

# High Performance Schottky Rectifier, 3.0 A


**SMC (DO-214AB)**


## FEATURES

- Very 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/doc299912](http://www.vishay.com/doc299912)


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

## DESCRIPTION

The VS-30BQ040HM3 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.

## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	3.0 A
$V_R$	40 V
$V_F$ at $I_F$	0.46 V
$I_{RM}$	30 mA at 125 °C
$T_J$ max.	150 °C
$E_{AS}$	6.0 mJ
Package	SMC (DO-214AB)
Circuit configuration	Single

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	3.0	A
$V_{RRM}$		40	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	1600	A
$V_F$	3.0 A <sub>pk</sub> , $T_J = 125$ °C	0.46	V
$T_J$	Range	-55 to +150	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-30BQ040HM3	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 $T_L = 115$ °C, rectangular waveform	3.0	A
		50 % duty cycle at $T_L = 104$ °C, rectangular waveform	4.0	
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	1600	
		10 ms sine or 6 ms rect. pulse	90	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 1.0$ A, $L = 12$ mH	6.0	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	$V_{\text{FM}}^{(1)}$	3 A	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	0.57	V
		6 A		0.76	
		3 A	$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$	0.46	
		6 A		0.64	
Maximum reverse leakage current	$I_{\text{RM}}$	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$	$V_{\text{R}} = \text{Rated } V_{\text{R}}$	0.5	mA
		$T_{\text{J}} = 125\text{ }^{\circ}\text{C}$		30	
Maximum junction capacitance	$C_{\text{T}}$	$V_{\text{R}} = 5\text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$		230	pF
Typical series inductance	$L_{\text{S}}$	Measured lead to lead 5 mm from package body		3.0	nH
Maximum voltage rate of change	dV/dt	Rated $V_{\text{R}}$		10 000	V/μs

**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 <sub>J</sub> <sup>(1)</sup> , T <sub>Stg</sub>		-55 to +150	°C
Maximum thermal resistance, junction to lead	R <sub>thJL</sub> <sup>(2)</sup>	DC operation	12	°C/W
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>		46	
Approximate weight			0.24	g
			0.008	oz.
Marking device		Case style SMC (DO-214AB)	3F	

**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

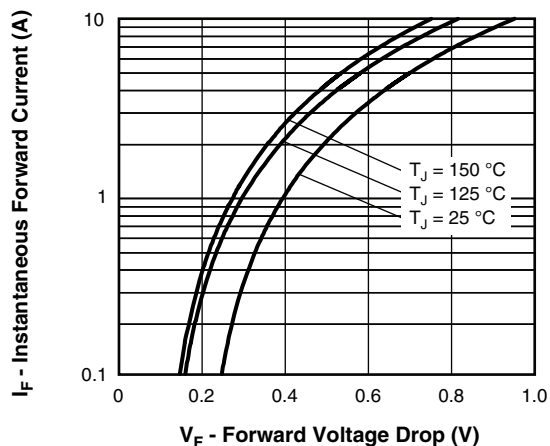


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

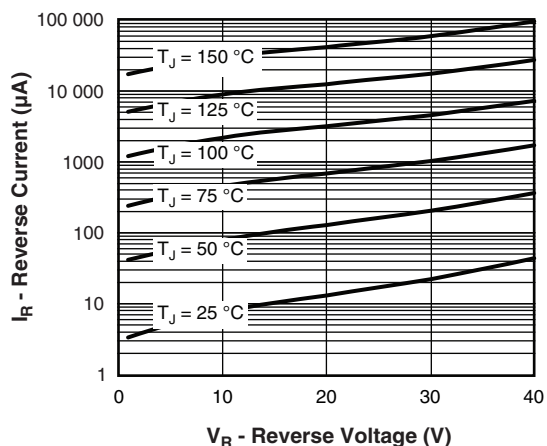


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

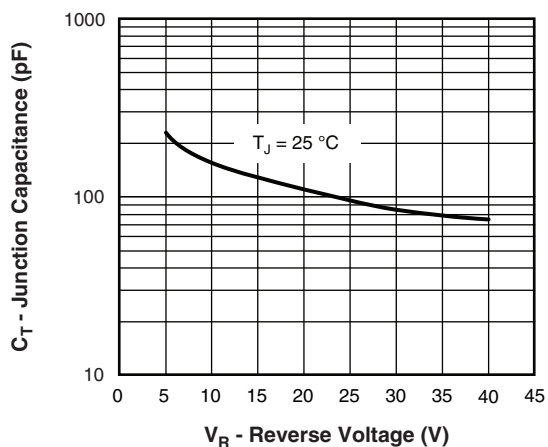
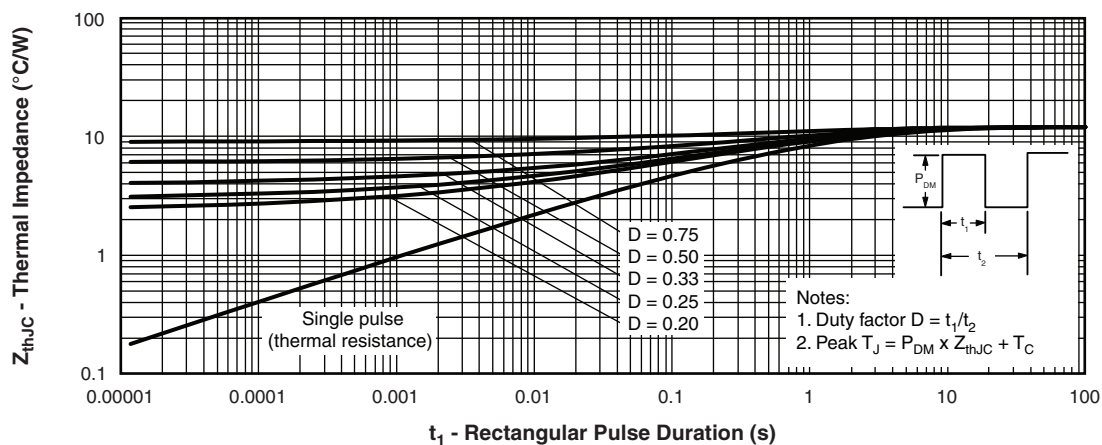


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)


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

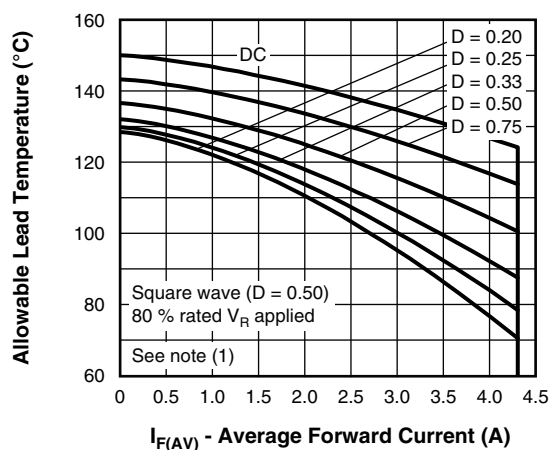


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

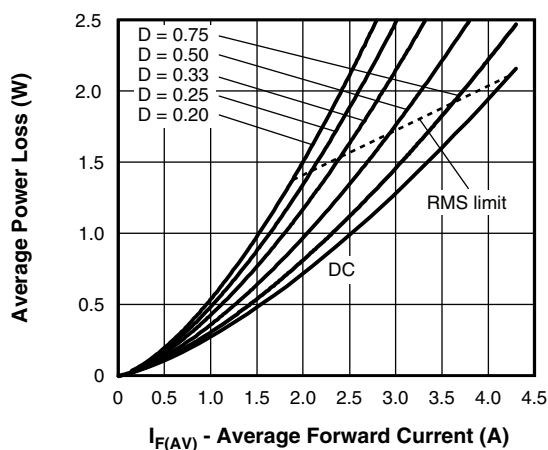


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

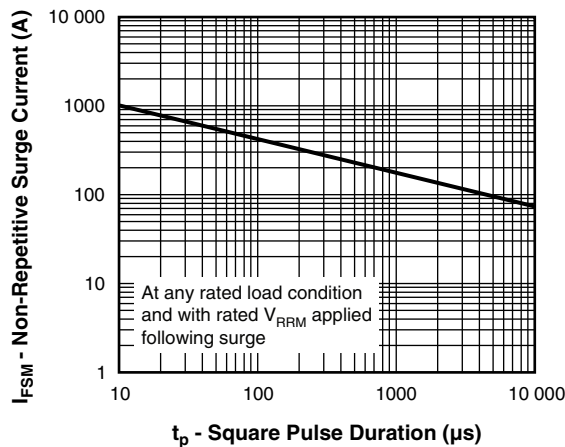


Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

#### 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 =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$



ORDERING INFORMATION TABLE

Device code	VS-	30	B	Q	040	H	M3
	1	2	3	4	5	6	7

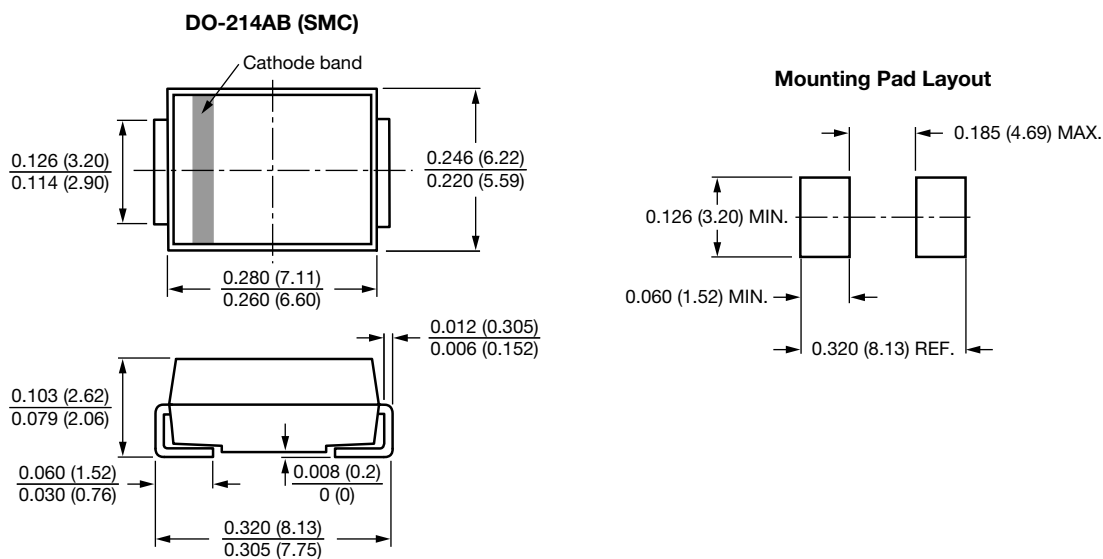
- |   |   |                               |
|---|---|-------------------------------|
| 1 | - | Vishay Semiconductors product |
| 2 | - | Current rating                |
| 3 | - | B = SMC                       |
| 4 | - | Q = Schottky "Q" series       |
| 5 | - | Voltage rating (040 = 40 V)   |
| 6 | - | H = AEC-Q101 qualified        |
| 7 | - | Environmental digit:          |
- 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-30BQ040HM3/9AT	9AT	3500	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95402">www.vishay.com/doc?95402</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>
SPIICE model	<a href="http://www.vishay.com/doc?96601">www.vishay.com/doc?96601</a>

## SMC

### DIMENSIONS in inches (millimeters)





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