Bulletin PD-20052 01/01

International
IOR Rectifier

MBR4060WT

SCHOTTKY RECTIFIER

40 Amp

$I_{F(AV)}$ = 40Amp
V_R = 60V

Major Ratings and Characteristics

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	40	A
V_{RRM}	60	V
I_{FSM} @tp = 5 µs sine	3200	A
V_F @20Apk, T_J=125°C (per leg)	0.49	V
T_J	-55 to 150	°C

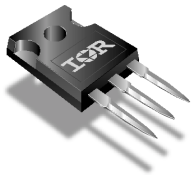
Description/Features

The MBR... 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

Case Styles

MBR4060WT



TO-247

Voltage Ratings

	Part number	MBR4060WT
V_R	Max. DC Reverse Voltage (V)	60
V_{RWM}	Max. Working Peak Reverse Voltage (V)	

Absolute Maximum Ratings

	Parameters	Values	Units	Conditions	
$I_{F(AV)}$	Max. Average Forward Current	40	A	@ T_C = 120°C, 50% duty cycle, rectangular waveform	
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	3200	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
		320		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repetitive Avalanche Energy (Per Leg)	18	mJ	T_J = 25 °C, I_{AS} = 3 Amps, L = 4.40 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)	0.53	V	@ 20A	T_J = 25 °C
		0.68	V	@ 40A	
		0.49	V	@ 20A	T_J = 125 °C
		0.64	V	@ 40A	
I_{RM}	Max. Instantaneus Reverse Current	1.7	mA	T_J = 25 °C	Rated DC voltage
		96	mA	TJ = 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	7.5	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		-55 to 150	°C	
T_{stg}	Max. Storage Temperature Range		-55 to 150	°C	
R_{thJC}	Max. Thermal Resistance Junction to Case (Per Package)		1.25	°C/W	DC operation
R_{thCS}	Typical Thermal Resistance Case to Heatsink		0.63	°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

