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[Vishay Semiconductor/Diodes Division](#)  
[VS-121NQ045PBF](#)

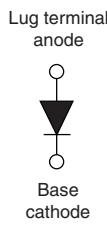
For any questions, you can email us directly:

[sales@integrated-circuit.com](mailto:sales@integrated-circuit.com)

## High Performance Schottky Rectifier, 120 A



HALF-PAK (D-67)



### FEATURES

- 175 °C  $T_J$  operation
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Designed and qualified for industrial level
- UL approved file E222165 
- Material categorization: for definitions of compliance please see [www.vishay.com/doc/99912](http://www.vishay.com/doc/99912)



### PRODUCT SUMMARY

$I_{F(AV)}$	120 A
$V_R$	45 V
Package	HALF-PAK (D-67)
Circuit	Single diode

### DESCRIPTION

The VS-121NQ.. high current Schottky rectifier module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in high current switching power supplies, plating power supplies, UPS systems, converters, freewheeling diodes, welding, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	120	A
$V_{RRM}$		45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	16 000	A
$V_F$	120 A <sub>pk</sub> , $T_J = 125$ °C	0.6	V
$T_J$	Range	-55 to 175	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-121NQ045PbF	UNITS
Maximum DC reverse voltage	$V_R$	45	V
Maximum working peak reverse voltage	$V_{RWM}$		

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 137$ °C, rectangular waveform	120	A
Maximum peak one cycle non-repetitive surge current See fig. 7	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	16 000	A
		10 ms sine or 6 ms rect. pulse	2000	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 13$ A, $L = 1$ mH	81	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	13	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop See fig. 1	V <sub>FM</sub> <sup>(1)</sup>	120 A	T <sub>J</sub> = 25 °C	0.65	V	
		240 A		0.82		
		120 A	T <sub>J</sub> = 125 °C	0.6		
		240 A		0.76		
Maximum reverse leakage current See fig. 2	I <sub>RM</sub>	T <sub>J</sub> = 25 °C	V <sub>R</sub> = Rated V <sub>R</sub>	10	mA	
		T <sub>J</sub> = 125 °C		90		
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		5200	pF	
Typical series inductance	L <sub>S</sub>	From top of terminal hole to mounting plane		7.0	nH	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>		10 000	V/μs	

**Note**

(1) Pulse width = 500 μs

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>			-55 to 175	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation See fig. 4		0.38	°C/W
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased		0.05	
Approximate weight				30	g
				1.06	oz.
Mounting torque	minimum	Non-lubricated threads		3 (26.5)	N · m (lbf · in)
	maximum			4 (35.4)	
Terminal torque	minimum			3.4 (30)	
	maximum			5 (44.2)	
Case style				HALF-PAK module	

