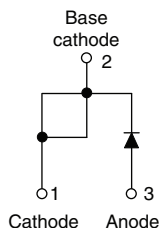


## Schottky Rectifier, 7.5 A


**TO-220AC**


### FEATURES

- 150 °C  $T_J$  operation
- High frequency operation
- Low forward voltage drop
- 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-220AC
$I_{F(AV)}$	7.5 A
$V_R$	35 V, 45 V
$V_F$ at $I_F$	0.57 V
$I_{RM}$ max.	15 mA at 125 °C
$T_J$ max.	150 °C
Diode variation	Single die
$E_{AS}$	7 mJ

### DESCRIPTION

The VS-MBR7... 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	7.5	A
$V_{RRM}$		35/45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	690	A
$V_F$	7.5 A <sub>pk</sub> , $T_J = 125$ °C	0.57	V
$T_J$	Range	- 65 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-MBR735PbF	VS-MBR735-N3	VS-MBR745PbF	VS-MBR745-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	$I_{F(AV)}$	$T_C = 131$ °C, rated $V_R$		7.5	A
Non-repetitive peak surge current	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied	690	A
		Surge applied at rated load condition half wave single phase 60 Hz		150	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 2$ A, $L = 3.5$ mH		7	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		2	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	$V_{\text{FM}}^{(1)}$	15 A	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	0.84	V
		7.5 A	$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$	0.57	
		15 A		0.72	
Maximum instantaneous reverse current	$I_{\text{RM}}^{(1)}$	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	Rated DC voltage	0.1	mA
		$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$		15	
Maximum junction capacitance	$C_{\text{T}}$	$V_{\text{R}} = 5\text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$		400	pF
Typical series inductance	$L_{\text{S}}$	Measured from top of terminal to mounting plane		8.0	nH
Maximum voltage rate of change	dV/dt	Rated $V_{\text{R}}$		1000	V/ $\mu$ s

**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	3.0	°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 maximum		6 (5)	kgf · cm (lbf · in)
			12 (10)	
Marking device		Case style TO-220AC	MBR735	
			MBR745	

