

# MBR60H100CT

## SWITCHMODE™ Power Rectifier 100 V, 60 A

### Features and Benefits

- Low Forward Voltage: 0.72 V @ 125°C
- Low Power Loss/High Efficiency
- High Surge Capacity
- 175°C Operating Junction Temperature
- 60 A Total (30 A Per Diode Leg)
- Pb-Free Package is Available

### Applications

- Power Supply – Output Rectification
- Power Management
- Instrumentation

### Mechanical Characteristics:

- Case: Epoxy, Molded
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight: 1.9 Grams (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:  
260°C Max. for 10 Seconds
- ESD Rating: Human Body Model = 3B  
Machine Model = C

### MAXIMUM RATINGS

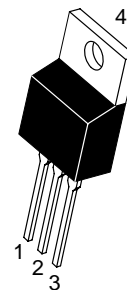
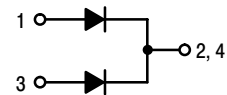
Please See the Table on the Following Page



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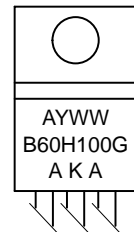
<http://onsemi.com>

## SCHOTTKY BARRIER RECTIFIER 60 AMPERES 100 VOLTS



TO-220AB  
CASE 221A  
PLASTIC

### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
B60H100 = Device Code  
G = Pb-Free Package  
AKA = Polarity Designator

### ORDERING INFORMATION

Device	Package	Shipping
MBR60H100CT	TO-220	50 Units/Rail
MBR60H100CTG	TO-220 (Pb-Free)	50 Units/Rail

# MBR60H100CT

## MAXIMUM RATINGS (Per Diode Leg)

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	100	V
Average Rectified Forward Current ( $T_C = 155^\circ\text{C}$ ) Per Diode Per Device	$I_{F(AV)}$	30 60	A
Peak Repetitive Forward Current (Square Wave, 20 kHz, $T_C = 151^\circ\text{C}$ )	$I_{FRM}$	60	A
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	$I_{FSM}$	350	A
Operating Junction Temperature (Note 1)	$T_J$	+175	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +175	$^\circ\text{C}$
Voltage Rate of Change (Rated $V_R$ )	dv/dt	10,000	V/ $\mu\text{s}$
Controlled Avalanche Energy (see test conditions in Figures 9 and 10)	$W_{AVAIL}$	400	mJ
ESD Ratings: Machine Model = C Human Body Model = 3B		> 400 > 8000	V

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.

1. The heat generated must be less than the thermal conductivity from Junction-to-Ambient:  $dP_D/dT_J < 1/R_{\theta JA}$ .

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Maximum Thermal Resistance – Junction-to-Case (Min. Pad) – Junction-to-Ambient (Min. Pad)	$R_{\theta JC}$ $R_{\theta JA}$	1.0 70	$^\circ\text{C}/\text{W}$

## ELECTRICAL CHARACTERISTICS (Per Diode Leg)

Characteristic	Symbol	Min	Typ	Max	Unit
Maximum Instantaneous Forward Voltage (Note 2) ( $i_F = 30\text{ A}$ , $T_J = 25^\circ\text{C}$ ) ( $i_F = 30\text{ A}$ , $T_J = 125^\circ\text{C}$ ) ( $i_F = 60\text{ A}$ , $T_J = 25^\circ\text{C}$ ) ( $i_F = 60\text{ A}$ , $T_J = 125^\circ\text{C}$ )	$v_F$	–	0.80 0.68 0.93 0.81	0.84 0.72 0.98 0.84	V
Maximum Instantaneous Reverse Current (Note 2) (Rated DC Voltage, $T_J = 125^\circ\text{C}$ ) (Rated DC Voltage, $T_J = 25^\circ\text{C}$ )	$i_R$	–	2.0 0.0013	10 0.01	mA

2. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

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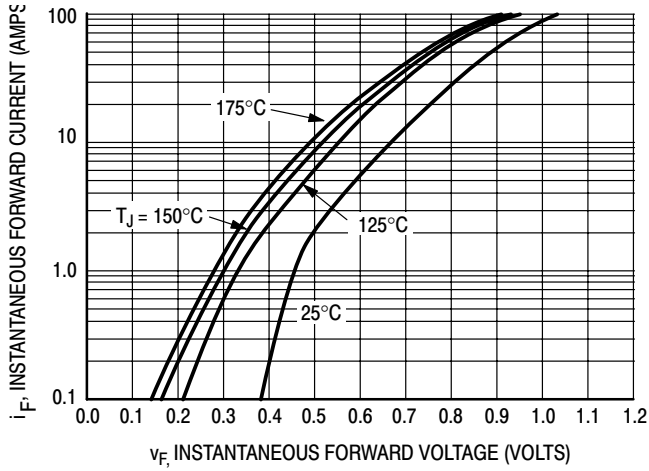


