Bulletin PD-20866 rev. B 05/06

International
IOR Rectifier

MBR20..CTPbF Series

SCHOTTKY RECTIFIER 20 Amp

$I_{F(AV)}$ = 20Amp
V_R = 35-45V

Major Ratings and Characteristics

Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform (Per Device)	20	A
I_{FRM}	@ T_C = 135°C (Per Leg)	20	A
V_{RRM}		35-45	V
I_{FSM}	@ tp = 5 µs sine	1060	A
V_F	@ 10 Apk, T_J = 125°C	0.57	V
T_J	range	- 65 to 150	°C

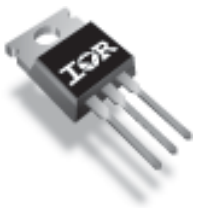
Description/ Features

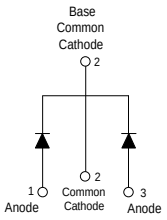
This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery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

- 150° C T_J operation
- Center tap TO-220 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
- Lead-Free ("PbF" suffix)

Case Styles

MBR20..CTQPbF





TO-220

Voltage Ratings

	Parameters	MBR2035CTPbF	MBR2045CTPbF
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)	10	A	@ T_C = 135° C, (Rated V_R)
	Current (Per Device)	20		
I_{FRM}	Peak Repetitive Forward Current (Per Leg)	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	(Per Leg) T_J = 25 °C, I_{AS} = 2 Amps, L = 4 mH
I_{AR}	Repetitive Avalanche Current (Per Leg)	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 (Rated V_R)	10000	V/ µs		

(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 (Per Leg)		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)	Non-lubricated threads
		Max.	12 (10)		
	Marking Device		MBR2045CT		

