

# MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G

## Schottky Power Rectifier, Surface Mount,

### 0.5 A, 40 V, SOD-123 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
- AEC-Q101 Qualified and PPAP Capable
- NRVB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- All Packages are Pb-Free\*

#### Mechanical Characteristics

- 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
- ESD Rating:
  - ◆ Human Body Model = 3B
  - ◆ Machine Model = C



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### 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†                                |
|-------------|-------------------|------------------------------------------|
| MBR0540T1G  | SOD-123 (Pb-Free) | 3,000/Tape & Reel (8 mm Tape, 7" Reel)   |
| NRVB0540T1G | SOD-123 (Pb-Free) | 3,000/Tape & Reel (8 mm Tape, 7" Reel)   |
| MBR0540T3G  | SOD-123 (Pb-Free) | 10,000/Tape & Reel (8 mm Tape, 13" Reel) |
| NRVB0540T3G | SOD-123 (Pb-Free) | 10,000/Tape & Reel (8 mm Tape, 13" 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.

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

# MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G

## 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 $V_R$ , $T_C = 115^\circ\text{C}$ )                          | $I_O$                           | 0.5         | A                |
| Peak Repetitive Forward Current<br>(At Rated $V_R$ , Square Wave, 20 kHz, $T_C = 115^\circ\text{C}$ )       | $I_{FRM}$                       | 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 | $^\circ\text{C}$ |
| Operating Junction Temperature                                                                              | $T_J$                           | -55 to +150 | $^\circ\text{C}$ |
| Voltage Rate of Change<br>(Rated $V_R$ , $T_J = 25^\circ\text{C}$ )                                         | $dv/dt$                         | 1000        | V/ $\mu\text{s}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## THERMAL CHARACTERISTICS

| Characteristic                                    | Symbol    | Value | Unit                      |
|---------------------------------------------------|-----------|-------|---------------------------|
| Thermal Resistance – Junction-to-Lead (Note 1)    | $R_{tjl}$ | 118   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance – Junction-to-Ambient (Note 2) | $R_{tja}$ | 206   | $^\circ\text{C}/\text{W}$ |

- Mounted with minimum recommended pad size, PC Board FR4.
- 1 inch square pad size (1 X 0.5 inch for each lead) on FR4 board.

## ELECTRICAL CHARACTERISTICS

| Characteristic                                                                                           | Symbol | Value                    |                           | Unit          |
|----------------------------------------------------------------------------------------------------------|--------|--------------------------|---------------------------|---------------|
| Maximum Instantaneous Forward Voltage (Note 3)<br><br>( $i_F = 0.5\text{ A}$ )<br>( $i_F = 1\text{ A}$ ) | $V_F$  | $T_J = 25^\circ\text{C}$ | $T_J = 100^\circ\text{C}$ | V             |
|                                                                                                          |        | 0.51<br>0.62             | 0.46<br>0.61              |               |
| Maximum Instantaneous Reverse Current (Note 3)<br><br>( $V_R = 40\text{ V}$ )<br>( $V_R = 20\text{ V}$ ) | $I_R$  | $T_J = 25^\circ\text{C}$ | $T_J = 100^\circ\text{C}$ | $\mu\text{A}$ |
|                                                                                                          |        | 20<br>10                 | 13,000<br>5,000           |               |

- Pulse Test: Pulse Width  $\leq 250\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

