

International  
**IOR** Rectifier

**MBR2045CT**  
**MBRB2045CT**  
**MBR2045CT-1**

**SCHOTTKY RECTIFIER**

**20 Amp**

$$I_{F(AV)} = 20\text{Amp}$$

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

#### Major Ratings and Characteristics

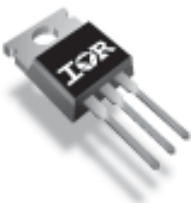
| Characteristics                                 | Values     | Units            |
|-------------------------------------------------|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform (Per Device)   | 20         | A                |
| $I_{FRM}$ @ $T_C = 135^\circ\text{C}$ (Per Leg) | 20         | A                |
| $V_{RRM}$                                       | 35-45      | V                |
| $I_{FSM}$ @ $t_p = 5\text{ }\mu\text{s}$ 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 center tap 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
- Center tap 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

#### Case Styles

| MBR20..CT                                                                                                                                                                                 | MBRB20..CT                                                                                                                                                                                          | MBR20..CT-1                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Base<br/>Common<br/>Cathode</p> <p>2</p> <p>1 2 3<br/>Anode Common Cathode Anode</p> <p>TO-220</p> |  <p>Base<br/>Common<br/>Cathode</p> <p>2</p> <p>1 2 3<br/>Anode Common Cathode Anode</p> <p>D<sup>2</sup>PAK</p> |  <p>Base<br/>Common<br/>Cathode</p> <p>2</p> <p>1 2 3<br/>Anode Common Cathode Anode</p> <p>TO-262</p> |

## Voltage Ratings

| Parameters                                      | MBR2035CT<br>MBRB2035CT<br>MBR2035CT-1 | MBR2045CT<br>MBRB2045CT<br>MBR2045CT-1 |
|-------------------------------------------------|----------------------------------------|----------------------------------------|
| $V_R$ 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 (Per Leg)<br>Current (Per Device) | 10<br>20    | A     | @ $T_C = 135^\circ\text{C}$ , (Rated $V_R$ )                                                                                                                                                            |
| $I_{FRM}$ Peak Repetitive Forward<br>Current (Per Leg)             | 20          | A     | Rated $V_R$ , square wave, 20kHz<br>$T_C = 135^\circ\text{C}$                                                                                                                                           |
| $I_{FSM}$ Non Repetitive Peak<br>Surge Current                     | 1060<br>150 | A     | 5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse<br>Following any rated load condition<br>and with rated $V_{RWM}$ applied<br>Surge applied at rated load conditions halfwave,<br>single phase, 60Hz |
| $E_{AS}$ Non-Repetitive Avalanche Energy                           | 8           | mJ    | (Per Leg) $T_J = 25^\circ\text{C}$ , $I_{AS} = 2\text{Amps}$ , $L = 4\text{mH}$                                                                                                                         |
| $I_{AR}$ Repetitive Avalanche Current<br>(Per Leg)                 | 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                                            | Values               | Units            | Conditions                                                                       |
|-------------------------------------------------------|----------------------|------------------|----------------------------------------------------------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop<br>(1)             | 0.84<br>0.57<br>0.72 | V                | @ 20A<br>@ 10A<br>@ 20A<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ |
| $I_{RM}$ Max. Instantaneous Reverse Current<br>(1)    | 0.1<br>15            | mA               | $T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$<br>Rated DC voltage        |
| $V_{F(TO)}$ 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<br>(Rated $V_R$ ) | 10000                | V/ $\mu\text{s}$ |                                                                                  |

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

## Thermal-Mechanical Specifications

| 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<br>Junction to Case (Per Leg) | 2.0                        | $^\circ\text{C/W}$ | DC operation                                            |
| $R_{thCS}$ Typical Thermal Resistance<br>Case to Heatsink        | 0.50                       | $^\circ\text{C/W}$ | Mounting surface, smooth and greased<br>Only for TO-220 |
| wt Approximate Weight                                            | 2 (0.07)                   | g (oz.)            |                                                         |
| T Mounting Torque                                                | Min. 6 (5)<br>Max. 12 (10) | Kg-cm<br>(lbf-in)  | Non-lubricated threads                                  |

