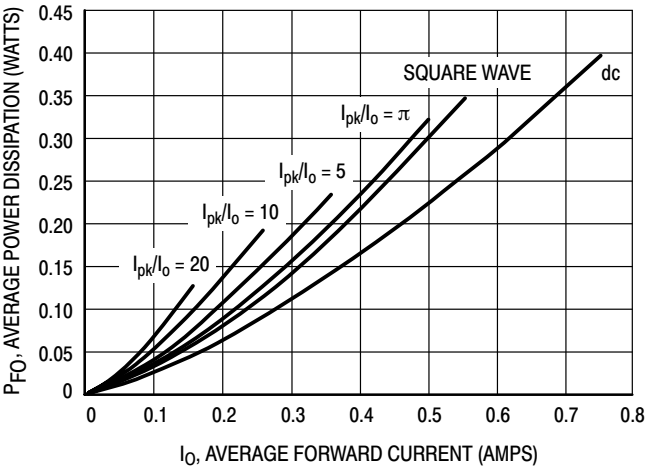



**Figure 6. Forward Power Dissipation**

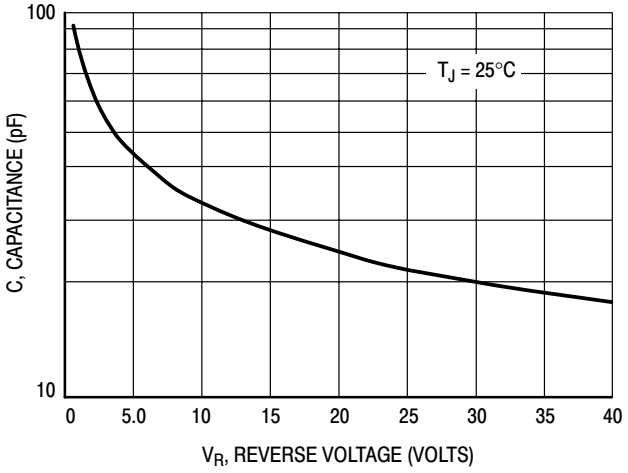



**Figure 7. Capacitance**

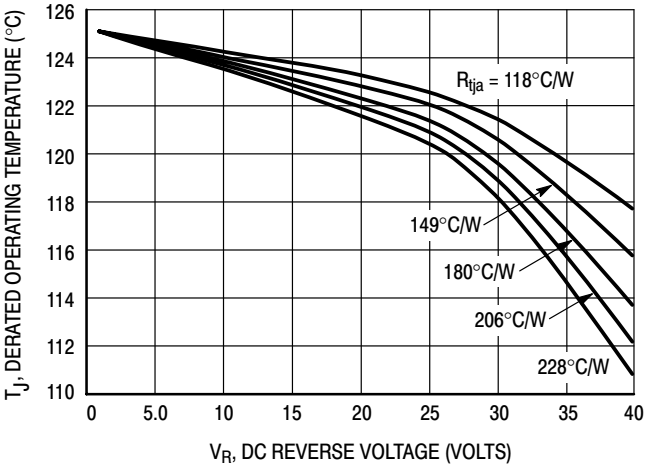



**Figure 8. Typical Operating Temperature Derating***

* 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: $T_J = T_{Jmax} - r(t)(Pf + Pr)$ where

r(t) = thermal impedance under given conditions,
Pf = forward power dissipation, and
Pr = reverse power dissipation

