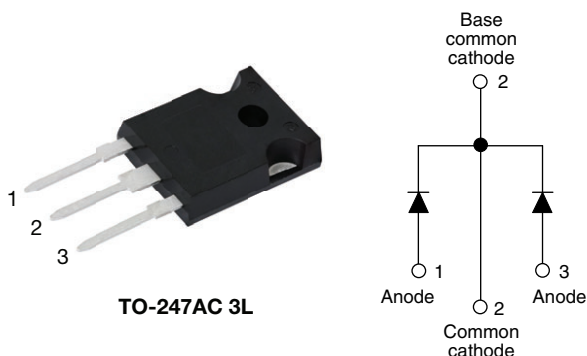


High Performance Schottky Rectifier, 2 x 20 A



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
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 20 A
V_R	45 V
V_F at I_F	0.56 V
I_{RM} max.	110 mA at 125 °C
T_J max.	150 °C
E_{AS}	20 mJ
Package	TO-247AC 3L
Circuit configuration	Common cathode

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}	$t_p = 5$ μ s sine	1020	A
V_F	20 A _{pk} , $T_J = 125$ °C	0.56	V
T_J	Range	-55 to +150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-MBR4045WT-N3	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	$I_{F(AV)}$	$T_C = 125$ °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, see fig. 7	I_{FSM}	5 μ s sine or 3 μ s rect. pulse	1020	
		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 μ 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	$V_{\text{FM}}^{(1)}$	20 A	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	0.59	V
		40 A		0.78	
		20 A	$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$	0.56	
		40 A		0.72	
Maximum instantaneous reverse current	$I_{\text{RM}}^{(1)}$	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	Rated DC voltage	1.75	mA
		$T_{\text{J}} = 100\text{ }^{\circ}\text{C}$		50	
		$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$		110	
Threshold voltage	$V_{\text{F(TO)}}$	$T_{\text{J}} = T_{\text{J maximum}}$		0.29	V
Forward slope resistance	r_{t}			10.3	mΩ
Maximum junction capacitance	C_{T}	$V_{\text{R}} = 5\text{ V}_{\text{DC}}$ (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/μs

Note

⁽¹⁾ Pulse width < 300 μs , duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction temperature range	T _J		-55 to 150	°C
Maximum storage temperature range	T _{Stg}		-55 to 175	
Maximum thermal resistance, junction to case per package	R _{thJC}	DC operation	1.4	°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 (lbf · in)
	maximum		12 (10)	
Device marking		Case style TO-247AC 3L	MBR4045WT	

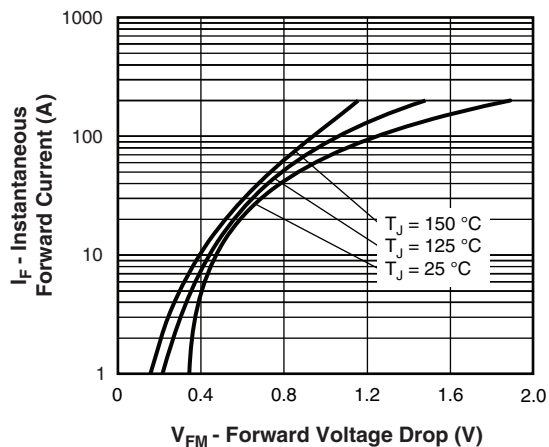


Fig. 1 - Maximum Forward Voltage Drop Characteristics

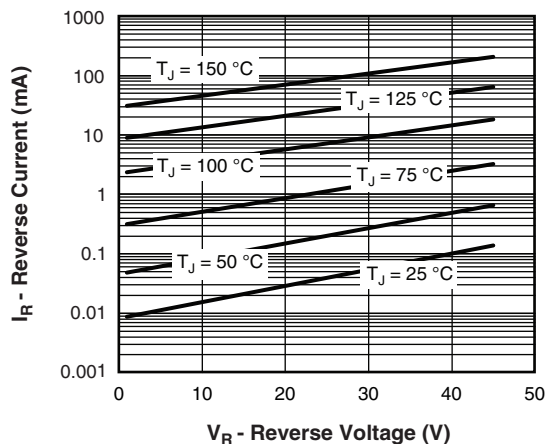


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

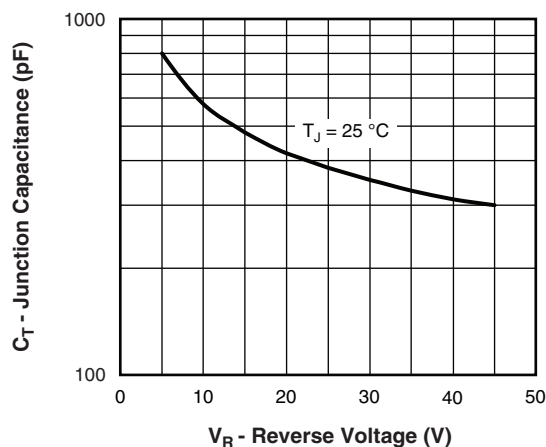
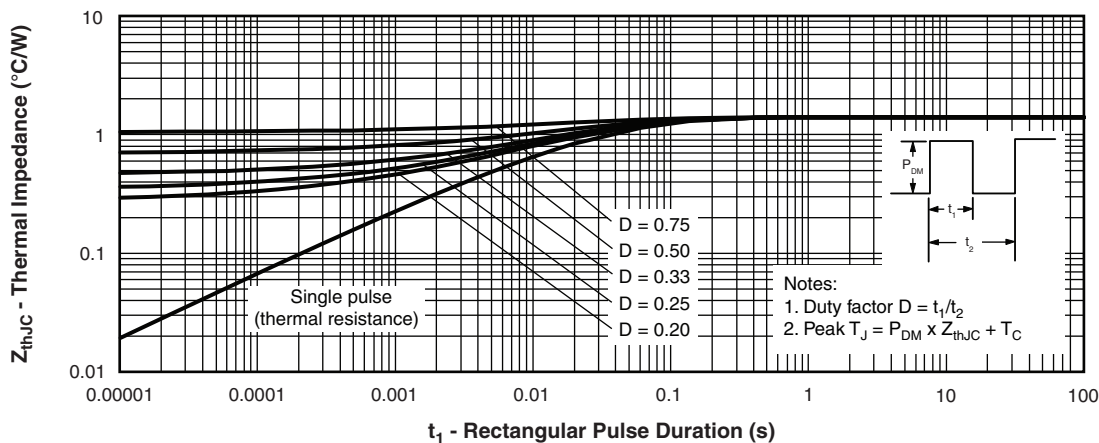


