

# International IR Rectifier

## MBRB10..PbF Series

SCHOTTKY RECTIFIER

10 Amp

$$I_{F(AV)} = 10\text{Amp}$$

$$V_R = 35/45\text{V}$$

### Major Ratings and Characteristics

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	10	A
$I_{FRM}$ @ $T_C = 135^\circ\text{C}$	20	A
$V_{RRM}$	35/45	V
$I_{FSM}$ @ $t_p = 5\ \mu\text{s}$ sine	1060	A
$V_F$ @ 10 Apk, $T_J = 125^\circ\text{C}$	0.57	V
$T_J$ range	-65 to 150	$^\circ\text{C}$

### Description/ Features

This Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to  $150^\circ\text{C}$  junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- $150^\circ\text{C}$   $T_J$  operation
- TO-220 and D<sup>2</sup>Pak packages
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

### Case Styles



MBRB10..PbF Series

Bulletin PD-21042 rev. A 06/06



Voltage Ratings

Part number	MBRB1035PbF	MBRB1045PbF
$V_R$ Max. DC Reverse Voltage (V)	35	45
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)		

Absolute Maximum Ratings

Parameters	Values	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current	10	A	@ $T_C = 135^\circ\text{C}$ (Rated $V_R$ )
$I_{FRM}$ Peak Repetitive Forward Current	20	A	Rated $V_R$ , square wave, 20kHz $T_C = 135^\circ\text{C}$
$I_{FSM}$ Non Repetitive Peak Surge Current	1060	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse
	150		Following any rated load condition and with rated $V_{RWM}$ applied Surge applied at rated load conditions halfwave, single phase, 60Hz
$E_{AS}$ Non-Repetitive Avalanche Energy	8	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 2$ Amps, $L = 4$ mH
$I_{AR}$ Repetitive Avalanche Current	2	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical

Electrical Specifications

Parameters	Values	Units	Conditions	
$V_{FM}$ Max. Forward Voltage Drop (1)	0.84	V	@ 20A	$T_J = 25^\circ\text{C}$
	0.57	V	@ 10A	$T_J = 125^\circ\text{C}$
	0.72	V	@ 20A	
$I_{RM}$ Max. Instantaneous Reverse Current (1)	0.1	mA	$T_J = 25^\circ\text{C}$	Rated DC voltage
	15	mA	$T_J = 125^\circ\text{C}$	
$V_{F(TO)}$ Threshold Voltage	0.354	V	$T_J = T_J$ max.	
$r_t$ Forward Slope Resistance	17.6	m $\Omega$		
$C_T$ Max. Junction Capacitance	600	pF	$V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$	
$L_S$ Typical Series Inductance	8.0	nH	Measured from top of terminal to mounting plane	
dv/dt Max. Voltage Rate of Change	10000	V/ $\mu\text{s}$	(Rated $V_R$ )	

Thermal-Mechanical Specifications

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle <2%

Parameters	Values	Units	Conditions
$T_J$ Max. Junction Temperature Range	-65 to 150	$^\circ\text{C}$	
$T_{stg}$ Max. Storage Temperature Range	-65 to 175	$^\circ\text{C}$	
$R_{thJC}$ Max. Thermal Resistance Junction to Case	2.0	$^\circ\text{C}/\text{W}$	DC operation
$R_{thCS}$ Typical Thermal Resistance Case to Heatsink	0.50	$^\circ\text{C}/\text{W}$	Mounting surface, smooth and greased Only for TO-220
wt Approximate Weight	2 (0.07)	g (oz.)	
T Mounting Torque	Min. 6 (5)	Kg-cm (lbf-in)	
	Max. 12 (10)		
Marking Device	MBRB10..		Case style D <sup>2</sup> Pak