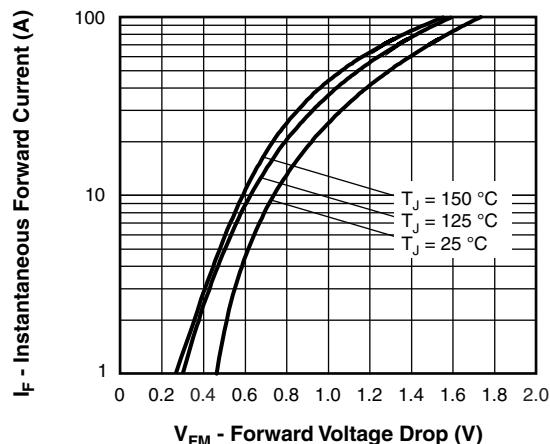


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

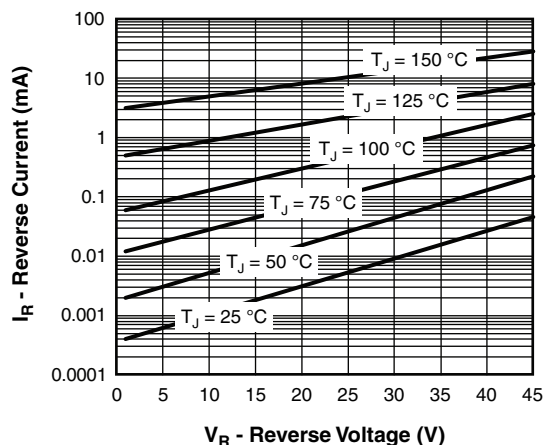


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

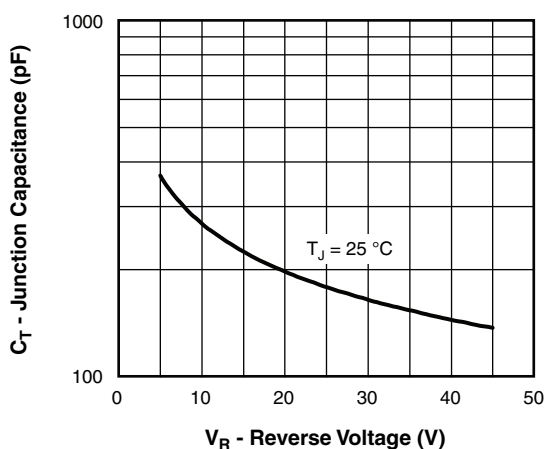


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

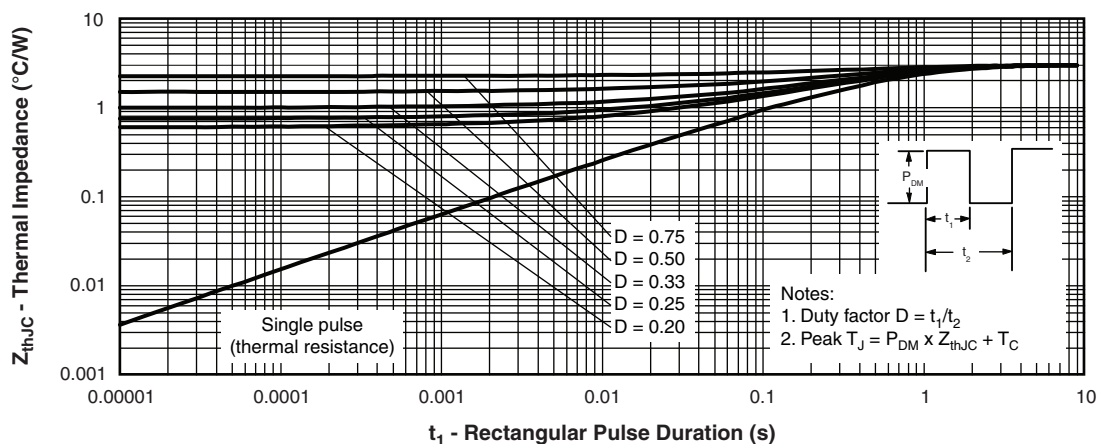


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

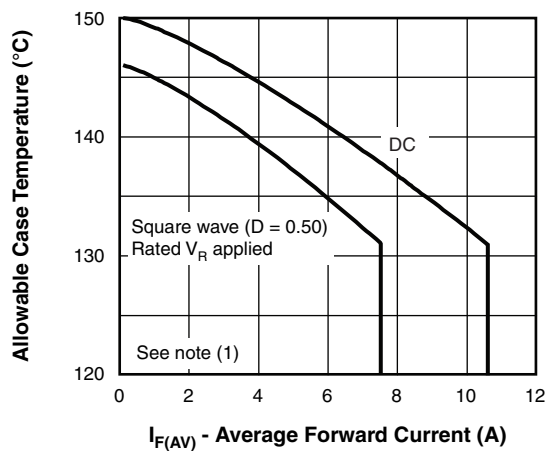


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

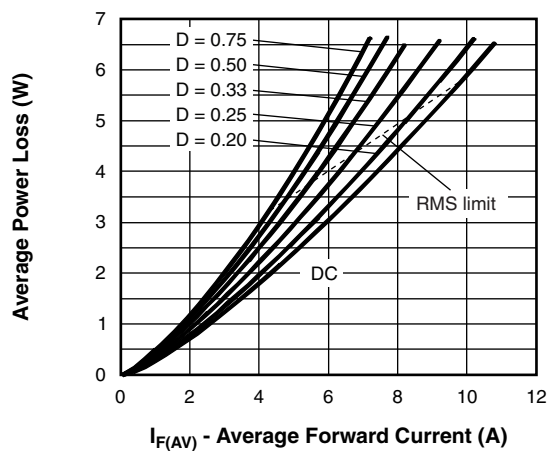


Fig. 6 - Forward Power Loss Characteristics

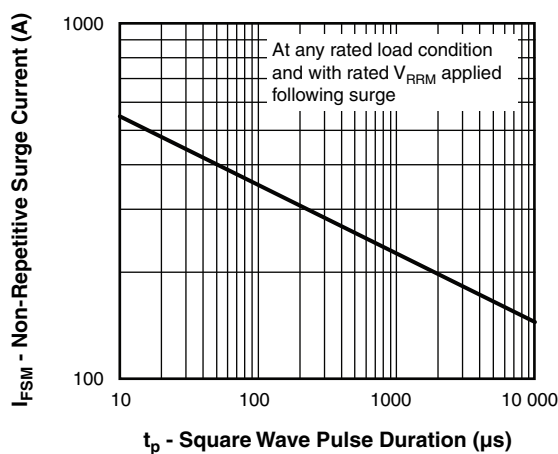
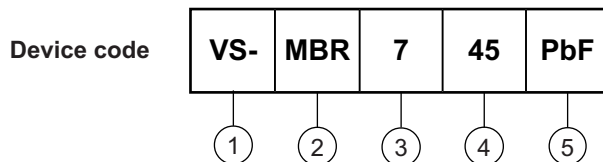


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

## 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**

- |   |                                 |