Figure 1. Typical Forward Voltage

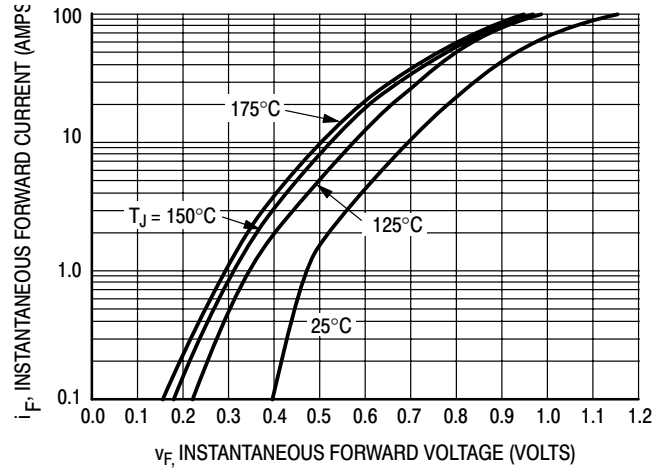


Figure 2. Maximum Forward Voltage

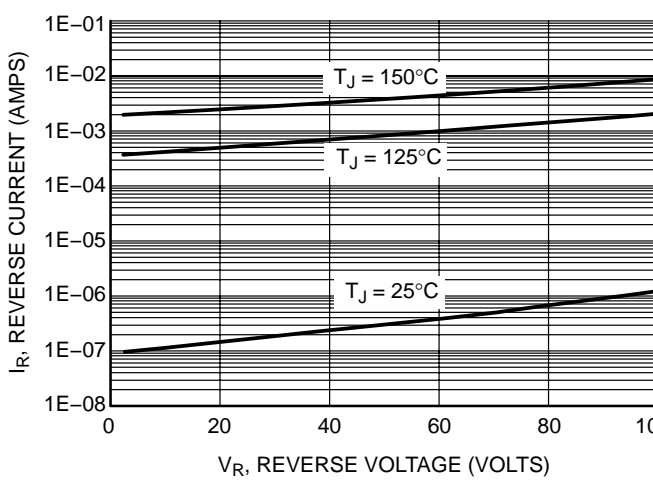


Figure 3. Typical Reverse Current

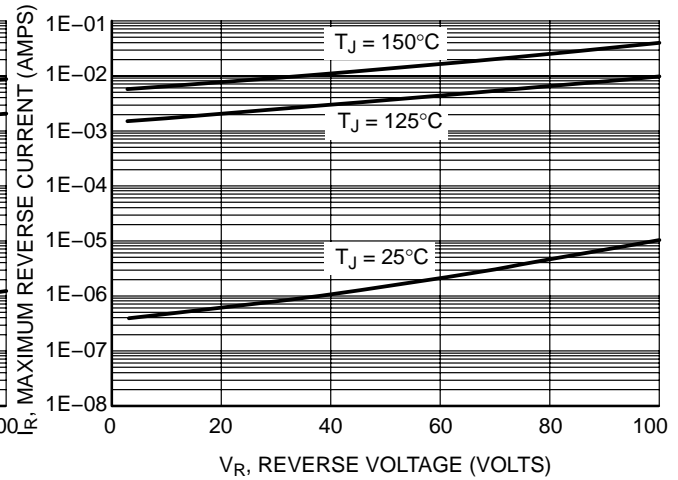


Figure 4. Maximum Reverse Current

