Bulletin PD-2.317 rev. G 06/06

International
IOR Rectifier

MBR10.. Series
MBRB10.. Series

SCHOTTKY RECTIFIER

10 Amp

$I_{F(AV)}$ = 10Amp
V_R = 35 - 45V

Major Ratings and Characteristics

Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform	10	A
V_{RRM}	range	35-45	V
I_{FSM}	@tp = 5 µs sine	1060	A
V_F	@10Apk, T_J = 125°C	0.57	V
T_J	range	-55 to 150	°C

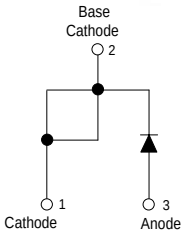
Description/ Features

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

- 150°C T_J operation
- TO-220 and D^2Pak 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

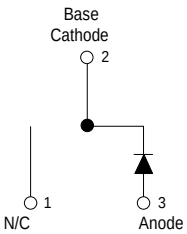
Case Styles

MBR10..



TO-220AC

MBRB10..



D^2PAK

Voltage Ratings

	Part number	MBR1035/MBRB1035	MBR1045/MBRB1045
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° C (Rated V_R)	
I_{FRM}	Peak Repetitive Forward Current	20	A	Rated V_R, square wave, 20kHz T_C = 135° C	
I_{FSM}	Non Repetitive Peak Surge Current	1060	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
		150		Surge applied at rated load conditions halfwave, single phase, 60Hz	
E_{AS}	Non-Repetitive Avalanche Energy	8	mJ	T_J = 25 °C, I_{AS} = 2 Amps, L = 4 mH	
I_{AR}	Repetitive Avalanche Current	2	A	Current decaying linearly to zero in 1 µsec Frequency limited by T_J max. V_A = 1.5 x V_R typical	

Electrical Specifications

	Parameters	Values	Units	Conditions	
V_{FM}	Max. Forward Voltage Drop (1)	0.84	V	@ 20A	T_J = 25 °C
		0.57	V	@ 10A	T_J = 125 °C
		0.72	V	@ 20A	
I_{RM}	Max. Instantaneus Reverse Current (1)	0.1	mA	T_J = 25 °C	Rated DC voltage
		15	mA	T_J = 125 °C	
$V_{F(TO)}$	Threshold Voltage	0.354	V	T_J = T_J max.	
r_t	Forward Slope Resistance	17.6	mΩ		
C_T	Max. Junction Capacitance	600	pF	V_R = 5V_{DC} (test signal range 100Khz to 1Mhz) 25°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/ µs	(Rated V_R)	

(1) Pulse Width < 300µs, Duty Cycle <2%

Thermal-Mechanical Specifications

	Parameters		Values	Units	Conditions
T_J	Max. Junction Temperature Range		-65 to 150	°C	
T_{stg}	Max. Storage Temperature Range		-65 to 175	°C	
R_{thJC}	Max. Thermal Resistance Junction to Case		2.0	°C/W	DC operation
R_{thCS}	Typical Thermal Resistance Case to Heatsink		0.50	°C/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		MBR1045		Case Style TO-220
			MBRB1045		Case Style D^2Pak

