# MBR150, MBR160

MBR160 is a Preferred Device

# Axial Lead Rectifiers

The MBR150/160 series employs the Schottky Barrier principle in a large area metal−to−silicon power diode. State−of−the−art geometry features epitaxial construction with oxide passivation and metal overlap contact. Ideally suited for use as rectifiers in low−voltage, high−frequency inverters, free wheeling diodes, and polarity protection diodes.

### Features

- Low Reverse Current
- Low Stored Charge, Majority Carrier Conduction
- Low Power Loss/High Efficiency
- Highly Stable Oxide Passivated Junction
- These devices are manufactured with a Pb−Free external lead finish only*

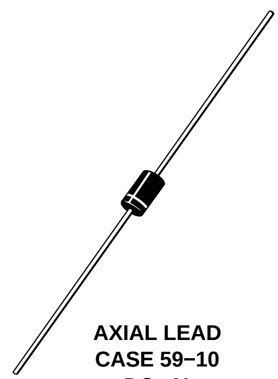
### Mechanical Characteristics

- Case: Epoxy, Molded
- Weight: 0.4 gram (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead and Mounting Surface Temperature for Soldering Purposes: 220°C Max. for 10 Seconds, 1/16″ from case
- Shipped in Plastic Bags, 1000 per bag
- Available Tape and Reeled, 5000 per reel, by adding a “RL’’ suffix to the part number
- Polarity: Cathode Indicated by Polarity Band

ON Semiconductor®

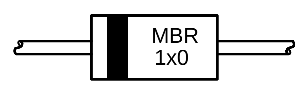
http://onsemi.com

**SCHOTTKY BARRIER RECTIFIERS 1.0 AMPERE 50, 60 VOLTS**



AXIAL LEAD
CASE 59−10
DO−41
PLASTIC

**MARKING DIAGRAM**




MBR1x0 = Device Code
x = 5 or 6

**ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

**Preferred** devices are recommended choices for future use and best overall value.

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

### MAXIMUM RATINGS

| Rating | Symbol | MBR150 | MBR160 | Unit |
|---|---|---|---|---|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 50 | 60 | V |
| RMS Reverse Voltage | $V_{R(RMS)}$ | 35 | 42 | V |
| Average Rectified Forward Current (Note 1)<br>($V_{R(equiv)} \leq 0.2\ V_R$(dc), $T_L$ = 90°C, $R_{\theta JA}$ = 80°C/W, P.C. Board Mounting, $T_A$ = 55°C) | $I_O$ | 1.0 | | A |
| Nonrepetitive Peak Surge Current<br>(Surge applied at rated load conditions, halfwave, single phase, 60 Hz, $T_L$ = 70°C) | $I_{FSM}$ | 25 (for one cycle) | | A |
| Operating and Storage Junction Temperature Range (Reverse Voltage Applied) | $T_J$, $T_{stg}$ | – 65 to +150 | | °C |
| Peak Operating Junction Temperature (Forward Current Applied) | $T_{J(pk)}$ | 150 | | °C |

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 (Notes 1 and 2)

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction−to−Ambient | $R_{\theta JA}$ | 80 | °C/W |

### ELECTRICAL CHARACTERISTICS ($T_L$ = 25°C unless otherwise noted) (Note 1)

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Maximum Instantaneous Forward Voltage (Note 2)<br>($i_F$ = 0.1 A)<br>($i_F$ = 1.0 A)<br>($i_F$ = 3.0 A) | $v_F$ | <br>0.550<br>0.750<br>1.000 | V |
| Maximum Instantaneous Reverse Current @ Rated dc Voltage (Note 2)<br>($T_L$ = 25°C)<br>($T_L$ = 100°C) | $i_R$ | <br>0.5<br>5.0 | mA |

1. Lead Temperature reference is cathode lead 1/32″ from case.
2. Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MBR150 | Axial Lead<br>(Pb−Free) | 1000 Units / Bag |
| MBR150RL | Axial Lead<br>(Pb−Free) | 5000 / Tape & Reel |
| MBR160 | Axial Lead<br>(Pb−Free) | 1000 Units / Bag |
| MBR160RL | Axial Lead<br>(Pb−Free) | 5000 / 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.