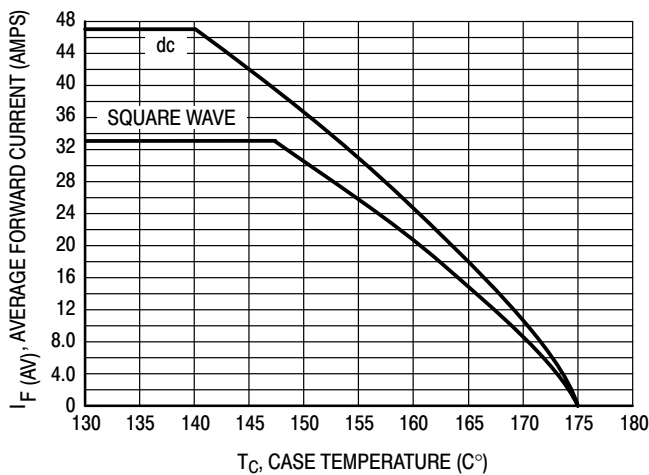


Figure 5. Current Derating, Case Per Leg

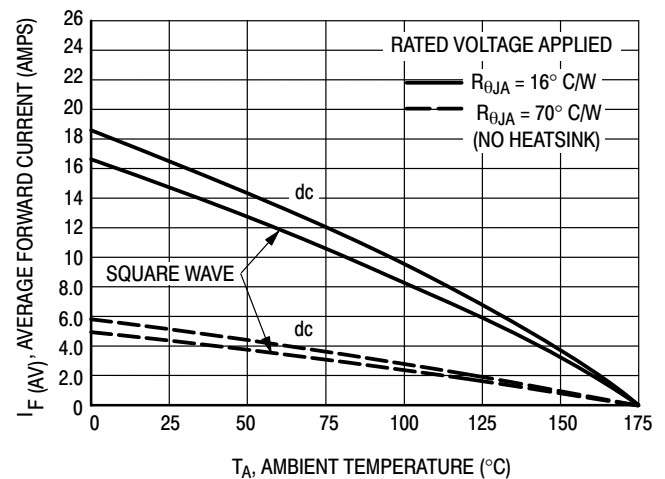


Figure 6. Current Derating, Ambient Per Leg

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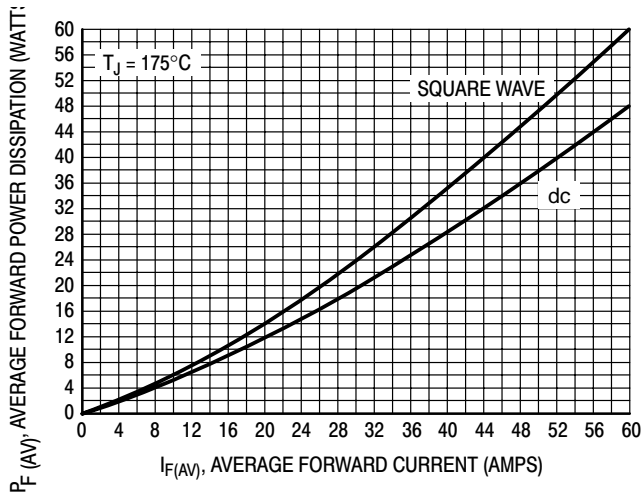


