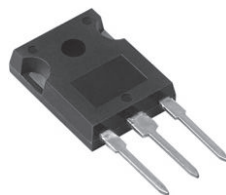
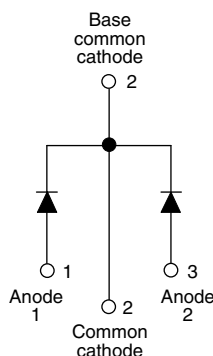


## Schottky Rectifier, 2 x 20 A


**TO-247AC**


### FEATURES

- 150 °C  $T_J$  operation
- 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
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### PRODUCT SUMMARY

Package	TO-247AC
$I_{F(AV)}$	2 x 20 A
$V_R$	45 V
$V_F$ at $I_F$	0.56 V
$I_{RM}$ max.	85 mA at 125 °C
$T_J$ max.	150 °C
Diode variation	Common cathode
$E_{AS}$	20 mJ

### DESCRIPTION

The VS-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.

### MAJOR RATINGS AND CHARACTERISTICS

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

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-MBR4045WTPbF	VS-MBR4045WT-N3	UNITS
Maximum DC reverse voltage	$V_R$	45	45	V
Maximum working peak reverse voltage	$V_{RWM}$			

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 125$ °C, 50 % duty cycle, rectangular waveform	20	A
per leg			40	
Peak repetitive forward current per leg	$I_{FRM}$	Rated $V_R$ , square wave, 20 kHz, $T_C = 125$ °C	40	
Maximum peak one cycle non-repetitive surge current per leg	$I_{FSM}$	5 $\mu$ s sine or 3 $\mu$ s rect. pulse	1020	
See fig. 7		10 ms sine or 6 ms rect. pulse	265	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 3$ A, $L = 4.40$ mH	20	mJ
Repetitive avalanche current per leg	$I_{AR}$	Current decaying linearly to zero in 1 $\mu$ 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	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.59	V	
		40 A		0.78		
		20 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.56		
		40 A		0.72		
Maximum instantaneous reverse current	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	Rated DC voltage	1.75	mA	
		$T_J = 100\text{ }^{\circ}\text{C}$		50		
		$T_J = 125\text{ }^{\circ}\text{C}$		85		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J$ maximum		0.29	V	
Forward slope resistance	$r_t$			10.3	$m\Omega$	
Maximum junction capacitance	$C_T$	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$		900	pF	
Typical series inductance	$L_S$	Measured from top of terminal to mounting plane		7.5	nH	
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/ $\mu$ s	