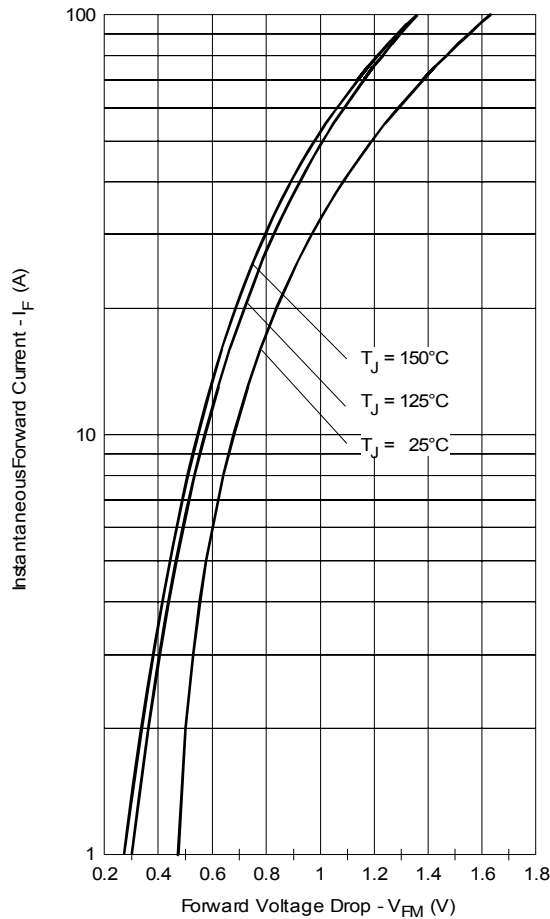


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

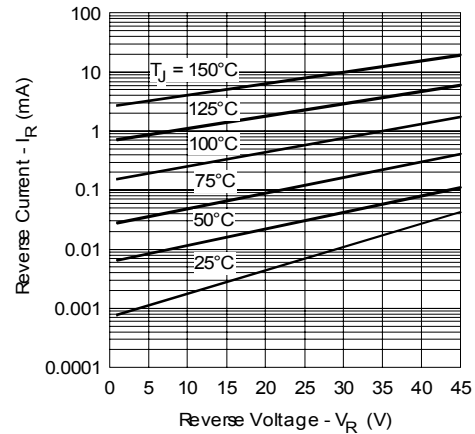


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

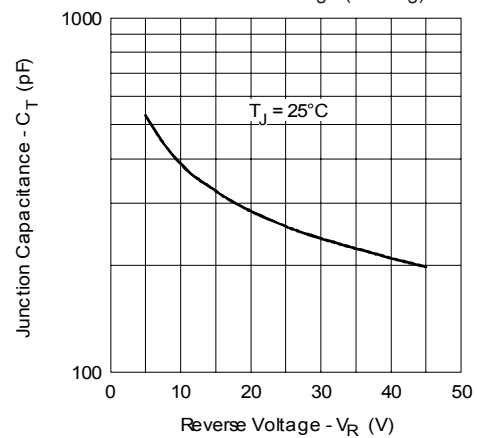


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