Figure 7. Forward Power Dissipation

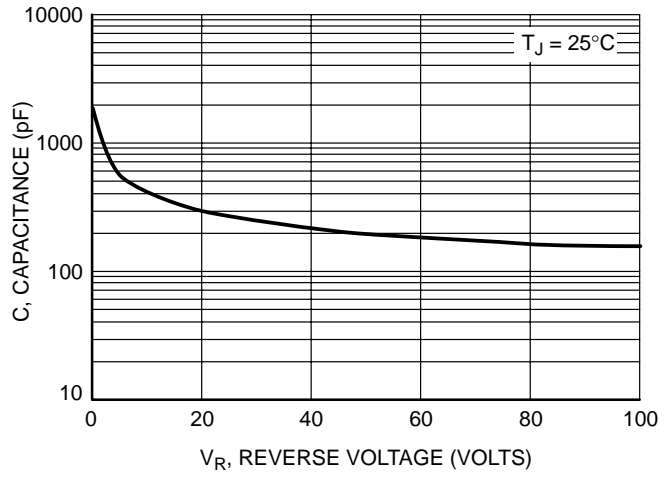


Figure 8. Capacitance

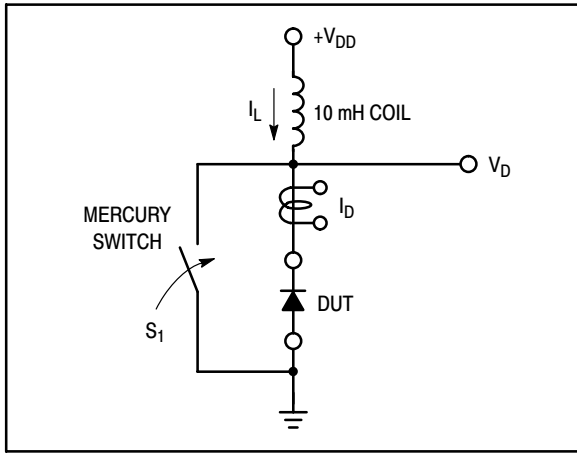


Figure 9. Test Circuit

The unclamped inductive switching circuit shown in Figure 9 was used to demonstrate the controlled avalanche capability of this device. A mercury switch was used instead of an electronic switch to simulate a noisy environment when the switch was being opened.

When  $S_1$  is closed at  $t_0$  the current in the inductor  $I_L$  ramps up linearly; and energy is stored in the coil. At  $t_1$  the switch is opened and the voltage across the diode under test begins to rise rapidly, due to  $di/dt$  effects, when this induced voltage reaches the breakdown voltage of the diode, it is clamped at  $BV_{DUT}$  and the diode begins to conduct the full load current which now starts to decay linearly through the diode, and goes to zero at  $t_2$ .

By solving the loop equation at the point in time when  $S_1$  is opened; and calculating the energy that is transferred to the diode it can be shown that the total energy transferred is equal to the energy stored in the inductor plus a finite amount of energy from the  $V_{DD}$  power supply while the diode is in breakdown (from  $t_1$  to  $t_2$ ) minus any losses due to finite component resistances. Assuming the component resistive

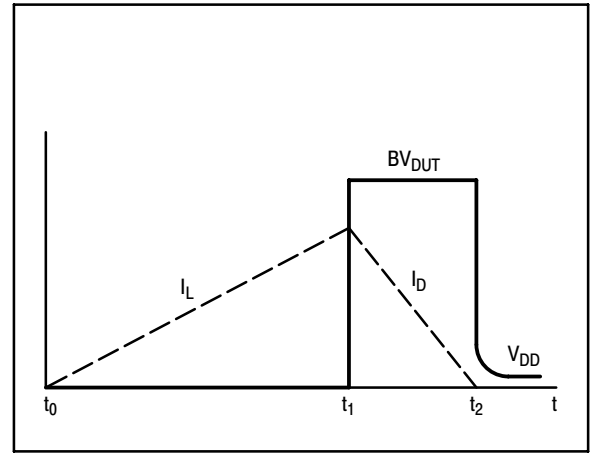


Figure 10. Current-Voltage Waveforms

elements are small Equation (1) approximates the total energy transferred to the diode. It can be seen from this equation that if the  $V_{DD}$  voltage is low compared to the breakdown voltage of the device, the amount of energy contributed by the supply during breakdown is small and the total energy can be assumed to be nearly equal to the energy stored in the coil during the time when  $S_1$  was closed, Equation (2).

EQUATION (1):

$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2 \left( \frac{BV_{DUT}}{BV_{DUT} - V_{DD}} \right)$$

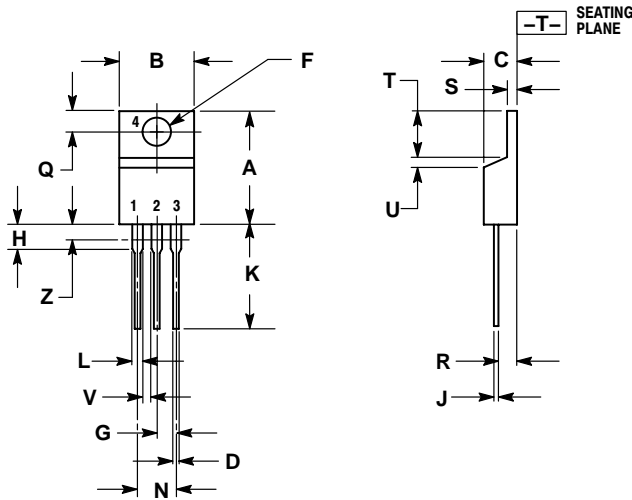
EQUATION (2):

$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2$$

# MBR60H100CT

## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AD



**NOTES:**


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

**STYLE 6:**

- PIN 1. ANODE
- CATHODE
- ANODE
- CATHODE

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