

## High Performance Schottky Rectifier, 1 A



SMB (DO-214AA)



### FEATURES

- Low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability
- Small foot print, surface mountable
- High frequency operation
- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### DESCRIPTION

The VS-10BQ100-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.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	1 A
$V_R$	100 V
$V_F$ at $I_F$	0.59 V
$I_{RM}$	1 mA at 125 °C
$T_J$ max.	175 °C
$E_{AS}$	1.0 mJ
Package	SMB (DO-214AA)
Circuit configuration	Single

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	1	A
$V_{RRM}$		100	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	780	A
$V_F$	1.0 Apk, $T_J = 125 \text{ °C}$	0.59	V
$T_J$	Range	-55 to +175	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-10BQ100-M3	UNITS
Maximum DC reverse voltage	$V_R$	100	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 $T_L = 143 \text{ °C}$ , rectangular waveform		1.0	A
Maximum peak one cycle non-repetitive 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	780	A
		10 ms sine or 6 ms rect. pulse		38	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25 \text{ °C}$ , $I_{AS} = 0.5 \text{ A}$ , $L = 8 \text{ mH}$		1.0	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		0.5	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	1 A	$T_J = 25\text{ }^\circ\text{C}$	0.75	V
		2 A		0.82	
		1 A	$T_J = 125\text{ }^\circ\text{C}$	0.59	
		2 A		0.65	
Maximum reverse leakage current See fig. 2	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	0.5	mA
		$T_J = 125\text{ }^\circ\text{C}$		1	
Typical junction capacitance	$C_T$	$V_R = 5 V_{DC}$ , (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$		65	pF
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body		2.0	nH
Maximum voltage rate of charge	$dV/dt$	Rated $V_R$		10 000	V/ $\mu\text{s}$

**Note**

(1) Pulse width = 300  $\mu\text{s}$ , 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 175	$^\circ\text{C}$
Maximum thermal resistance, junction to lead	$R_{thJL}^{(2)}$	DC operation		36	$^\circ\text{C/W}$
Maximum thermal resistance, junction to ambient	$R_{thJA}$			80	
Approximate weight				0.10	g
				0.003	oz.
Marking device		Case style SMB (DO-214AA)		1J	

