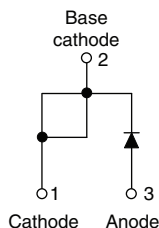




## High Performance Schottky Rectifier, 16 A



TO-220AC



## FEATURES

- 150 °C  $T_J$  operation
- 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](http://www.vishay.com/doc?99912)



## PRODUCT SUMMARY

Package	TO-220AC
$I_{F(AV)}$	16 A
$V_R$	35 V, 45 V
$V_F$ at $I_F$	0.57 V
$I_{RM}$ max.	40 mA at 125 °C
$T_J$ max.	150 °C
Diode variation	Single die
$E_{AS}$	24 mJ

## DESCRIPTION

The VS-MBR16... Schottky rectifier has been optimized for low reverse leakage at high temperature. 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	16	A
$V_{RRM}$		35, 45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	1800	A
$V_F$	16 A <sub>pk</sub> , $T_J = 125$ °C	0.57	V
$T_J$	Range	-65 to +150	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-MBR1635PbF	VS-MBR1635-N3	VS-MBR1645PbF	VS-MBR1645-N3	UNITS
Maximum DC reverse voltage	$V_R$	35	35	45	45	V
Maximum working peak reverse voltage	$V_{RWM}$					

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 134$ °C, rated $V_R$	16	A
Non-repetitive peak surge current	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	1800	A
		Following any rated load condition and with rated $V_{RRM}$ applied		
		Surge applied at rated load condition half wave single phase, 60 Hz	150	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 3.6$ A, $L = 3.7$ mH	24	mJ
Repetitive avalanche current	$I_{AR}$	Current decaying linearly to zero in 1 $\mu s$ Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical	3.6	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	V <sub>FM</sub> <sup>(1)</sup>	16 A	T <sub>J</sub> = 25 °C	0.63	V
			T <sub>J</sub> = 125 °C	0.57	
Maximum instantaneous reverse current	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 25 °C	Rated DC voltage	0.2	mA
		T <sub>J</sub> = 125 °C		40	
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		1400	pF
Typical series inductance	L <sub>S</sub>	Measured from top of terminal to mounting plane		8.0	nH
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>		10 000	V/μs

**Note**

<sup>(1)</sup> 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>		-65 to +150	°C
Maximum storage temperature range	T <sub>Stg</sub>		-65 to +175	
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation	1.50	°C/W
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased	0.50	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220AC (JEDEC)	MBR1635	
			MBR1645	

