Bulletin PD-20051 rev. A 09/01

International
IOR Rectifier

MBR4045CT
MBRB4045CT
MBR4045CT-1

SCHOTTKY RECTIFIER

40 Amp

Major Ratings and Characteristics

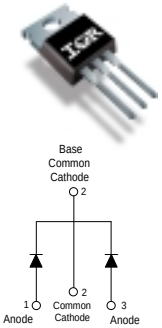
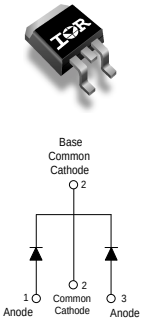
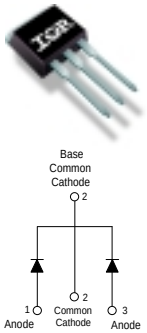
Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform (Per Device)	40	A
I_{FRM}	@ T_C = 118°C (Per Leg)	40	A
V_{RRM}		45	V
I_{FSM}	@ tp = 5 µs sine	900	A
V_F	@ 20 Apk, T_J = 125°C	0.58	V
T_J	range	- 65 to 150	°C

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, D^2Pak and TO-262 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

MBR4045CT	MBRB4045CT	MBR4045CT-1
 TO-220AB	 D^2PAK	 TO-262

Voltage Ratings

	Parameters	MBR4045CT MBRB4045CT MBR4045CT-1
V_R	Max. DC Reverse Voltage (V)	45
V_{RWM}	Max. Working Peak Reverse Voltage (V)	

Absolute Maximum Ratings

	Parameters	Values	Units	Conditions	
$I_{F(AV)}$	Max. Average Forward (Per Leg)	20	A	@ T_C = 118° C, (Rated V_R)	
	Current (Per Device)	40			
I_{FRM}	Peak Repetitive Forward Current (Per Leg)	40	A	Rated V_R, square wave, 20kHz T_C = 118° C	
I_{FSM}	Max. Peak One Cycle Non-Repetitive	900	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
	Surge Current (Per Leg)	210		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repetitive Avalanche Energy (Per Leg)	20	A	T_J = 25°C, I_{AS} = 3Amps, L = 4.40mH	
I_{AR}	Repetitive Avalanche Current (Per Leg)	3	A	Current decaying linearty 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	0.60	V	@ 20A	T_J = 25 °C
		0.78	V	@ 40A	
	(1)	0.58	V	@ 20A	T_J = 125 °C
		0.75	V	@ 40A	
I_{RM}	Max. Instantaneus Reverse Current	1	mA	T_J = 25 °C	Rated DC voltage
	(1)	50	mA	T_J = 100 °C	
		95	mA	T_J = 125 °C	
C_T	Max. Junction Capacitance	900	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)	10,000	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)		1.5	°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
R_{thJA}	Max. Thermal Resistance Junction to Ambient		50	°C/W	DC operation For D²Pak and TO-262
wt	Approximate Weight		2 (0.07)	g (oz.)	
T	Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)	Non-lubricated threads
		Max.	12 (10)		

