MBRB30H30CT-1G, NRVBB30H30CT-1G, MBR30H30CTG

Switch-mode Power Rectifiers 30 V, 30 A

Features and Benefits

- Low Forward Voltage
- Low Power Loss/High Efficiency
- High Surge Capacity
- 150°C Operating Junction Temperature
- 30 A Total (15 A Per Diode Leg)
- Guard−Ring for Stress Protection
- NRVBB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Power Supply − Output Rectification
- Power Management
- Instrumentation

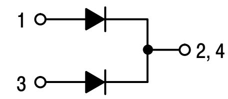
Mechanical Characteristics:

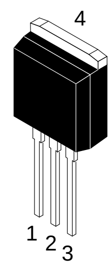
- Case: Epoxy, Molded
- Epoxy Meets UL 94 V−0 @ 0.125 in
- Weight: 1.5 Grams (I^{2}PAK) (Approximately)
  1.9 Grams (TO−220) (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:
  260°C Max. for 10 Seconds

ON Semiconductor®

www.onsemi.com

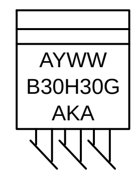
SCHOTTKY BARRIER RECTIFIER 30 AMPERES, 30 VOLTS

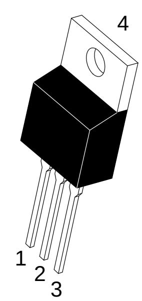




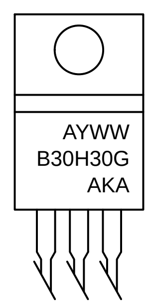
I^{2}PAK (TO−262)
CASE 418D
STYLE 3

MARKING DIAGRAMS





TO−220
CASE 221A
STYLE 6



A	= Assembly Location
Y	= Year
WW	= Work Week
B30H30	= Device Code
G	= Pb−Free Package
AKA	= Diode Polarity

ORDERING AND MARKING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

January, 2015 − Rev. 6

Publication Order Number:
MBRB30H30CT−1/D

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	30	V
Average Rectified Forward Current (Rated V_R) T_C = 138°C	$I_{F(AV)}$	15	A
Peak Repetitive Forward Current (Rated V_R, Square Wave, 20 kHz)	I_{FRM}	30	A
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	I_{FSM}	260	A
Operating Junction Temperature (Note 1)	T_J	−55 to +150	°C
Storage Temperature	T_{stg}	− 55 to +150	°C
Voltage Rate of Change (Rated V_R)	dv/dt	10,000	V/μs
Controlled Avalanche Energy (see test conditions in Figures 9 and 10)	W_{AVAL}	250	mJ
ESD Ratings: Machine Model = C Human Body Model = 3B		> 400 > 8000	V

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.

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

Rating	Symbol	Value	Unit
Maximum Thermal Resistance Junction−to−Case Junction−to−Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.0 70	°C/W

ELECTRICAL CHARACTERISTICS (Per Diode Leg)

Rating	Symbol	Value	Unit
Maximum Instantaneous Forward Voltage (Note 2) (I_F = 15 A, T_C = 25°C) (I_F = 15 A, T_C = 125°C) (I_F = 30 A, T_C = 25°C) (I_F = 30 A, T_C = 125°C)	v_F	0.48 0.40 0.55 0.53	V
Maximum Instantaneous Reverse Current (Note 2) (Rated DC Voltage, T_C = 25°C) (Rated DC Voltage, T_C = 125°C)	i_R	0.8 130	mA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