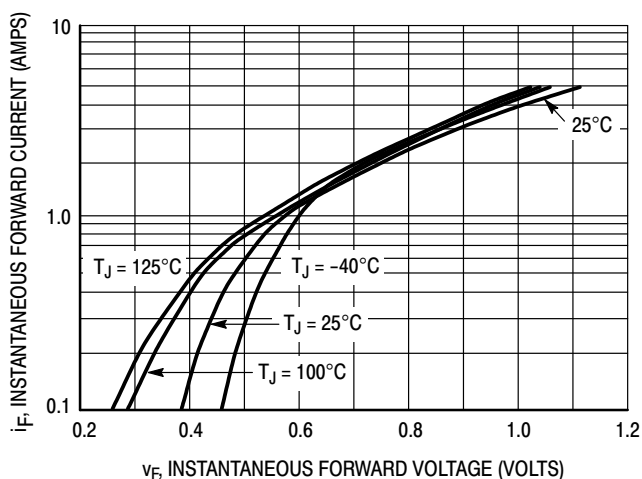


Figure 1. Typical Forward Voltage

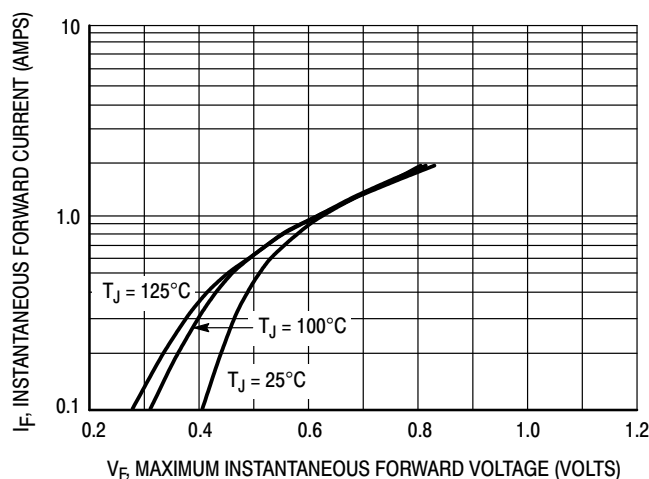


Figure 2. Maximum Forward Voltage

# MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G

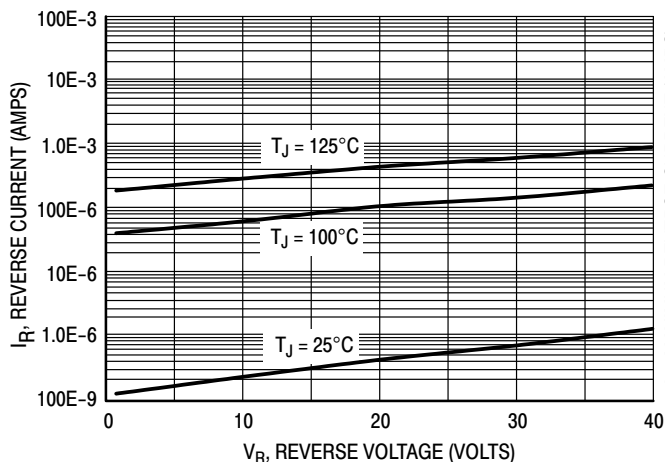


Figure 3. Typical Reverse Current

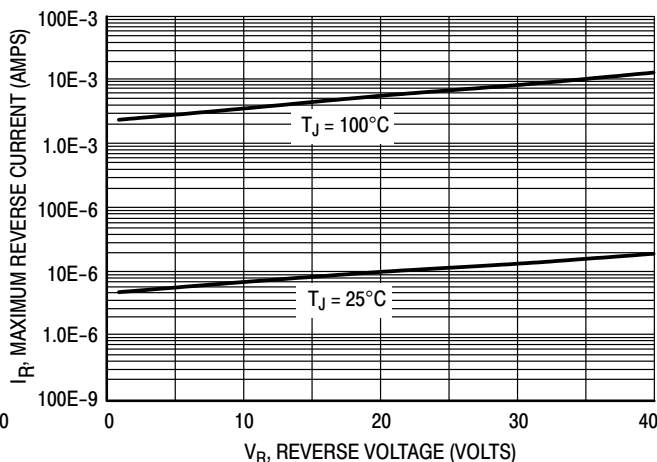


Figure 4. Maximum Reverse Current

