

## Schottky Rectifier, 3.0 A



SMC



### FEATURES

- Small foot print, surface mountable
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level


**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

$I_{F(AV)}$	3.0 A
$V_R$	20 V
$I_{RM}$	35 mA at 125 °C

### DESCRIPTION

The VS-MBRS320TRPbF surface mount Schottky rectifier has been designed for applications requiring low forward drop and small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	3.0	A
$V_{RRM}$		20	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	820	A
$V_F$	3.0 Apk, $T_J = 125 \text{ °C}$	0.36	V
$T_J$	Range	- 65 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-MBRS320TRPbF	UNITS
Maximum DC reverse voltage	$V_R$	20	V
Maximum working peak reverse voltage	$V_{RWM}$		

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	50 % duty cycle at $T_L = 136 \text{ °C}$ , rectangular waveform	3.0	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	820	
		10 ms sine or 6 ms rect. pulse	80	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25 \text{ °C}$ , $I_{AS} = 1.0 \text{ A}$ , $L = 8 \text{ mH}$	4	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	1.0	A

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS
Maximum forward voltage drop	$V_{FM}^{(1)}$	3 A	$T_J = 25\text{ }^\circ\text{C}$	0.41	0.45	V
		6 A		0.45	0.53	
		3 A	$T_J = 125\text{ }^\circ\text{C}$	0.29	0.36	
		6 A		0.35	0.46	
Maximum reverse leakage current	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	0.04	0.5	mA
		$T_J = 100\text{ }^\circ\text{C}$		8.0	20	
		$T_J = 125\text{ }^\circ\text{C}$		23	35	
Typical junction capacitance	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$		360	-	pF
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body		3.0	-	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 and storage temperature range	$T_J^{(1)}, T_{Stg}$		- 65 to 150	$^\circ\text{C}$
Maximum thermal resistance, junction to lead	$R_{thJL}^{(2)}$	DC operation	12	$^\circ\text{C}/\text{W}$
Maximum thermal resistance, junction to ambient	$R_{thJA}$		46	
Approximate weight			0.24	g
			0.008	oz.
Marking device		Case style SMC (similar to DO-214AB)	V32	

**Notes**

(1)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$  thermal runaway condition for a diode on its own heatsink