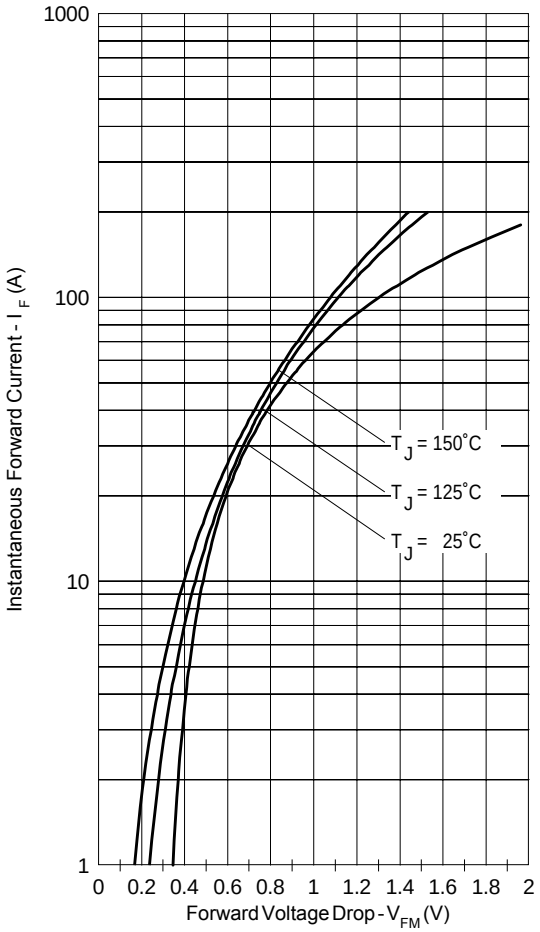


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

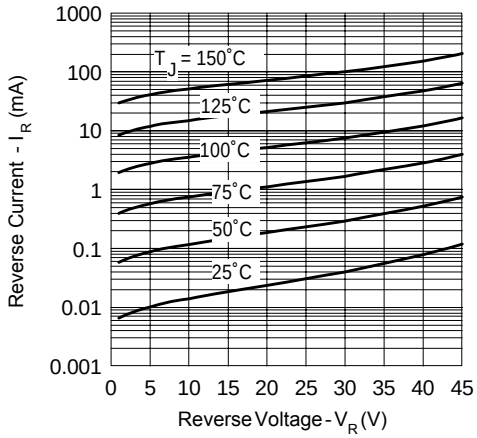


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

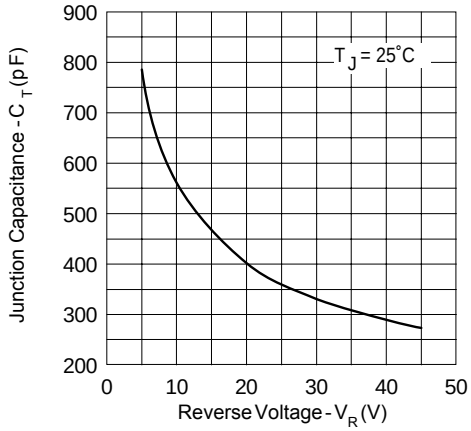


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

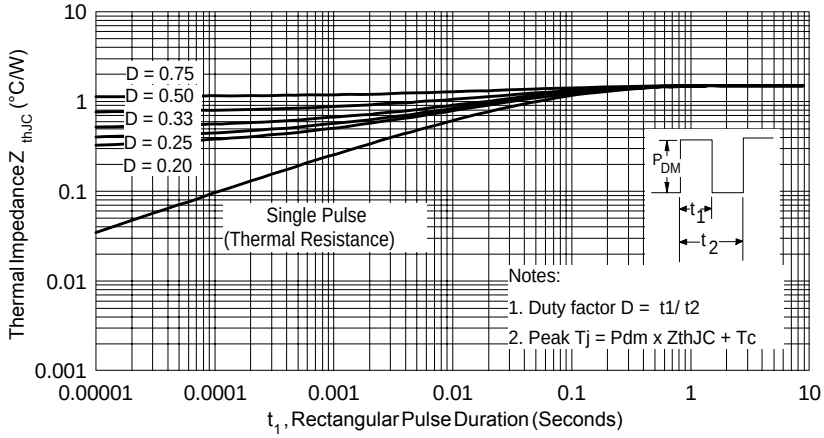