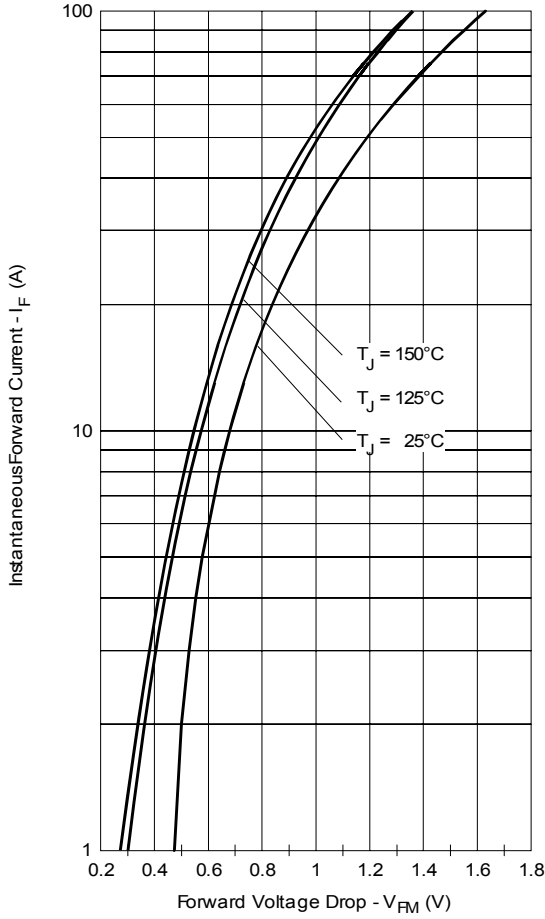


Fig. 1 - Max. Forward Voltage Drop Characteristics

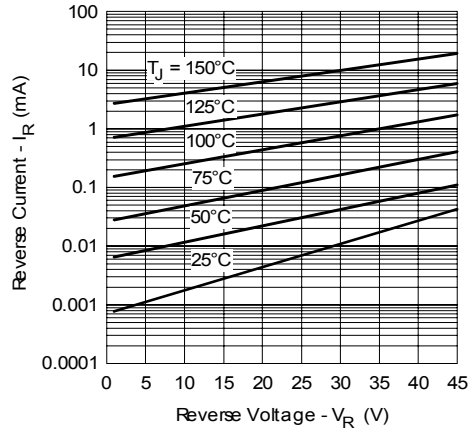


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

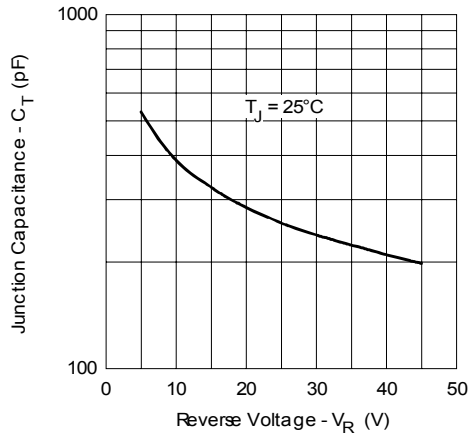


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

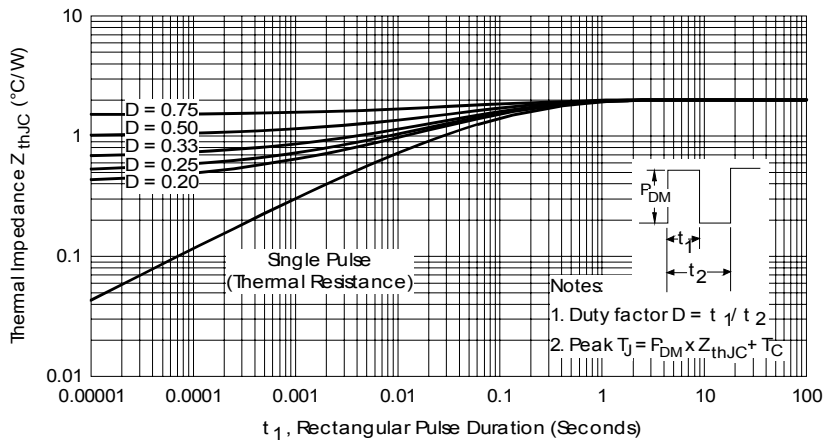


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

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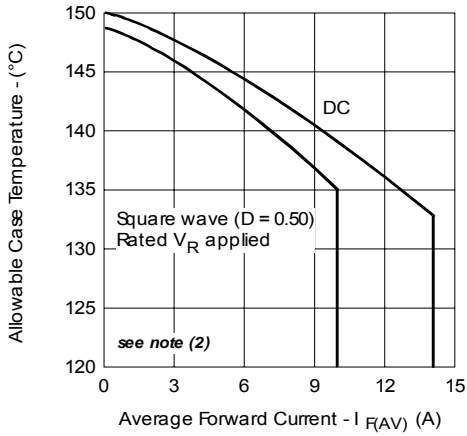


