MBR150, MBR160

MBR160 is a Preferred Device

Axial Lead Rectifiers

. . . employing 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.

- Low Reverse Current
- Low Stored Charge, Majority Carrier Conduction
- Low Power Loss/High Efficiency
- Highly Stable Oxide Passivated Junction

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
- Marking: B150, B160

MAXIMUM RATINGS

Please See the Table on the Following Page

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

Device	Package	Shipping
MBR150	Axial Lead	1000 Units/Bag
MBR150RL	Axial Lead	5000/Tape & Reel
MBR160	Axial Lead	1000 Units/Bag
MBR160RL	Axial Lead	5000/Tape & Reel

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

MAXIMUM RATINGS

Rating	Symbol	MBR150	MBR160	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	50	60	Volts
RMS Reverse Voltage	$V_{R(RMS)}$	35	42	Volts
Average Rectified Forward Current (Note 1) ($V_{R(equiv)} \leq 0.2\ V_R(dc)$, T_L = 90°C, $R_{\theta JA}$ = 80°C/W, P.C. Board Mounting, see Note 1, T_A = 55°C)	I_O	1.0		Amp
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions, halfwave, single phase, 60 Hz, T_L = 70°C)	I_{FSM}	25 (for one cycle)		Amps
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

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) (i_F = 0.1 A) (i_F = 1.0 A) (i_F = 3.0 A)	v_F	 0.550 0.750 1.000	Volt
Maximum Instantaneous Reverse Current @ Rated dc Voltage (Note 2) (T_L = 25°C) (T_L = 100°C)	i_R	 0.5 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%.

