

# High Performance Schottky Rectifier, 1.0 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
- Meets JESD 201 class 2 whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?999912](http://www.vishay.com/doc?999912)



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

## DESCRIPTION / APPLICATIONS

The VS-10BQ060HM3 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

$I_{F(AV)}$	1.0 A
$V_R$	60 V
$V_F$ at $I_F$	0.42 V
$I_{RM}$	8 mA at 125 °C
$T_J$ max.	150 °C
$E_{AS}$	2.0 mJ
Package	SMB (DO-214AA)
Circuit configuration	Single

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	1.0	A
$V_{RRM}$		60	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	700	A
$V_F$	1.0 A <sub>pk</sub> , $T_J = 125$ °C	0.42	V
$T_J$	Range	-55 to +150	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-10BQ060HM3	UNITS
Maximum DC reverse voltage	$V_R$	60	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 $T_L = 116$ °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	700	A
		10 ms sine or 6 ms rect. pulse	42	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 1$ A, $L = 4$ mH	2.0	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	1.0	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	1 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.49	V
		2 A		0.60	
		1 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.42	
		2 A		0.56	
Maximum reverse leakage current See fig. 2	$I_{RM}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_R$	0.1	mA
		$T_J = 125\text{ }^{\circ}\text{C}$		8.0	
Typical junction capacitance	$C_T$	$V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$		80	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 +150	$^{\circ}\text{C}$
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)	1H	

**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

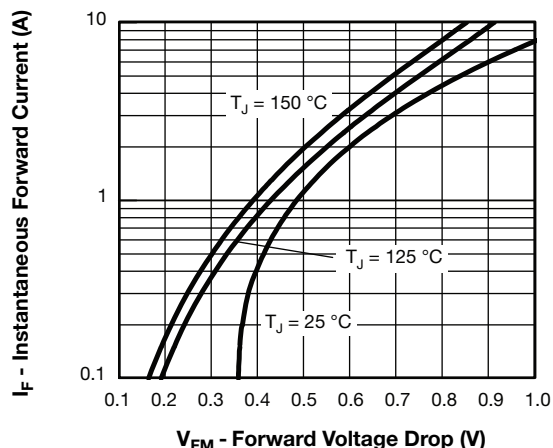


Fig. 1 - Maximum Forward Voltage Drop Characteristics

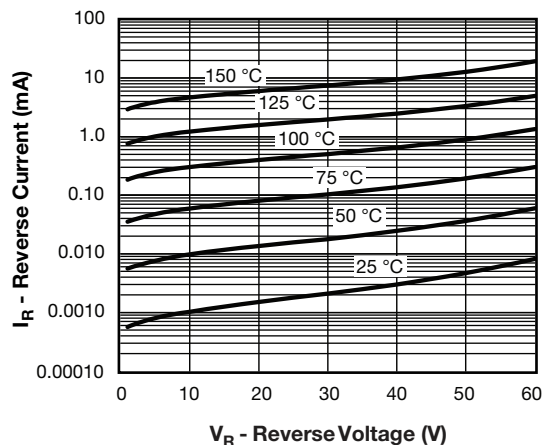


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

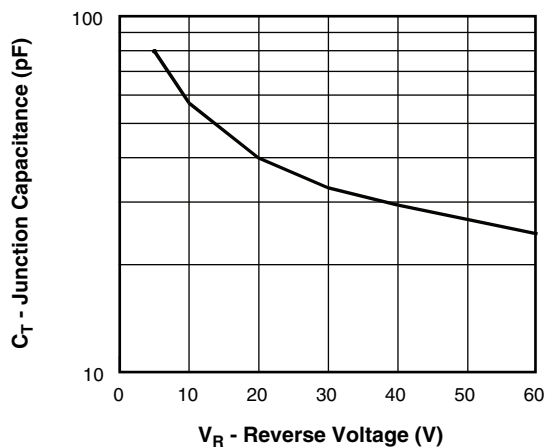
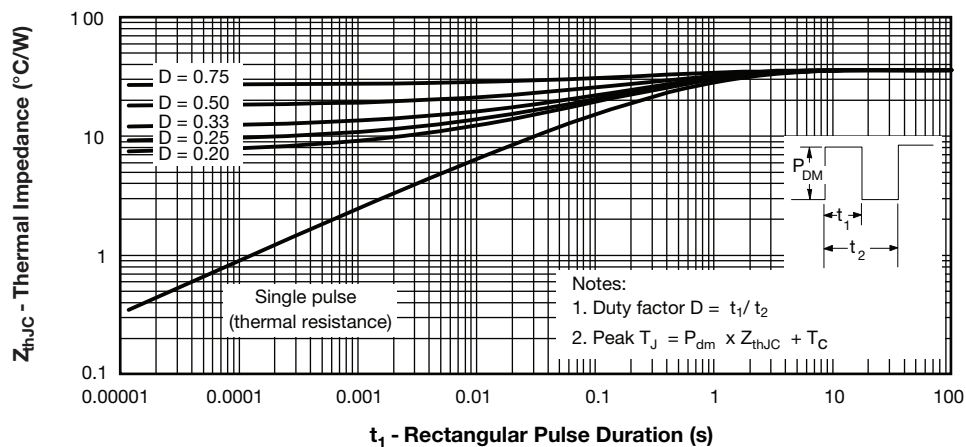