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

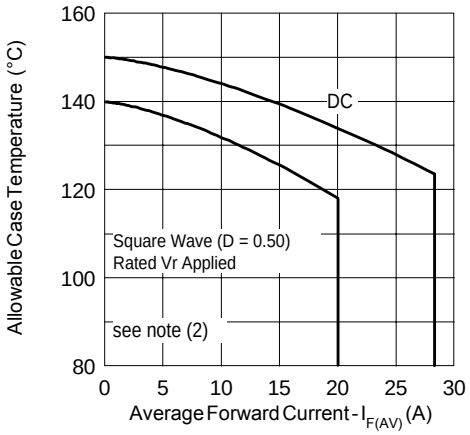


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

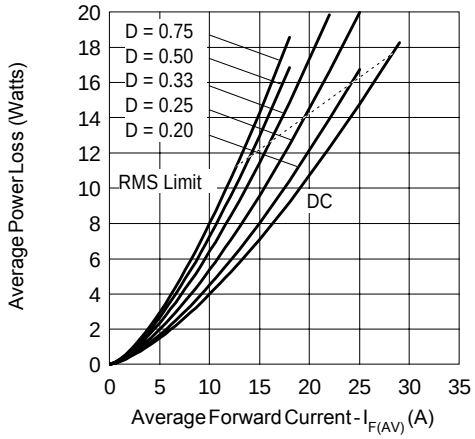


Fig. 6 - Forward Power Loss Characteristics

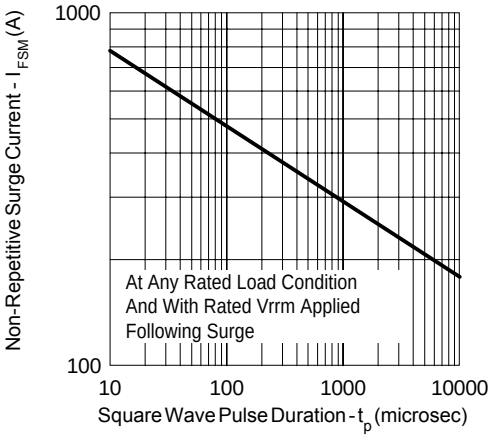
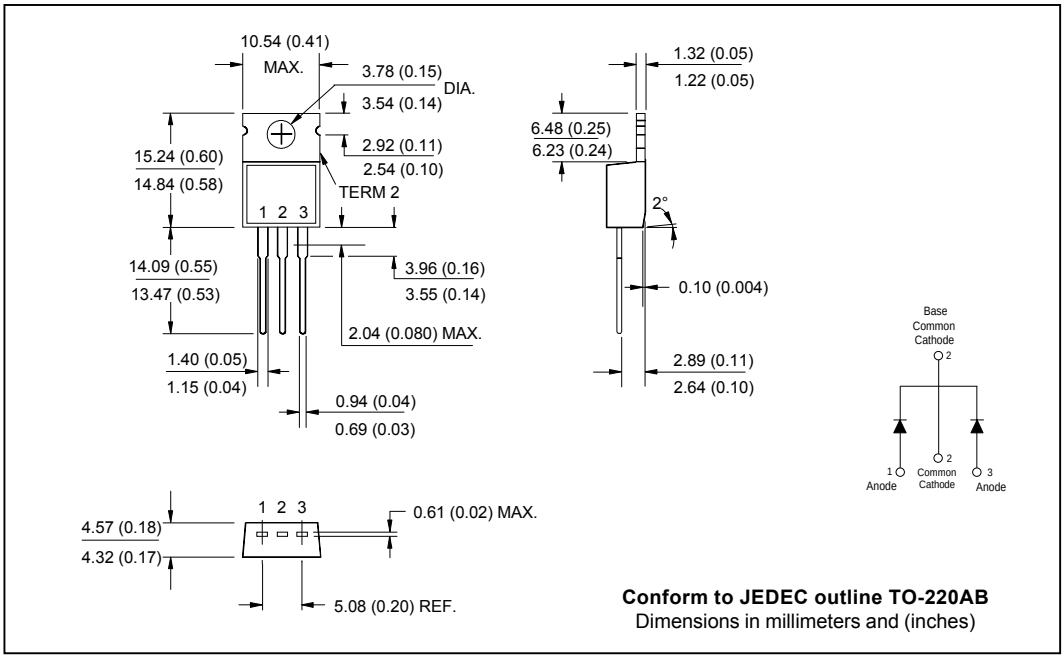