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

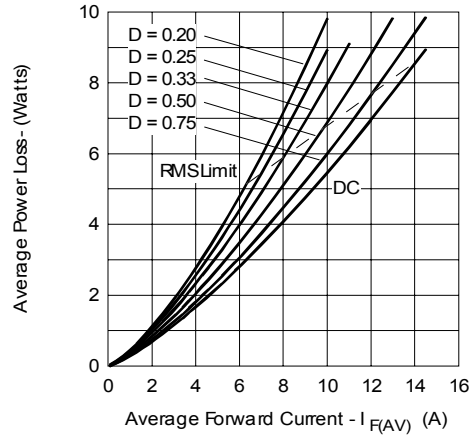


Fig. 6 - Forward Power Loss Characteristics

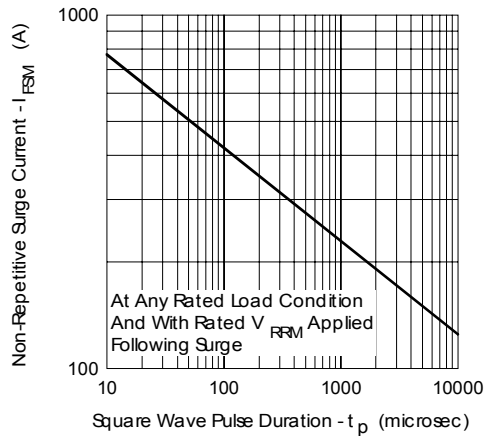


Fig. 7 - Max. Non-Repetitive Surge Current

(2) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

$P_d$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

$P_{d_{REV}}$  = Inverse Power Loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_{R1}$  = rated  $V_R$

Outline Table

NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994  
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].  
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.  
 4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.  
 5. CONTROLLING DIMENSION: INCH.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.78	.045	.070	
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	4
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86		.270		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1		1.65		.065	
L2	1.27	1.78	.050	.070	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
R	0.51	0.71	.020	.028	
θ	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**  
**HEXFET**  
 1.- GATE  
 2, 4.- DRAIN  
 3.- SOURCE  
**IGBTs, CoPACK**  
 1.- GATE  
 2, 4.- COLLECTOR  
 3.- EMITTER  
**DIODES**  
 1.- ANODE \*  
 2, 4.- CATHODE  
 3.- ANODE  
 \* PART DEPENDENT.

**Conform to JEDEC outline D<sup>2</sup>Pak (SMD-220)**  
 Dimensions in millimeters and (inches)

Part Marking Information

EXAMPLE: THIS IS A MBRB1045  
 LOT CODE 8024  
 ASSEMBLED ON WW 02, 2000

Note: "P" in assembly line position indicates "Lead-Free"