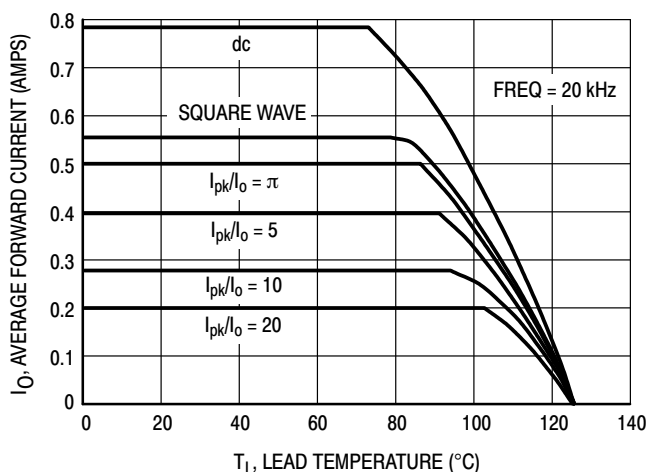


Figure 5. Current Derating

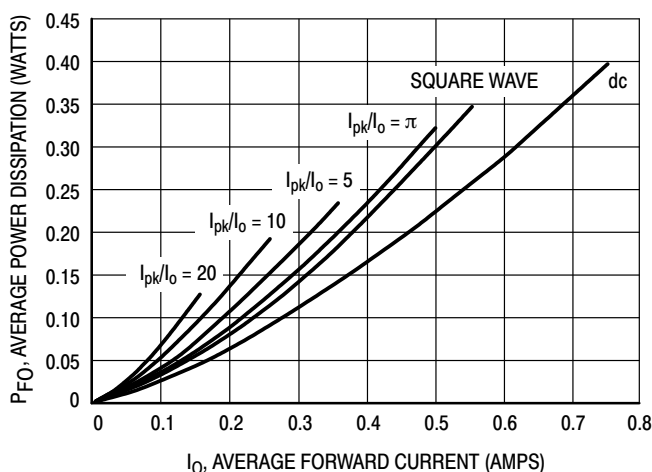


Figure 6. Forward Power Dissipation

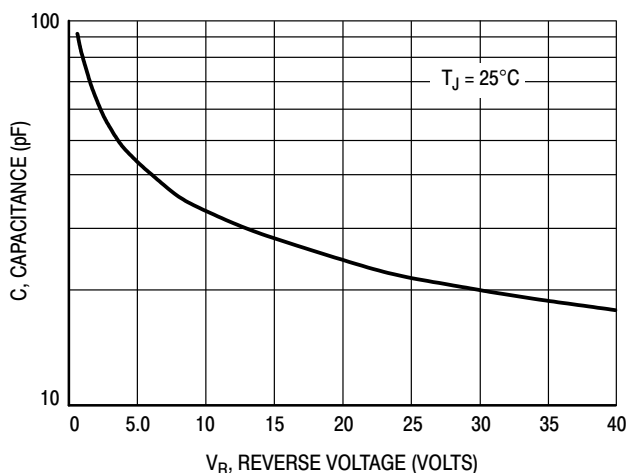


Figure 7. Capacitance

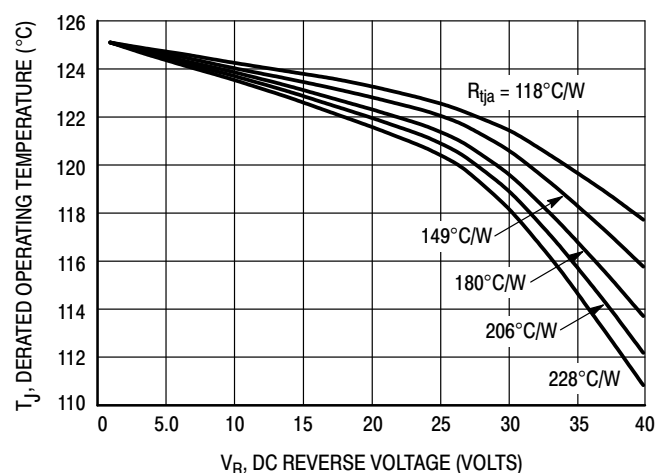


Figure 8. Typical Operating Temperature Derating\*

\* 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:

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

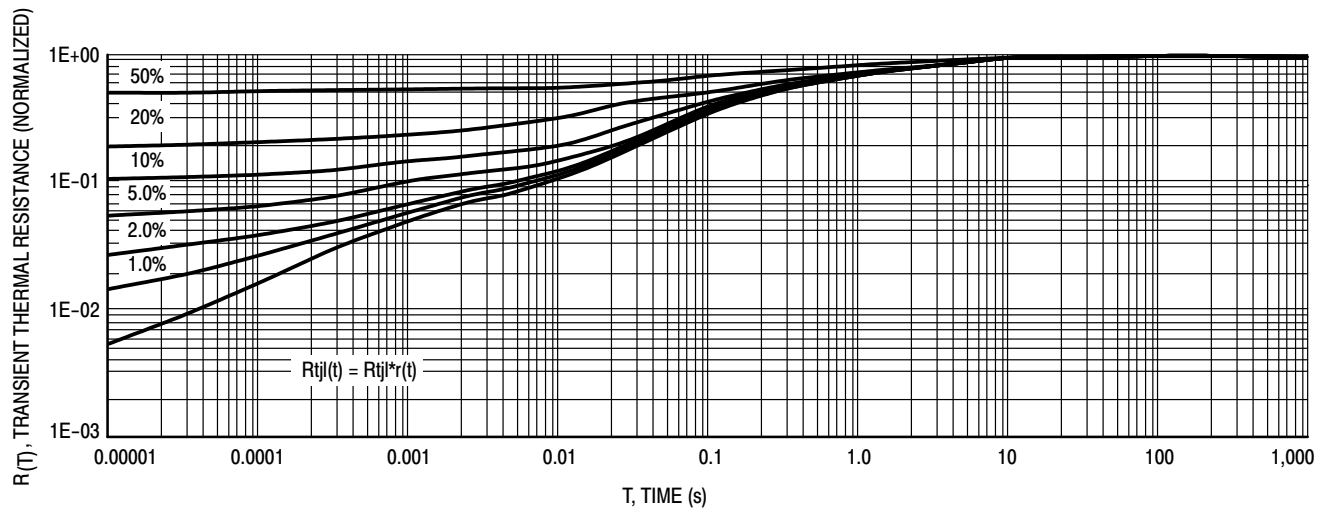
$$r(t) = \text{thermal impedance under given conditions,}$$