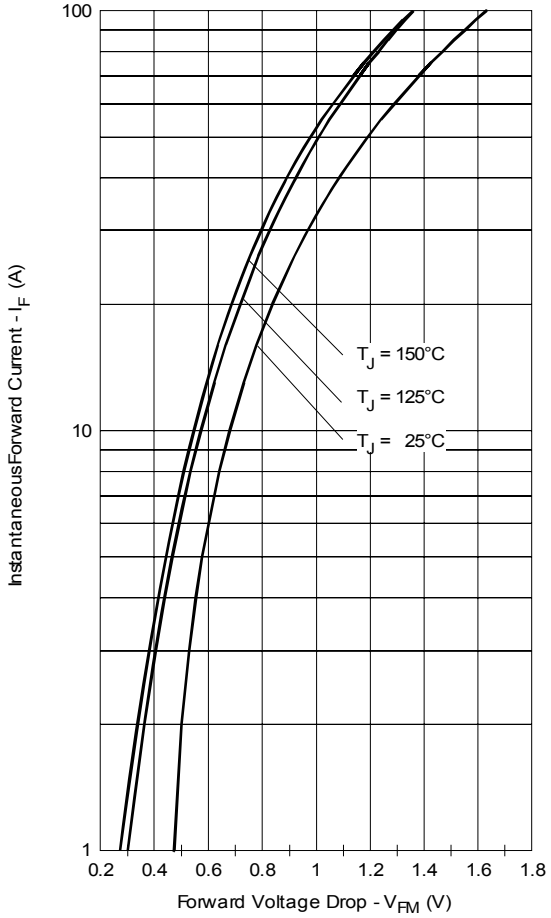


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

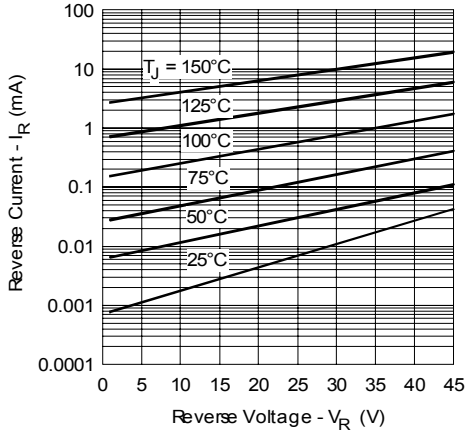


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

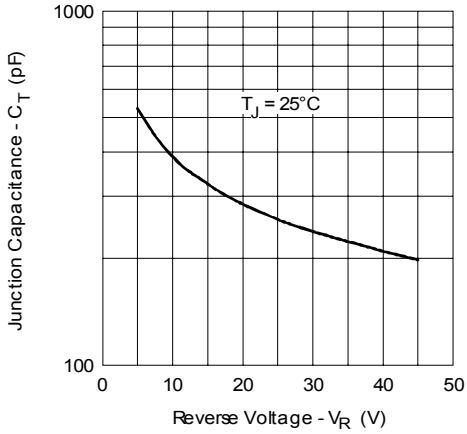


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

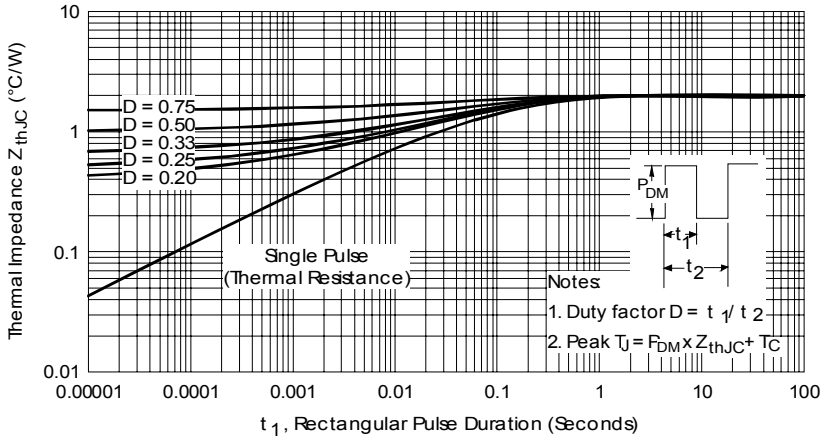


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

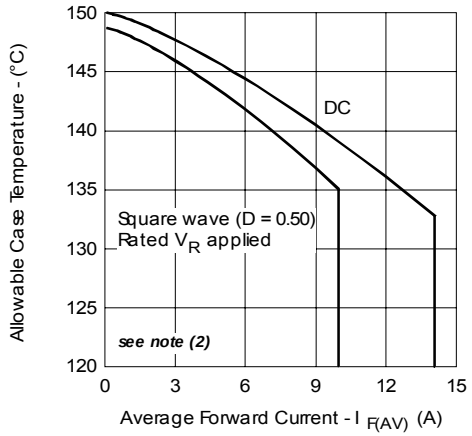


Fig. 5 - Max. Allowable Case Temperature
Vs. Average Forward Current (Per Leg)

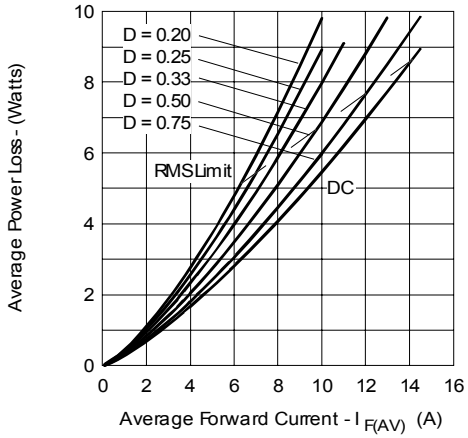


Fig. 6 - Forward Power Loss Characteristics
(Per Leg)