|---|---------------------------------|
| 1 | - Vishay Semiconductors product |
| 2 | - Schottky MBR series           |
| 3 | - Current rating (7.5 A)        |
| 4 | - Voltage ratings               |
| 5 | - Environmental digit           |
- 35 = 35 V

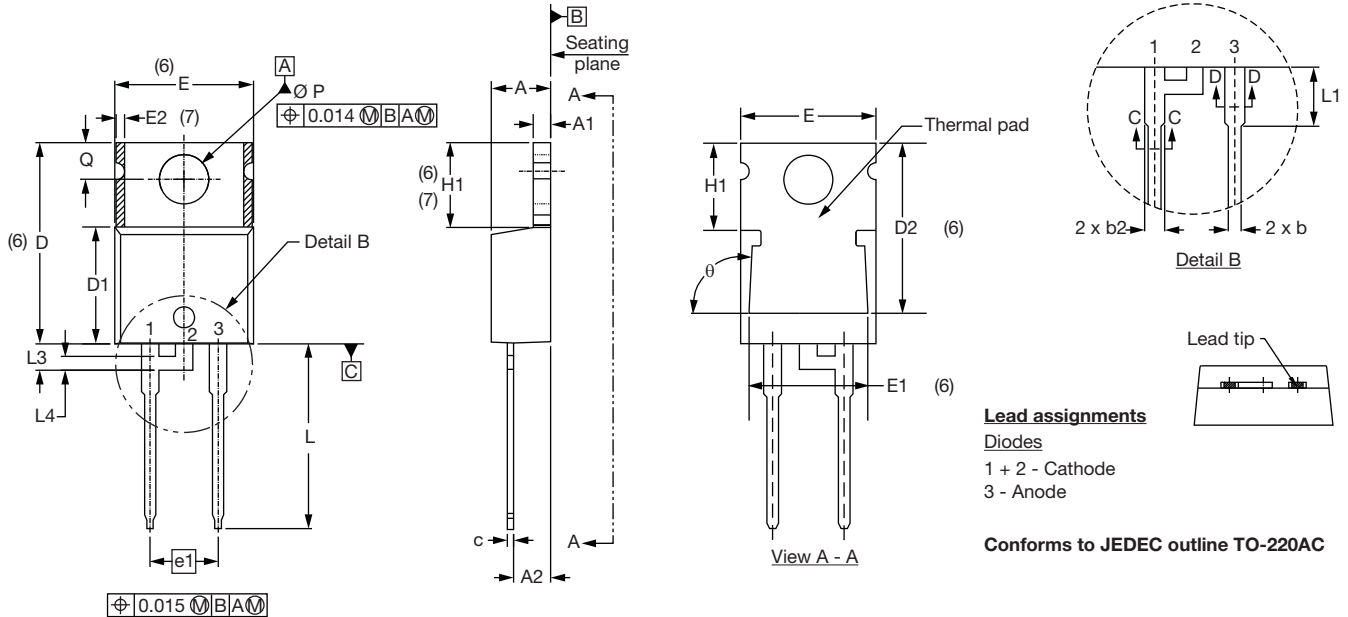
45 = 45 V
- PbF = Lead (Pb)-free and RoHS compliant
  - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-MBR735PbF	50	1000	Antistatic plastic tube
VS-MBR735-N3	50	1000	Antistatic plastic tube
VS-MBR745PbF	50	1000	Antistatic plastic tube
VS-MBR745-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>
SPICE model	<a href="http://www.vishay.com/doc?95298">www.vishay.com/doc?95298</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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