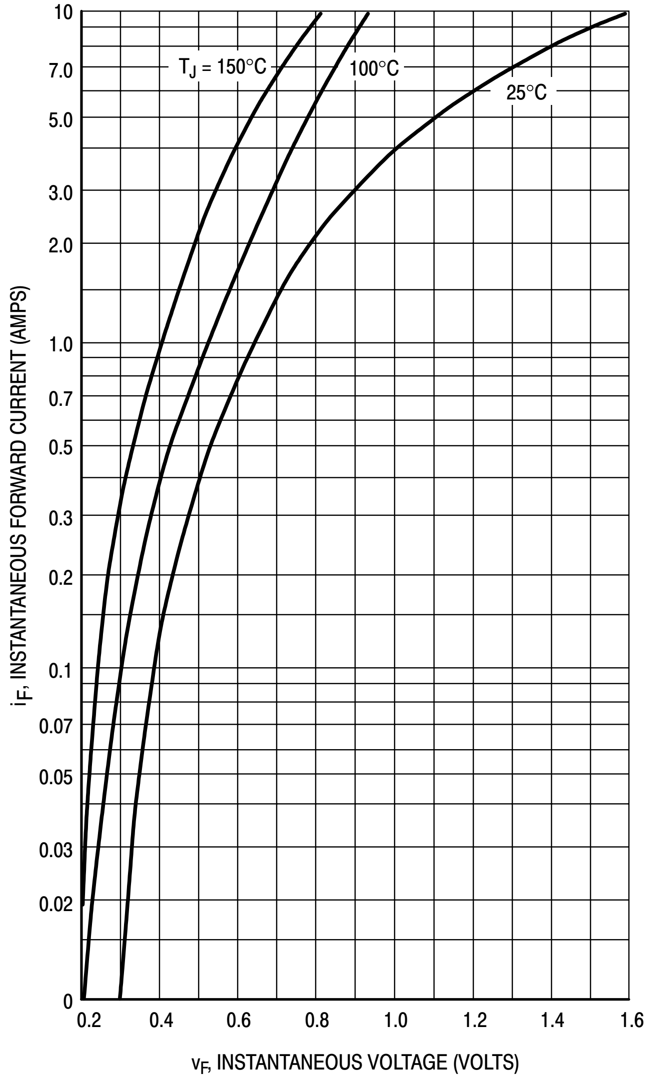



**Figure 1. Typical Forward Voltage**

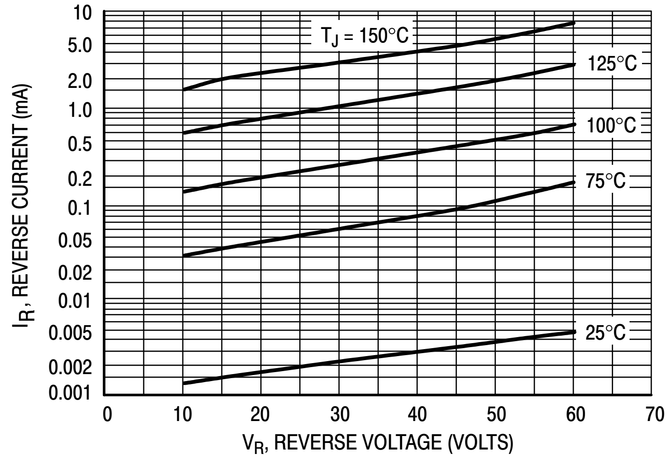



**Figure 2. Typical Reverse Current***

*The curves shown are typical for the highest voltage device in the voltage grouping. Typical reverse current for lower voltage selections can be estimated from these same curves if $V_R$ is sufficiently below rated $V_R$.