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

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

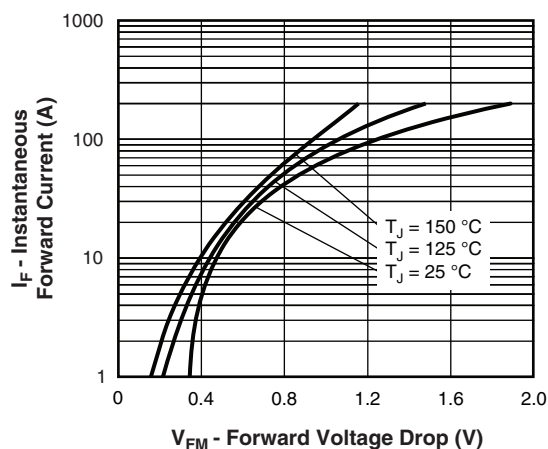


Fig. 1 - Maximum Forward Voltage Drop Characteristics

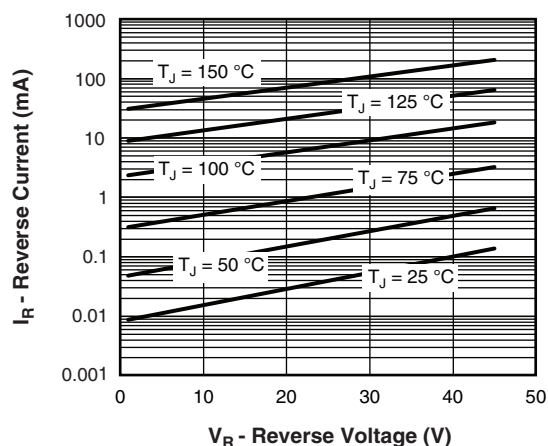


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

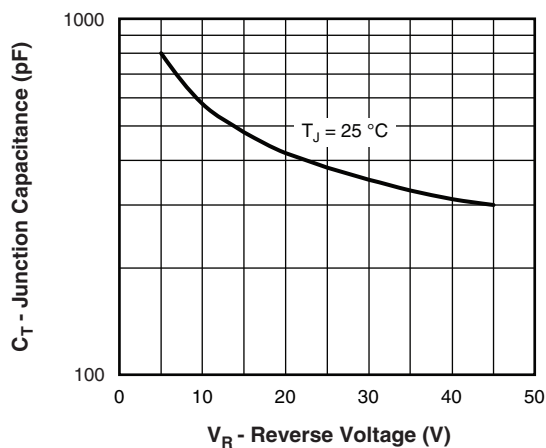
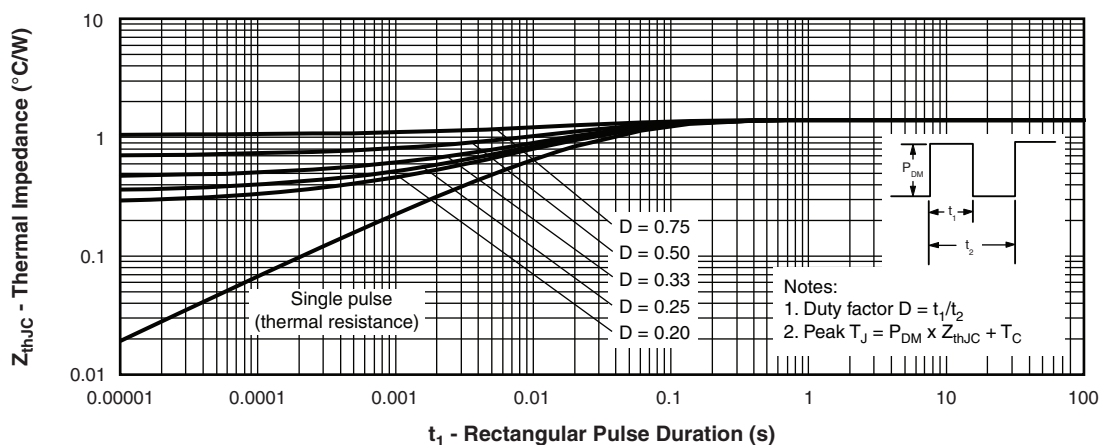