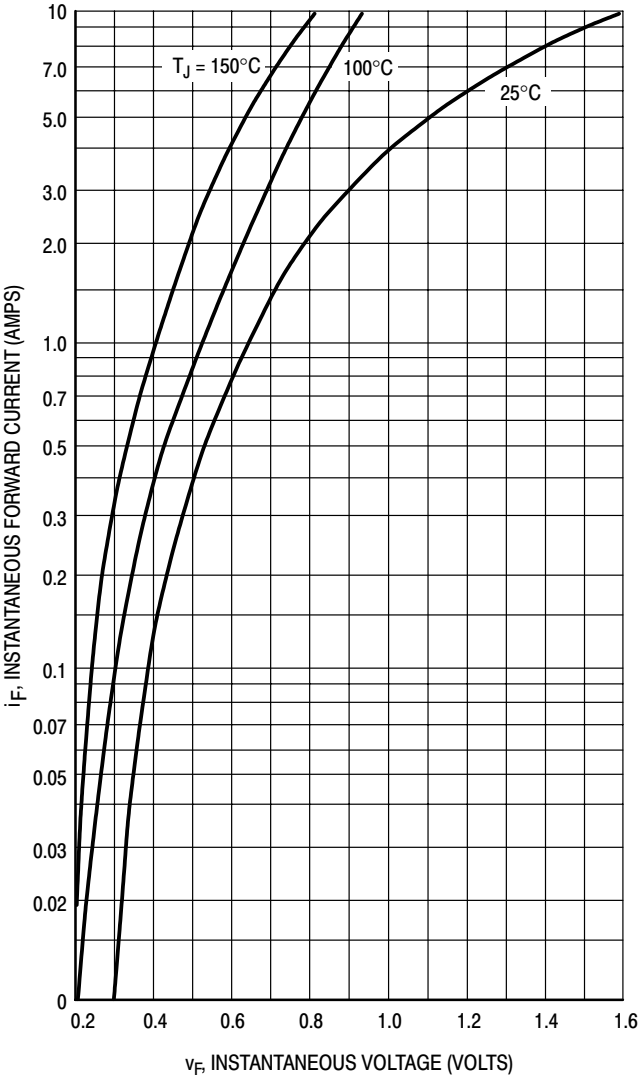


Figure 1. Typical Forward Voltage

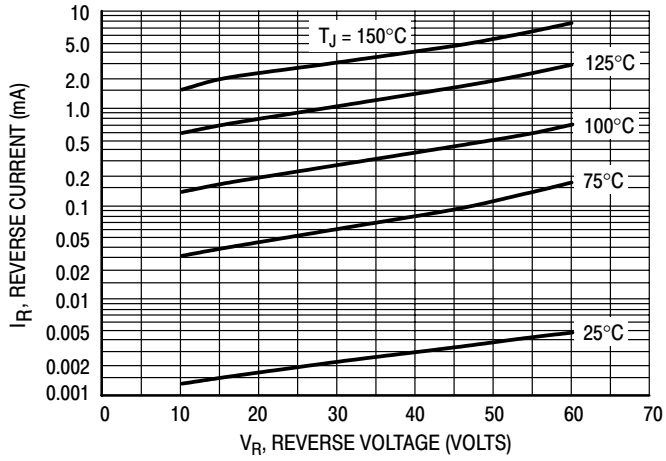


Figure 2. Typical Reverse Current*

*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.