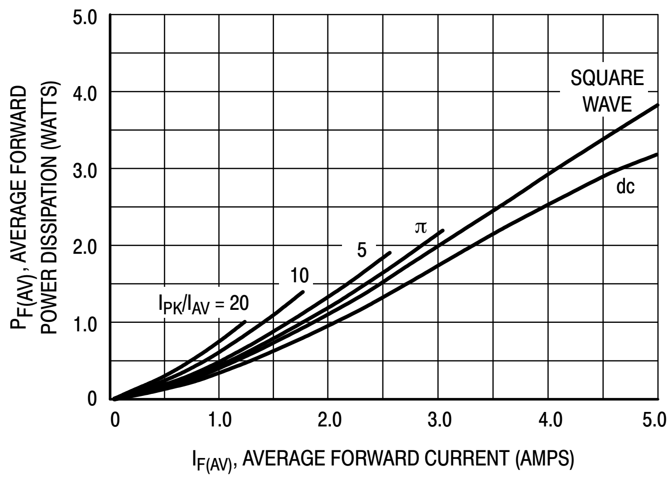



**Figure 3. Forward Power Dissipation**

## THERMAL CHARACTERISTICS

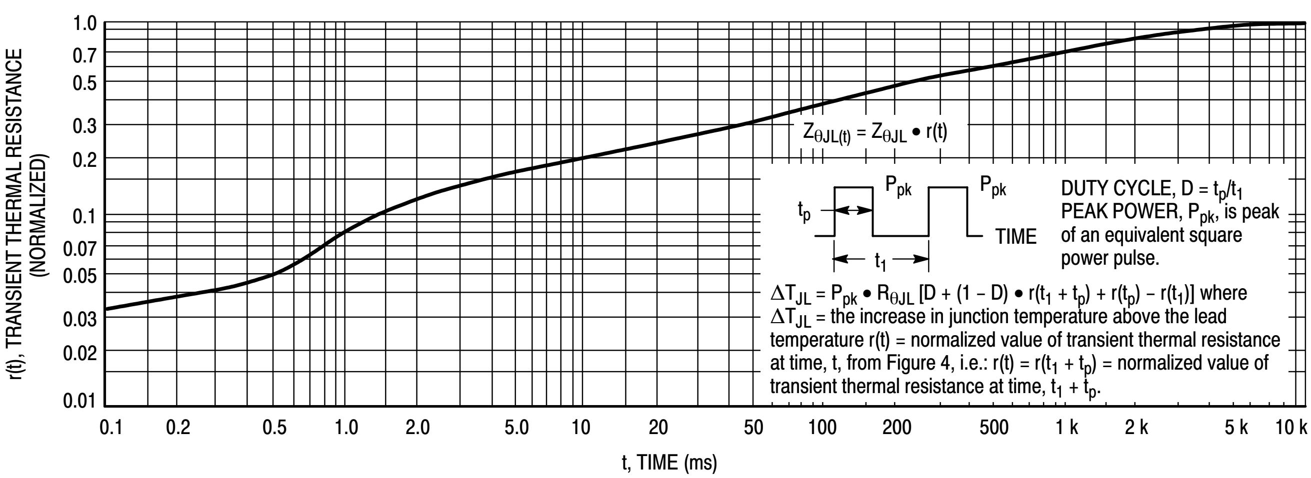



**Figure 4. Thermal Response**

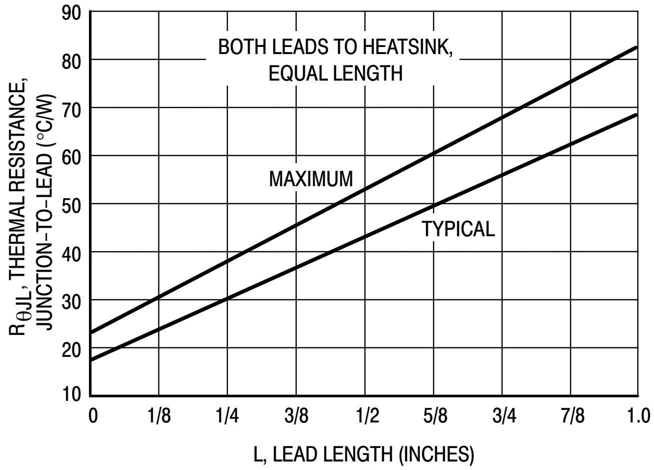



**Figure 5. Steady−State Thermal Resistance**

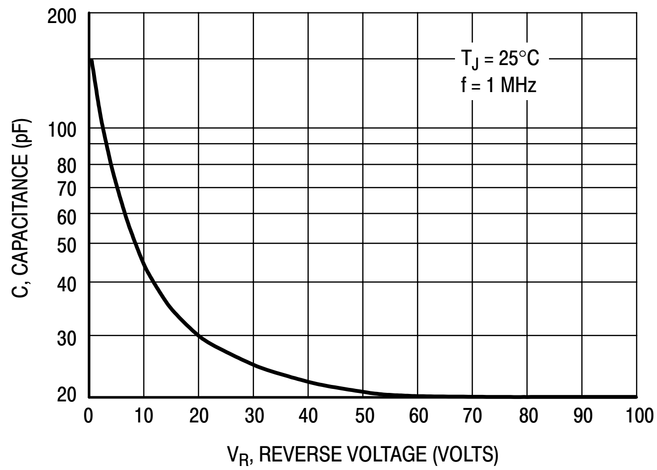
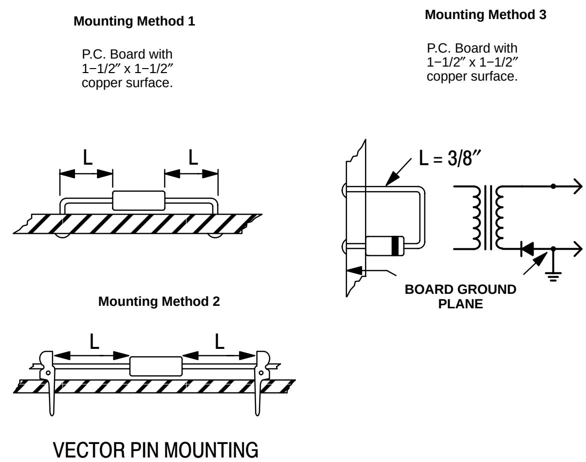