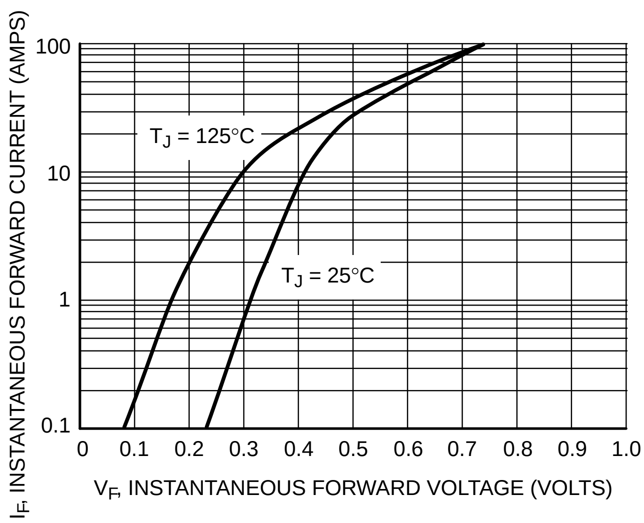


Figure 1. Typical Forward Voltage

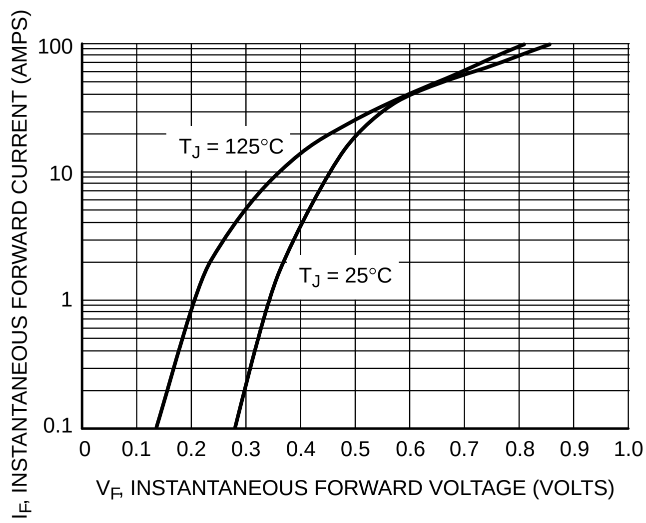


Figure 2. Maximum Forward Voltage

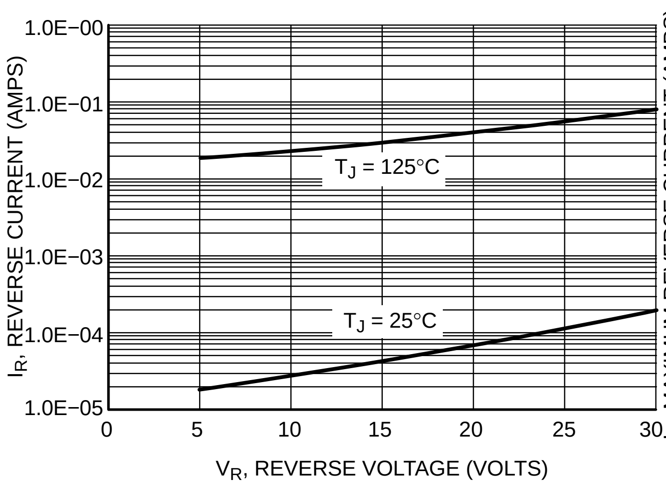


Figure 3. Typical Reverse Current

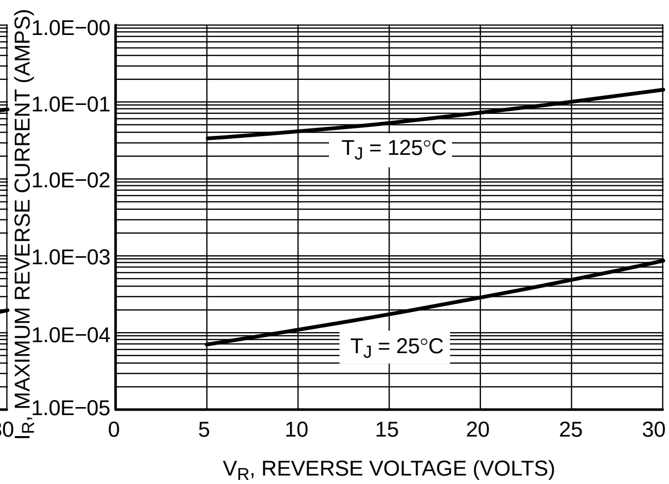


Figure 4. Maximum Reverse Current

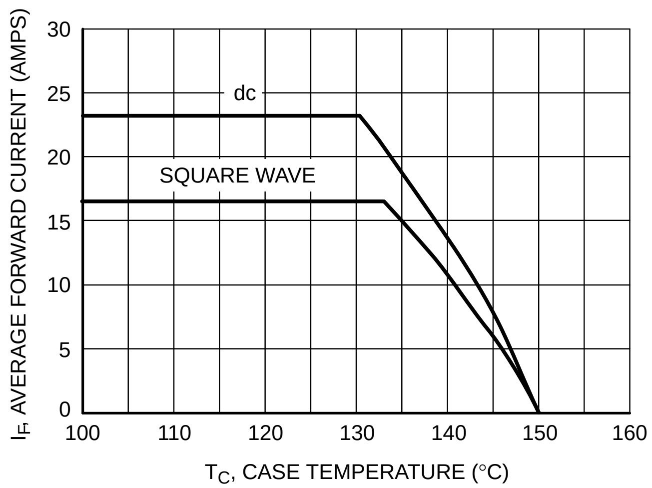


Figure 5. Current Derating

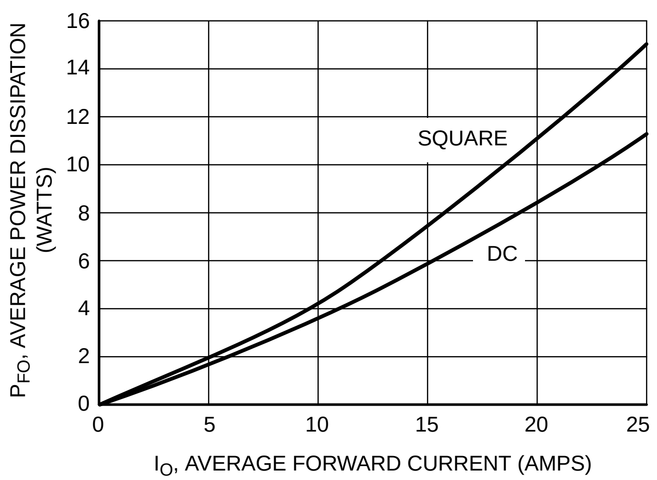


Figure 6. Forward Power Dissipation

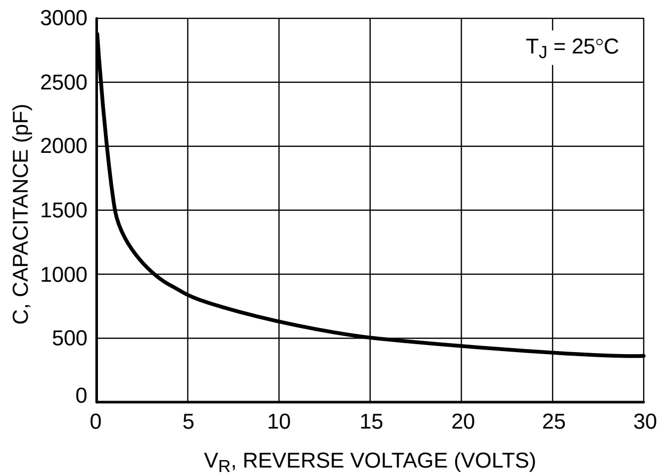


Figure 7. Typical Capacitance

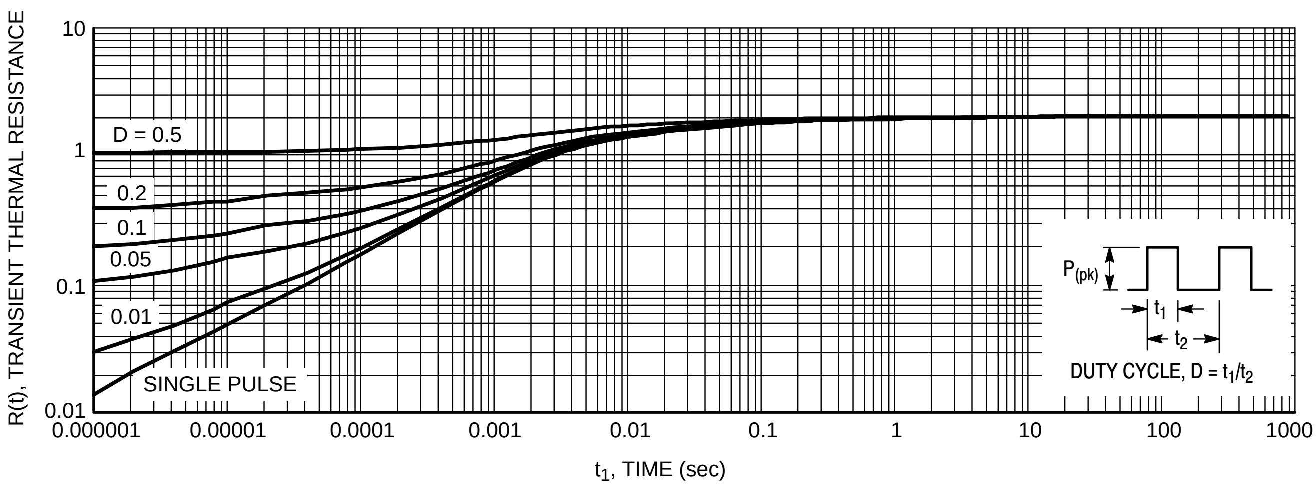


Figure 8. Thermal Response Junction−to−Case

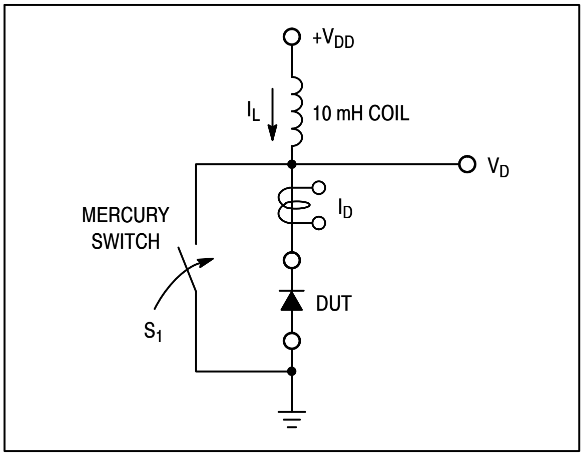


