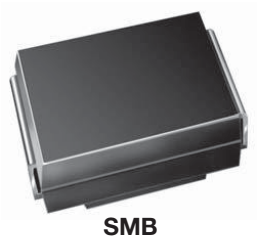
High Performance Schottky Rectifier, 1.0 A



SMB

FEATURES

- Small foot print, surface mountable
- 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

DESCRIPTION

The VS-MBRS140-M3 surface mount Schottky rectifier has been designed for applications requiring low forward drop and very small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

PRODUCT SUMMARY	
Package	SMB
$I_{F(AV)}$	1.0 A
V_R	40 V
V_F at I_F	0.53 V
I_{RM} max.	4.0 mA at 125 °C
T_J max.	125 °C
Diode variation	Single die
E_{AS}	3.0 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	1.0	A
V_{RRM}		40	V
I_{FSM}	t_p = 5 µs sine	380	A
V_F	1.0 A_{pk}, T_J = 125 °C	0.53	V
T_J	Range	-55 to +150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-MBRS140-M3	UNITS
Maximum DC reverse voltage	V_R	40	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 = 119 °C, rectangular waveform		1.0	A
Maximum peak one cycle non-repetitive surge current	I_{FSM}	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	380	
		10 ms sine or 6 ms rect. pulse		40	
Non-repetitive avalanche energy	E_{AS}	T_J = 25 °C, I_{AS} = 1 A, L = 6 mH		3.0	mJ
Repetitive avalanche current	I_{AR}	Current decaying linearly to zero in 1 µs Frequency limited by T_J maximum V_A = 1.5 x V_R typical		1.0	A

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS
Maximum forward voltage drop	V_{FM} (1)	1 A	T_J = 25 °C	0.52	0.6	V
		2 A		0.70	0.77	
		1 A	T_J = 125 °C	0.48	0.53	
		2 A		0.63	0.71	
Maximum reverse leakage current	I_{RM} (1)	T_J = 25 °C	V_R = Rated V_R	-	0.1	mA
		T_J = 125 °C		-	4.0	
Maximum junction capacitance	C_T	V_R = 5 V_{DC} (test signal range 100 kHz to 1 MHz), 25 °C		-	80	pF
Typical series inductance	L_S	Measured lead to lead 5 mm from package body		-	2.0	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 and storage temperature range	T_J (1), T_{Stg}		-55 to +150	°C
Maximum thermal resistance, junction to lead	R_{thJL} (2)	DC operation See fig. 4	36	°C/W
Maximum thermal resistance, junction to ambient	R_{thJA}	DC operation	80	
Approximate weight			0.10	g
			0.003	oz.
Marking device		Case style SMB (similar to DO-214AA)	14	