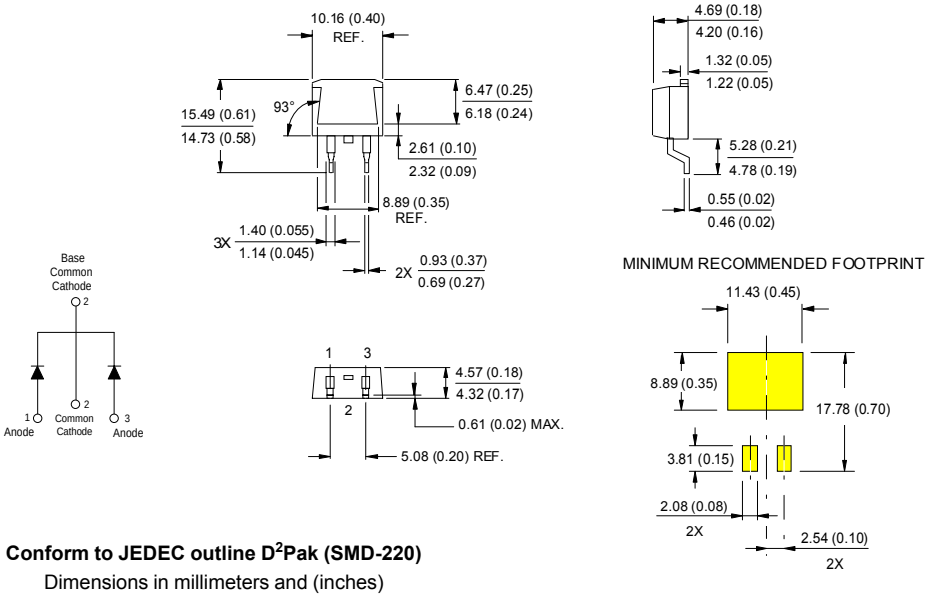
Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

(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



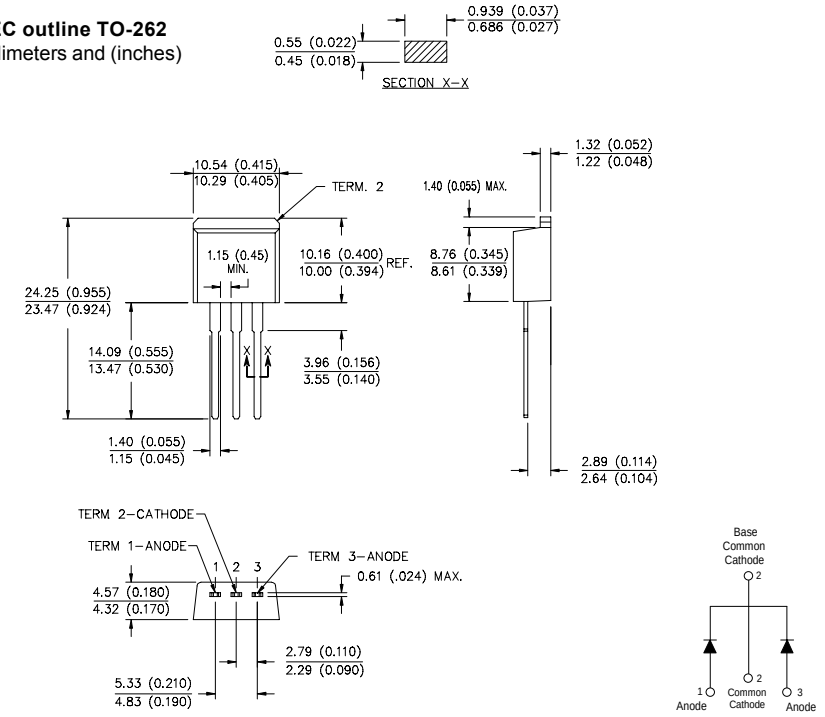
Conform to JEDEC outline TO-220AB
Dimensions in millimeters and (inches)



