

# Surface Mount Schottky Power Rectifier

## SCHOTTKY BARRIER RECTIFIER 0.5 AMPERES, 40 VOLTS

### SOD-123 Power Surface Mount Package

## MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G



SOD-123  
CASE 425  
STYLE 1

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

#### 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 **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G

## 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	$^\circ\text{C}$
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	1000	V/ $\mu\text{s}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL CHARACTERISTICS

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

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

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

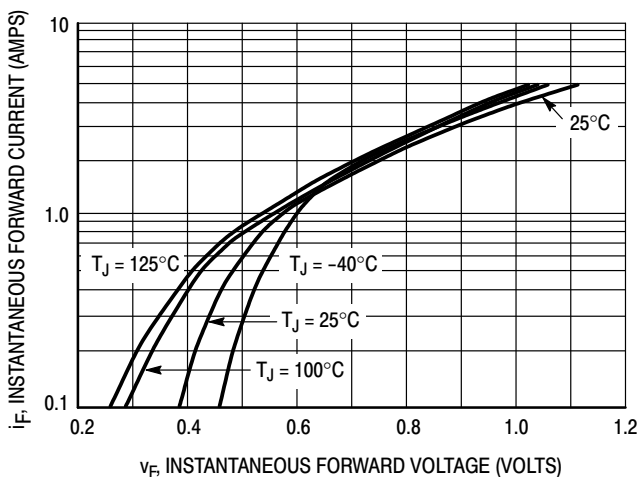


Figure 1. Typical Forward Voltage

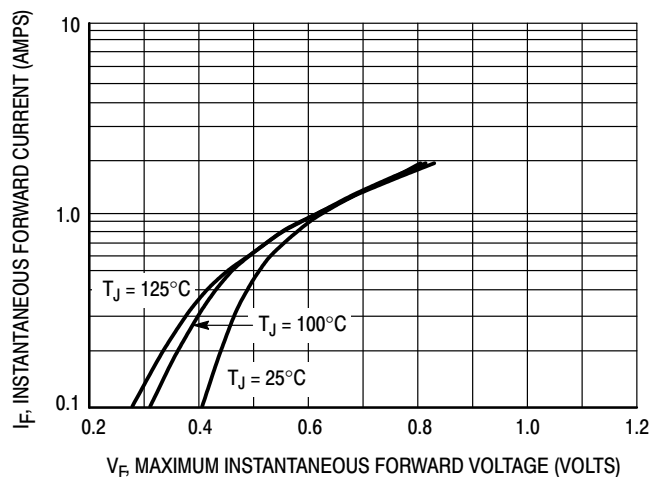


Figure 2. Maximum Forward Voltage

# MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G

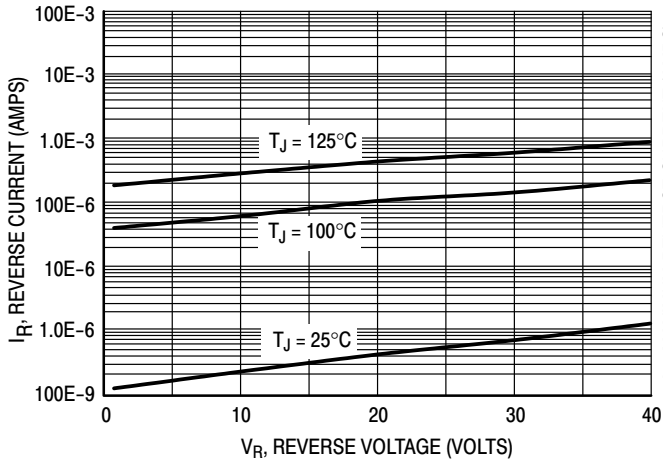


Figure 3. Typical Reverse Current

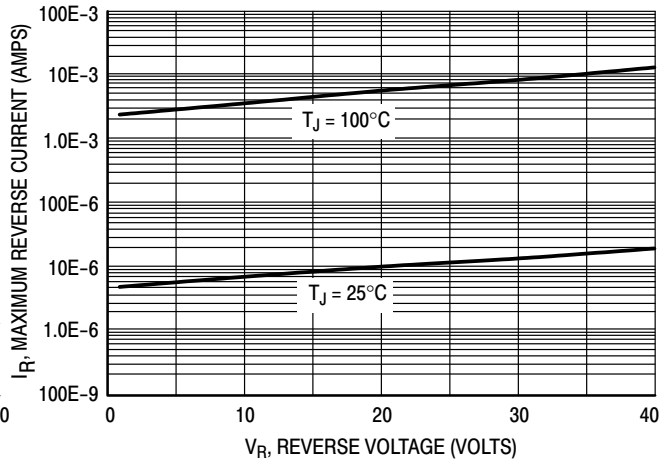


Figure 4. Maximum Reverse Current

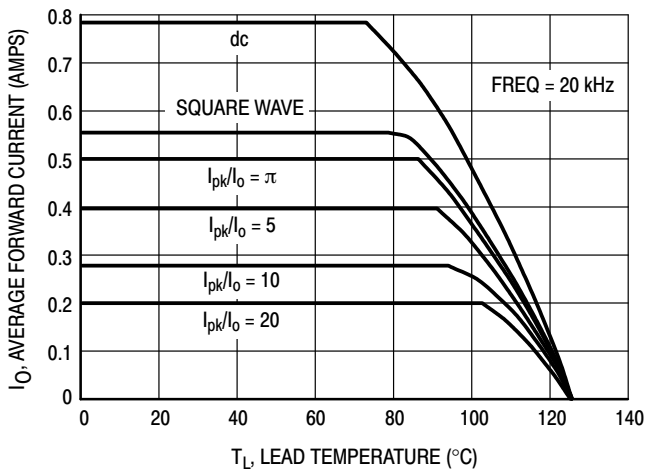


Figure 5. Current Derating

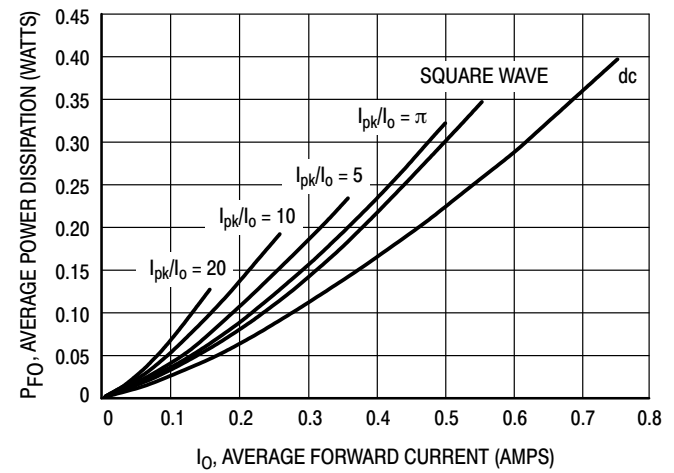


Figure 6. Forward Power Dissipation

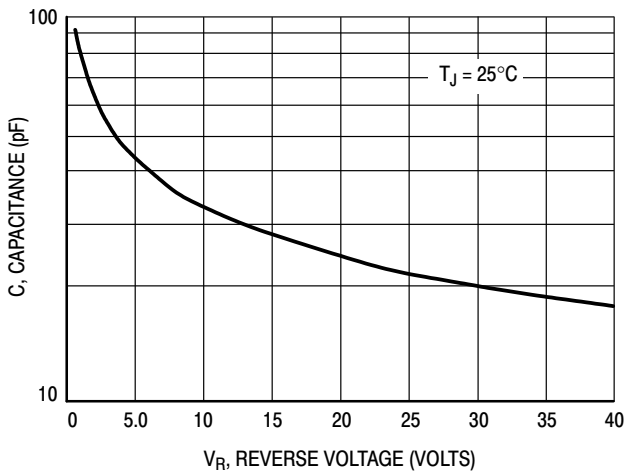


Figure 7. Capacitance

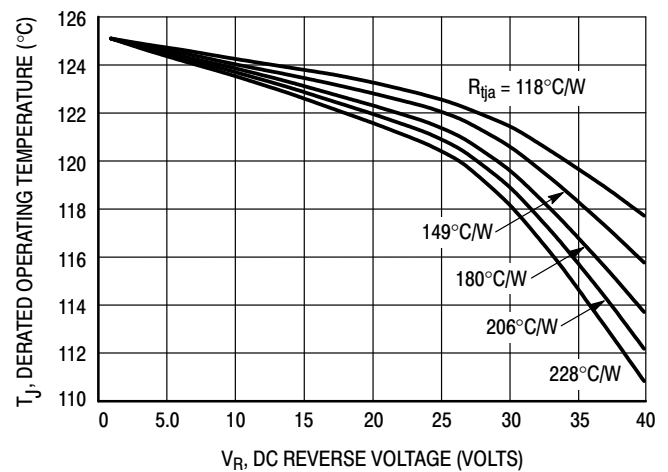


Figure 8. Typical Operating Temperature Derating\*