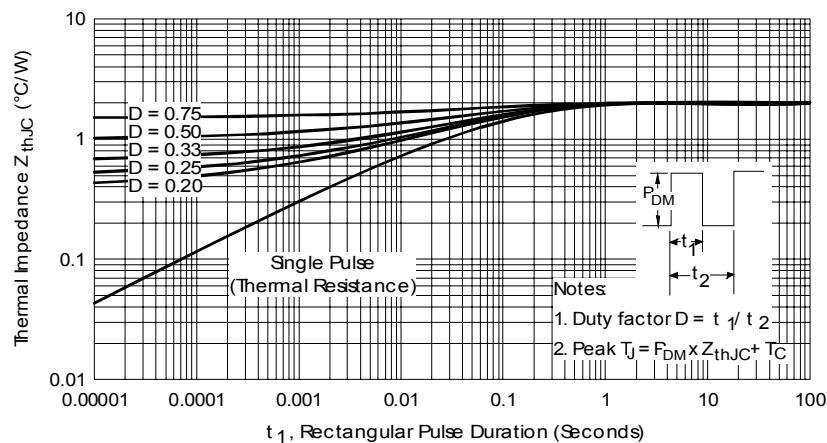


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

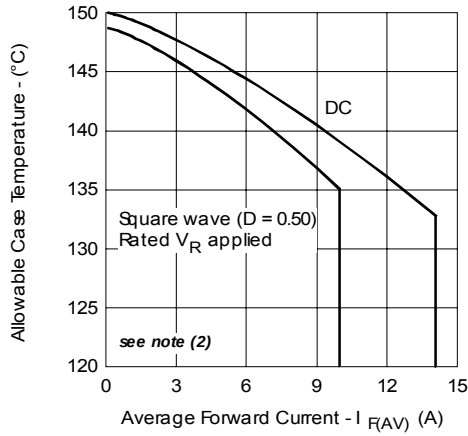


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

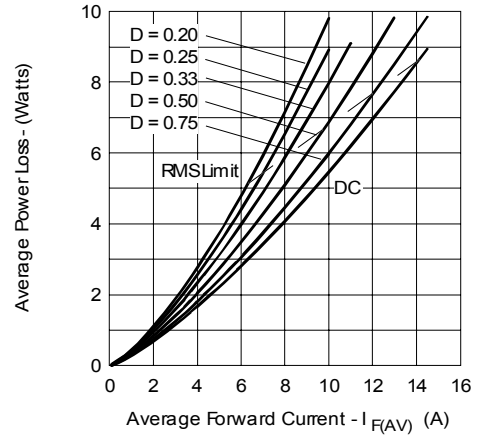


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

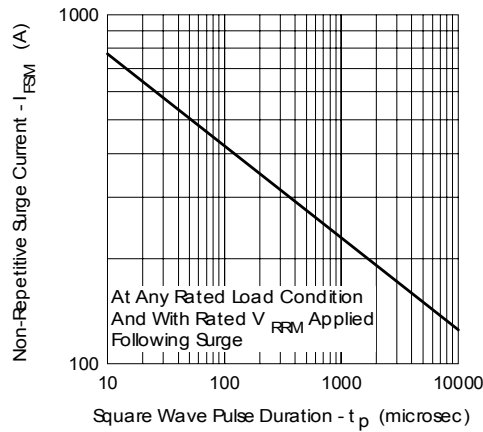


