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 (I²PAK) (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



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ORDERING AND MARKING INFORMATION

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

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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)	TJ	-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 _{θJC} R _{θJA}	2.0 70	°C/W

ELECTRICAL CHARACTERISTICS (Per Diode Leg)

Rating	Symbol	Value	Unit
	v _F	0.48 0.40 0.55 0.53	V
Maximum Instantaneous Reverse Current (Note 2) (Rated DC Voltage, $T_C = 25^{\circ}C$) (Rated DC Voltage, $T_C = 125^{\circ}C$)	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 μ s, Duty Cycle \leq 2.0%.

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Figure 7. Typical Capacitance



Figure 8. Thermal Response Junction-to-Case



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 S₁ is closed at t₀ the current in the inductor I_L ramps up linearly; and energy is stored in the coil. At t₁ 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 t₂.

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

ORDERING INFORMATION



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):

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

EQUATION (2):

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

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





STYLE 1:		STYLE 2:		STYLE 3:		STYLE 4:	
PIN 1.	BASE	PIN 1.	GATE	PIN 1.	ANODE	PIN 1.	GATE
2.	COLLECTOR	2.	DRAIN	2.	CATHODE	2.	COLLECTOR
3.	EMITTER	3.	SOURCE	3.	ANODE	3.	EMITTER
4.	COLLECTOR	4.	DRAIN	4.	CATHODE	4.	COLLECTOR

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