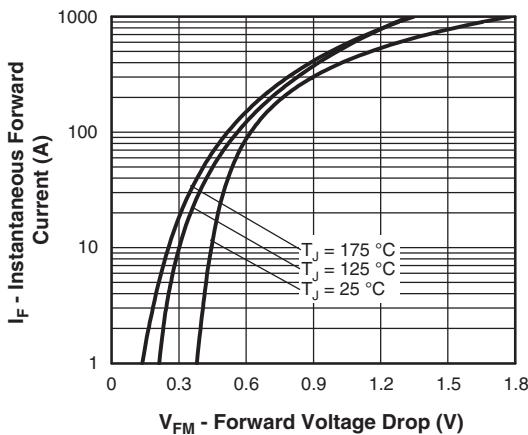


Fig. 1 - Maximum Forward Voltage Drop Characteristics

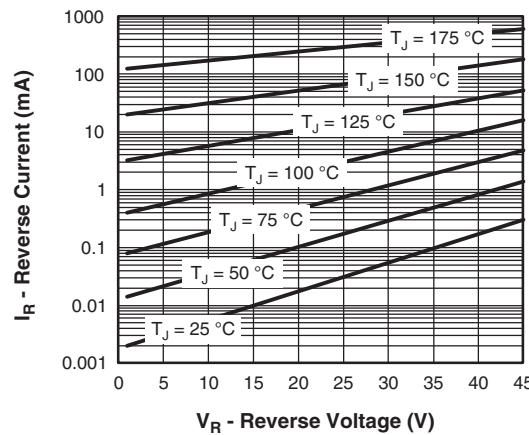


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

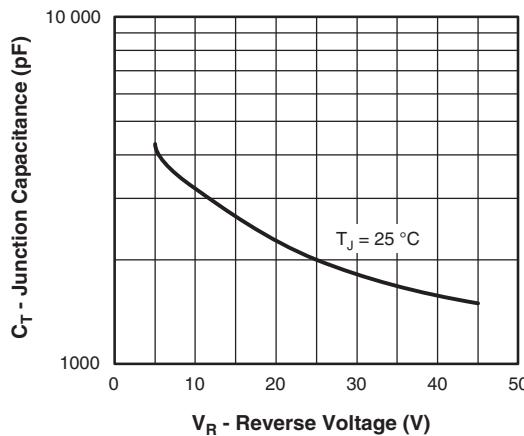


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

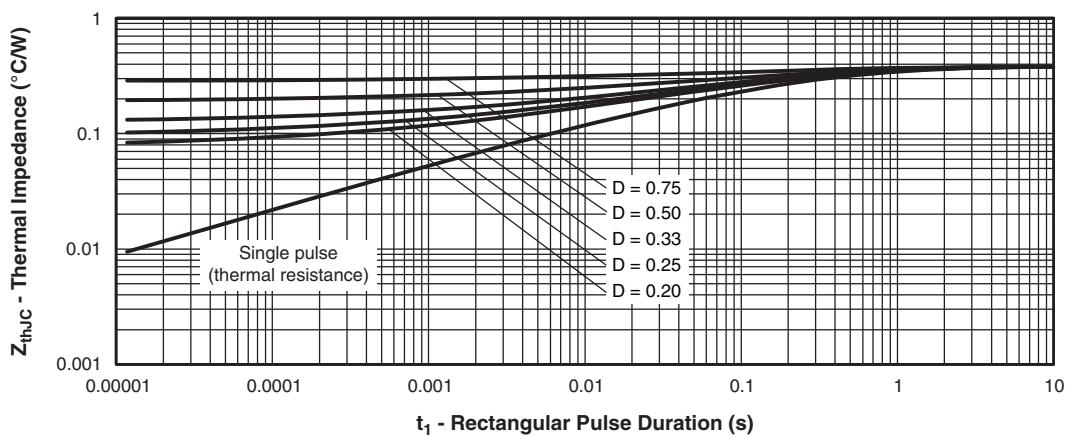


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

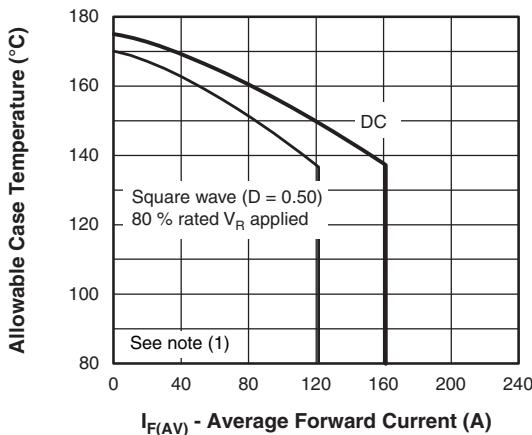


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

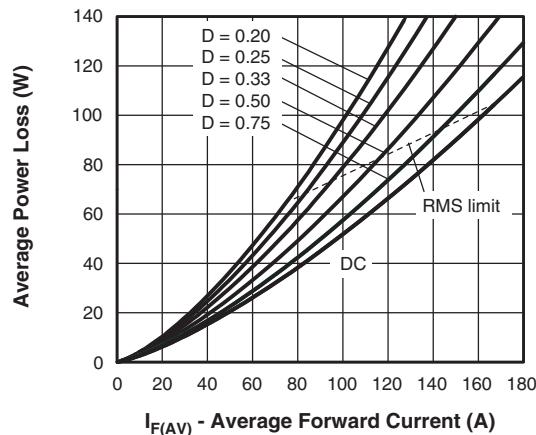


Fig. 6 - Forward Power Loss Characteristics

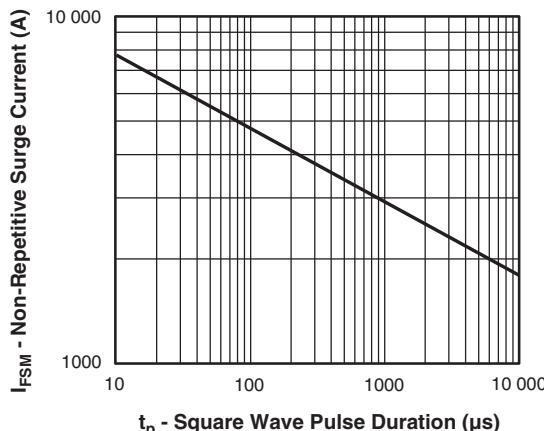


Fig. 7 - Maximum Non-Repetitive Surge Current

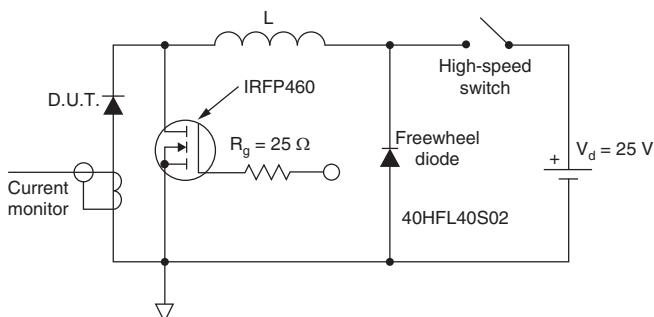


Fig. 8 - Unclamped Inductive Test Circuit

**Note**

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