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

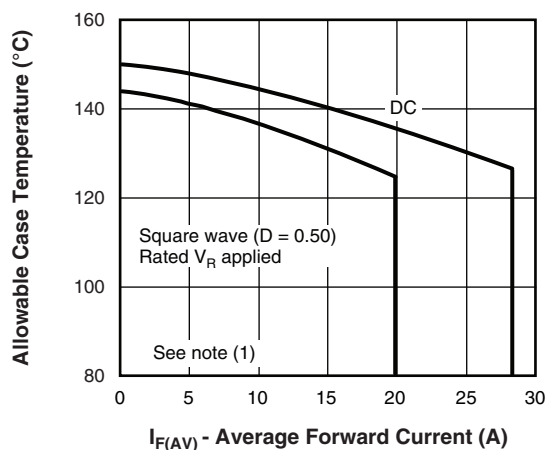


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

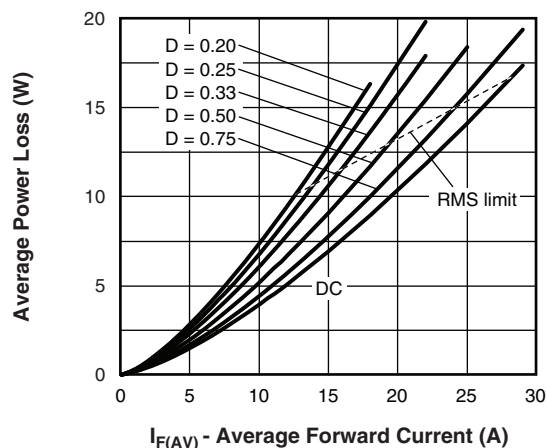


Fig. 6 - Forward Power Loss Characteristics

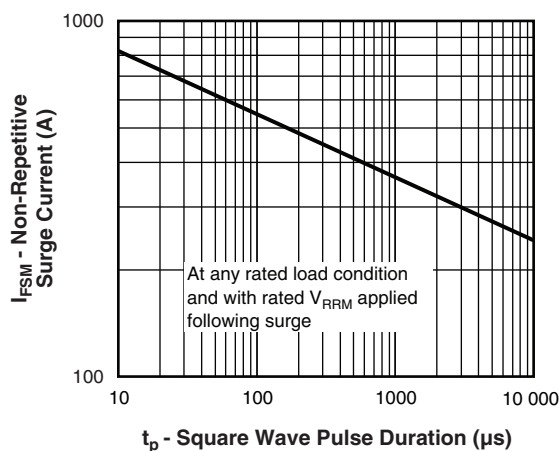


Fig. 7 - Maximum Non-Repetitive Surge Current

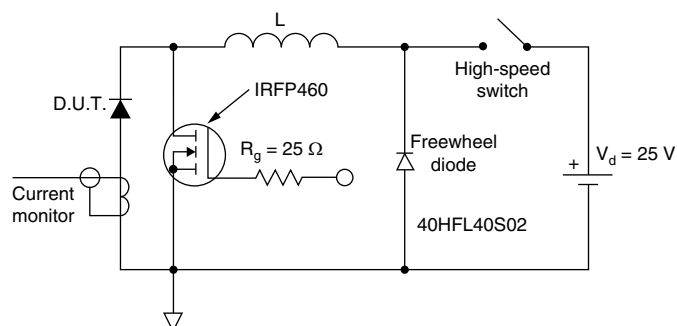


Fig. 8 - Unclamped Inductive Test Circuit

#### 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>VS-</b>	<b>MBR</b>	<b>40</b>	<b>45</b>	<b>WT</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥

- |          |   |  |
|----------|---|--|
| <b>1</b> | - | Vishay Semiconductors product  |
| <b>2</b> | - | Schottky MBR series  |
| <b>3</b> | - | Current rating (40 = 40 A)   |
| <b>4</b> | - | Voltage rating (45 = 45 V)   |
| <b>5</b> | - | Circuit configuration:<br>Center tap (dual) TO-247   |
| <b>6</b> | - | Environmental digit <ul style="list-style-type: none"><li>• PbF = Lead (Pb)-free and RoHS compliant</li><li>• -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free</li></ul> |

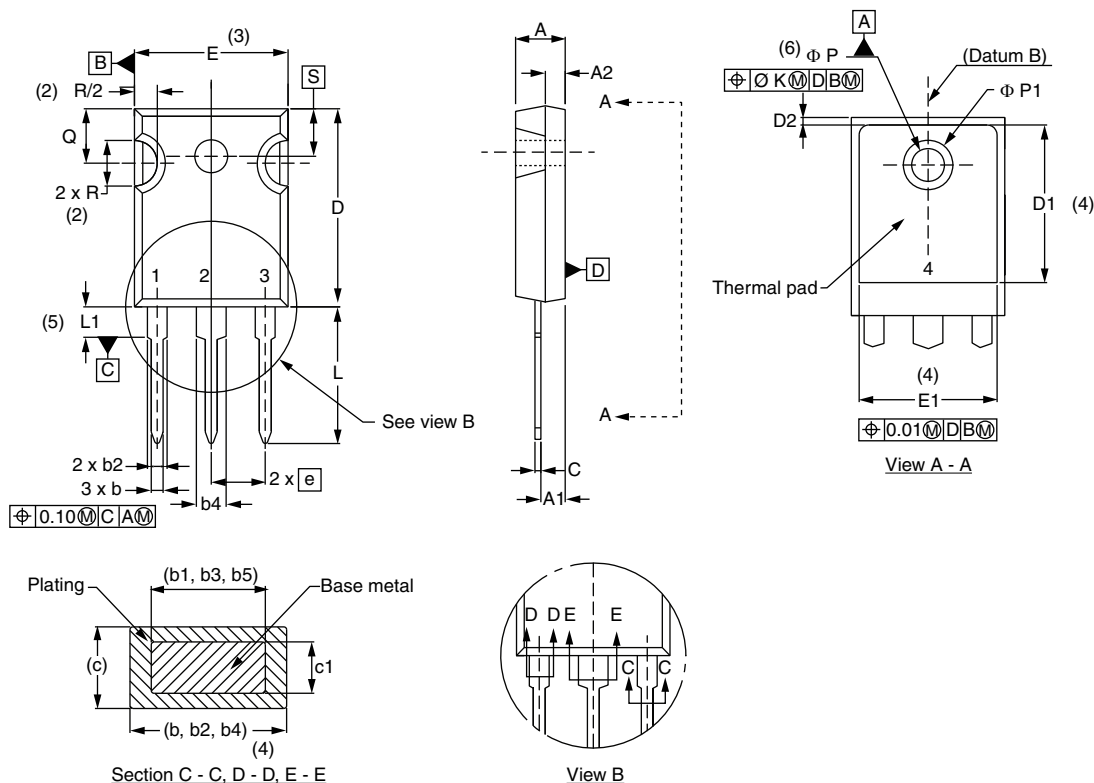
<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-MBR4045WTPbF	25	500	Antistatic plastic tube
VS-MBR4045WT-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95223">www.vishay.com/doc?95223</a>
Part marking information	TO-247AC PbF <a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a>
	TO-247AC -N3 <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>
SPIICE model	<a href="http://www.vishay.com/doc?95297">www.vishay.com/doc?95297</a>



## TO-247AC

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.72	-	0.540	-	
e	5.46 BSC		0.215 BSC		
$\Phi K$	2.54		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
$\Phi P$	3.56	3.66	0.14	0.144	
$\Phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

## Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6)  $\Phi P$  to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension c



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