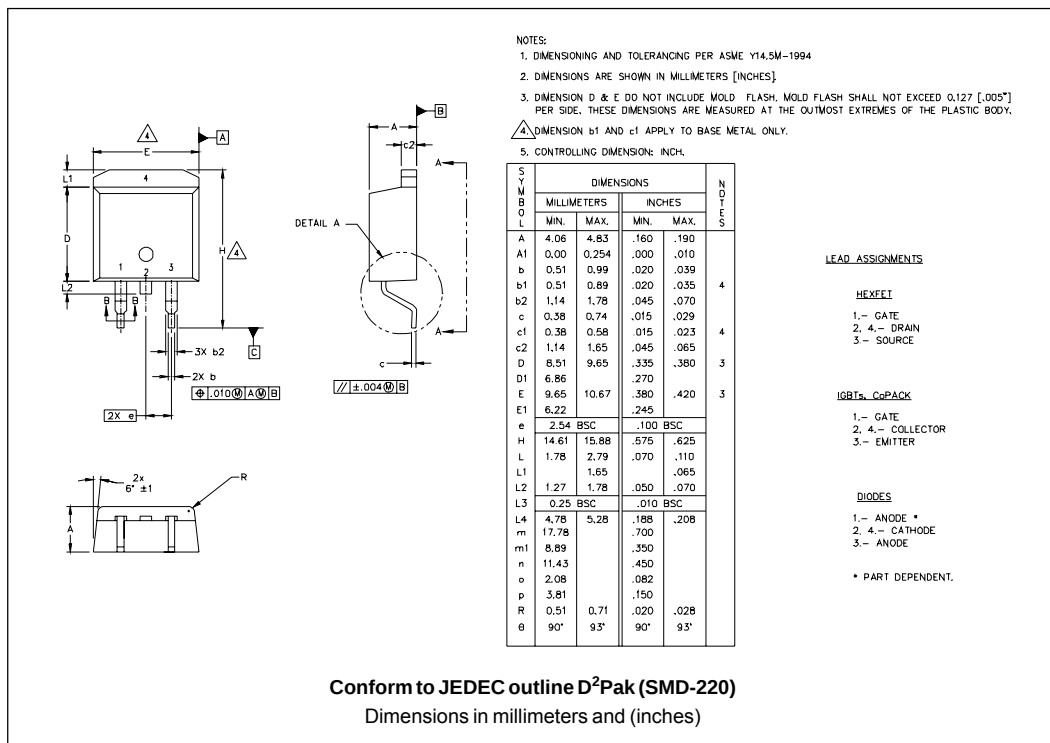
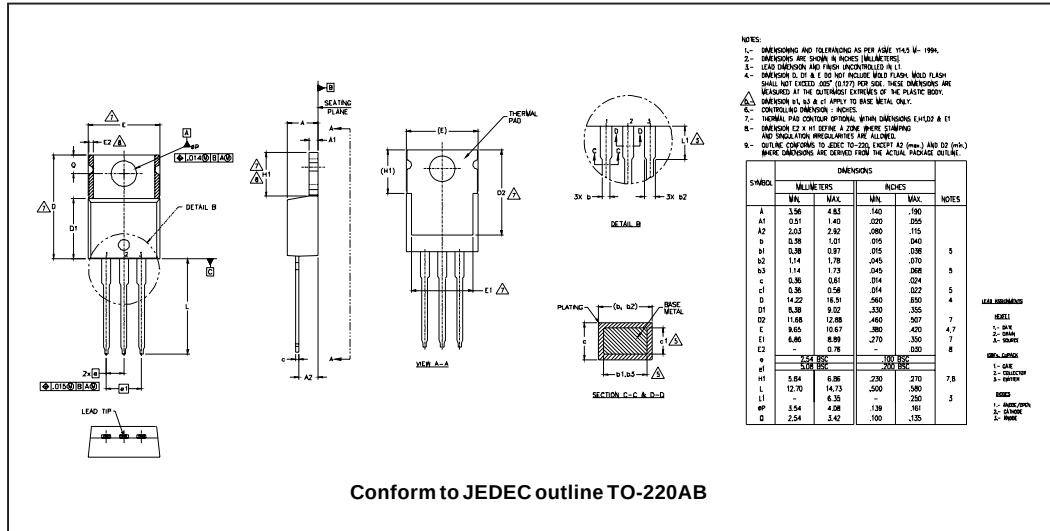
Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

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

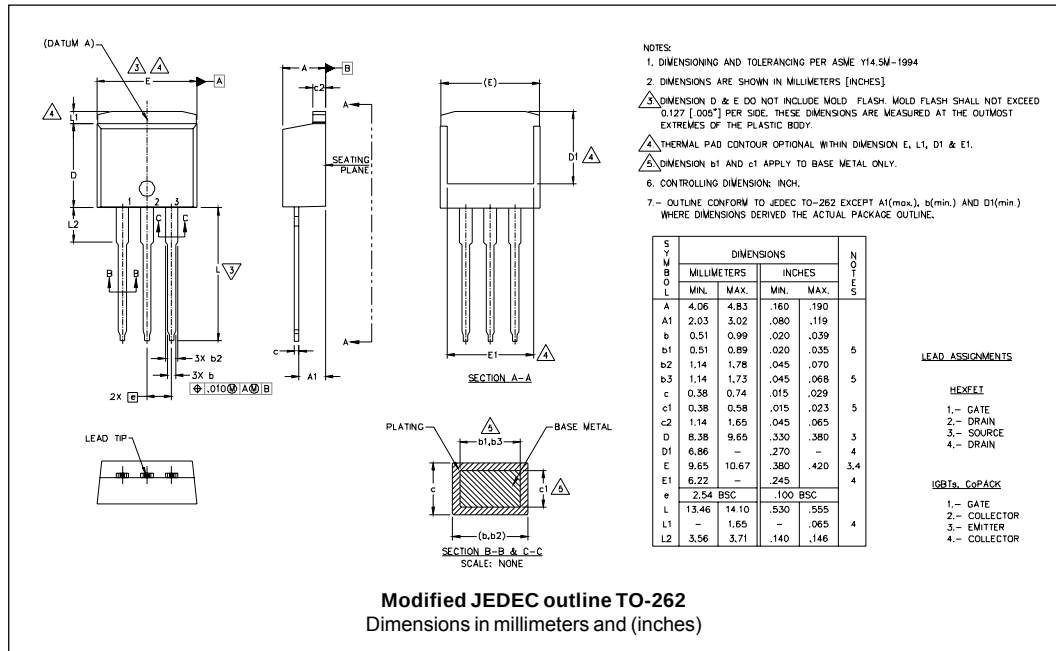
$P_d$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