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

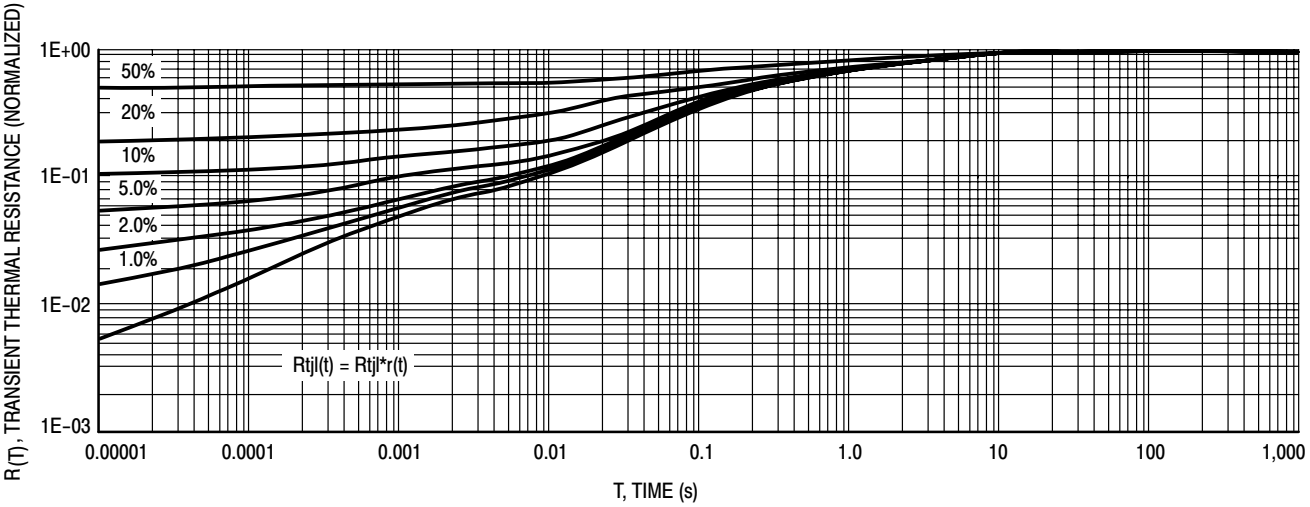



**Figure 9. Thermal Response Junction to Lead**

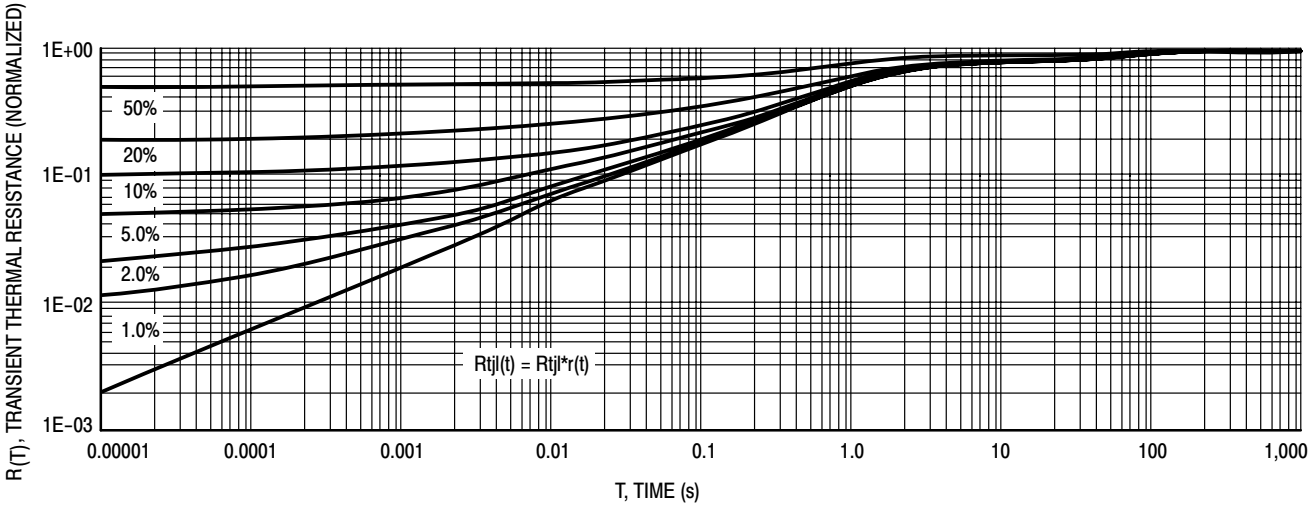
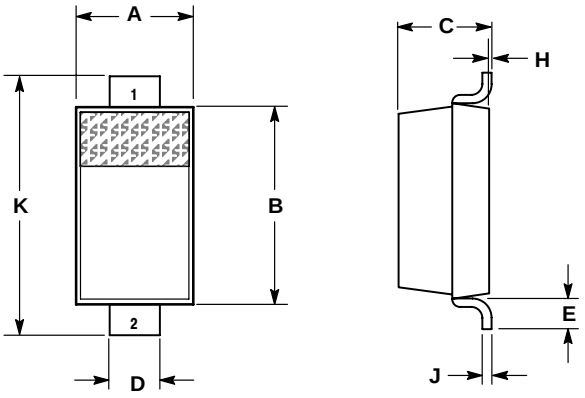



**Figure 10. Thermal Response Junction to Ambient**

## PACKAGE DIMENSIONS

**SOD−123**
PLASTIC
CASE 425−04
ISSUE C

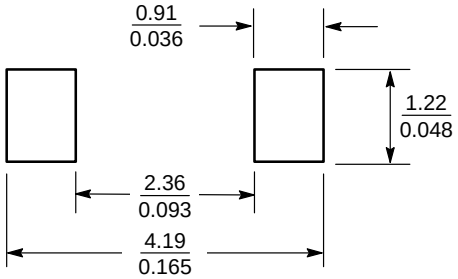



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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

## SOLDERING FOOTPRINT*




SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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