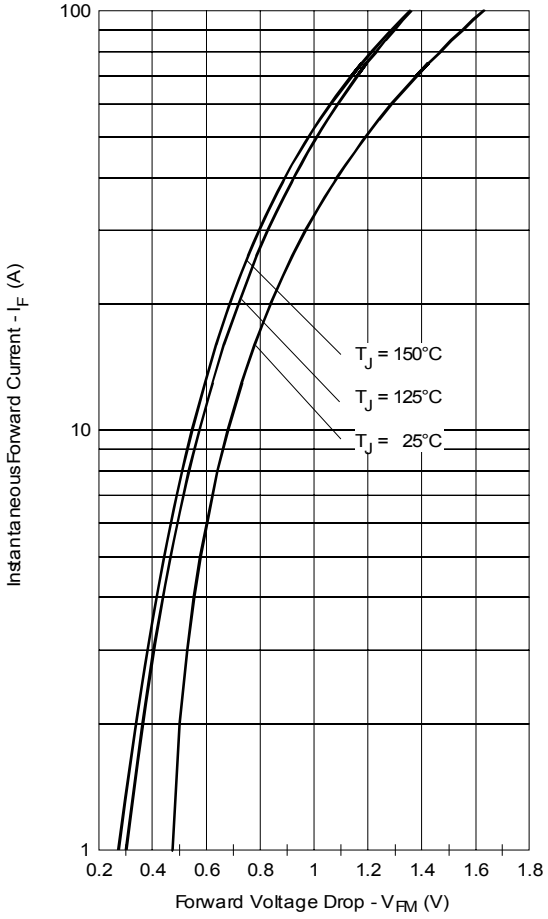


Fig. 1 - Max. Forward Voltage Drop Characteristics

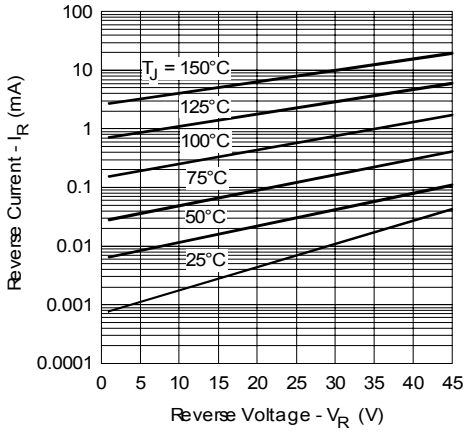


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

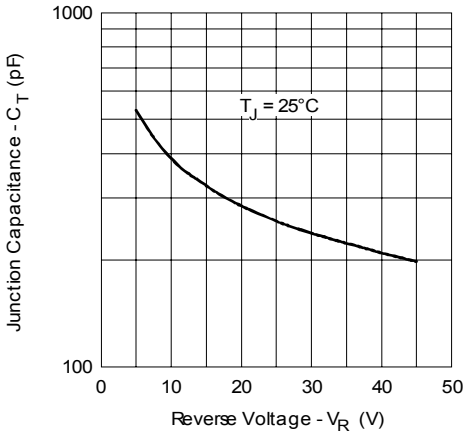


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

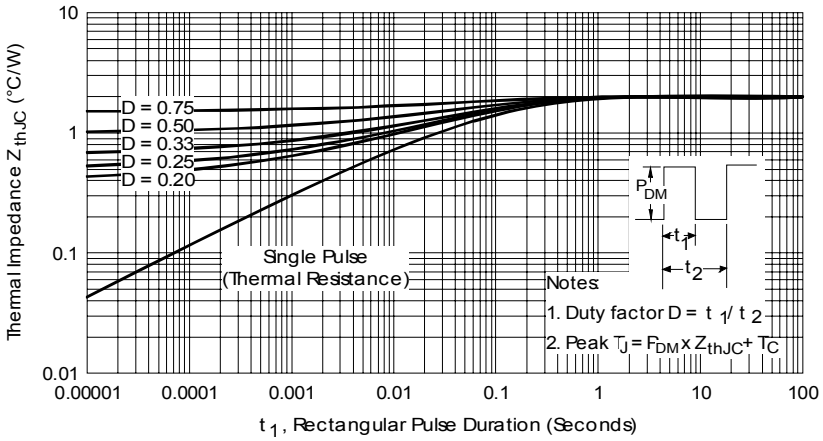


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

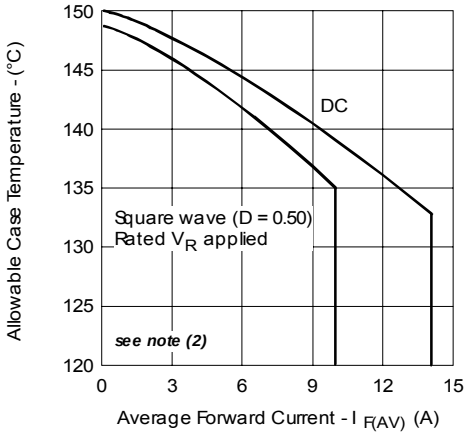


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

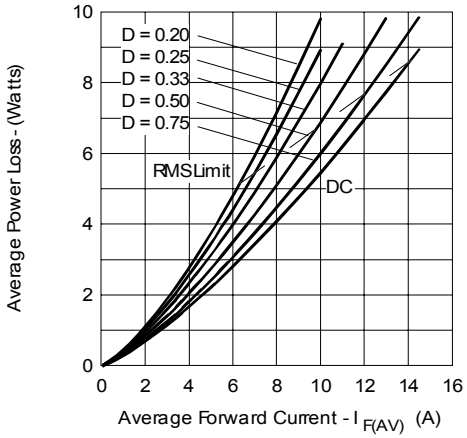


Fig. 6 - Forward Power Loss Characteristics

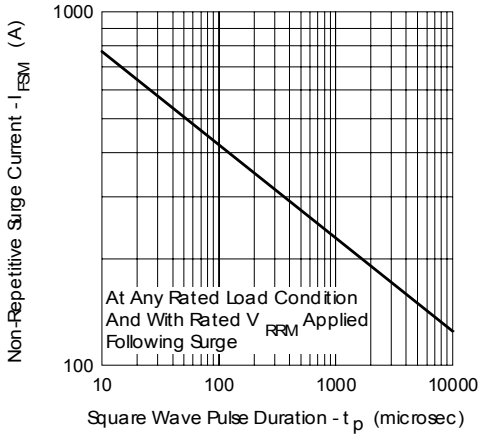
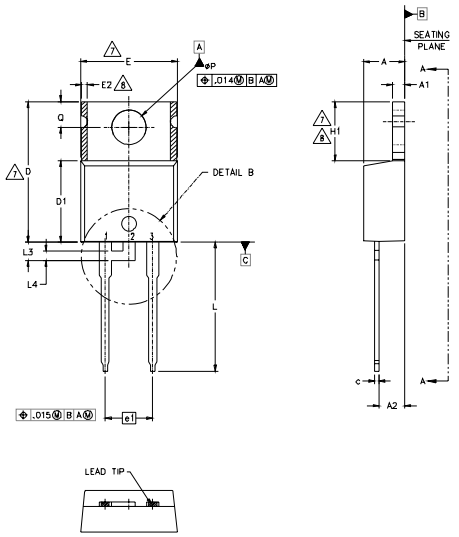


Fig. 7 - Max. Non-Repetitive Surge Current

(2) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$ (see Fig. 6);
Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1}$ = rated V_R

Outline Table

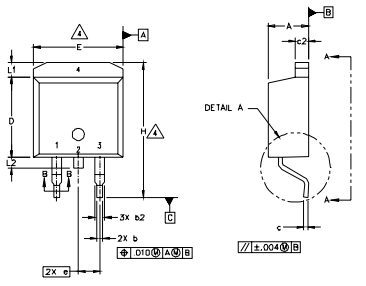


NOTES:
1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
4.- DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5.- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
6.- CONTROLLING DIMENSION : INCHES.
7.- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
8.- DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
9.- OUTLINE CONFORMS TO JEDEC TO-220, D2 (min) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	–	0.76	–	.030	8
e	2.54 BSC		.100 BSC		
e1	5.08 BSC		.200 BSC		
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	–	6.35	–	.250	3
L3	1.78	2.13	.070	.084	
L4	0.76	1.27	.030	.050	3
øP	3.53	3.73	.139	.147	
Q	2.54	3.05	.100	.120	

LEAD ASSIGNMENTS
DIODES
1+2.- CATHODE
3.- ANODE

Conform to JEDEC outline TO-220AC
Dimensions in millimeters and (inches)



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 [.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

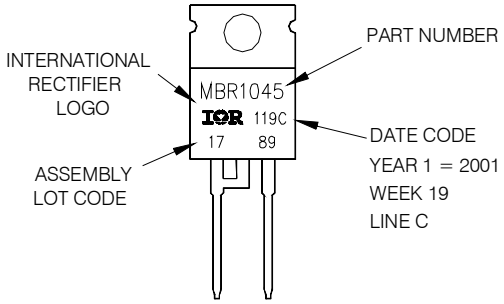
* PART DEPENDENT.