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

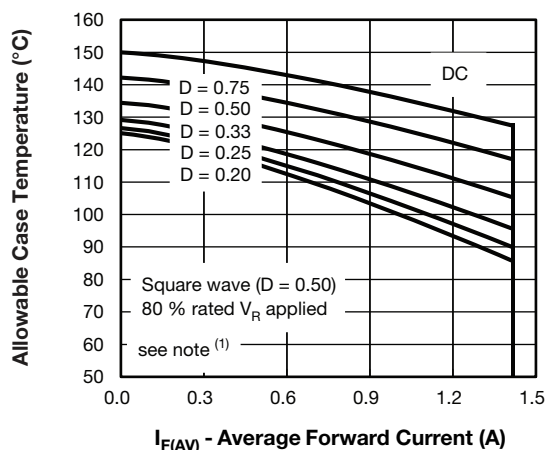


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

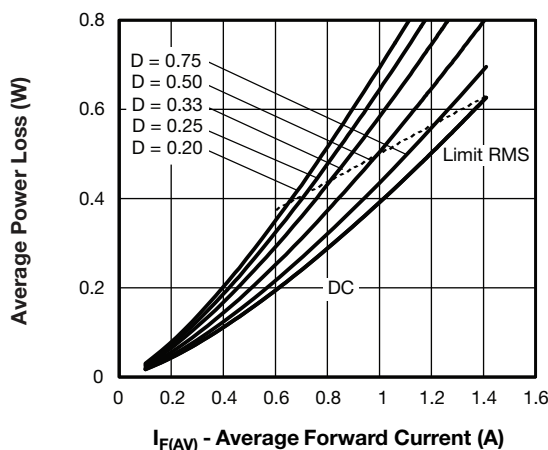


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

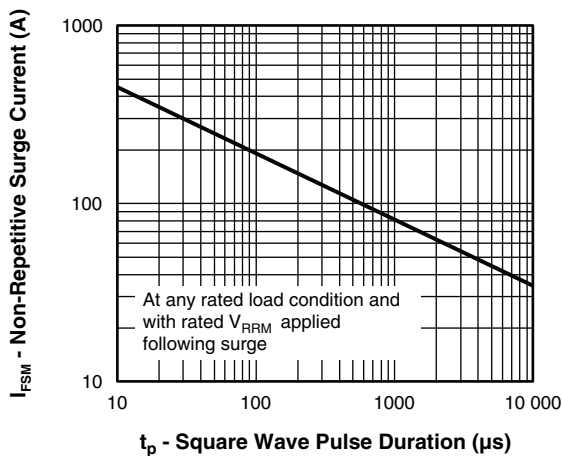


Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

#### 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**

Device code	<b>VS-</b>	<b>10</b>	<b>B</b>	<b>Q</b>	<b>060</b>	<b>H</b>	<b>M3</b>
	1	2	3	4	5	6	7

- |          |   |
|----------|---|
| <b>1</b> | - Vishay Semiconductors product   |
| <b>2</b> | - Current rating  |
| <b>3</b> | - B = SMB   |
| <b>4</b> | - Q = Schottky "Q" series   |
| <b>5</b> | - Voltage rating (060 = 60 V)   |
| <b>6</b> | - H = AEC-Q101 qualified  |
| <b>7</b> | - Environmental digit:<br>M3 = halogen-free, RoHS compliant and terminations lead (Pb)-free |

**ORDERING INFORMATION** (Example)

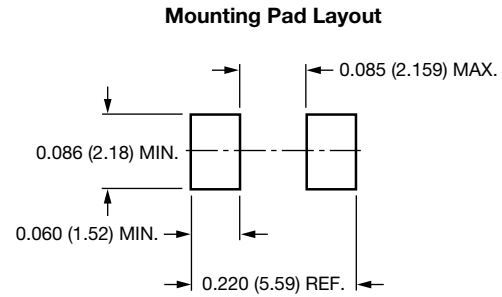
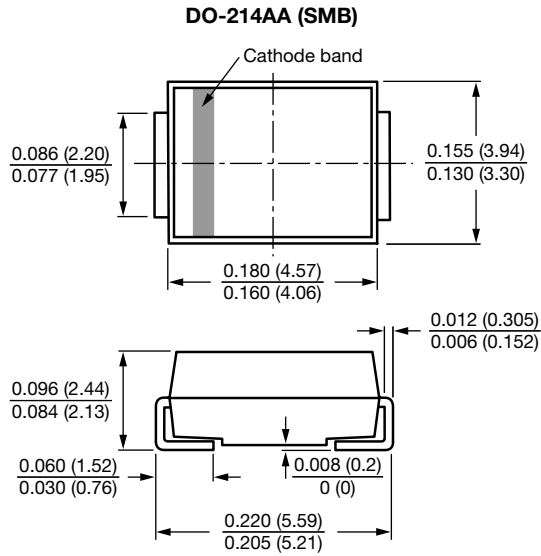
PREFERRED P/N	PREFERRED PACKAGE CODE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-10BQ060HM3/5BT	5BT	3200	13" diameter plastic tape and reel

**LINKS TO RELATED DOCUMENTS**

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?95536">www.vishay.com/doc?95536</a>
Packaging information	<a href="http://www.vishay.com/doc?95404">www.vishay.com/doc?95404</a>
SPIICE model	<a href="http://www.vishay.com/doc?95638">www.vishay.com/doc?95638</a>

## SMB

**DIMENSIONS** in inches (millimeters)





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