



# MBRB15..CTPbF MBR15..CT-1PbF

SCHOTTKY RECTIFIER

15 Amp

$I_{F(AV)} = 15\text{Amp}$   
 $V_R = 35/45\text{V}$

### Major Ratings and Characteristics


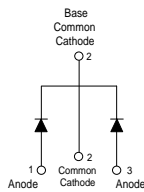

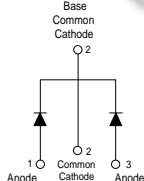
Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	15	A
$V_{RRM}$	35/45	V
$I_{FSM}$ @ tp = 5 $\mu$ s sine	690	A
$V_F$ @7.5Apk, $T_J=125^\circ\text{C}$	0.57	V
$T_J$	-65 to 150	$^\circ\text{C}$

### Description/ Features

The MBR15.. 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° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150° C  $T_J$  operation
- Center tap TO-220 package
- 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

<p><b>MBRB15..CTPbF</b></p>  <div style="text-align: center;">  <p><b>D<sup>2</sup>PAK</b></p> </div>	<p><b>MBR15..CT-1PbF</b></p>  <div style="text-align: center;">  <p><b>TO-262</b></p> </div>
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**Voltage Ratings**

Parameters	MBRB1535CT MBR1535CT-1	MBRB1545CT MBR1545CT-1
$V_R$ Max. DC Reverse Voltage (V)	35	45
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)		

**Absolute Maximum Ratings**

Parameters	Value	Units	Conditions
$I_{F(AV)}$ Max. Aver. Forward Current (Per Leg) (Per Device)	7.5 15	A	@ $T_C = 131^\circ\text{C}$ (Rated $V_R$ )
$I_{FSM}$ Max. Peak One Cycle Non Repetitive Surge	690 150	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse Surge applied at rated load condition halfwave single phase 60Hz Following any rated load condition and with rated $V_{RRM}$ applied
$E_{AS}$ Non-Repetitive Avalanche Energy	7	mJ	(Per Leg) $T_J = 25^\circ\text{C}$ , $I_{AS} = 2\text{Amps}$ , $L = 3.5\text{mH}$
$I_{AR}$ Repetitive Avalanche Current (Per Leg)	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	Value	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (1)	0.84 0.57 0.72	V	@ 15A $T_J = 25^\circ\text{C}$ @ 7.5A $T_J = 125^\circ\text{C}$ @ 15A $T_J = 125^\circ\text{C}$
$I_{RM}$ Max. Instantaneous Reverse Current (1)	0.1 15	mA	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ Rated DC voltage
$C_T$ 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 $V_R$ )	10000	V/ $\mu\text{s}$	

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

**Thermal-Mechanical Specifications**

Parameters	Value	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 (Per Leg)	3.0	$^\circ\text{C}/\text{W}$	DC operation
$R_{thCS}$ Typical Thermal Resistance, Case to Heatsink	0.50	$^\circ\text{C}/\text{W}$	Mounting surface, smooth and greased
$R_{thJA}$ Max. Thermal Resistance Junction	60	$^\circ\text{C}/\text{W}$	DC operation
wt Approximate Weight	2 (0.07)	g (oz.)	
T Mounting Torque	Min. 6 (5) Max. 12 (10)	Kg-cm (lbf-in)	
Device Marking	MBRB15..CT MBR15..CT-1		Case style D <sup>2</sup> Pak Case style TO-262