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

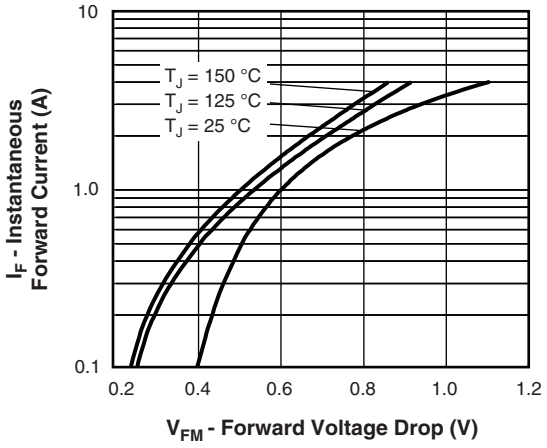


Fig. 1 - Maximum Forward Voltage Drop Characteristics

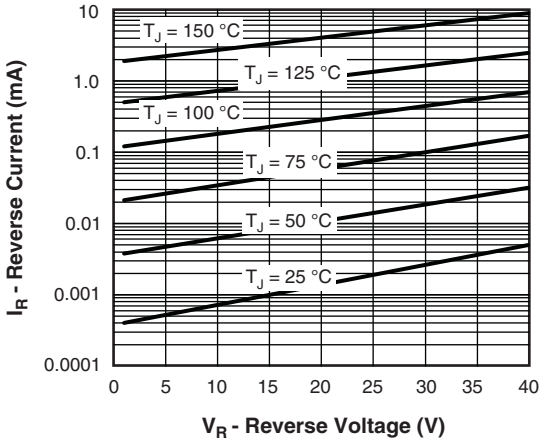


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

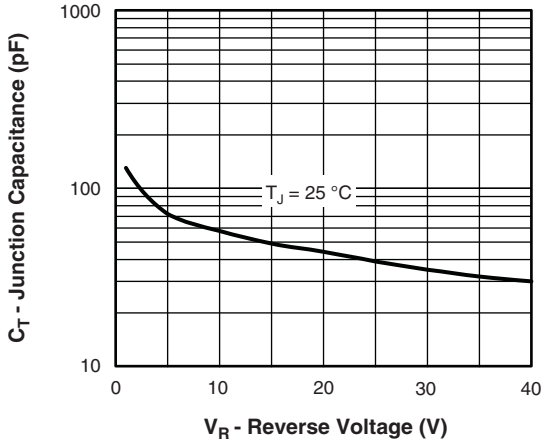


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

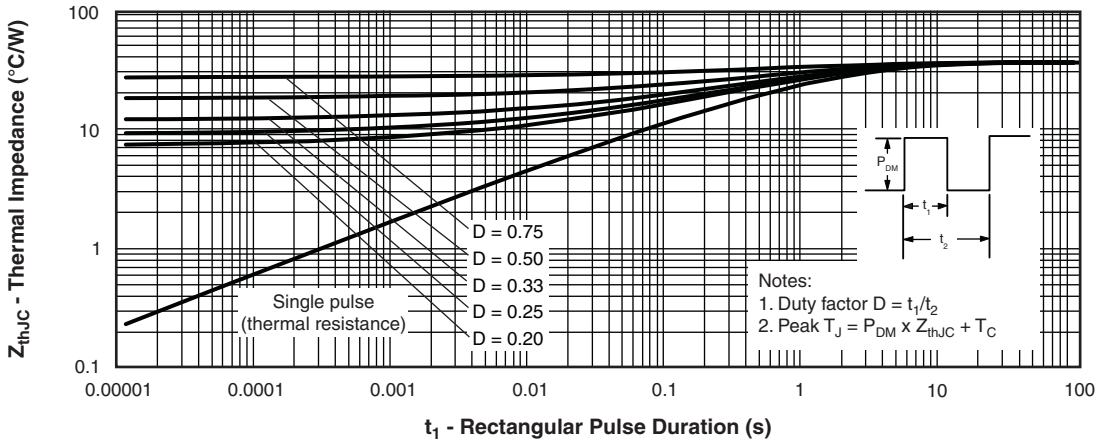


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

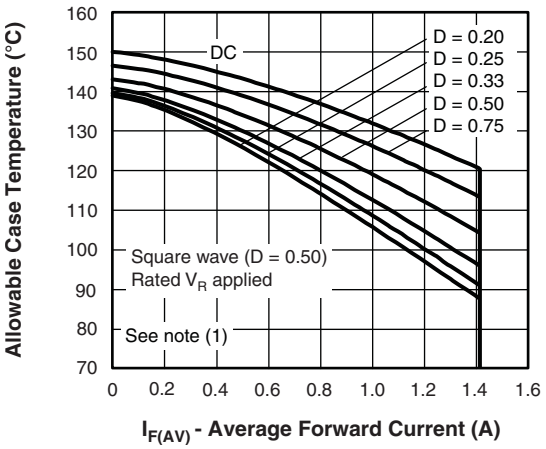


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

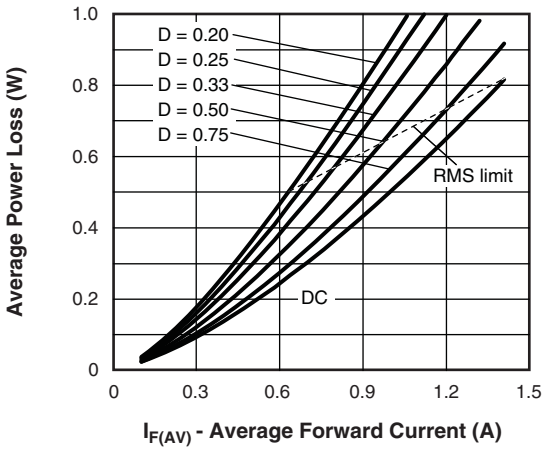


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

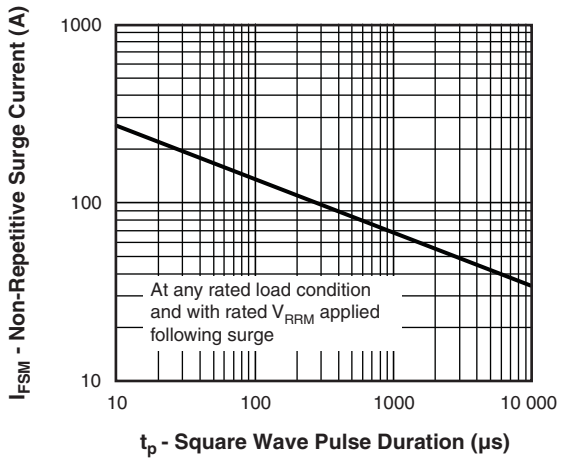


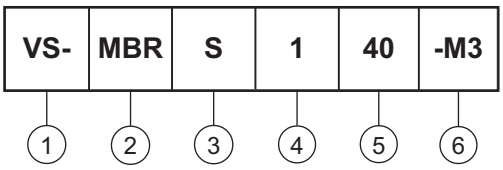
Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6);
