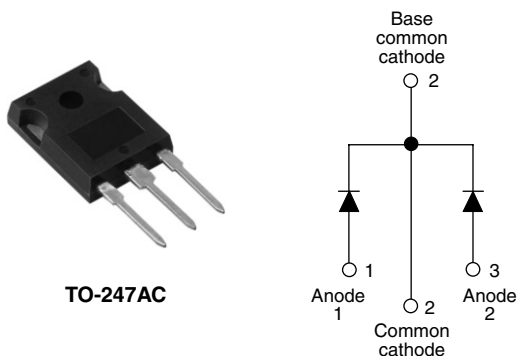


## Schottky Rectifier, 2 x 20 A



### FEATURES

- 150 °C  $T_J$  operation
- Center tap TO-247 package
- Very low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Designed and qualified for industrial level

### DESCRIPTION

The MBR4045WT 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, freewheeling diodes, and reverse battery protection.

### PRODUCT SUMMARY

$I_{F(AV)}$	2 x 20 A
$V_R$	45 V
$I_{RM}$	85 mA at 125 °C

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform (per device)	40	A
$I_{FRM}$	$T_C = 125\text{ °C}$ (per leg)	40	
$V_{RRM}$		45	V
$I_{FSM}$	$t_p = 5\text{ }\mu\text{s}$ sine	1020	A
$V_F$	20 Apk, $T_J = 125\text{ °C}$	0.56	V
$T_J$	Range	- 55 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	MBR4045WT	UNITS
Maximum DC reverse voltage	$V_R$	45	V
Maximum working peak reverse voltage	$V_{RWM}$		

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg per device	$I_{F(AV)}$	$T_C = 125\text{ °C}$ , 50 % duty cycle, rectangular waveform	20	A
			40	
Peak repetitive forward current per leg	$I_{FRM}$	Rated $V_R$ , square wave, 20 kHz, $T_C = 125\text{ °C}$	40	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	$I_{FSM}$	5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse	1020	
		10 ms sine or 6 ms rect. pulse	265	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25\text{ °C}$ , $I_{AS} = 3\text{ A}$ , $L = 4.40\text{ mH}$	20	mJ
Repetitive avalanche current per leg	$I_{AR}$	Current decaying linearly to zero in 1 $\mu\text{s}$ Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical	3	A

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop	V <sub>FM</sub> <sup>(1)</sup>	20 A	T <sub>J</sub> = 25 °C	0.59	V	
		40 A		0.78		
		20 A	T <sub>J</sub> = 125 °C	0.56		
		40 A		0.72		
Maximum instantaneous reverse current	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 25 °C	Rated DC voltage	1.75	mA	
		T <sub>J</sub> = 100 °C		50		
		T <sub>J</sub> = 125 °C		85		
Threshold voltage	V <sub>F(TO)</sub>	T <sub>J</sub> = T <sub>J</sub> maximum		0.29	V	
Forward slope resistance	r <sub>t</sub>			10.3	mΩ	
Maximum junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz) 25 °C		900	pF	
Typical series inductance	L <sub>S</sub>	Measured from top of terminal to mounting plane		7.5	nH	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>		10 000	V/μs	

### Note

(1) Pulse width < 300  $\mu$ s, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction temperature range	T <sub>J</sub>		- 55 to 150	°C
Maximum storage temperature range	T <sub>Stg</sub>		- 55 to 175	
Maximum thermal resistance, junction to case per package	R <sub>thJC</sub>	DC operation	1.4	°C/W
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased	0.7	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Device marking		Case style TO-247AC (JEDEC)	MBR4045WT	