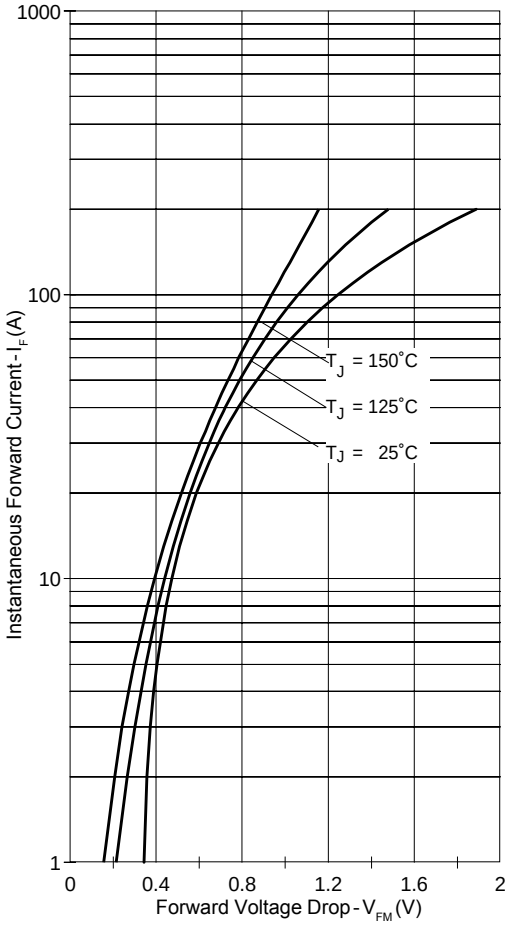


Fig. 1 - Max. Forward Voltage Drop Characteristics

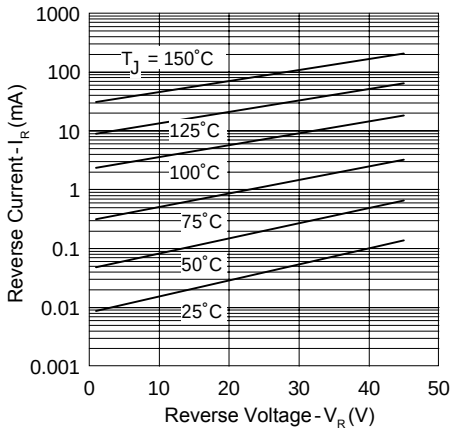


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

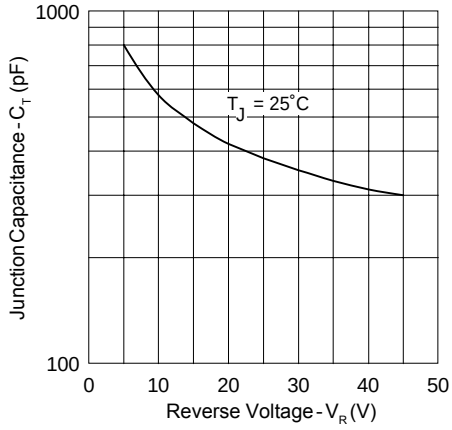


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

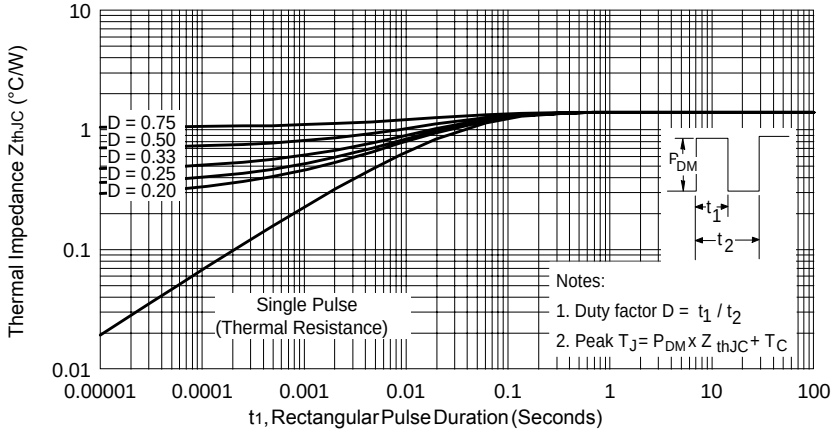


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

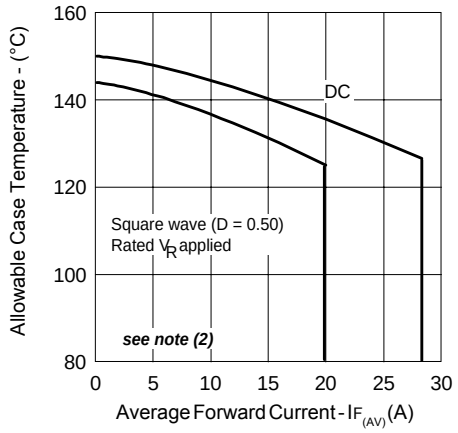


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

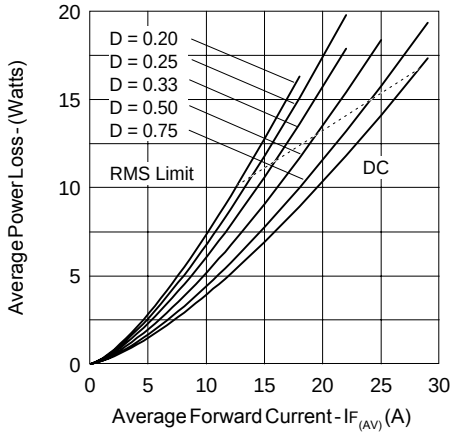


Fig. 6 - Forward Power Loss Characteristics

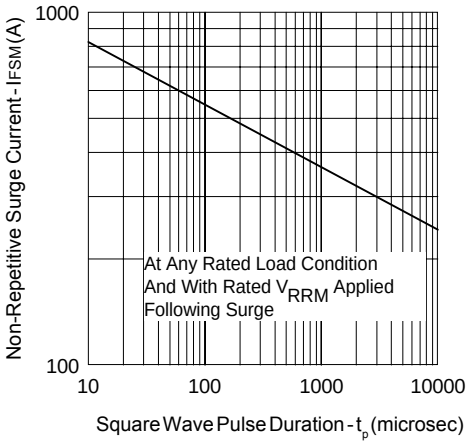


Fig. 7 - Max. Non-Repetitive Surge Current

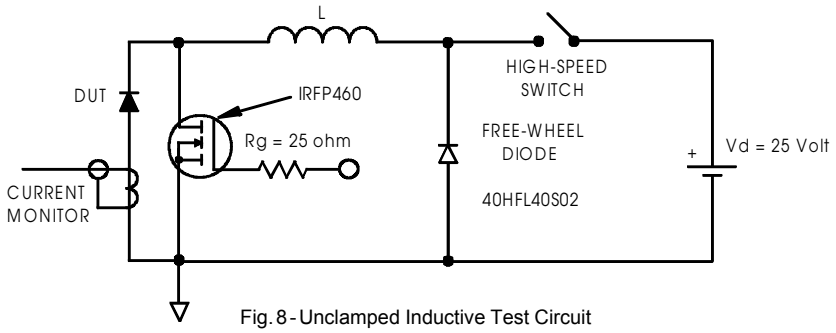
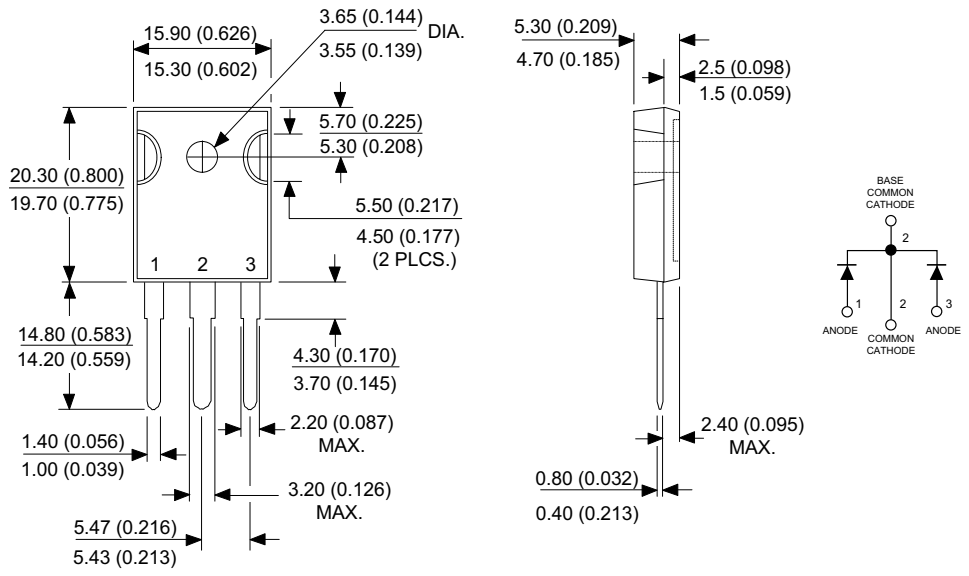


Fig. 8 - Unclamped Inductive Test Circuit

(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

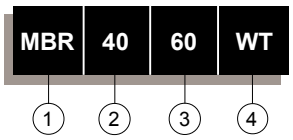
Outline Table



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

Ordering Information Table

Device Code



1	-	Schottky MBR Series	
2	-	Currrent Rating	: 40 = 40A
3	-	Voltage Rating	: 60 = 60V
4	-	Circuit Configuration	:
		Center Tap (Dual) TO-247	

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MBR4060WT
********************************************
  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 MBR4060WT ANO CAT
D1 ANO 1 DMOD (0.15431)
*Define diode model
.MODEL DMOD D(IS=1.24122088285142E-04A,N=1.118139845134,BV=68V,
+ IBV=0.326321361043483A,RS= 0.001033877,CJO=1.77866386701626E-08,
+ VJ=1.31756418398729,XTI=2, EG=0.750533880678658)
********************************************
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=16.0583931154828)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP((((-2.583306E-03/16.05839)*((V(2,CAT)*1E6)/(I(VX)+1E-
6)-1))+1)*4.198821E-02*ABS(V(ANO,CAT)))-1)}
********************************************
.ENDS MBR4060WT


Thermal Model Subcircuit
.SUBCKT MBR4060WT 5 1

CTHERM1     5     4     1.25E+00
CTHERM2     4     3     4.94E+00
CTHERM3     3     2     1.45E+01
CTHERM4     2     1     7.99E+01

RTHERM1     5     4     6.22E-01
RTHERM2     4     3     4.63E-01
RTHERM1     3     2     1.36E-01
RTHERM1     2     1     2.41E-02


.ENDS MBR4060WT
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International
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