Bulletin PD-2.325 rev. F 06/06

International
IOR Rectifier

MBR7.. Series
MBRB7.. Series

SCHOTTKY RECTIFIER 7.5 Amp

$I_{F(AV)}$ = 7.5Amp
V_R = 35 - 45V

Major Ratings and Characteristics

Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform	7.5	A
V_{RRM}	range	35 - 45	V
I_{FSM}	@ tp = 5 µs sine	690	A
V_F	@ 16 Apk, T_J = 125°C	0.57	V
T_J	range	- 65 to 150	°C

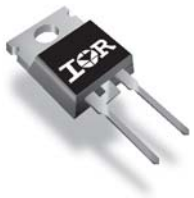
Description/ Features

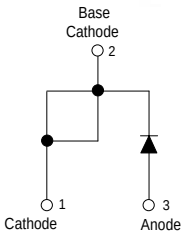
The MBR7.. Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150° C T_J operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

Case Styles

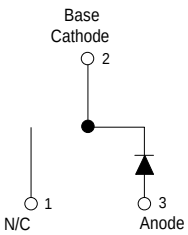
MBR7..





TO-220AC

MBRB7..



D²PAK

Voltage Ratings

Parameters		MBR.735	MBR.745
V_R	Max. DC Reverse Voltage (V)	35	45
V_{RWM}	Max. Working Peak Reverse Voltage (V)		

Absolute Maximum Ratings

Parameters		MBR..	Units	Conditions	
$I_{F(AV)}$	Max. Average Forward Current	7.5	A	@ T_C = 131 °C (Rated V_R)	
I_{FSM}	Non-Repetitive Peak Surge Current	690	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
		150		Surge applied at rated load condition halfwave single phase 60Hz	
E_{AS}	Non-Repetitive Avalanche Energy	7	mJ	T_J = 25 °C, I_{AS} = 2 Amps, L = 3.5 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		MBR..	Units	Conditions	
V_{FM}	Max. Forward Voltage Drop (1)	0.84	V	@ 15A	T_J = 25 °C
		0.57	V	@ 7.5A	T_J = 125 °C
		0.72	V	@ 15A	
I_{RM}	Max. Instantaneus Reverse Current	0.1	mA	T_J = 25 °C	Rated DC voltage
	(1)	15	mA	T_J = 125 °C	
C_T	Max. Junction Capacitance	400	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 (Rated V_R)	1000	V/ µs		

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

Thermal-Mechanical Specifications

Parameters			MBR..	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		3.0	°C/W	DC operation
R_{thCS}	Typical Thermal Resistance, Case to Heatsink		0.50	°C/W	Mounting surface, smooth and greased
wt	Approximate Weight		2 (0.07)	g (oz.)	
T	Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)	
		Max.	12 (10		
	Marking Device		MBR745		Case Style TO-220
			MBRB745		Case Style D^2Pak