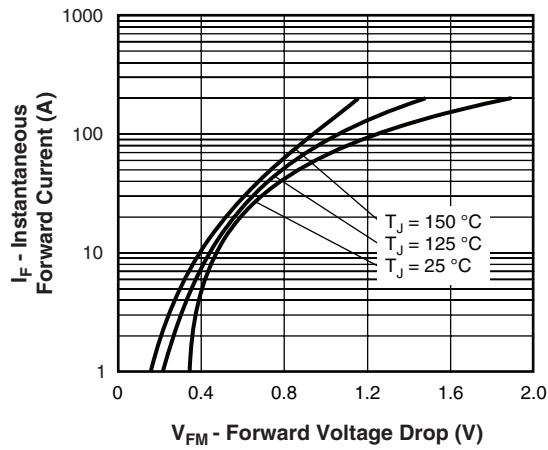


Fig. 1 - Maximum Forward Voltage Drop Characteristics

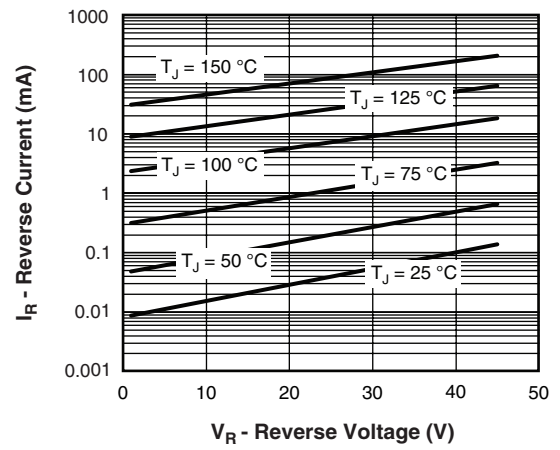


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

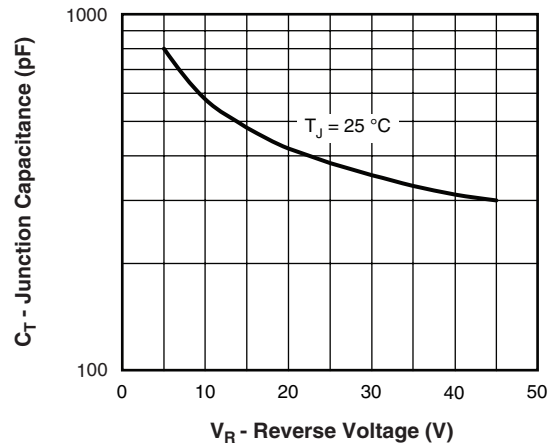
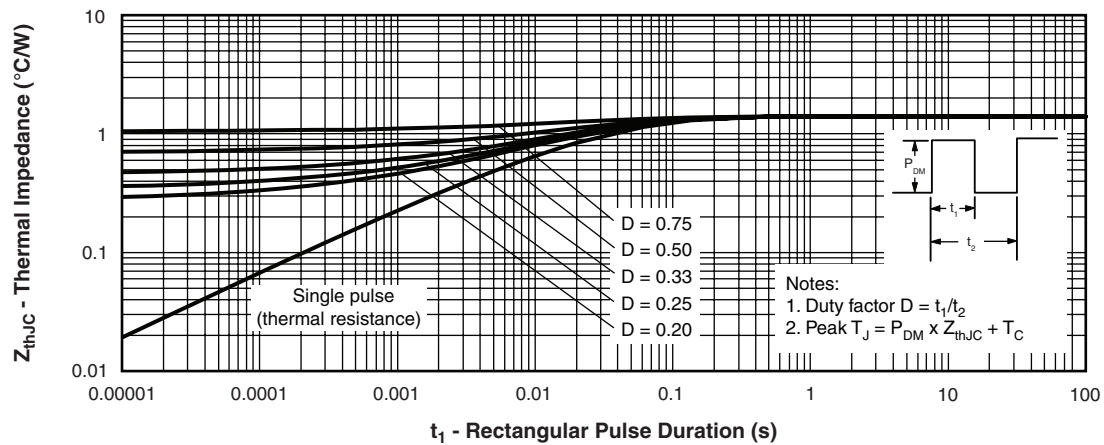