INTERNATIONAL  
 RECTIFIER  
 LOGO

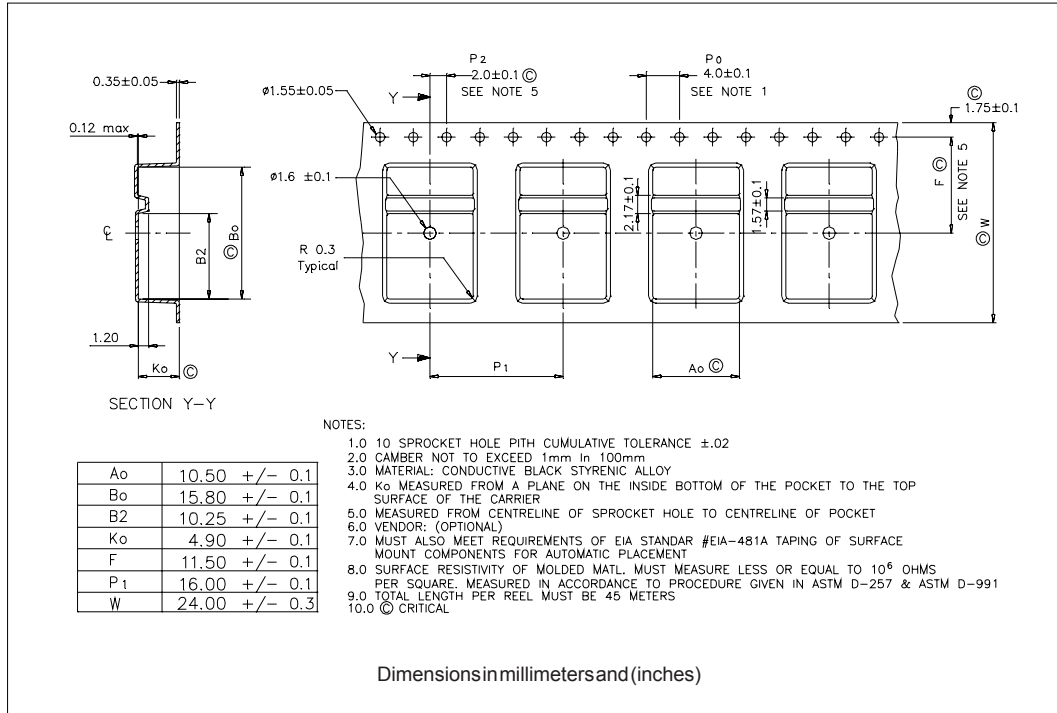
ASSEMBLY  
 LOT CODE

PART NUMBER

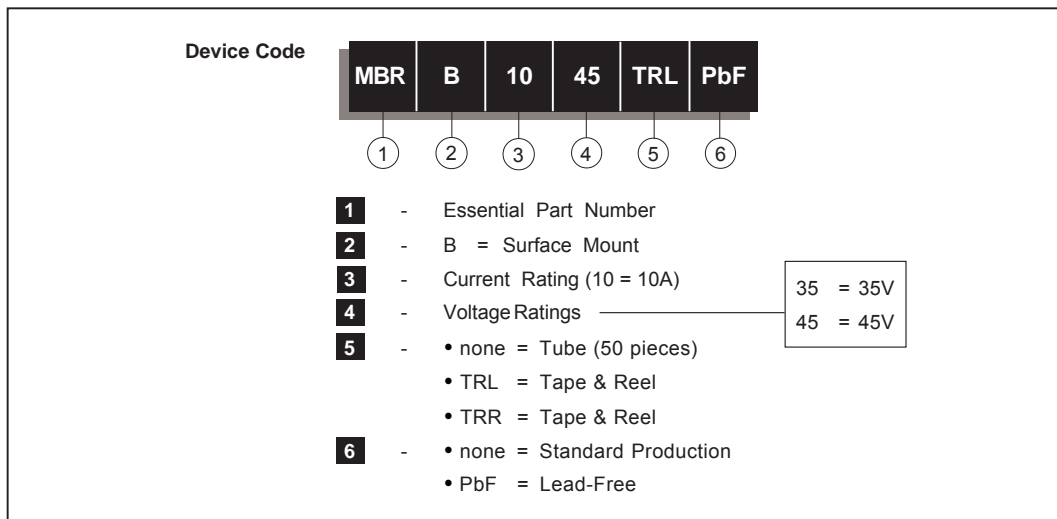
DATE CODE

YEAR 0 = 2000  
 WEEK 02  
 P = LEAD-FREE

Tape & Reel Information



Ordering Information Table



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MBR1045
*****
* This model has been developed by *
* Wizard SPICE MODEL GENERATOR (1999) *
* (International Rectifier Corporation) *
* Contains Proprietary Information *
*****
* SPICE Model Diode is composed by a *
* simple diode plus paralalled VCG2T *
*****
.SUBCKT MBR1045 ANO CAT
D1 ANO 1 DMOD (0.04688)
*Define diode model
.MODEL DMOD D(IS=2.14849701885607E-04A,N=1.50833541375759,BV=52V,
+ IBV=-0.431942180477539A,RS= 0.000618816,CJO=1.90645706123736E-08,
+ VJ=2.31227489200037,XTI=2, EG=0.684712841282824)
*****
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=-29.9118224426661)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP(((((-6.195028E-06/-29.91182)*((V(2,CAT)*1E6)/(I(VX)+1E-6)-
1)))+1)*4.475503E-02*ABS(V(ANO,CAT)))-1)}
*****
.ENDS MBR1045

Thermal Model Subcircuit
.SUBCKT MBR1045 5 1

CTHERM1 5 4 1.40E+00
CTHERM2 4 3 1.46E+01
CTHERM3 3 2 9.30E+01
CTHERM4 2 1 1.69E+03

R THERM1 5 4 5.79E-01
R THERM2 4 3 7.72E-01
R THERM1 3 2 4.45E-01
R THERM1 2 1 1.93E-01

.ENDS MBR1045
    
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Data and specifications subject to change without notice.  
 This product has been designed and qualified for Industrial Level and Lead-Free.  
 Qualification Standards can be found on IR's Web site.

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