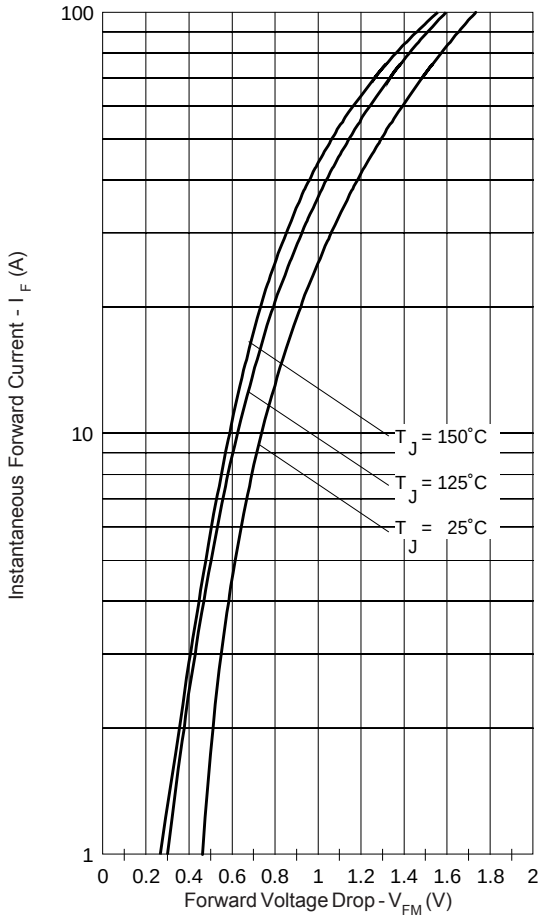


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

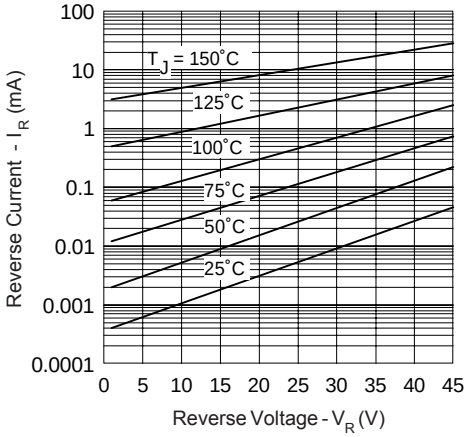


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

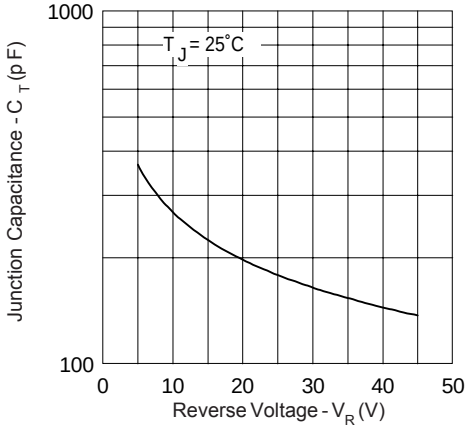


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

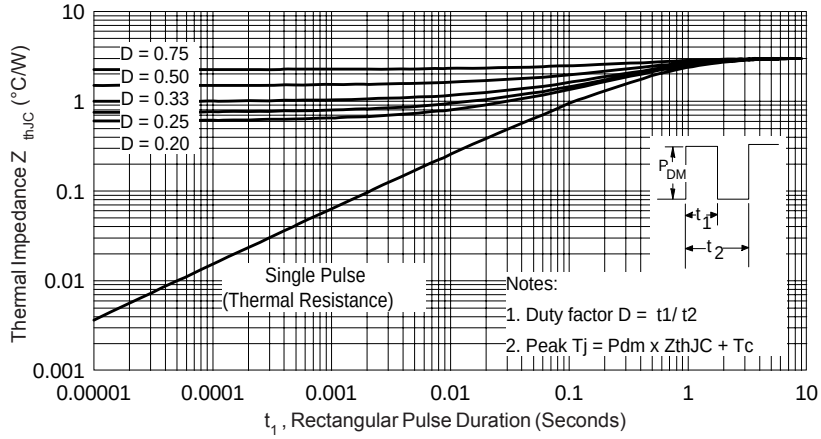


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

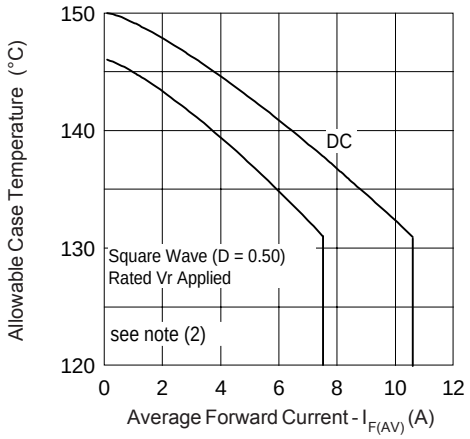


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

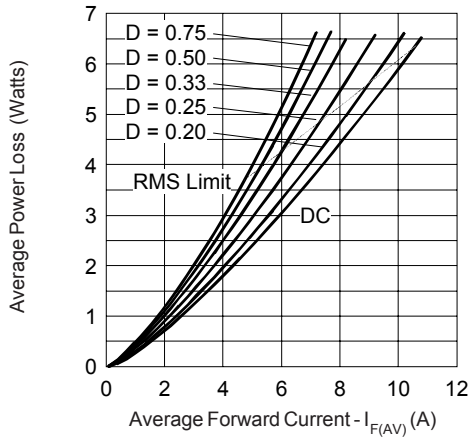


Fig. 6 - Forward Power Loss Characteristics

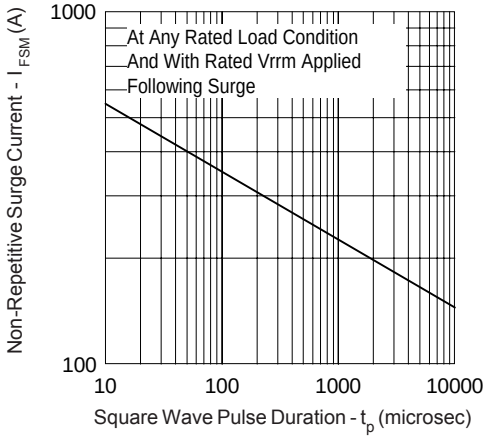
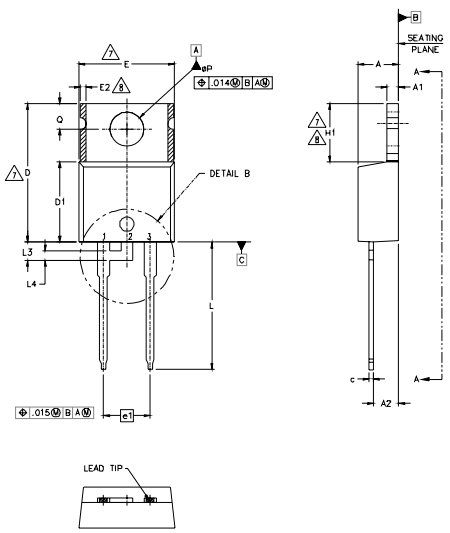


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

(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.