(2) Mounted 1" square PCB

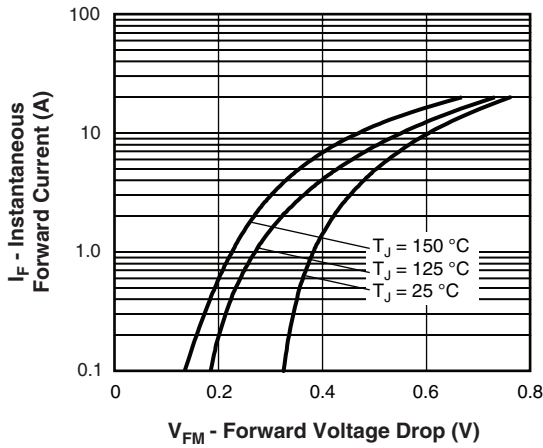


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

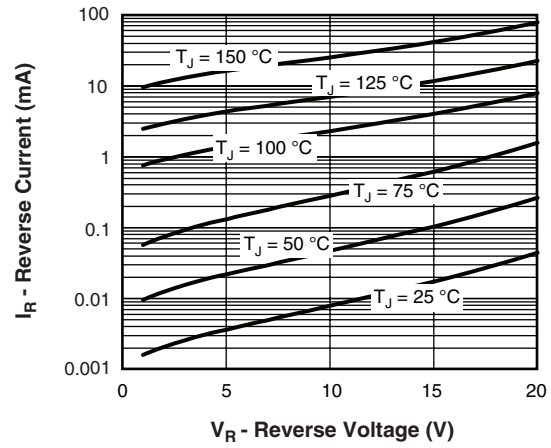


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

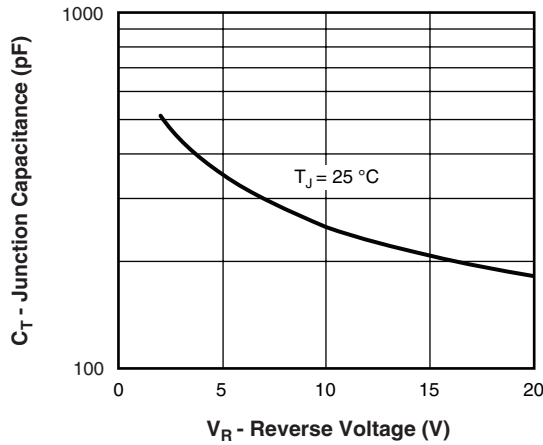


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

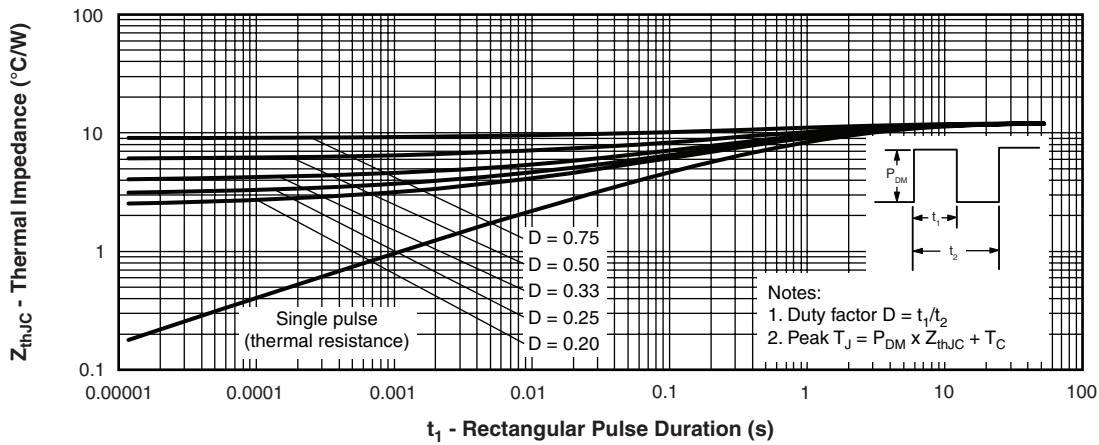


Fig. 4 - - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

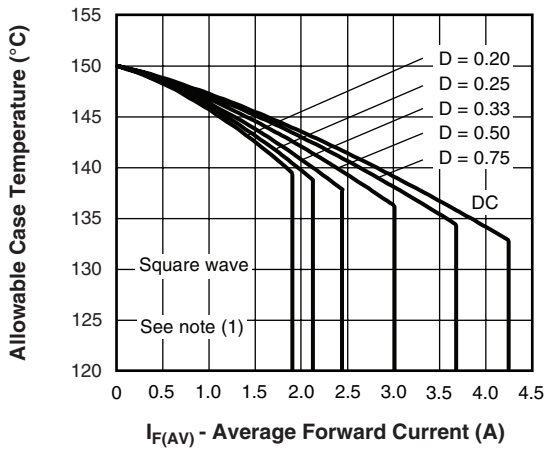


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

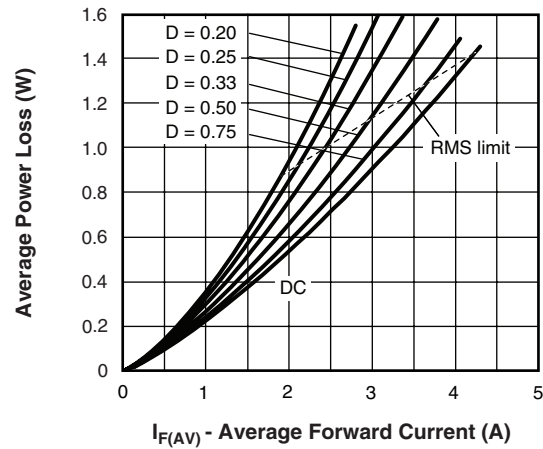


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

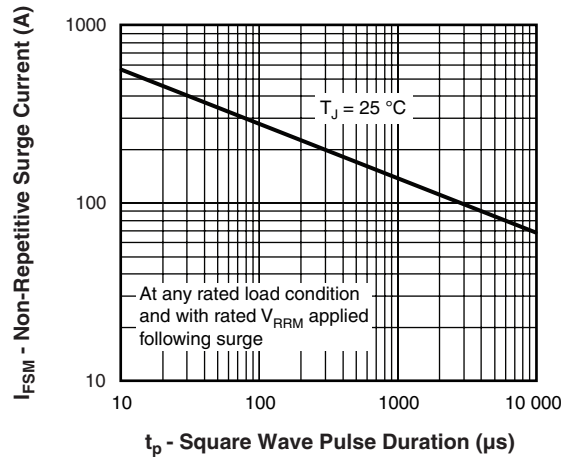


Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

**Note**

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