**ORDERING INFORMATION TABLE**

Device code	VS-	12	1	N	Q	045	PbF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>1</b> - Vishay Semiconductors product							
<b>2</b> - Average current rating (x 10)							
<b>3</b> - Product silicon identification							
<b>4</b> - N = Not isolated							
<b>5</b> - Q = Schottky rectifier diode							
<b>6</b> - Voltage rating (045 = 45 V)							
<b>7</b> - Lead (Pb)-free							

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95020">www.vishay.com/doc?95020</a>
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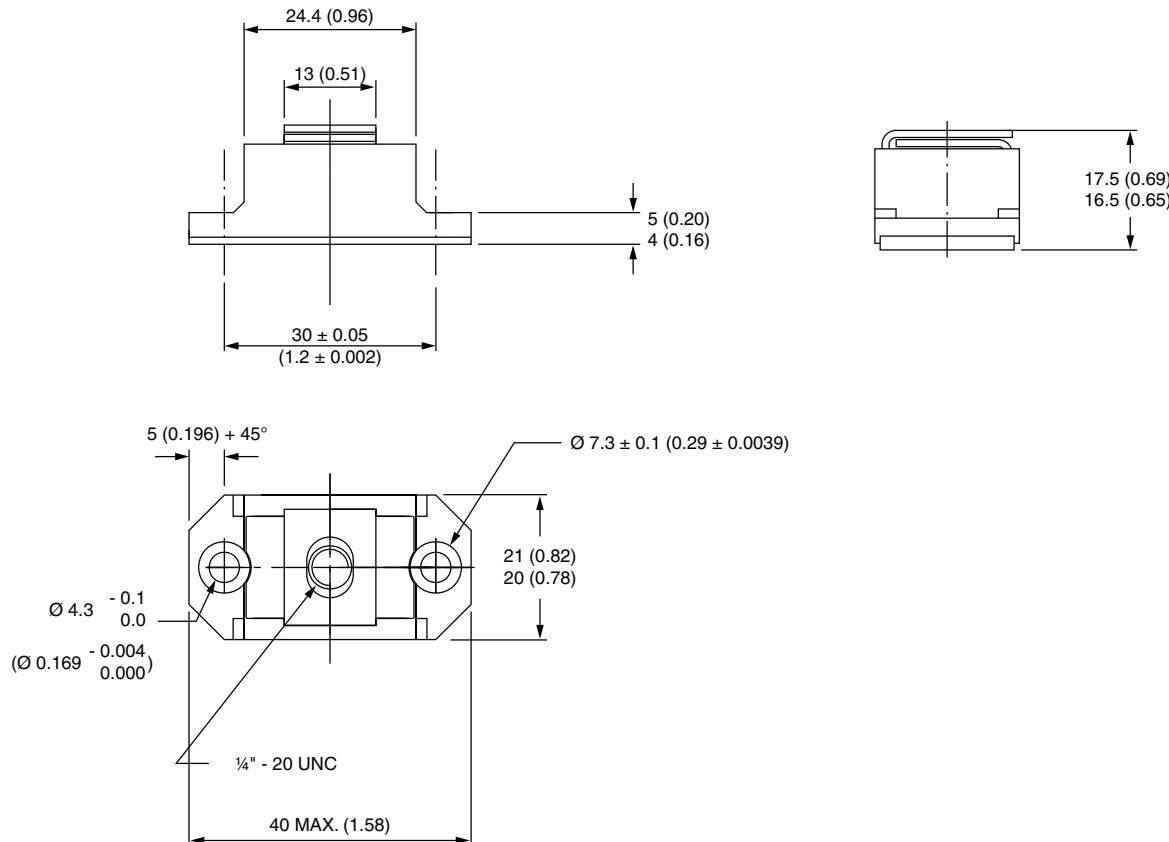


## Outline Dimensions

Vishay Semiconductors

### D-67 HALF-PAK

#### DIMENSIONS in millimeters (inches)



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