Conform to JEDEC outline D^2Pak (SMD-220)
Dimensions in millimeters and (inches)

Part Marking Information

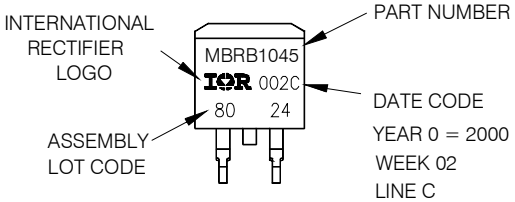
TO-220AC

EXAMPLE: THIS IS A MBR1045
LOT CODE 1789
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "C"

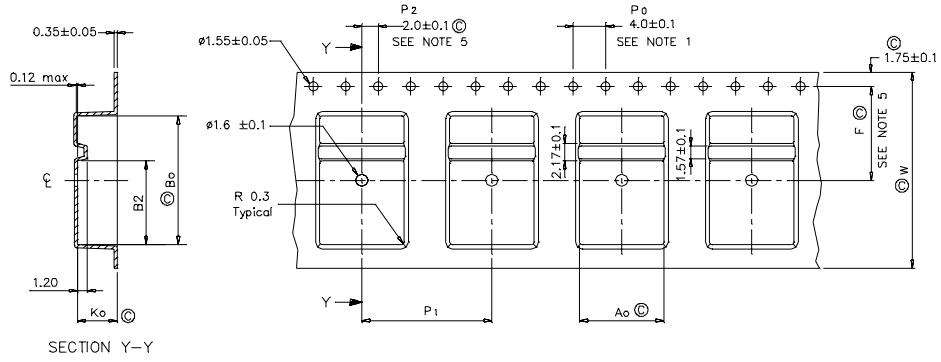


D^2Pak

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



Tape & Reel Information



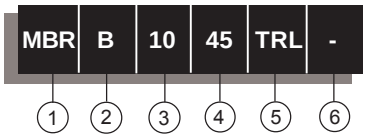
Ao	10.50 +/– 0.1
Bo	15.80 +/– 0.1
B2	10.25 +/– 0.1
Ko	4.90 +/– 0.1
F	11.50 +/– 0.1
P1	16.00 +/– 0.1
W	24.00 +/– 0.3

NOTES:
1.0 10 SPROCKET HOLE PITH CUMULATIVE TOLERANCE ±.02
2.0 CAMBER NOT TO EXCEED 1mm in 100mm
3.0 MATERIAL: CONDUCTIVE BLACK STYRENIC ALLOY
4.0 Ko MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
5.0 MEASURED FROM CENTRELINE OF SPROCKET HOLE TO CENTRELINE OF POCKET
6.0 VENDOR: (OPTIONAL)
7.0 MUST ALSO MEET REQUIREMENTS OF EIA STANDAR #EIA–481A TAPING OF SURFACE MOUNT COMPONENTS FOR AUTOMATIC PLACEMENT
8.0 SURFACE RESISTIVITY OF MOLDED MATL MUST MEASURE LESS OR EQUAL TO 10^6 OHMS PER SQUARE, MEASURED IN ACCORDANCE TO PROCEDURE GIVEN IN ASTM D–257 & ASTM D–991
9.0 TOTAL LENGTH PER REEL MUST BE 45 METERS
10.0 © CRITICAL

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code



1 - Schottky MBR Series

2 - Package Style:
- none = TO-220
- B = D^2PAk

3 - Current Rating (10 = 10A)

4 - Voltage Ratings

35	= 35V
45	= 45V

5 -
- none = Tube
- TRR = Tape & Reel (Right Oriented)
- TRL = Tape & Reel (Left Oriented)

6 -
- none = Standard Production
- PbF = Lead-Free

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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 paralled 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

RTHERM1         5       4       5.79E-01
RTHERM2         4       3       7.72E-01
RTHERM1         3       2       4.45E-01
RTHERM1         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.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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