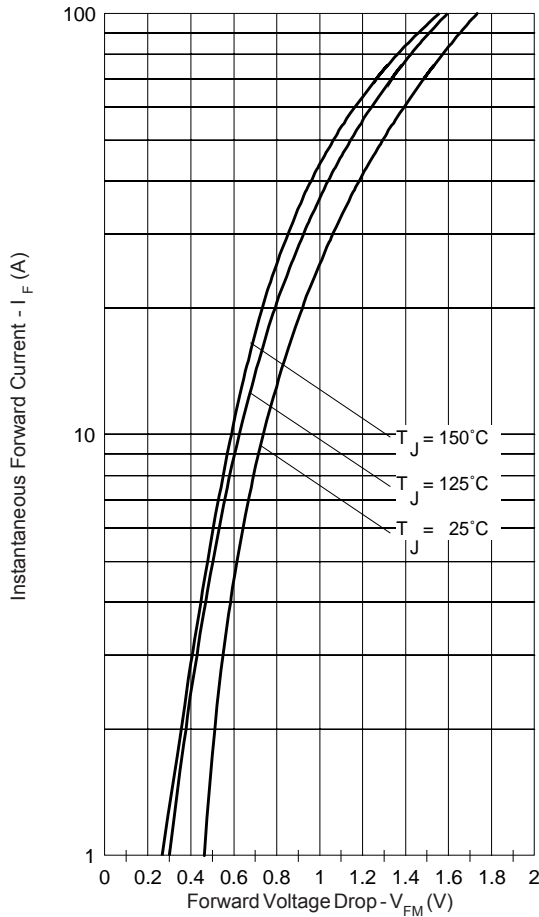


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

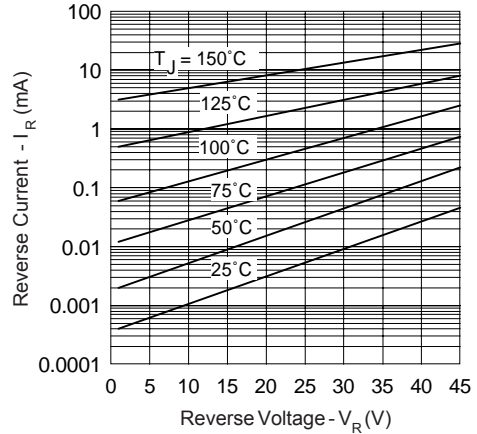


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

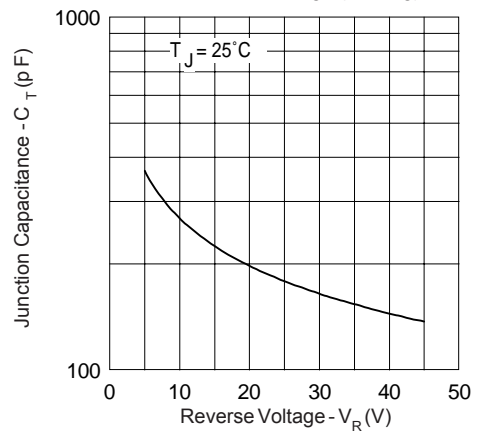


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

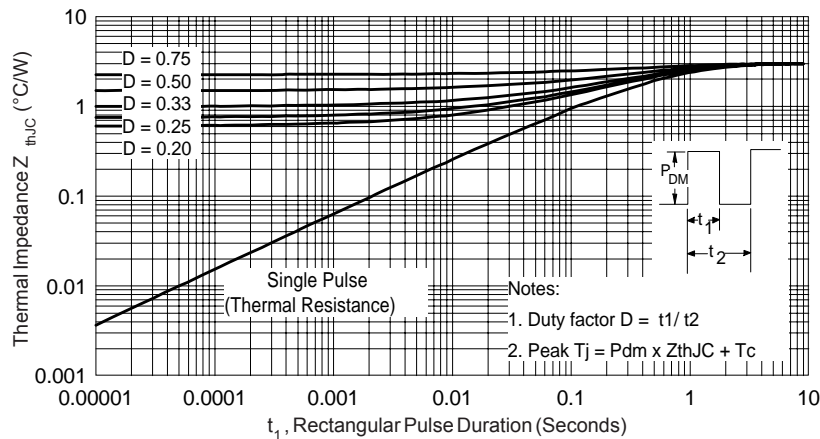


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

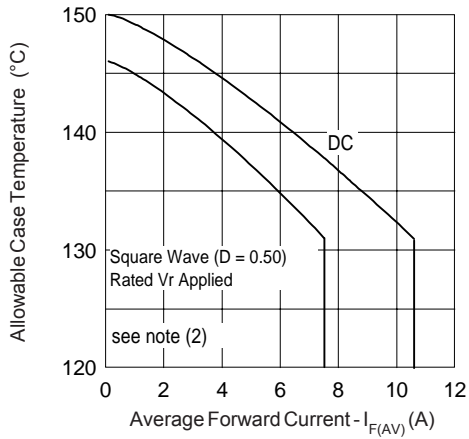


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

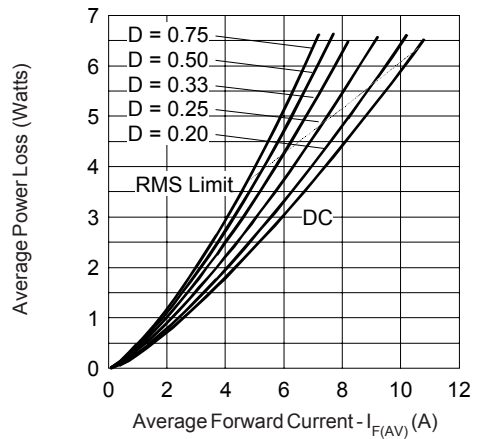


Fig. 6 - Forward Power Loss Characteristics

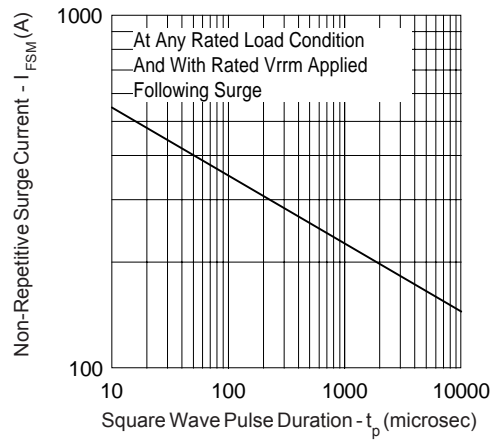


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

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

Outlines 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 [.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	4
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	4
c1	0.38	0.58	.015	.023	
c2	1.14	1.65	.045	.065	3
D	8.51	9.65	.335	.380	
D1	6.86		.270		3
E	9.65	10.67	.380	.420	
E1	6.22		.245		3
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	4
L	1.78	2.79	.070	.110	
L1		1.65		.065	4
L2	1.27	1.78	.050	.070	
L3	0.25 BSC		.010 BSC		4
L4	4.78	5.28	.188	.208	
m	17.78		.700		4
m1	8.89		.350		
n	11.43		.450		4
o	2.08		.082		
p	3.81		.150		4
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 D²Pak (SMD-220)**  
 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. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.  
 5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.  
 6. CONTROLLING DIMENSION: INCH.  
 7. - OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b1(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	5
A1	2.03	3.02	.080	.119	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86		.270		
E	9.65		.380	.420	3,4
E1	6.22		.245		
e	2.54 BSC		.100 BSC		4
L	13.46	14.10	.530	.555	
L1		1.65		.065	4
L2	3.56	3.71	.140	.146	

**LEAD ASSIGNMENTS**  
 HEXFET  
 1.- GATE  
 2.- DRAIN  
 3.- SOURCE  
 4.- DRAIN  
 IGBTs, CoPACK  
 1.- GATE  
 2.- COLLECTOR  
 3.- EMITTER  
 4.- COLLECTOR

**Modified JEDEC outline TO-262**  
 Dimensions in millimeters and (inches)

Part Marking Information