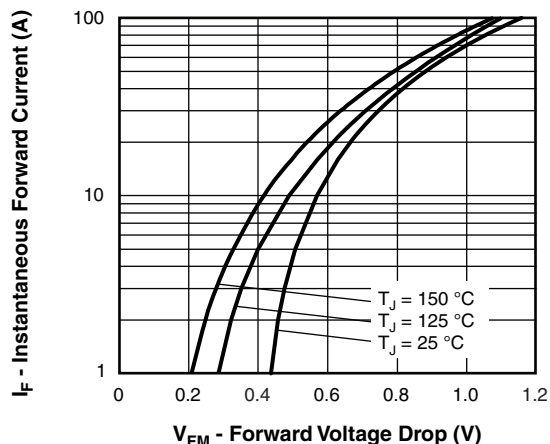


Fig. 1 - Maximum Forward Voltage Drop Characteristics

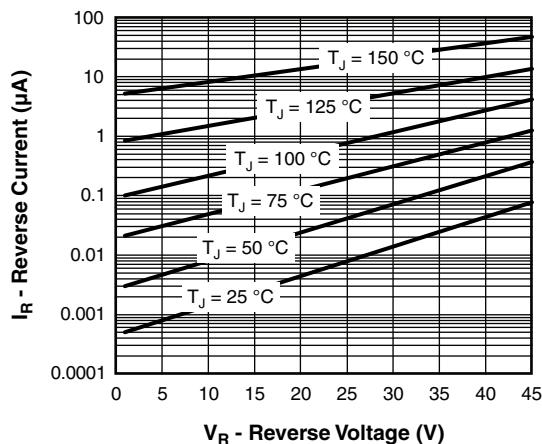


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

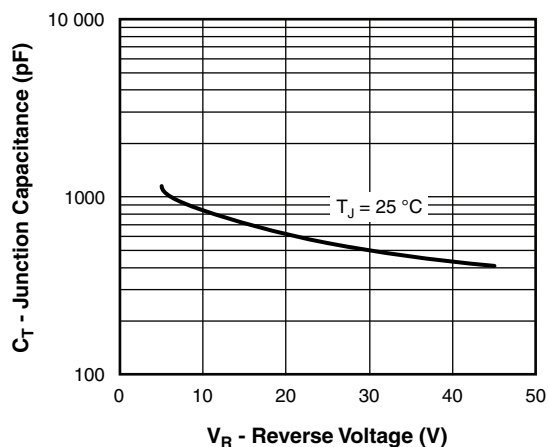


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

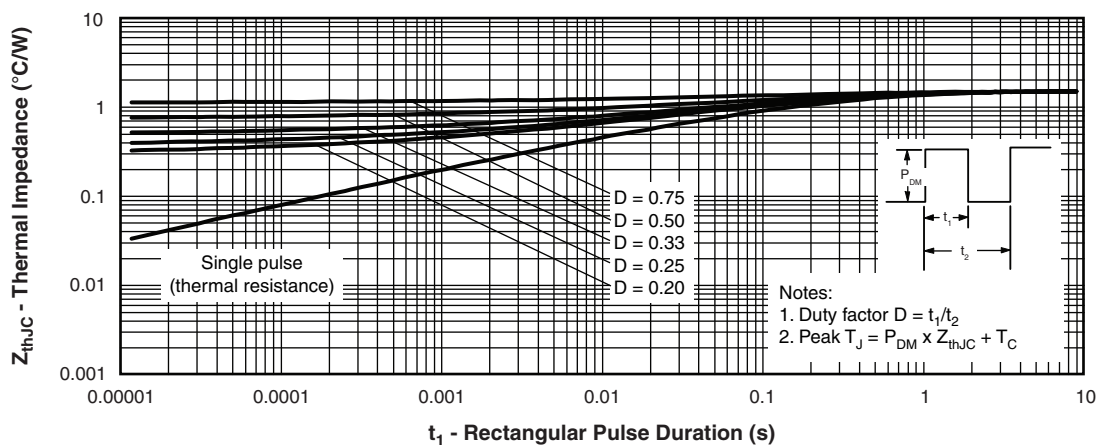


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

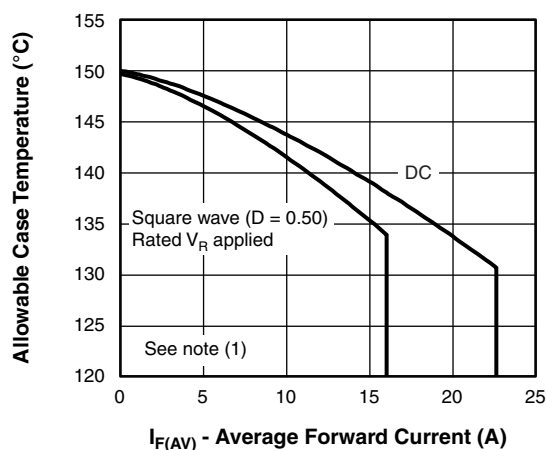


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

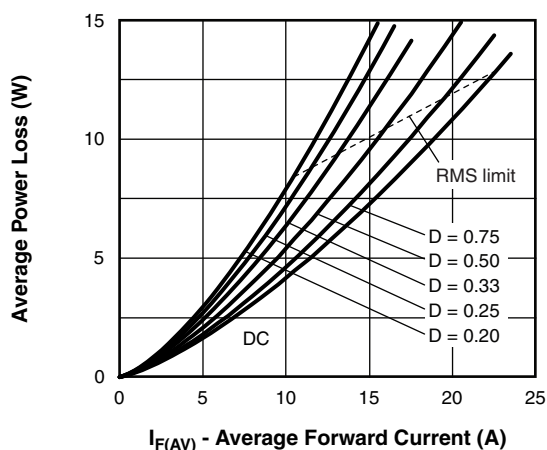


Fig. 6 - Forward Power Loss Characteristics

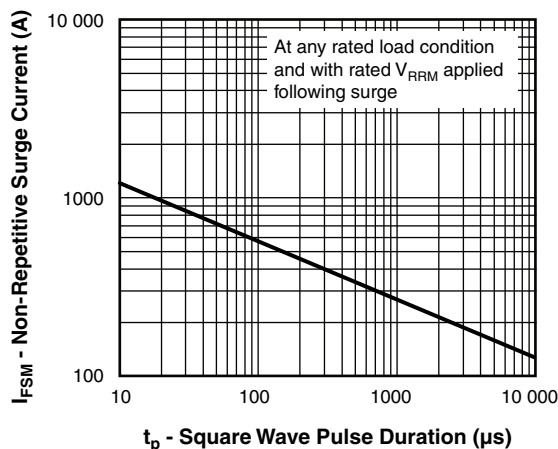


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

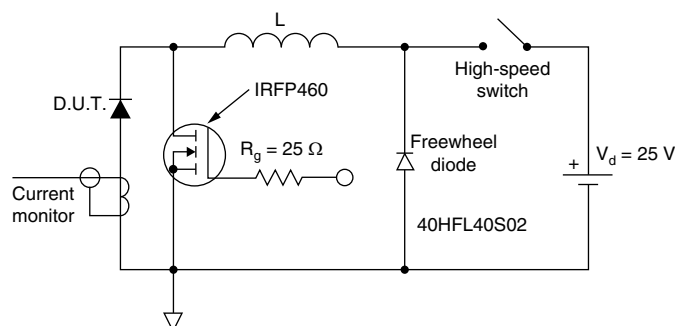


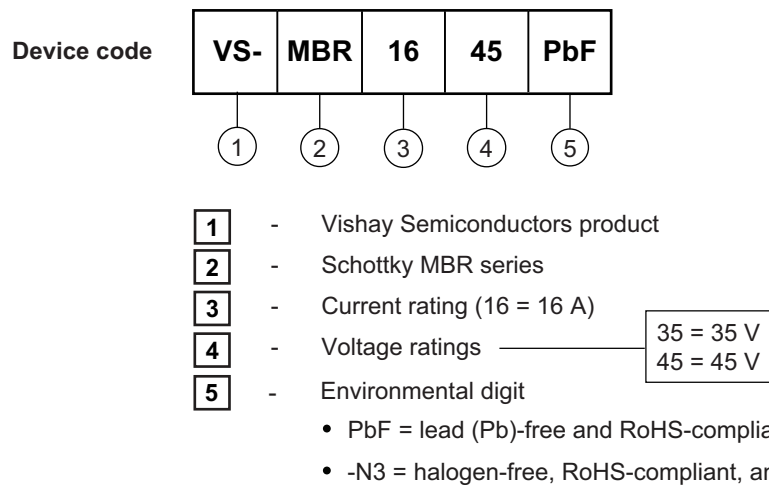
Fig. 8 - Unclamped Inductive Test Circuit

#### 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  $V_R$  applied



## ORDERING INFORMATION TABLE



ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-MBR1635PbF	50	1000	Antistatic plastic tube
VS-MBR1635-N3	50	1000	Antistatic plastic tube
VS-MBR1645PbF	50	1000	Antistatic plastic tube
VS-MBR1645-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions		<a href="http://www.vishay.com/doc?95221">www.vishay.com/doc?95221</a>
Part marking information	TO-220AC PbF	<a href="http://www.vishay.com/doc?95224">www.vishay.com/doc?95224</a>
	TO-220AC -N3	<a href="http://www.vishay.com/doc?95068">www.vishay.com/doc?95068</a>

### TO-220AC

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	
θ	90° to 93°		90° to 93°		

#### Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1 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) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimension: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline



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