

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

Major Ratings and Characteristics

| Characteristics                      | Values      | Units      |
|--------------------------------------|-------------|------------|
| $I_{F(AV)}$ Rectangular waveform     | 7.5         | A          |
| $V_{RRM}$                            | 35-45       | V          |
| $I_{FSM}$ @ $t_p = 5 \mu s$ sine     | 690         | A          |
| $V_F$ @ 7.5 Apk, $T_J = 125^\circ C$ | 0.57        | V          |
| $T_J$ range                          | - 65 to 150 | $^\circ C$ |

Description/ Features

The MBR7..PbF 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.

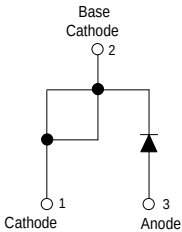
- 150° C  $T_J$  operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

Case Styles

MBR7..PbF



TO-220AC



## Voltage Ratings

| Parameters                                      | MBR735PbF | MBR745PbF |
|-------------------------------------------------|-----------|-----------|
| $V_R$ 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     | @ $T_C = 131^\circ\text{C}$ (Rated $V_R$ )                                                                               |
| $I_{FSM}$ Non-Repetitive Peak Surge Current | 690   | A     | 5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ 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    | $T_J = 25^\circ\text{C}$ , $I_{AS} = 2$ Amps, $L = 3.5$ mH                                                               |
| $I_{AR}$ Repetitive Avalanche Current       | 2     | A     | Current decaying linearly to zero in 1 $\mu\text{sec}$<br>Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical |

## Electrical Specifications

| Parameters                                         | MBR.. | Units            | Conditions                                                            |
|----------------------------------------------------|-------|------------------|-----------------------------------------------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop (1)             | 0.84  | V                | @ 15A $T_J = 25^\circ\text{C}$                                        |
|                                                    | 0.57  | V                | @ 7.5A $T_J = 125^\circ\text{C}$                                      |
|                                                    | 0.72  | V                | @ 15A                                                                 |
| $I_{RM}$ Max. Instantaneous Reverse Current (1)    | 0.1   | mA               | $T_J = 25^\circ\text{C}$ Rated DC voltage                             |
|                                                    | 15    | mA               | $T_J = 125^\circ\text{C}$                                             |
| $C_T$ Max. Junction Capacitance                    | 400   | 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 (Rated $V_R$ ) | 1000  | V/ $\mu\text{s}$ |                                                                       |

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

## Thermal-Mechanical Specifications

| Parameters        |                                              | MBR..        | Units          | Conditions                           |
|-------------------|----------------------------------------------|--------------|----------------|--------------------------------------|
| T <sub>J</sub>    | Max. Junction Temperature Range              | - 65 to 150  | °C             |                                      |
| T <sub>stg</sub>  | Max. Storage Temperature Range               | - 65 to 175  | °C             |                                      |
| R <sub>thJC</sub> | Max. Thermal Resistance Junction to Case     | 3.0          | °C/W           | DC operation                         |
| R <sub>thCS</sub> | 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       |                |                                      |