**D<sup>2</sup>PAK**

EXAMPLE: THIS IS A MBRB1545CT  
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

**TO-262**

EXAMPLE: THIS IS A MBR1545CT-1  
LOT CODE 1789  
ASSEMBLED ON WW 19, 2002

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

INTERNATIONAL RECTIFIER LOGO  
ASSEMBLY LOT CODE  
PART NUMBER  
DATE CODE  
YEAR 2 = 2002  
WEEK 19  
P = LEAD-FREE

Tape & Reel Information

SECTION Y-Y

Ao	10.50	+/- 0.1
B0	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<sup>6</sup> 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																	
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;"><b>MBR</b></td> <td style="padding: 5px;"><b>B</b></td> <td style="padding: 5px;"><b>15</b></td> <td style="padding: 5px;"><b>45</b></td> <td style="padding: 5px;"><b>CT</b></td> <td style="padding: 5px;"><b>-1</b></td> <td style="padding: 5px;"><b>TRL</b></td> <td style="padding: 5px;"><b>PbF</b></td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> <td style="text-align: center;">⑦</td> <td style="text-align: center;">⑧</td> </tr> </table>	<b>MBR</b>	<b>B</b>	<b>15</b>	<b>45</b>	<b>CT</b>	<b>-1</b>	<b>TRL</b>	<b>PbF</b>	①	②	③	④	⑤	⑥	⑦	⑧
<b>MBR</b>	<b>B</b>	<b>15</b>	<b>45</b>	<b>CT</b>	<b>-1</b>	<b>TRL</b>	<b>PbF</b>										
①	②	③	④	⑤	⑥	⑦	⑧										
<b>1</b>	- Essential Part Number																
<b>2</b>	- B = Surface Mount None = TO-220																
<b>3</b>	- Current Rating (15 = 15A)																
<b>4</b>	- Voltage code: Code = $V_{RRM}$																
<b>5</b>	- CT = Essential Part Number																
<b>6</b>	- "-1" = TO-262																
<b>7</b>	- <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>																
<b>8</b>	- <ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul>																

35	= 35V
40	= 40V
45	= 45V

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MBR1545CT
*****
*       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 MBR1545 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 MBR1545

Thermal Model Subcircuit
.SUBCKT MBR1545 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 MBR1545
    
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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.