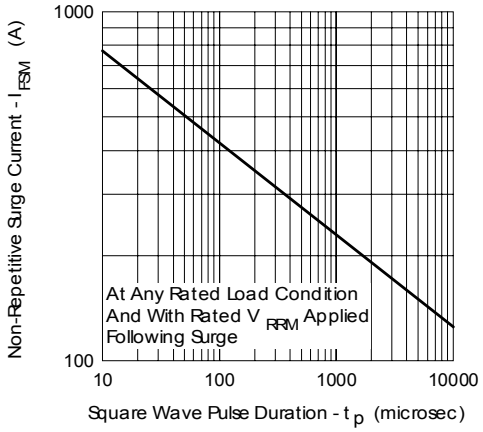
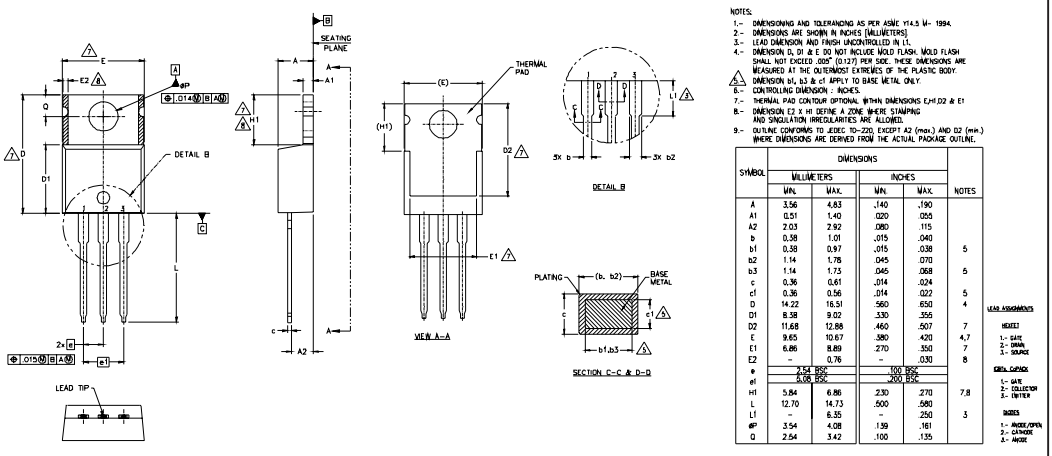


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

(2) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
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, EXCEPT A2 (max.) AND 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	2.30	.270	7,8
L	12.70	14.73	.500	.580	
L1	–	6.35	–	.250	3
øP	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	

LEAD ASSIGNMENTS
HEXFET
1.- GATE
2.- DRAIN
3.- SOURCE
IGBTs, COPACK
1.- GATE
2.- COLLECTOR
3.- EMITTER
DIODES
1.- ANODE/OPEN
2.- CATHODE
3.- ANODE

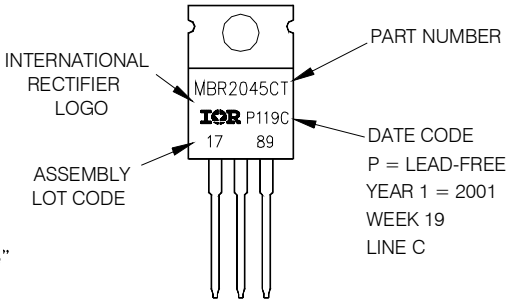
Conform to JEDEC outline TO-220AB

Part Marking Information

IRXC Assembly Line - SubCon Assembly Line

EXAMPLE: THIS IS A MBR2045CT
LOT CODE 1789
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "C"

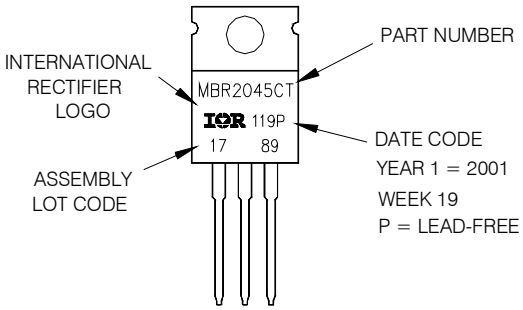
Note: "P" in the beginning of date code indicates "Lead–Free"



IRMX Assembly Line

EXAMPLE: THIS IS A MBR2045CT
LOT CODE 1789
ASSEMBLED ON WW 19, 2001

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



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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 paralled VCG2T           *
**********************************************
.SUBCKT MBR2045CT ANO CAT
D1 ANO 1 DMOD (0.03215)
*Define diode model
.MODEL DMOD D(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
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=-29.9397914371146)
GP1 ANO CAT 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

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 MBR2045CT
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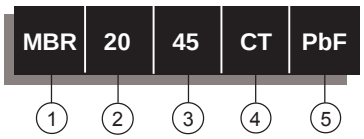
Ordering Information Table

Device Code



1 - Schottky MBR Series
2 - Current Rating (20 = 20A)
3 - Voltage Ratings
    35 = 35V
    45 = 45V
4 - CT = Essential Part Number
5 - • none = Standard Production
    • PbF = Lead-Free

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.

International
IOR Rectifier

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