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

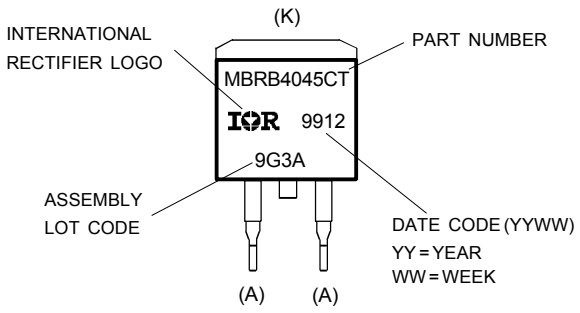
Outline Table

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

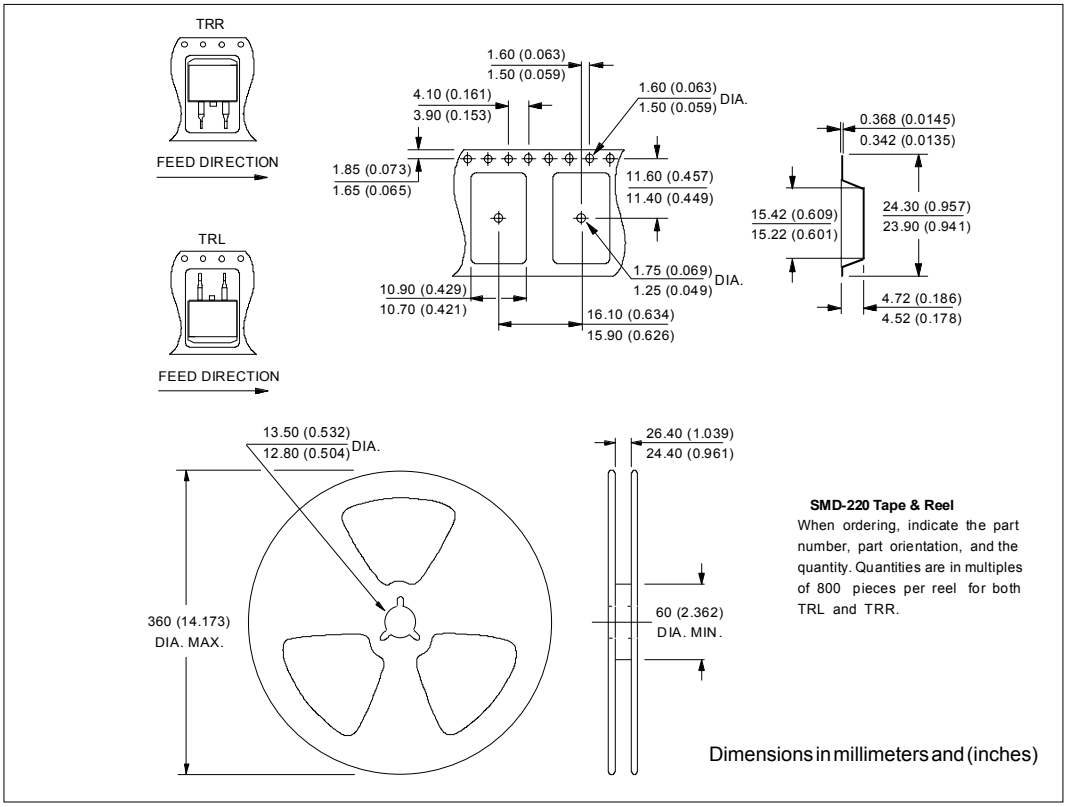


Marking Information

EXAMPLE: THIS IS AN MBRB4045CT



Tape & Reel Information

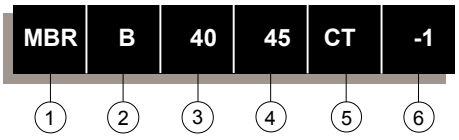


SMD-220 Tape & Reel
When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code



1 - Essential Part Number
2 - Package Style: none = TO-220
B = D^2 Pak
3 - Current Rating: 40 = 40A
4 Voltage code: Code = V_{RRM}
5 - Circuit configuration (Center Tap - Dual)
6 - -1 = TO-262 option

```
MBR4045CT
*****************************************
*     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 MBR4045CT ANO CAT
D1 ANO 1 DMOD (0.07089)
*Define diode model
.MODEL DMOD D(IS=1.41031849705903E-04A,N=1.12223892649545,BV=49V,
+ IBV=0.267178064395486A,RS= 0.000581298,CJO=2.94926944579954E-08,
+ VJ=0.779269989906853,XTI=2, EG=0.730300626417364)
*****************************************
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=19.7716341798827)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP((((-2.531689E-03/19.77164)*((V(2,CAT)*1E6)/
(I(VX)+1E-6)-1))+1)*6.454822E-02*ABS(V(ANO,CAT)))-1)}
*****************************************
.ENDS MBR4045CT


Thermal Model Subcircuit
.SUBCKT MBR4045CT 5 1

CTHERM1     5    4     1.84E+00
CTHERM2     4    3     1.74E+01
CTHERM3     3    2     9.36E+01
CTHERM4     2    1     1.30E+03

RTHERM1     5    4     4.55E-01
RTHERM2     4    3     5.76E-01
RTHERM1     3    2     3.12E-01
RTHERM1     2    1     1.49E-01


.ENDS MBR4045CT
```

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. 09/01