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

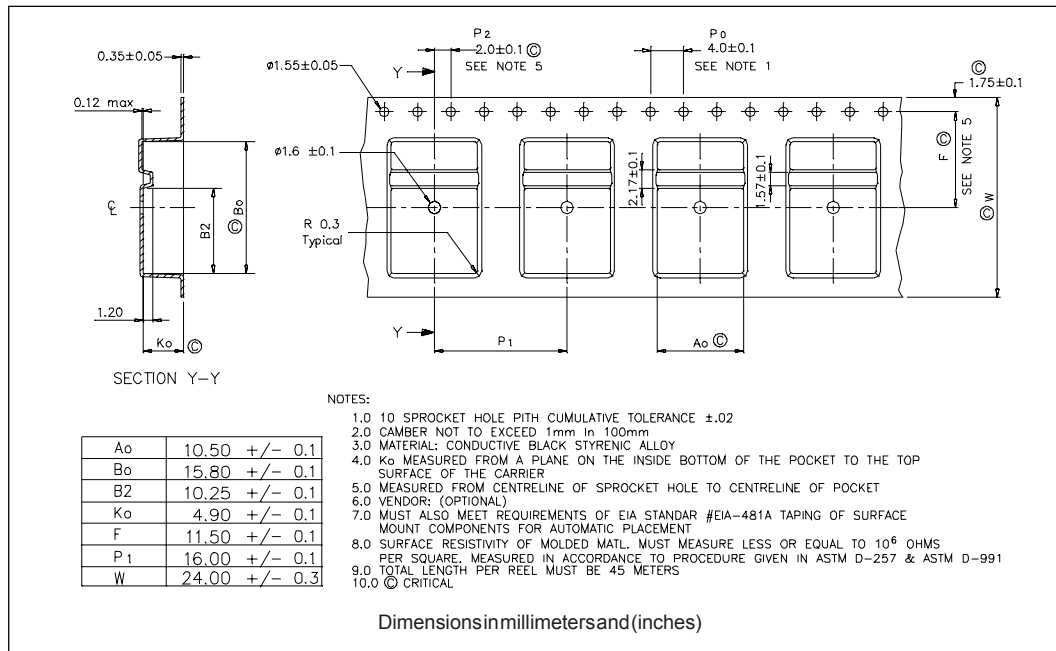
## Outline Table



## Outline Table



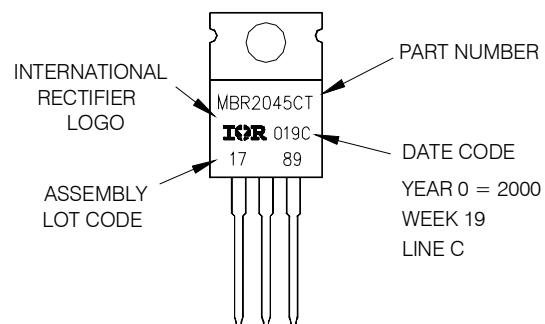
## Tape & Reel Information



## Part Marking Information

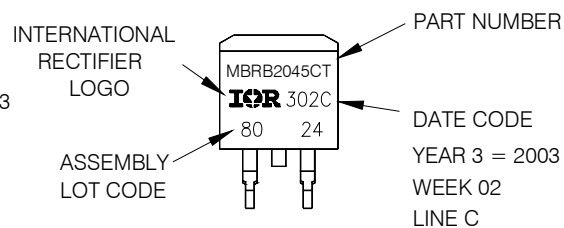
### TO-220

EXAMPLE: THIS IS A MBR2045CT  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2000  
IN THE ASSEMBLY LINE "C"



