

## Schottky Rectifier, 3.0 A



Cathode  Anode

SMC



**RoHS**  
COMPLIANT

### 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

### DESCRIPTION

The VS-30BQ040PbF 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.

<b>PRODUCT SUMMARY</b>	
$I_{F(AV)}$	3.0 A
$V_R$	40 V

<b>MAJOR RATINGS AND CHARACTERISTICS</b>			
<b>SYMBOL</b>	<b>CHARACTERISTICS</b>	<b>VALUES</b>	<b>UNITS</b>
$I_{F(AV)}$	Rectangular waveform	3.0	A
$V_{RRM}$		40	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	2000	A
$V_F$	$3.0 \text{ A}_{pk}, T_J = 125^\circ\text{C}$	0.43	V
$T_J$	Range	- 55 to 150	°C

<b>VOLTAGE RATINGS</b>			
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>VS-30BQ040PbF</b>	<b>UNITS</b>
Maximum DC reverse voltage	$V_R$	40	V
Maximum working peak reverse voltage	$V_{RWM}$		

<b>ABSOLUTE MAXIMUM RATINGS</b>						
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>TEST CONDITIONS</b>		<b>VALUES</b>	<b>UNITS</b>	
Maximum average forward current	$I_{F(AV)}$	50 % duty cycle at $T_L = 118^\circ\text{C}$ , rectangular waveform		3.0	A	
		50 % duty cycle at $T_L = 110^\circ\text{C}$ , rectangular waveform		4.0		
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied	2000		
		10 ms sine or 6 ms rect. pulse		110		
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25^\circ\text{C}, I_{AS} = 1.0 \text{ A}, L = 12 \text{ mH}$		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 <sub>FM</sub> <sup>(1)</sup>	3 A	T <sub>J</sub> = 25 °C	0.53	V	
		6 A		0.68		
		3 A	T <sub>J</sub> = 125 °C	0.43		
		6 A		0.57		
Maximum reverse leakage current	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 25 °C	V <sub>R</sub> = Rated V <sub>R</sub>	0.5	mA	
		T <sub>J</sub> = 125 °C		30		
Maximum junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz), 25 °C		230	pF	
Typical series inductance	L <sub>S</sub>	Measured lead to lead 5 mm from package body		3.0	nH	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>		10 000	V/μs	

**Note**

(1) Pulse width &lt; 300 μs, duty cycle &lt; 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
Marking device		Case style SMC (similar to DO-214AB)	V3F	

**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

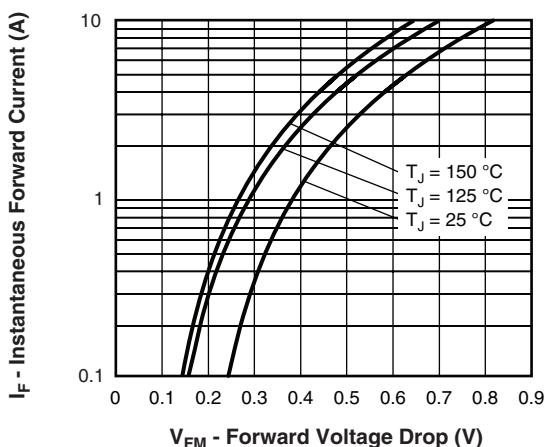


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

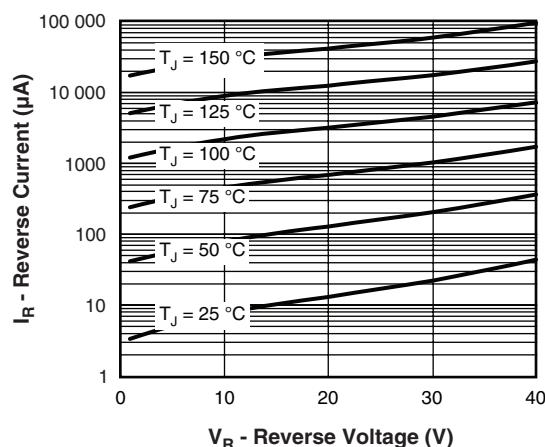


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

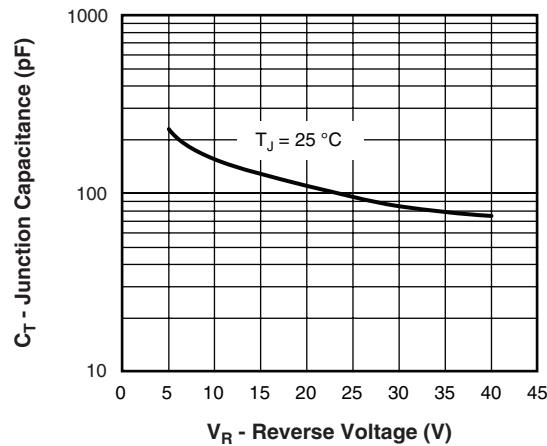
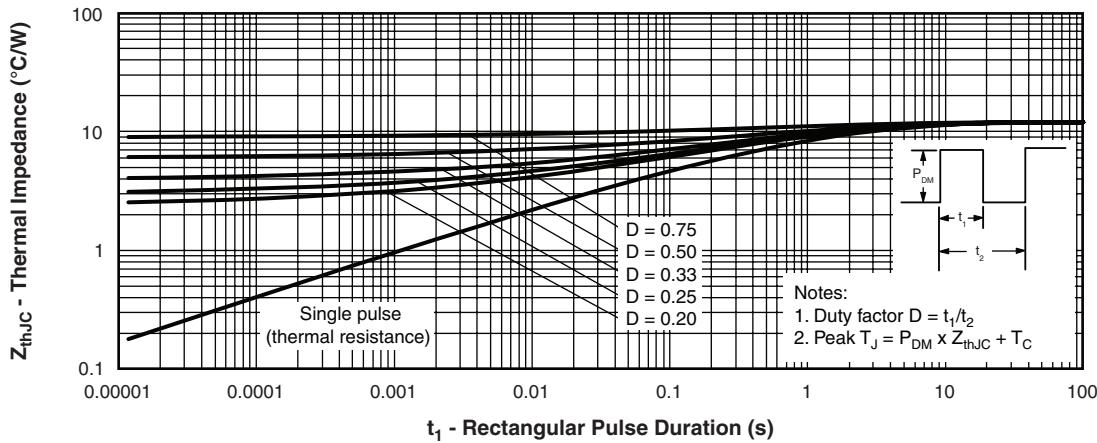


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)


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

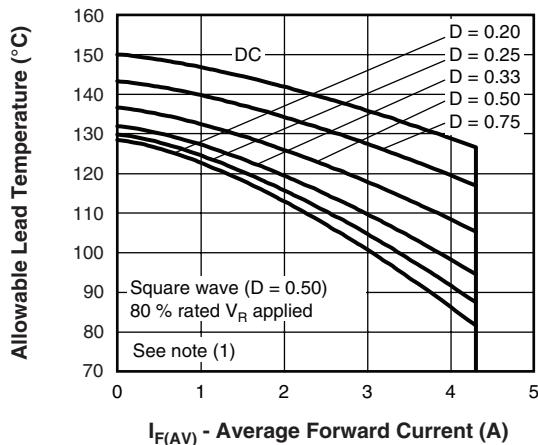


Fig. 5 - Maximum Average Forward Current vs.  
Allowable Lead Temperature

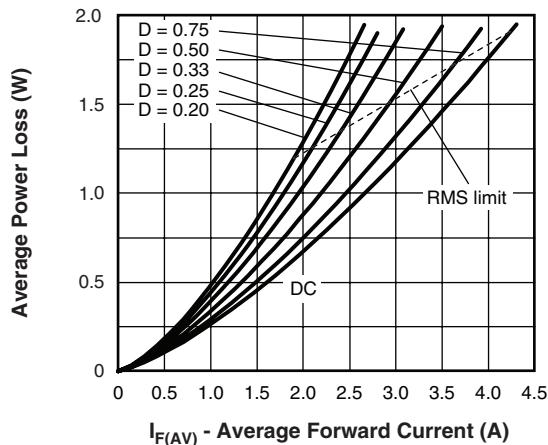


Fig. 6 - Maximum Average Forward Dissipation vs.  
Average Forward Current

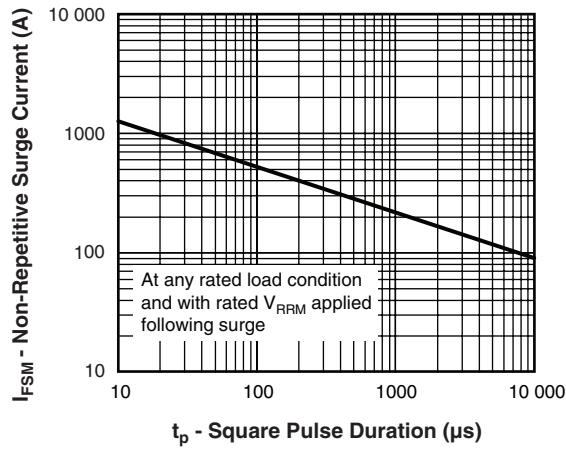


Fig. 7 - Maximum Peak Surge Current vs. Pulse Duration

#### Note

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

**ORDERING INFORMATION TABLE**

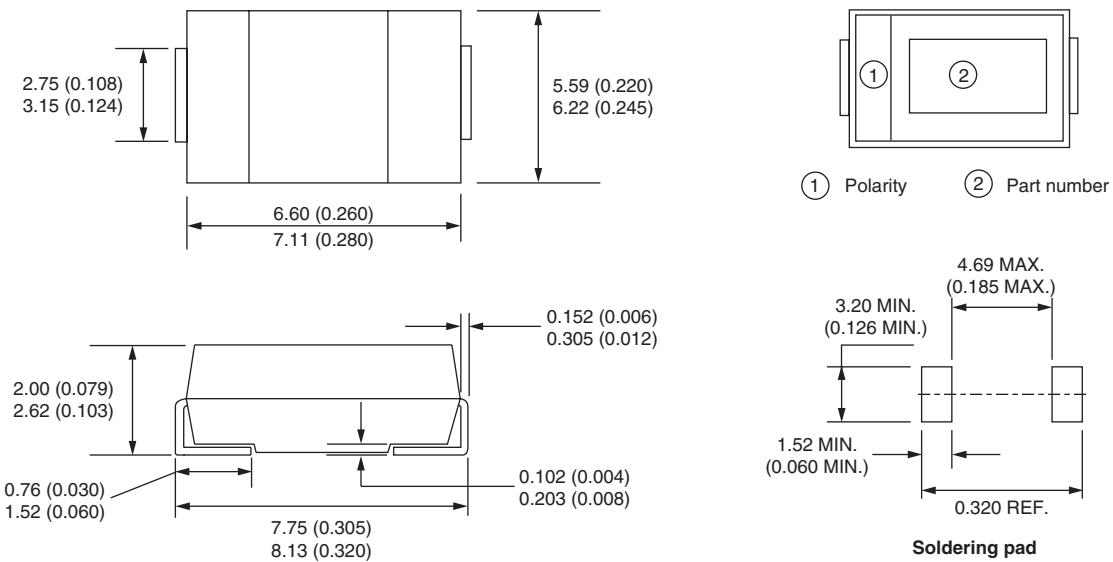
Device code	VS-	30	B	Q	040	TR	PbF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

- 1** - HPP product suffix
- 2** - Current rating
- 3** - B = Single lead diode
- 4** - Q = Schottky "Q" series
- 5** - Voltage rating (040 = 40 V)
- 6** - • None = Box (1000 pieces)  
• 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	Tape and reel	<a href="http://www.vishay.com/doc?95034">www.vishay.com/doc?95034</a>
	Bulk	<a href="http://www.vishay.com/doc?95397">www.vishay.com/doc?95397</a>
SPICE model		<a href="http://www.vishay.com/doc?95324">www.vishay.com/doc?95324</a>

### SMC

#### DIMENSIONS in millimeters (inches)



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