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

MBR0540T1G, NRVB0540T1G, MBR0540T3G, NRVB0540T3G

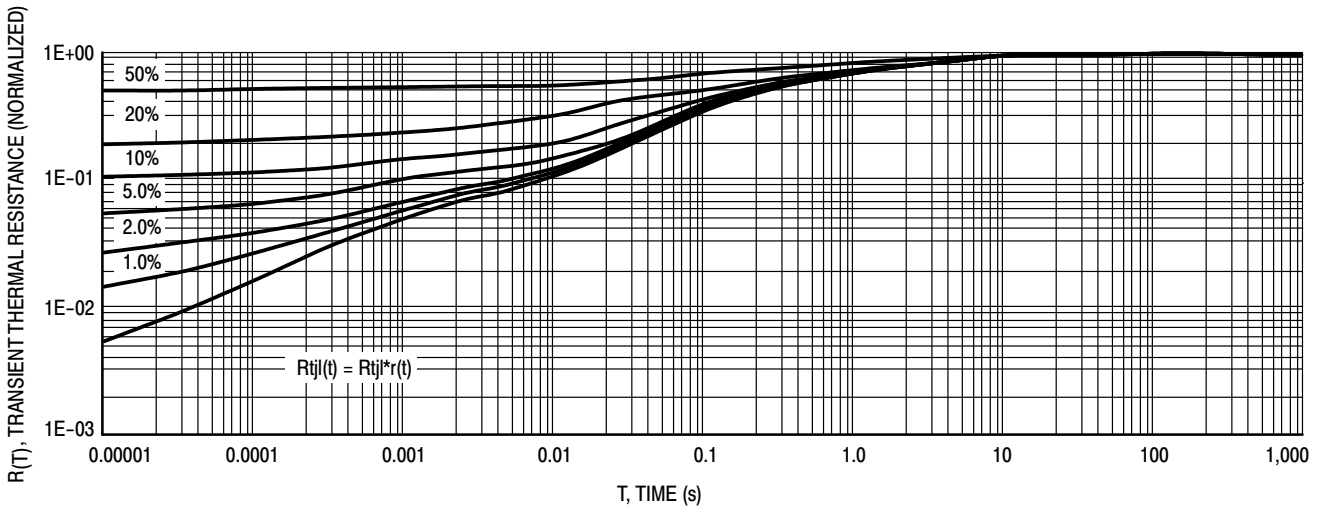


Figure 9. Thermal Response Junction to Lead

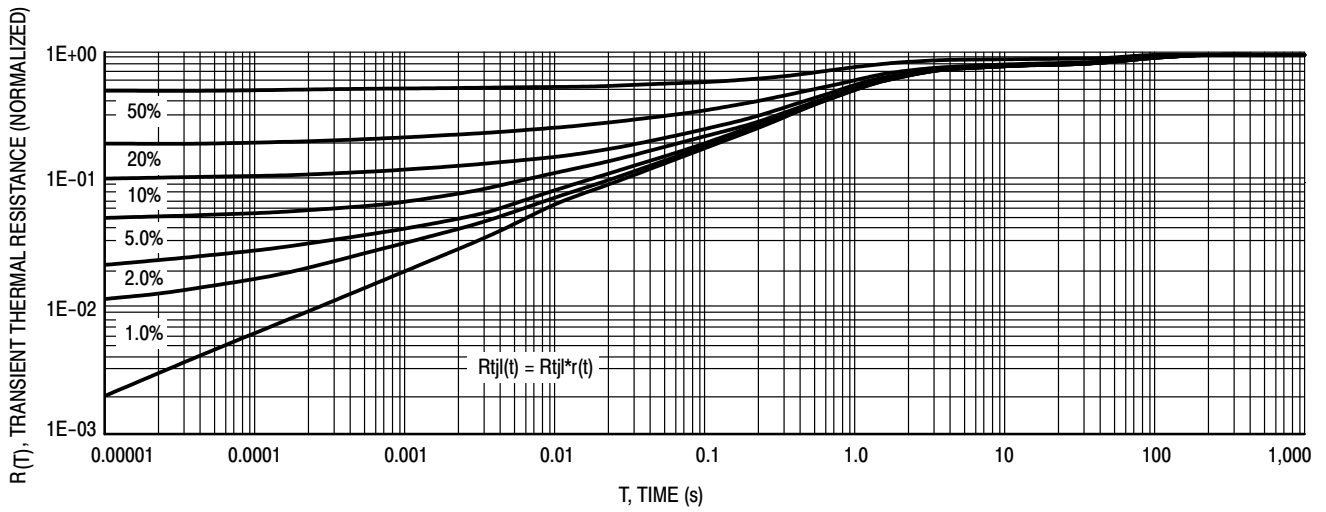
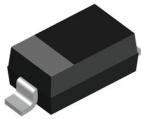
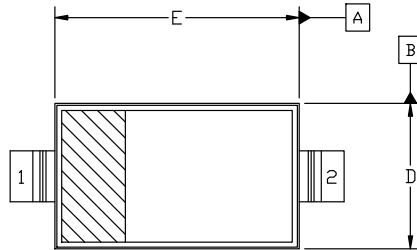


Figure 10. Thermal Response Junction to Ambient

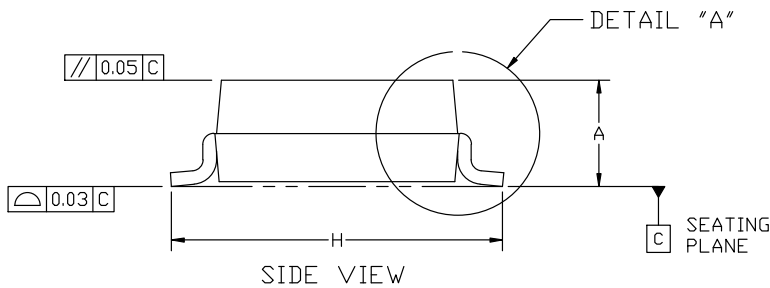


SOD-123 2-LEAD, 1.60x2.69x1.16  
CASE 425  
ISSUE H

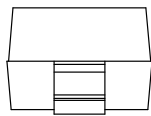
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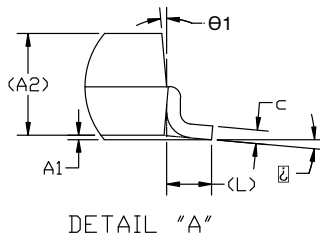
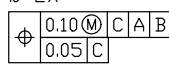
TOP VIEW



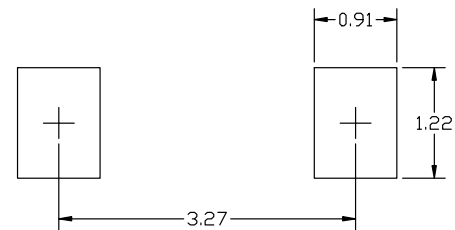
SIDE VIEW



END VIEW



DETAIL "A"



RECOMMENDED MOUNTING FOOTPRINT  
\*For additional information on or Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference manual SOLDERM/D.

NOTES:

1. DIMENSION AND TOLERANCING PER ASME Y14.5M, 2018
2. CONTROLLING DIMENSION: MILLIMETERS

DIM	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.94	1.17	1.35
A1	0.00	0.05	0.10
A2	1.16 REF.		
b	0.51	0.61	0.71
c	-	-	0.15
D	1.40	1.60	1.80
E	2.54	2.69	2.84
H	3.56	3.68	3.86
L	0.25 REF.		
∠	0°		10°
θ1	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. Some products may not follow the Generic Marking.

STYLE 1:  
PIN 1. CATHODE  
2. ANODE

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DESCRIPTION:	SOD-123 2-LEAD, 1.60x2.69x1.16	PAGE 1 OF 1

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