**Figure 6. Typical Capacitance**

**NOTE 1. — MOUNTING DATA:**

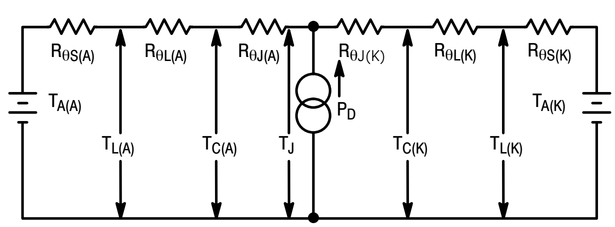
Data shown for thermal resistance junction−to−ambient ($R_{\theta JA}$) for the mounting shown is to be used as a typical guideline values for preliminary engineering or in case the tie point temperature cannot be measured.




**Typical Values for $R_{\theta JA}$ in Still Air**

| Mounting Method | Lead Length, L (in) | | | | $R_{\theta JA}$ |
|---|---|---|---|---|---|
| | 1/8 | 1/4 | 1/2 | 3/4 | |
| 1 | 52 | 65 | 72 | 85 | °C/W |
| 2 | 67 | 80 | 87 | 100 | °C/W |
| 3 | — | 50 | | | °C/W |

**NOTE 2. — THERMAL CIRCUIT MODEL:**
(For heat conduction through the leads)




Use of the above model permits junction to lead thermal resistance for any mounting configuration to be found. For a given total lead length, lowest values occur when one side of the rectifier is brought as close as possible to the heatsink. Terms in the model signify:

$T_A$ = Ambient Temperature  $T_C$ = Case Temperature
$T_L$ = Lead Temperature  $T_J$ = Junction Temperature
$R_{\theta S}$ = Thermal Resistance, Heatsink−to−Ambient
$R_{\theta L}$ = Thermal Resistance, Lead−to−Heatsink
$R_{\theta J}$ = Thermal Resistance, Junction−to−Case
$P_D$ = Power Dissipation

(Subscripts A and K refer to anode and cathode sides, respectively.) Values for thermal resistance components are:
$R_{\theta L}$ = 100°C/W/in typically and 120°C/W/in maximum.
$R_{\theta J}$ = 36°C/W typically and 46°C/W maximum.

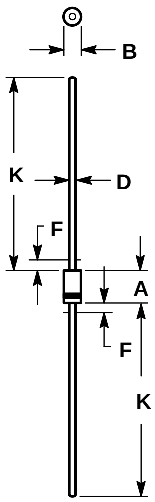
**NOTE 3. — HIGH FREQUENCY OPERATION:**

Since current flow in a Schottky rectifier is the result of majority carrier conduction, it is not subject to junction diode forward and reverse recovery transients due to minority carrier injection and stored charge. Satisfactory circuit analysis work may be performed by using a model consisting of an ideal diode in parallel with a variable capacitance. (See Figure 6)

Rectification efficiency measurements show that operation will be satisfactory up to several megahertz. For example, relative waveform rectification efficiency is approximately 70 percent at 2 MHz, e.g., the ratio of dc power to RMS power in the load is 0.28 at this frequency, whereas perfect rectification would yield 0.406 for sine wave inputs. However, in contrast to ordinary junction diodes, the loss in waveform efficiency is not indicative of power loss: it is simply a result of reverse current flow through the diode capacitance, which lowers the dc output voltage.

## PACKAGE DIMENSIONS

### AXIAL LEAD, DO−41
### CASE 59−10
### ISSUE S




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 59−04 OBSOLETE, NEW STANDARD 59−09.
4. 59−03 OBSOLETE, NEW STANDARD 59−10.
5. ALL RULES AND NOTES ASSOCIATED WITH JEDEC DO−41 OUTLINE SHALL APPLY
6. POLARITY DENOTED BY CATHODE BAND.
7. LEAD DIAMETER NOT CONTROLLED WITHIN F DIMENSION.

| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.161 | 0.205 | 4.10 | 5.20 |
| B | 0.079 | 0.106 | 2.00 | 2.70 |
| D | 0.028 | 0.034 | 0.71 | 0.86 |
| F | --- | 0.050 | --- | 1.27 |
| K | 1.000 | --- | 25.40 | --- |

## PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT**:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 USA
**Phone**: 480−829−7710 or 800−344−3860 Toll Free USA/Canada
**Fax**: 480−829−7709 or 800−344−3867 Toll Free USA/Canada
**Email**: orderlit@onsemi.com

**N. American Technical Support**: 800−282−9855 Toll Free USA/Canada

**Japan**: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
**Phone**: 81−3−5773−3850

**ON Semiconductor Website**: http://onsemi.com

**Order Literature**: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.