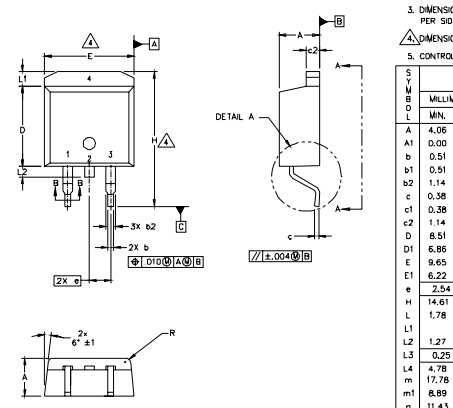
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.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

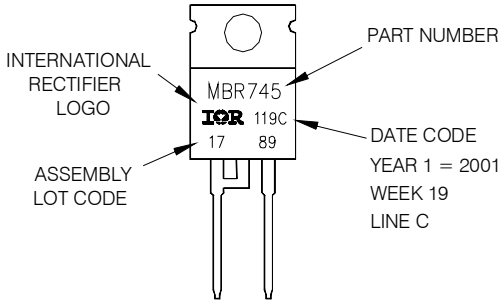
* PART DEPENDENT.

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

Part Marking Information

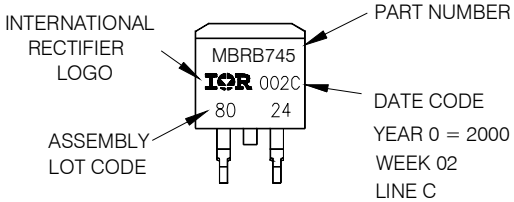
TO-220AC

EXAMPLE: THIS IS A MBR745
LOT CODE 1789
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "C"

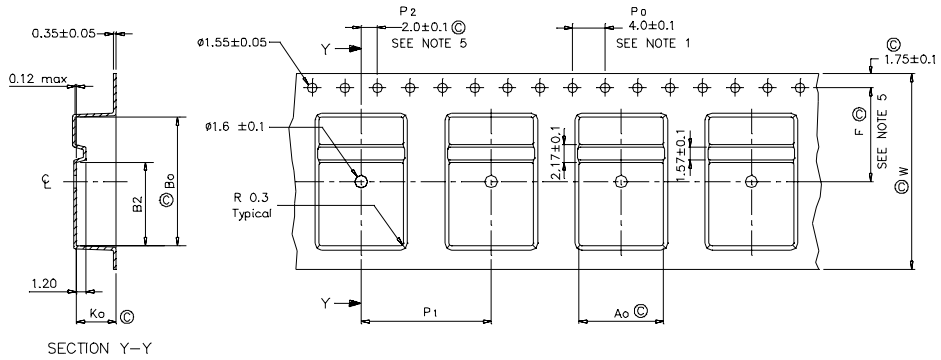


D²Pak

EXAMPLE: THIS IS A MBRB745
LOT CODE 8024
ASSEMBLED ON WW 02, 2000



Tape & Reel Information



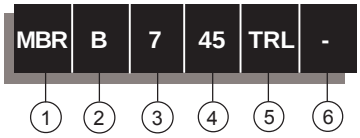
Ao	10.50 +/- 0.1
Bo	15.80 +/- 0.1
B2	10.25 +/- 0.1
Ko	4.90 +/- 0.1
F	11.50 +/- 0.1
P1	16.00 +/- 0.1
W	24.00 +/- 0.3

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 (7.5A)

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

```
MBR745
**********************************************
*      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 MBR745 ANO CAT
D1 ANO 1 DMOD (0.03191)
*Define diode model
.MODEL  DMOD  D(IS=9.72464638473799E-05A,N=1.30648926537753,BV=52V,
+  IBV=0.195508065728349A,RS=  0.000727548,CJO=1.94829876431799E-08,
+  VJ=2.27282978121533,XTI=2,  EG=0.854458710837653)
**********************************************
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL  TRES RES(R=1,TC1=27.6281424524011)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP((((-5.219758E-03/27.62814)*((V(2,CAT)*1E6)/(I(VX)+1E-6)-
1))+1)*7.000165E-02*ABS(V(ANO,CAT)))-1)}
**********************************************
.ENDS MBR745



Thermal Model Subcircuit
.SUBCKT MBR745  5 1

CTHERM1     5     4     1.05E+00
CTHERM2     4     3     4.44E+00
CTHERM3     3     2     1.16E+01
CTHERM4     2     1     6.12E+01

RTHERM1     5     4     1.33E+00
RTHERM2     4     3     1.19E+00
RTHERM1     3     2     3.81E-01
RTHERM1     2     1     9.54E-02


.ENDS MBR745
```

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

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
Visit us at www.irf.com for sales contact information. 06/06