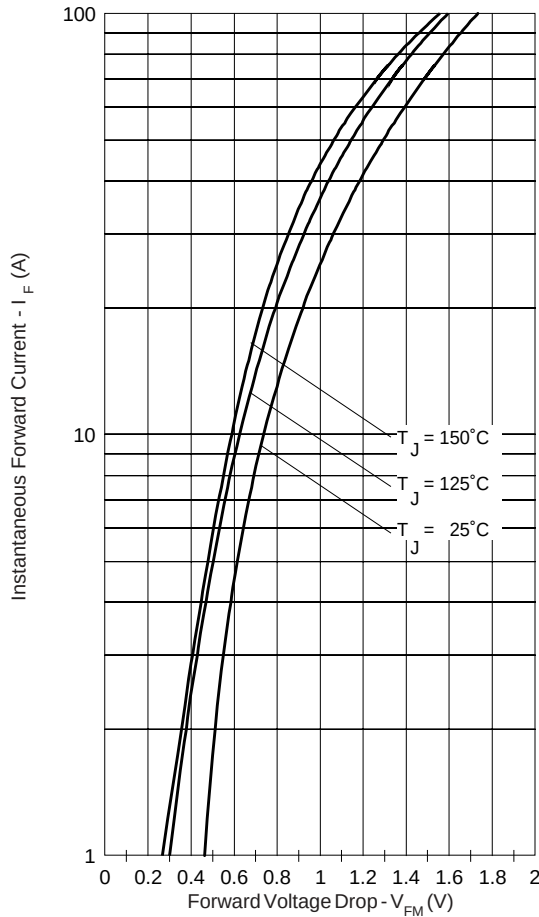


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

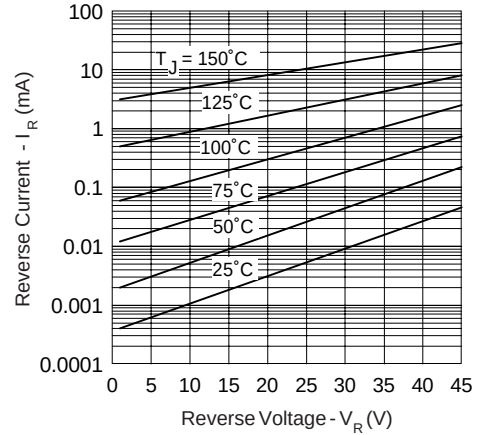


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

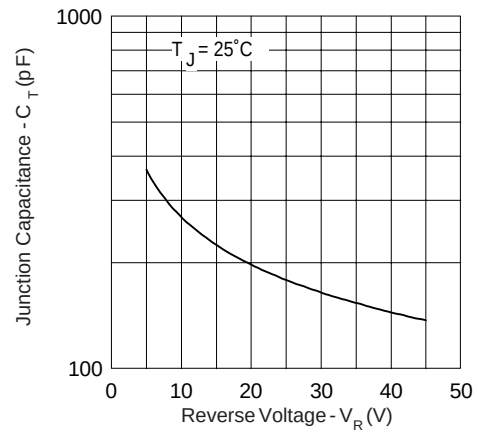


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

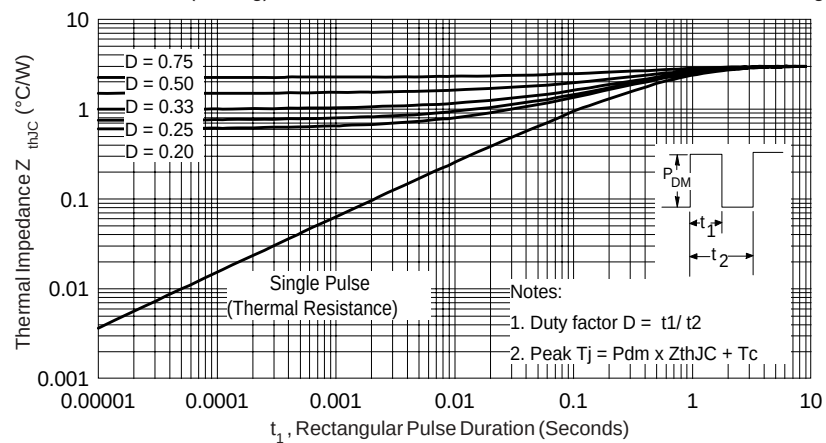


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

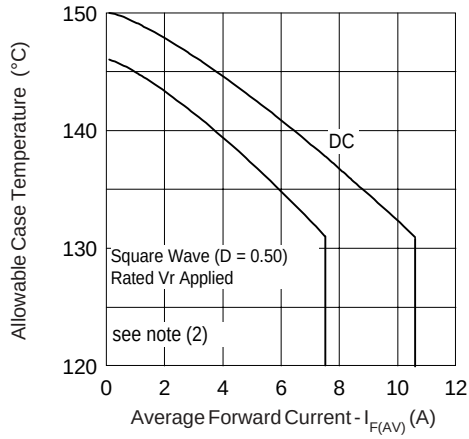


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

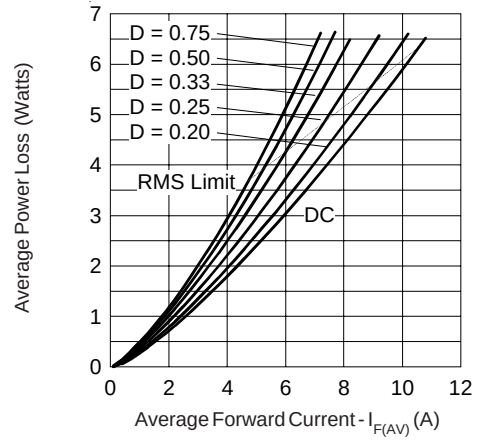


Fig. 6 - Forward Power Loss Characteristics

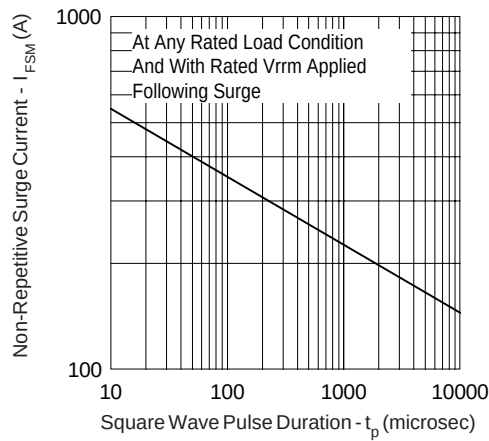


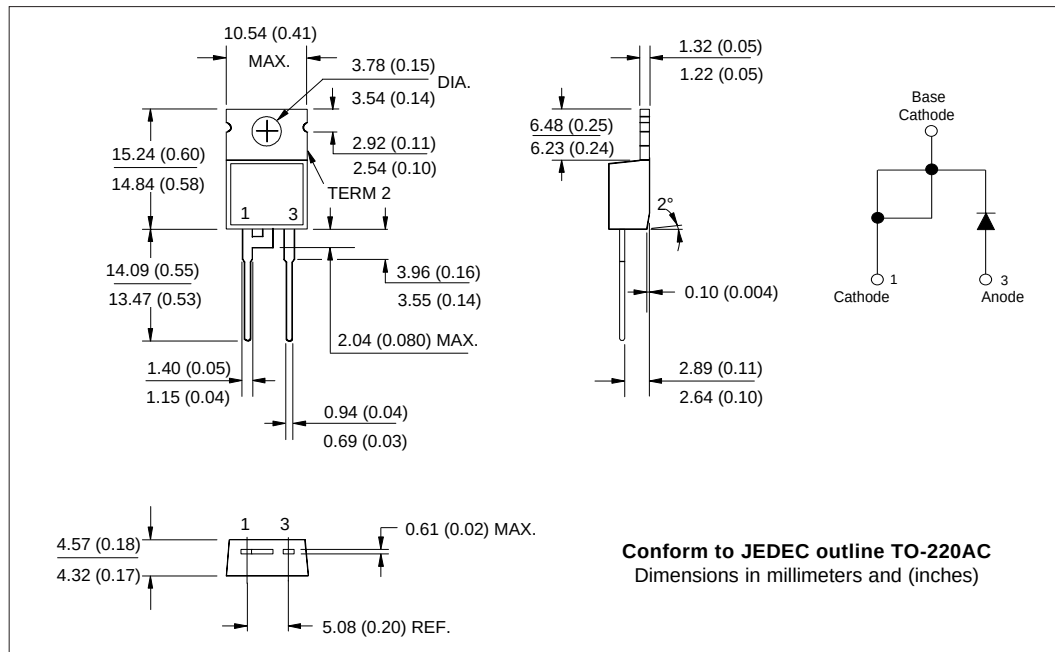
Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

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

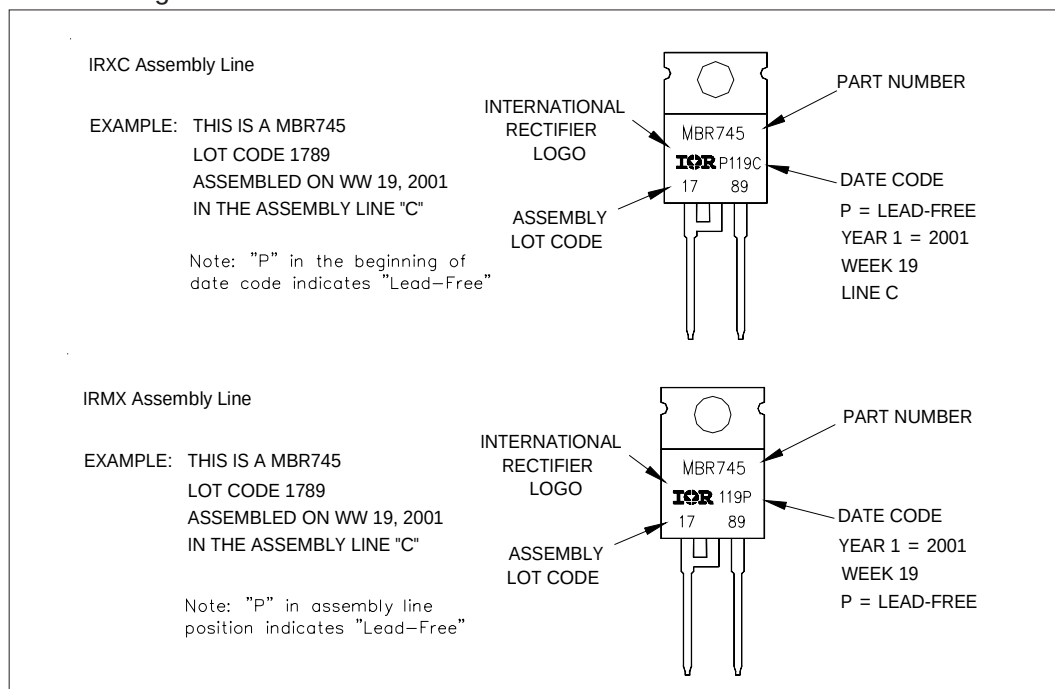
$Pd$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

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

## Outline Table



## Part Marking Information



```

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 paralalled 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

```

## Ordering Information Table

| Device Code |   |                                                                                                           |     |
|-------------|---|-----------------------------------------------------------------------------------------------------------|-----|
| MBR         | 7 | 45                                                                                                        | PbF |
| ①           | ② | ③                                                                                                         | ④   |
| <b>1</b>    | - | Schottky MBR Series                                                                                       |     |
| <b>2</b>    | - | Current Rating (7.5A)                                                                                     |     |
| <b>3</b>    | - | Voltage Ratings                                                                                           |     |
| <b>4</b>    | - | <ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul> |     |

35 = 35V  
45 = 45V

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.