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

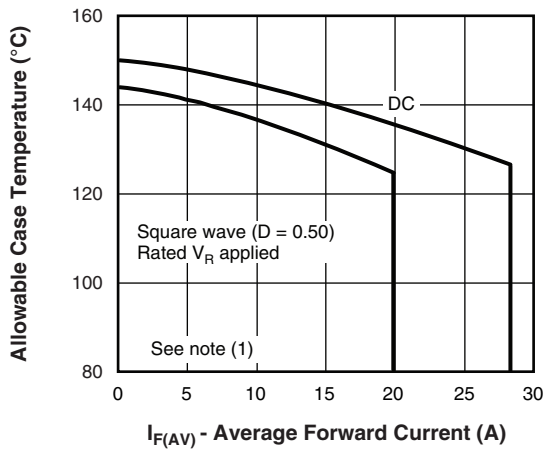


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

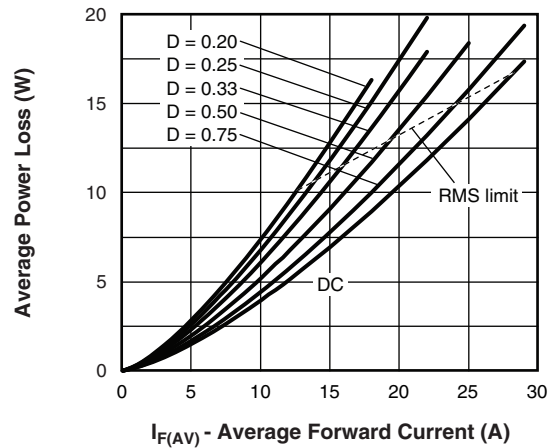


Fig. 6 - Forward Power Loss Characteristics

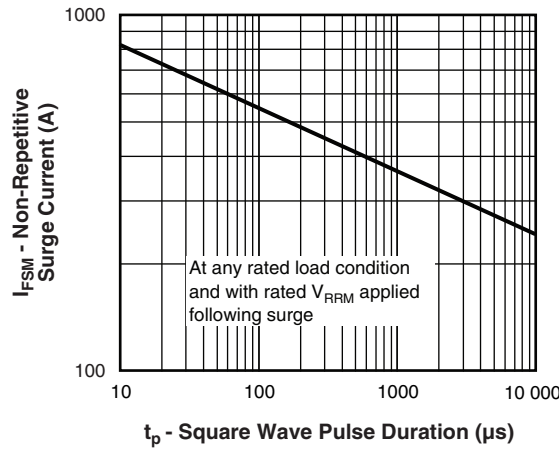


Fig. 7 - Maximum Non-Repetitive Surge Current

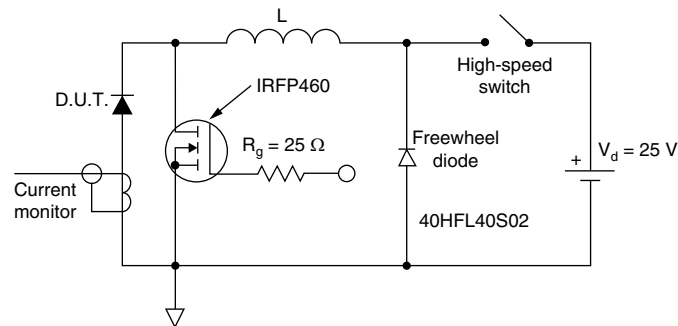


Fig. 8 - Unclamped Inductive Test Circuit

Note

- (2) 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	VS-	MBR	40	45	WT	-N3
	1	2	3	4	5	6

- 1** - Vishay Semiconductors product
- 2** - Schottky MBR series
- 3** - Current rating (40 = 40 A)
- 4** - Voltage rating (45 = 45 V)
- 5** - Circuit configuration:
Center tap (dual) TO-247
- 6** - Environmental digit
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-MBR4045WT-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?96138
Part marking information	www.vishay.com/doc?95007
SPICE model	www.vishay.com/doc?95297

TO-247AC 3L

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	1.17	1.37	0.046	0.054	
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	1.35	0.020	0.053	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
Ø P	3.56	3.66	0.14	0.144	
Ø P1	-	7.39	-	0.291	
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) Ø 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 Q



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