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

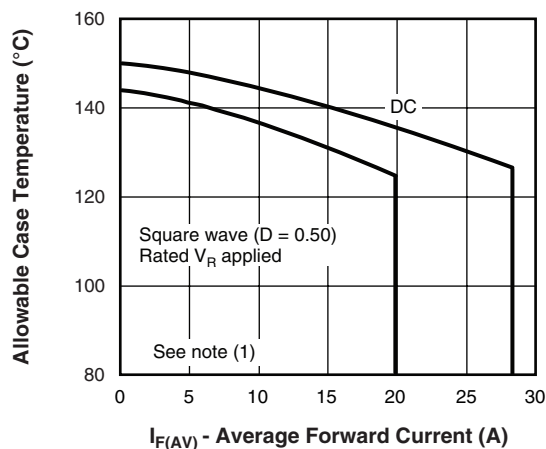


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

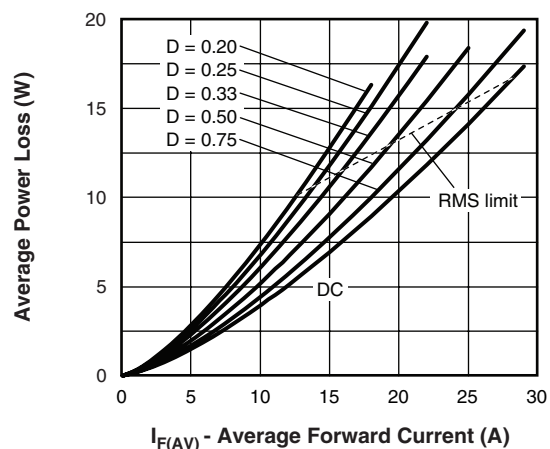


Fig. 6 - Forward Power Loss Characteristics

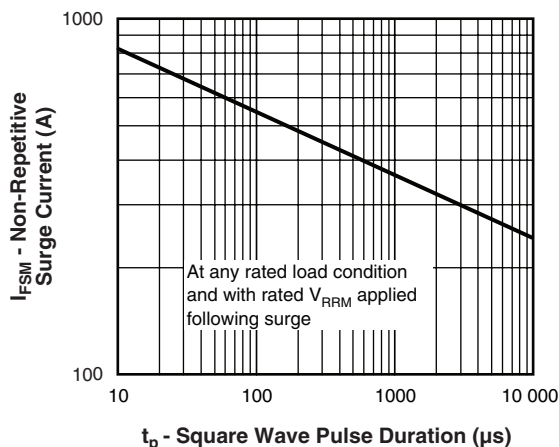


Fig. 7 - Maximum Non-Repetitive Surge Current

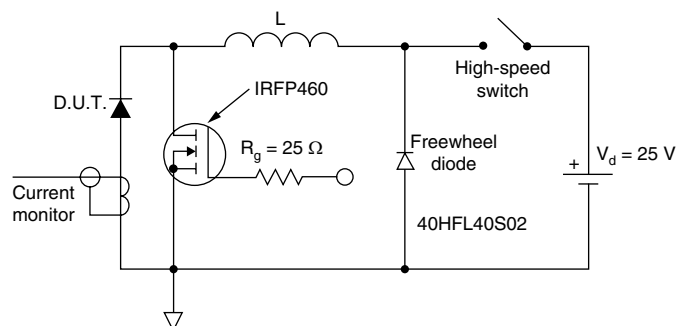


Fig. 8 - Unclamped Inductive Test Circuit

### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = Rated  $V_R$

**ORDERING INFORMATION TABLE**

Device code	<b>MBR</b>	<b>40</b>	<b>45</b>	<b>WT</b>	<b>-</b>
	1	2	3	4	5

- |          |   |   |
|----------|---|---|
| <b>1</b> | - | Schottky MBR series   |
| <b>2</b> | - | Current rating (40 = 40 A)  |
| <b>3</b> | - | Voltage rating (45 = 45 V)  |
| <b>4</b> | - | Circuit configuration:<br>Center tap (dual) TO-247  |
| <b>5</b> | - | <ul style="list-style-type: none"><li>• None = Standard production</li><li>• PbF = Lead (Pb)-free</li></ul> |

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95223">http://www.vishay.com/doc?95223</a>
Part marking information	<a href="http://www.vishay.com/doc?95226">http://www.vishay.com/doc?95226</a>
SPICE model	<a href="http://www.vishay.com/doc?95297">http://www.vishay.com/doc?95297</a>



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