### ORDERING INFORMATION TABLE

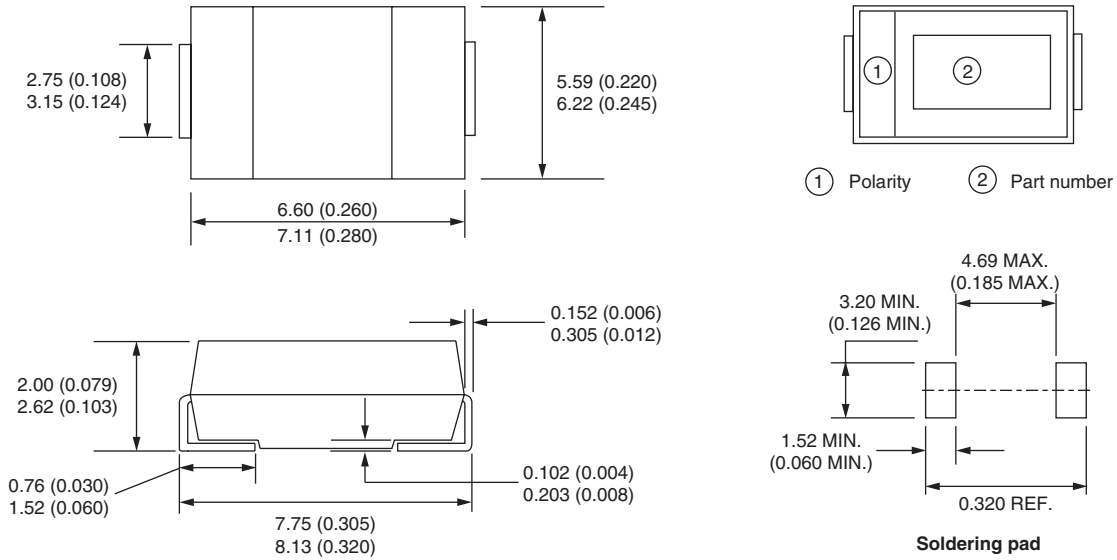
Device code	<b>VS-</b>	<b>MBR</b>	<b>S</b>	<b>3</b>	<b>20</b>	<b>TR</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - HPP product suffix
- 2** - Schottky MBR series
- 3** - S = SMC
- 4** - Current rating (3 = 3 A)
- 5** - Voltage rating (20 = 20 V)
- 6** - TR = Tape and reel (3000 pieces)
- 7** - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95023">www.vishay.com/doc?95023</a>
Part marking information	<a href="http://www.vishay.com/doc?95029">www.vishay.com/doc?95029</a>
Packaging information	<a href="http://www.vishay.com/doc?95034">www.vishay.com/doc?95034</a>

## SMC

**DIMENSIONS** in millimeters (inches)





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