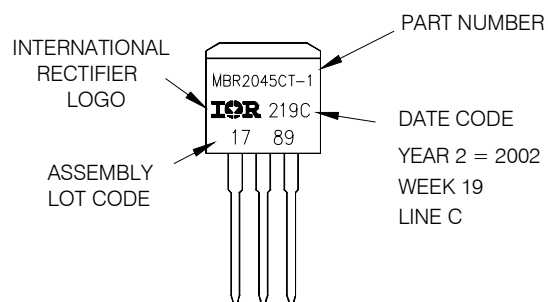
### D<sup>2</sup>PAK

EXAMPLE: THIS IS A MBRB2045CT  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2003  
IN ASSEMBLY LINE "C"



### TO-262

EXAMPLE: THIS IS A MBR2045CT-1  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2002  
IN ASSEMBLY LINE "C"



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MBR2045CT
*****
*   This model has been developed by           *
*   Wizard SPICE MODEL GENERATOR (1999)      *
*   (International Rectifier Corporation)      *
*   Contain Proprietary Information           *
*****
*   SPICE Model Diode is composed by a        *
*   simple diode plus paralalled VCG2T       *
*****
.SUBCKT MBR2045CT ANOCAT
D1 ANO1 DMOD(0.03215)
*Define diode model
.MODEL DMODD(IS=3.22473520069593E-04A,N=1.51153417806053,BV=52V,
+IBV=-0.64831328218128A,RS=0.00042438,CJO=2.77992867902976E-08,
+VJ=2.31227489200041,XTI=2,EG=0.682207095559952)
*****
*Implementation of VCG2T
VX12 DC 0V
R12 CAT TRES 1E-6
.MODEL TRESRES(R=1,TC1=-29.9397914371146)
GP1 ANOCAT VALUE={-ABS(I(VX))*(EXP((((1.396526E-04/-29.93979)*(V(2,CAT)*1E6)/(I(VX)+1E-6)-
1))+1)*4.399843E-02*ABS(V(ANO,CAT)))-1)}
*****
.ENDS MBR2045CT

Thermal Model Subcircuit
.SUBCKT MBR2045CT 5 1

CTHERM1      5      4      1.43E+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 MBR2045CT

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## Ordering Information Table

## Device Code

|     |   |    |    |    |    |     |   |
|-----|---|----|----|----|----|-----|---|
| MBR | B | 20 | 45 | CT | -1 | TRL | - |
| ①   | ② | ③  | ④  | ⑤  | ⑥  | ⑦   | ⑧ |

|                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>1</div> <div>2</div> <div>3</div> <div>4</div> <div>5</div> <div>6</div> <div>7</div> <div>8</div> | <ul style="list-style-type: none"> <li>- Essential Part Number</li> <li>-                             <ul style="list-style-type: none"> <li>• B = D<sup>2</sup>Pak</li> <li>• none = TO-220</li> </ul> </li> <li>- Current Rating (20A)</li> <li>- Voltage Ratings                             <div style="display: inline-block; vertical-align: middle; border: 1px solid black; padding: 5px; margin-left: 10px;">                                 35 = 35V<br/>45 = 45V                             </div> </li> <li>- CT = Essential Part Number</li> <li>- -1 = TO-262</li> <li>-                             <ul style="list-style-type: none"> <li>• none = Tube (50 pieces)</li> <li>• TRL = Tape &amp; Reel (Left Oriented - for D<sup>2</sup>Pak only)</li> <li>• TRR = Tape &amp; Reel (Right Oriented - for D<sup>2</sup>Pak only)</li> </ul> </li> <li>-                             <ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul> </li> </ul> |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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  
**IR** Rectifier

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Visit us at [www.irf.com](http://www.irf.com) for sales contact information. 07/06