Pd_{REV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = 80 % rated V_R

ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors products
2 - Schottky MBR series
3 - S = SMB
4 - Current rating (1 = 1 A)
5 - Voltage rating (40 = 40 V)
6 - -M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

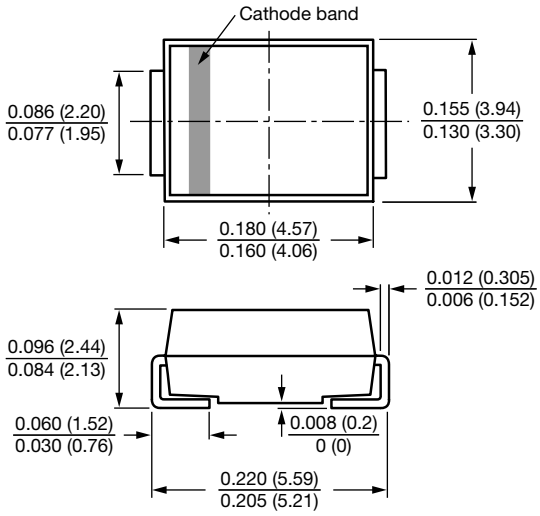
ORDERING INFORMATION (Example)			
PREFERRED P/N	**PREFERRED PACKAGE CODE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-MBRS140-M3/5BT	5BT	3200	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95401
Part marking information	www.vishay.com/doc?95403
Packaging information	www.vishay.com/doc?95404
SPICE model	www.vishay.com/doc?95299

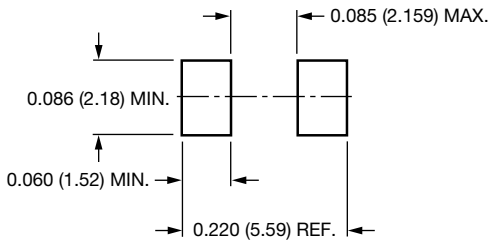
SMB

DIMENSIONS in inches (millimeters)

DO-214AA (SMB)



Mounting Pad Layout



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