Figure 9. Test Circuit

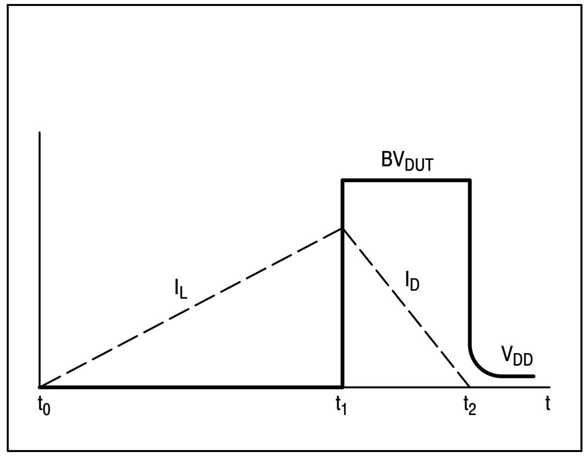


Figure 10. Current−Voltage Waveforms

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 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):

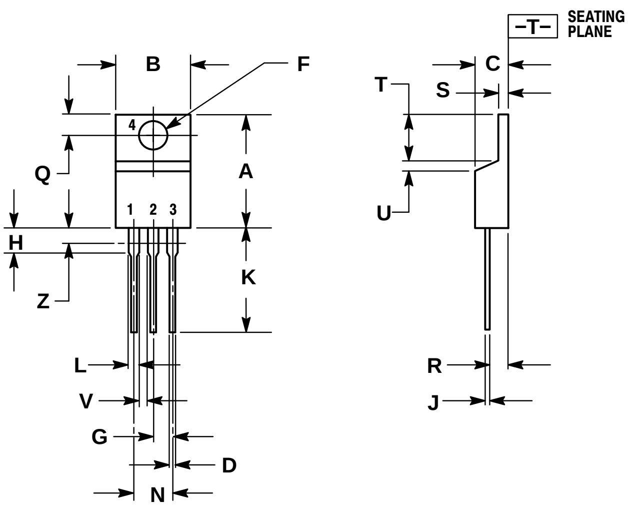
$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2$$

ORDERING INFORMATION

Device	Package	Shipping
MBRB30H30CT−1G	TO−262 (Pb−Free)	50 Units / Rail
NRVBB30H30CT−1G	TO−262 (Pb−Free)	50 Units / Rail
MBR30H30CTG	TO−220 (Pb−Free)	50 Units / Rail

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AH



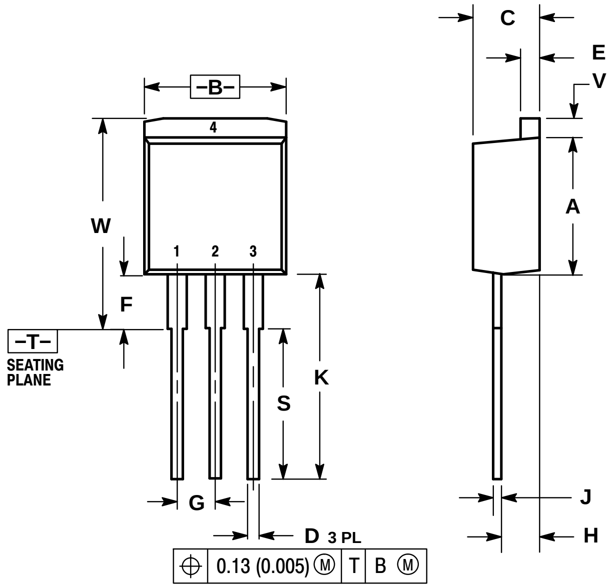
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
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
2. CATHODE
3. ANODE
4. CATHODE

PACKAGE DIMENSIONS

I2PAK (TO−262)
CASE 418D
ISSUE D



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.335	0.380	8.51	9.65
B	0.380	0.406	9.65	10.31
C	0.160	0.185	4.06	4.70
D	0.026	0.035	0.66	0.89
E	0.045	0.055	1.14	1.40
F	0.122 REF		3.10 REF	
G	0.100 BSC		2.54 BSC	
H	0.094	0.110	2.39	2.79
J	0.013	0.025	0.33	0.64
K	0.500	0.562	12.70	14.27
S	0.390 REF		9.90 REF	
V	0.045	0.070	1.14	1.78
W	0.522	0.551	13.25	14.00

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

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: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative