Bulletin PD-20677 rev. A 09/04

International
IOR Rectifier

MBR4045WTPbF

SCHOTTKY RECTIFIER

40 Amp

$I_{F(AV)}$ = 40Amp
V_R = 45V

Major Ratings and Characteristics

Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform (Per Device)	40	A
I_{FRM}	@T_C=125°C (Per Leg)	40	A
V_{RRM}		45	V
I_{FSM}	@ tp = 5 µs sine	1020	A
V_F	@20 Apk, T_J=125°C	0.56	V
T_J	range	-55 to 150	°C

Description/ Features

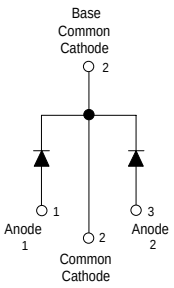
The MBR4045WTPbF center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150° C T_J operation
- Center tap TO-247 package
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

Case Styles

MBR4045WTPbF

TO-247AC



Voltage Ratings

	Part number	MBR4045WTPbF
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 Current	(Per Leg)	20	A	@ T_C = 125°C, 50% duty cycle, rectangular waveform	
		(Per Device)	40			
I_{FRM}	Peak Repetitive Forward Current	(Per Leg)	40	A	Rated V_R, square wave, 20kHz T_C = 125° C	
I_{FSM}	Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg)	See fig.7	1020	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
			265		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repetitive Avalanche Energy	(Per Leg)	20	mJ	T_J = 25 °C, I_{AS} = 3 Amps, L = 4.40 mH	
I_{AR}	Repetitive Avalanche Current	(Per Leg)	3	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)	0.59	V	@ 20A	T_J = 25 °C
		0.78	V	@ 40A	
		0.56	V	@ 20A	T_J = 125 °C
		0.72	V	@ 40A	
I_{RM}	Max. Instantaneus Reverse Current (1)	1.75	mA	T_J = 25 °C	Rated DC voltage
		50	mA	T_J = 100 °C	
		85	mA	T_J = 125 °C	
$V_{F(TO)}$	Threshold Voltage	0.29	V	T_J = T_J max.	
r_t	Forward Slope Resistance	10.3	mΩ		
C_T	Max. Junction Capacitance	900	pF	V_R = 5V_{DC} (test signal range 100Khz to 1Mhz) 25°C	
L_S	Typical Series Inductance	7.5	nH	Measured from top of terminal to mounting plane	
dv/dt	Max. Voltage Rate of Change	10000	V/ µs	(Rated V_R)	

(1) Pulse Width < 300µs, Duty Cycle <2%

Thermal-Mechanical Specifications

	Parameters		Values	Units	Conditions
T_J	Max. Junction Temperature Range		-55 to 150	°C	
T_{stg}	Max. Storage Temperature Range		-55 to 175	°C	
R_{thJC}	Max. Thermal Resistance Junction to Case (Per Package)		1.4	°C/W	DC operation
R_{thCS}	Typical Thermal Resistance Case to Heatsink		0.7	°C/W	Mounting surface, smooth and greased
wt	Approximate Weight		6 (0.21)	g (oz.)	
T	Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)	
		Max.	12 (10)		
	Case Style		TO-247AC (TO-3P)		JEDEC
	Device Marking		MBR4045WT		

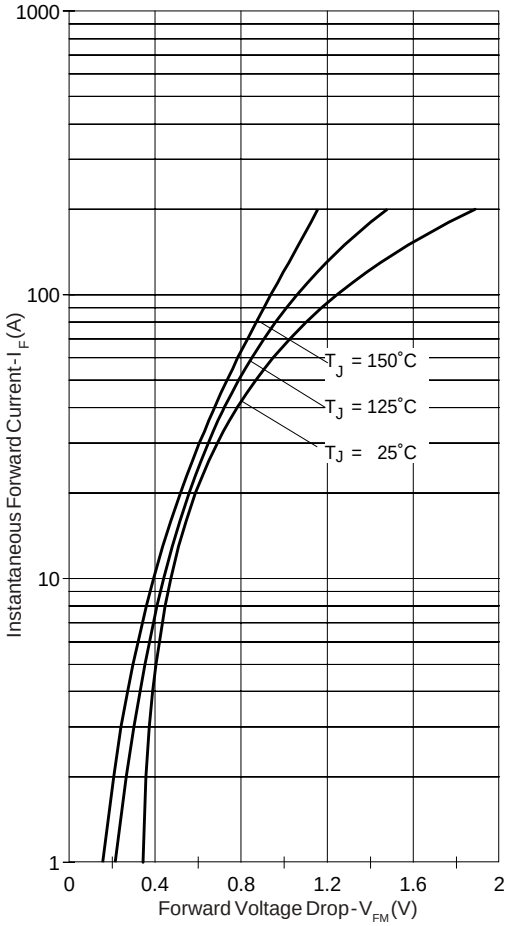


Fig. 1 - Max. Forward Voltage Drop Characteristics

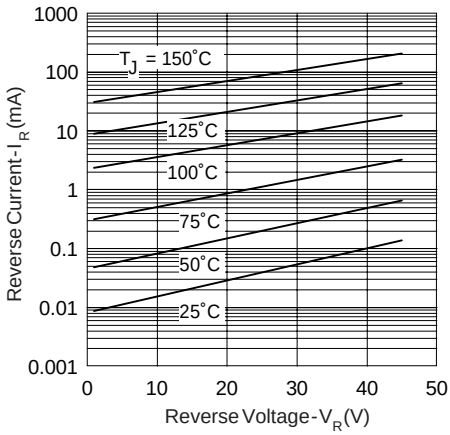


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

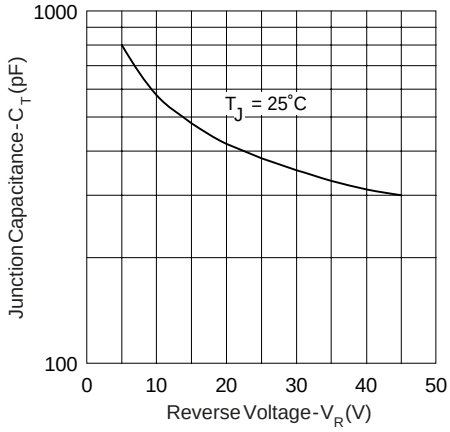


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

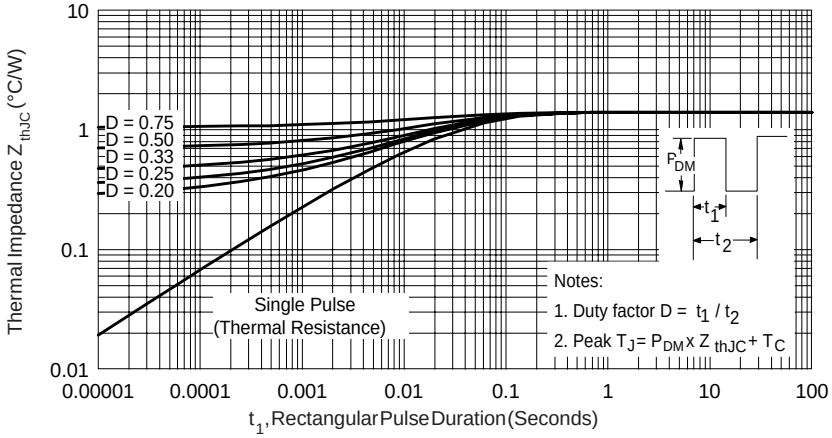


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

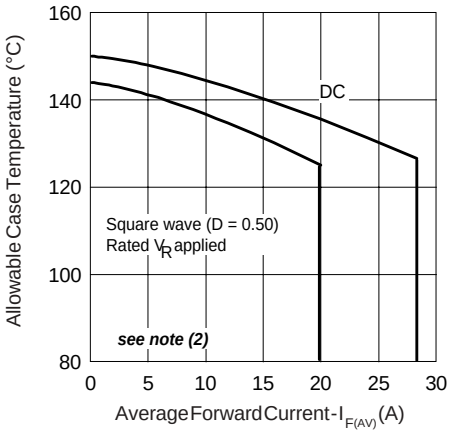


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

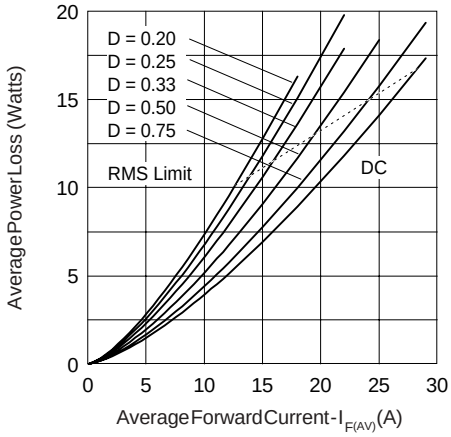


Fig. 6 - Forward Power Loss Characteristics

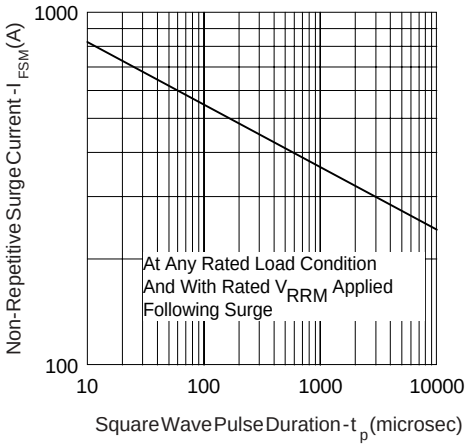


Fig. 7 - Max. Non-Repetitive Surge Current

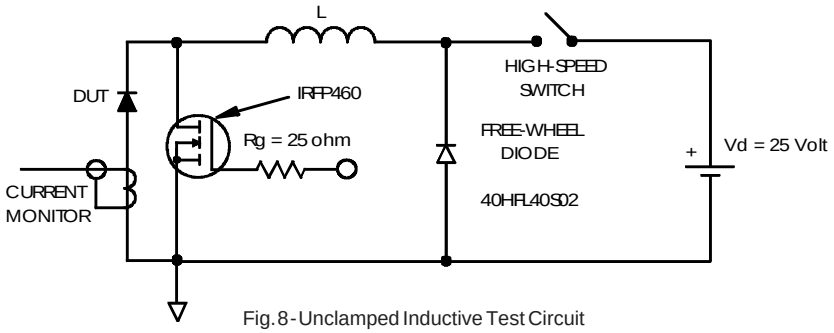
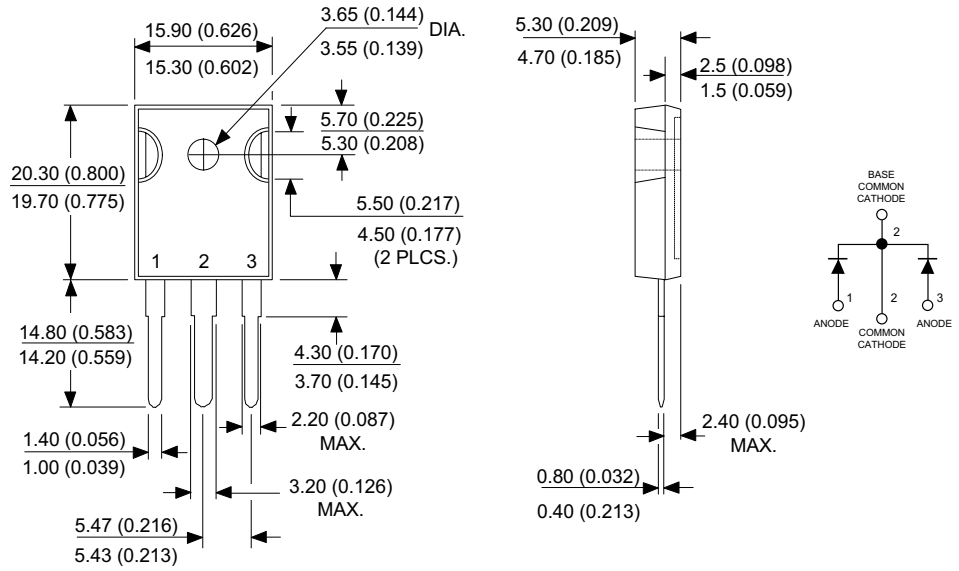


Fig. 8 - Unclamped Inductive Test Circuit

(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

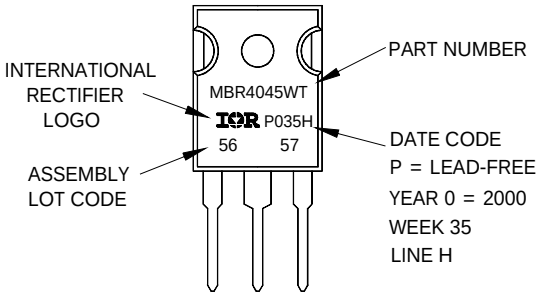
Outline Table



Conform to JEDEC outline TO-247AC (TO-3P)
Dimensions in millimeters and (inches)

Marking Information

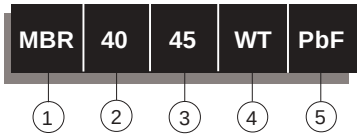
EXAMPLE: THIS IS A MBR4045WT
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN ASSEMBLY LINE "H"



```
MBR4045WT
**********************************************
     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 MBR4045WT ANO CAT
D1 ANO 1 DMOD (0.07089)
*Define diode model
.MODEL DMOD D(IS=1.876744473871 84E-04A,N=1.0815129563336,BV=51V,
+ IBV=0.370052071012812A,RS= 0.000482052,CJO=1.77083341686508E-08,
+ VJ=2.63120433908928,XTI=2, EG=0.680665296447736)
**********************************************
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=30.266567848718)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP((((-2.374754E-03/30.26657)*((V(2,CAT)*1E6)/(I(VX)+1E-6)-
1))+1)*6.049001E-02*ABS(V(ANO,CAT)))-1)}
**********************************************
.ENDS MBR4045WT


Thermal Model Subcircuit
.SUBCKT MBR4045WT 5 1

CTHERM1     5     4     8.75E-01
CTHERM2     4     3     1.19E+01
CTHERM3     3     2     7.69E+01
CTHERM4     2     1     4.98E+02

RTHERM1     5     4     1.00E-04
RTHERM2     4     3     7.15E-01
RTHERM1     3     2     5.30E-01
RTHERM1     2     1     1.50E-01


.ENDS MBR4045WT
```

Ordering Information Table

Device Code



1	-	Schottky MBR Series
2	-	Currrent Rating (40 = 40A)
3	-	Voltage Rating (45 = 45V)
4	-	Circuit Configuration : Center Tap (Dual) TO-247
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

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. 09/04