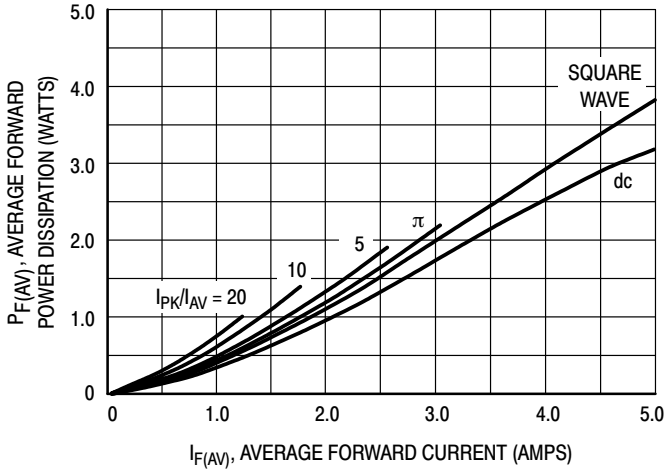


Figure 3. Forward Power Dissipation

THERMAL CHARACTERISTICS

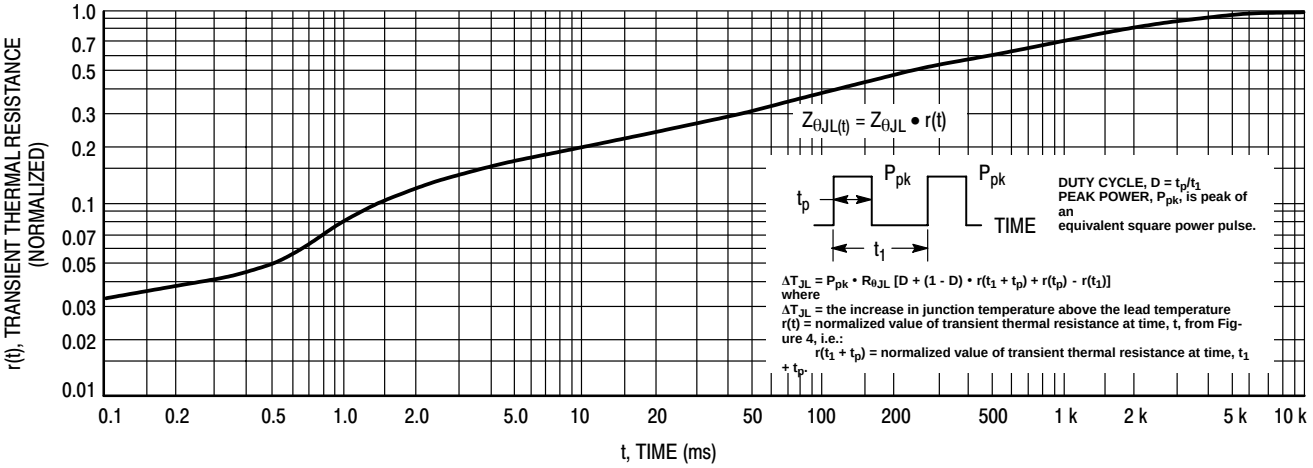


Figure 4. Thermal Response

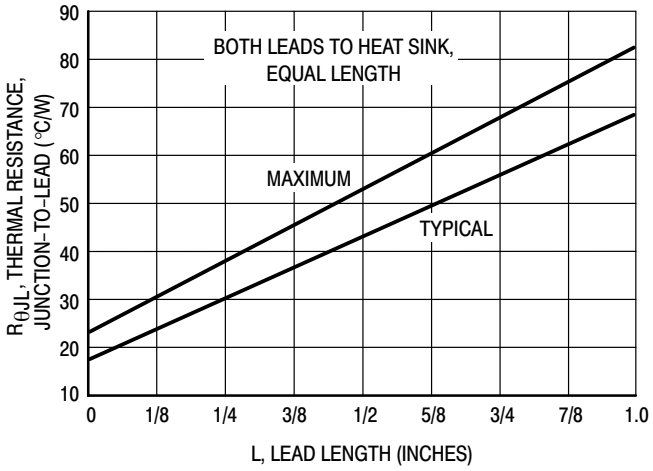


Figure 5. Steady-State Thermal Resistance

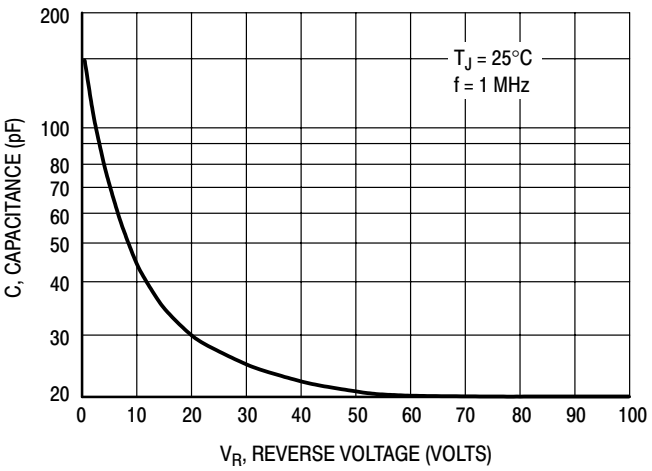


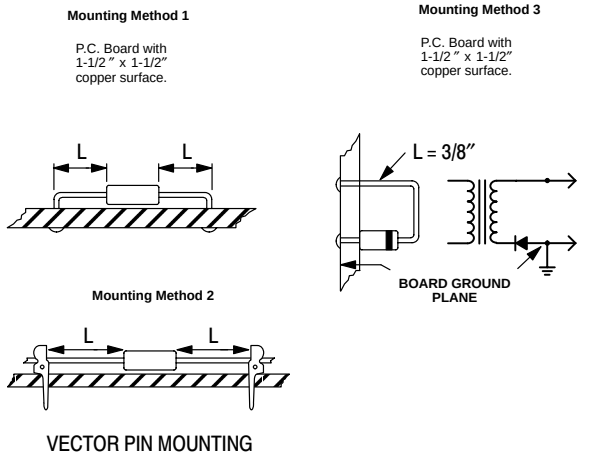
Figure 6. Typical Capacitance

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.

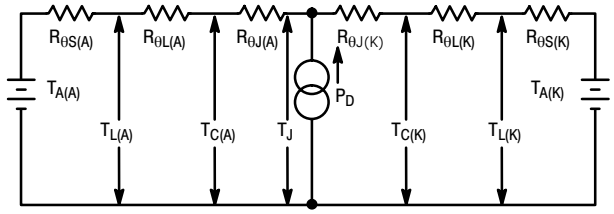
Typical Values for $R_{\theta JA}$ in Still Air

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 heat sink. 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, Heat Sink to Ambient
$R_{\theta L}$ = Thermal Resistance, Lead to Heat Sink
$R_{\theta J}$ = 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.

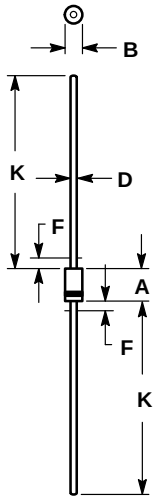
NOTE 3. — HIGH FREQUENCY OPERATION:

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.

	INCHES		MILLIMETERS	
DIM	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 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.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

For additional information, please contact your local
Sales Representative.