$$P_f = \text{forward power dissipation, and}$$

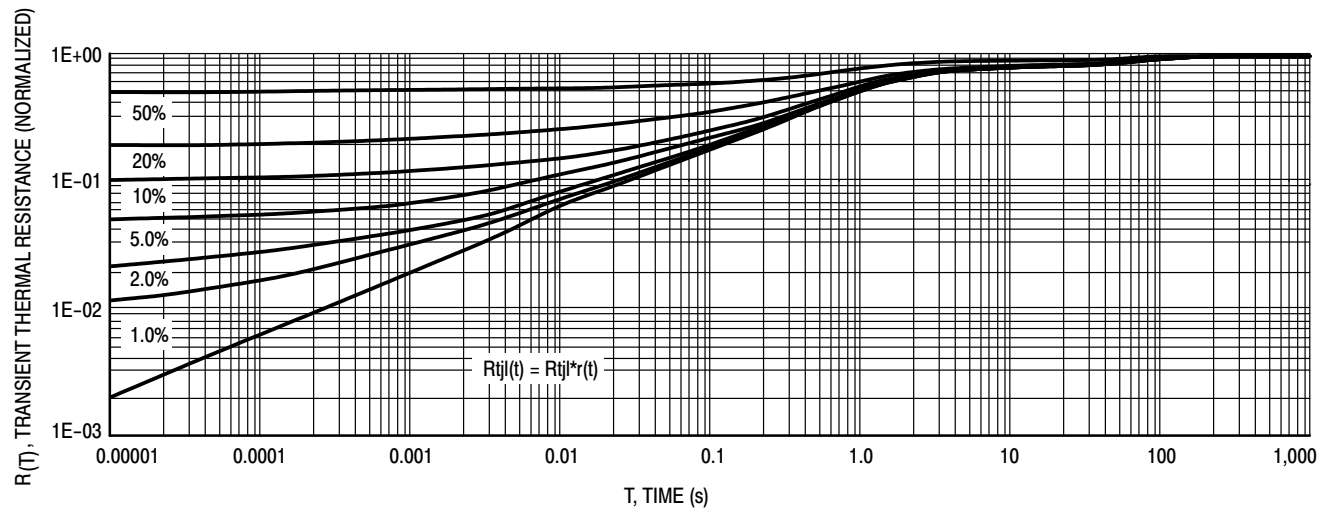
$$P_r = \text{reverse power dissipation}$$

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.

**MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G**



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



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

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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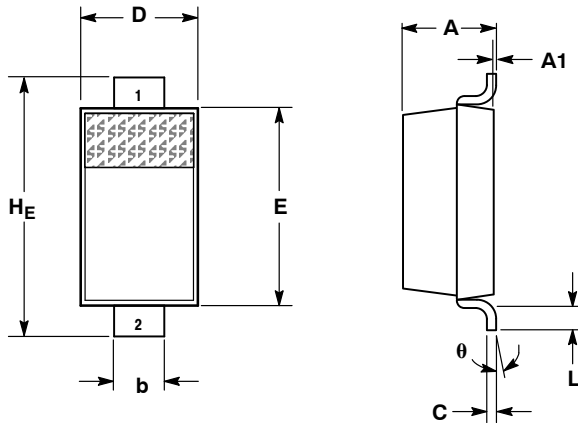
ON



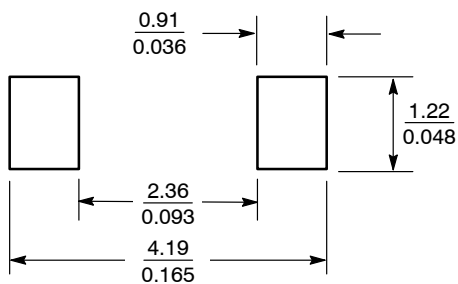
SCALE 5:1

**SOD-123**  
CASE 425-04  
ISSUE G

DATE 07 OCT 2009



### SOLDERING FOOTPRINT\*



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

### NOTES:

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

| DIM            | MILLIMETERS |      |      | INCHES |       |       |
|----------------|-------------|------|------|--------|-------|-------|
|                | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A              | 0.94        | 1.17 | 1.35 | 0.037  | 0.046 | 0.053 |
| A1             | 0.00        | 0.05 | 0.10 | 0.000  | 0.002 | 0.004 |
| b              | 0.51        | 0.61 | 0.71 | 0.020  | 0.024 | 0.028 |
| c              | ---         | ---  | 0.15 | ---    | ---   | 0.006 |
| D              | 1.40        | 1.60 | 1.80 | 0.055  | 0.063 | 0.071 |
| E              | 2.54        | 2.69 | 2.84 | 0.100  | 0.106 | 0.112 |
| H <sub>E</sub> | 3.56        | 3.68 | 3.86 | 0.140  | 0.145 | 0.152 |
| L              | 0.25        | ---  | ---  | 0.010  | ---   | ---   |
| θ              | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

### GENERIC MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
■ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

STYLE 1:  
PIN 1. CATHODE  
2. ANODE

\*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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