**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

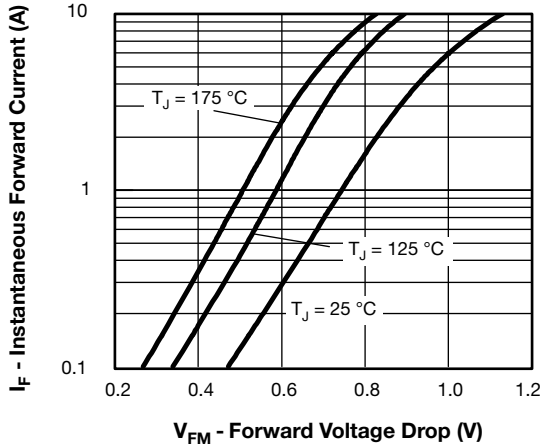


Fig. 1 - Maximum Forward Voltage Drop Characteristics

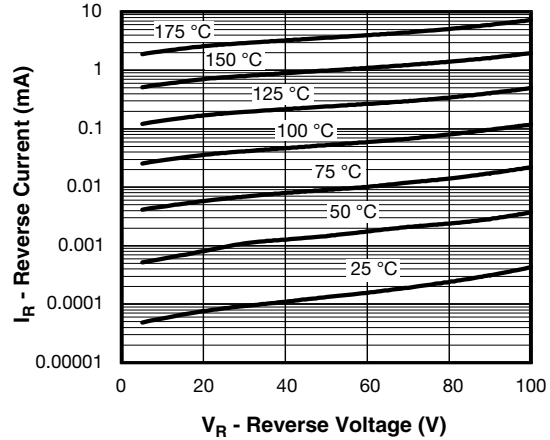


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

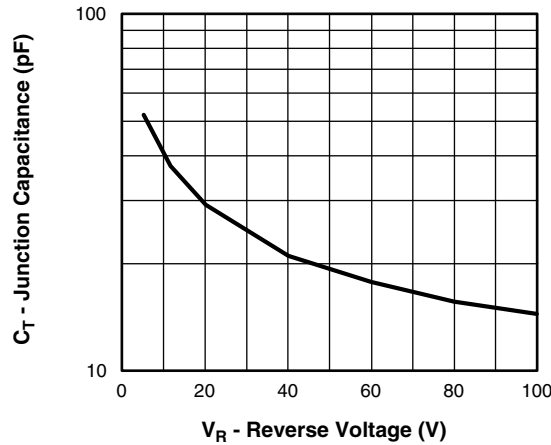


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

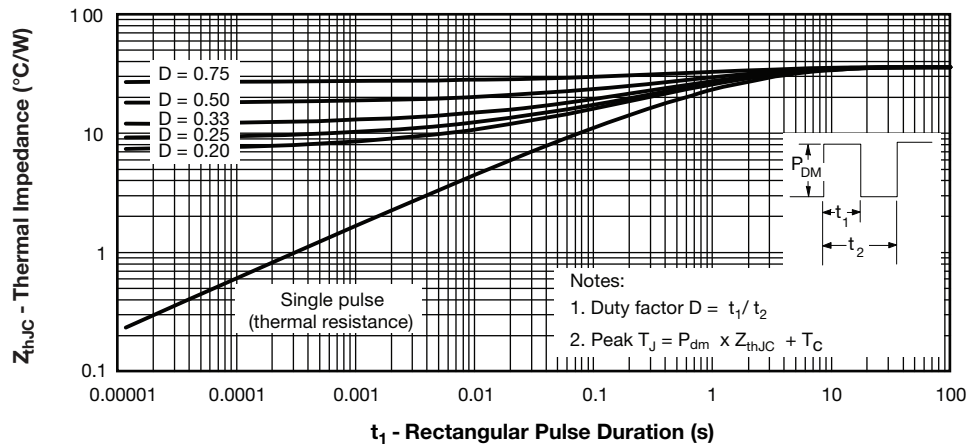


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

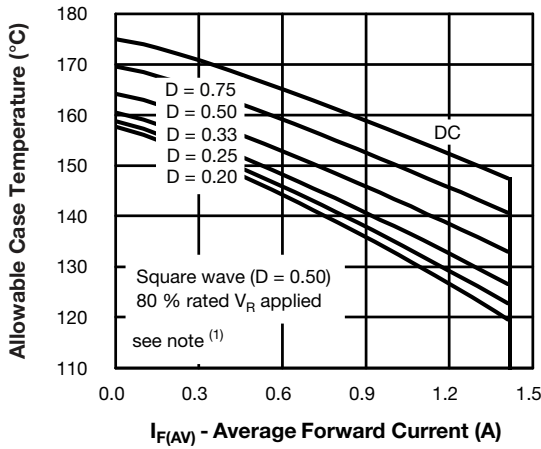


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

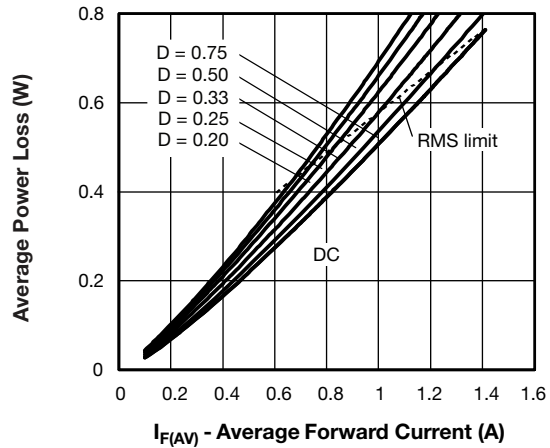


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

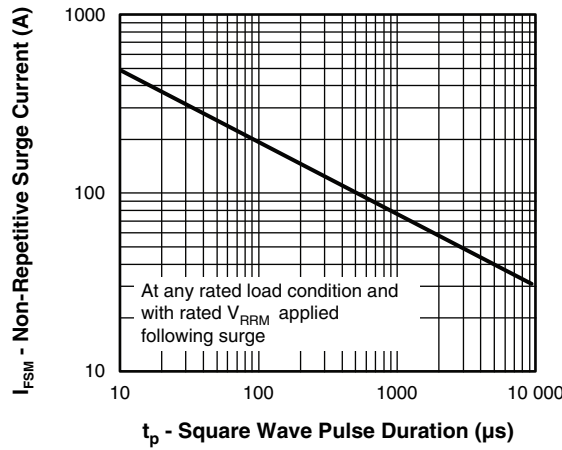


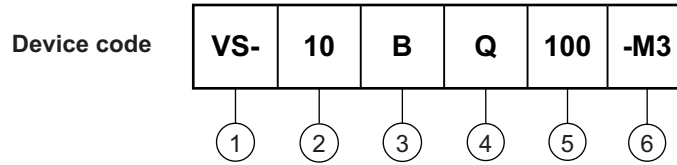
Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

**Note**

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



**ORDERING INFORMATION TABLE**



- 1** - Vishay Semiconductors product
- 2** - Current rating
- 3** - B = SMB
- 4** - Q = Schottky "Q" series
- 5** - Voltage rating (100 = 100 V)
- 6** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant and terminations lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	PREFERRED PACKAGE CODE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-10BQ100-M3/5BT	5BT	3200	13" diameter plastic tape and reel

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95401">www.vishay.com/doc?95401</a>
Part marking information	<a href="http://www.vishay.com/doc?95403">www.vishay.com/doc?95403</a>
Packaging information	<a href="http://www.vishay.com/doc?95404">www.vishay.com/doc?95404</a>
SPICE model	<a href="http://www.vishay.com/doc?96603">www.vishay.com/doc?96603</a>



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