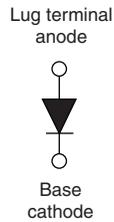


High Performance Schottky Rectifier, 120 A


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


RoHS
COMPLIANT

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	120 A
V_R	45 V
Package	HALF-PAK (D-67)
Circuit configuration	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 _{pk} , $T_J = 125 \text{ }^\circ\text{C}$	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 $T_C = 137 \text{ }^\circ\text{C}$, rectangular waveform	120	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I_{FSM}	5 μs sine or 3 μs rect. pulse	16 000	A
		10 ms sine or 6 ms rect. pulse		
Non-repetitive avalanche energy	E_{AS}	$T_J = 25 \text{ }^\circ\text{C}$, $I_{AS} = 13 \text{ A}$, $L = 1 \text{ mH}$	81	mJ
Repetitive avalanche current	I_{AR}	Current decaying linearly to zero in 1 μs 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	$V_{FM}^{(1)}$	120 A	$T_J = 25\text{ }^\circ\text{C}$	0.65	V
		240 A		0.82	
		120 A	$T_J = 125\text{ }^\circ\text{C}$	0.6	
		240 A		0.76	
Maximum reverse leakage current See fig. 2	I_{RM}	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	10	mA
		$T_J = 125\text{ }^\circ\text{C}$		90	
Maximum junction capacitance	C_T	$V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		5200	pF
Typical series inductance	L_S	From top of terminal hole to mounting plane		7.0	nH
Maximum voltage rate of change	dV/dt	Rated V_R		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_J, T_{Stg}		-55 to 175	$^\circ\text{C}$
Maximum thermal resistance, junction to case	R_{thJC}	DC operation See fig. 4	0.38	$^\circ\text{C}/\text{W}$
Typical thermal resistance, case to heatsink	R_{thCS}	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	

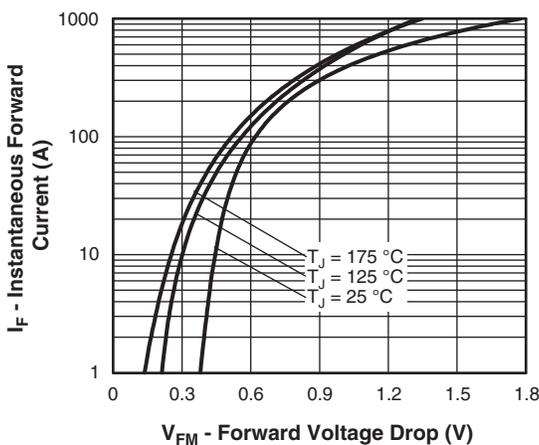


Fig. 1 - Maximum Forward Voltage Drop Characteristics

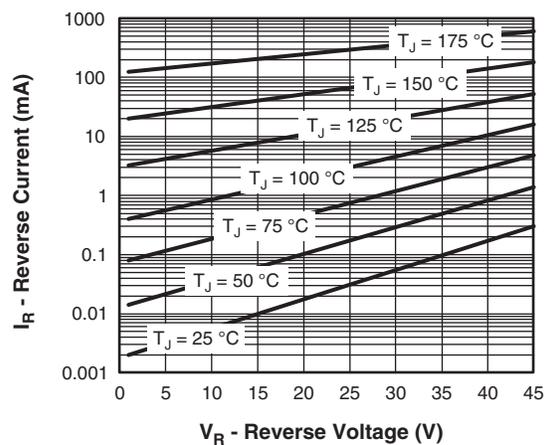


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

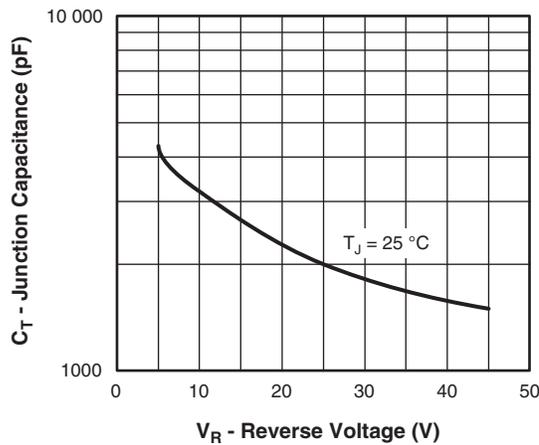


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

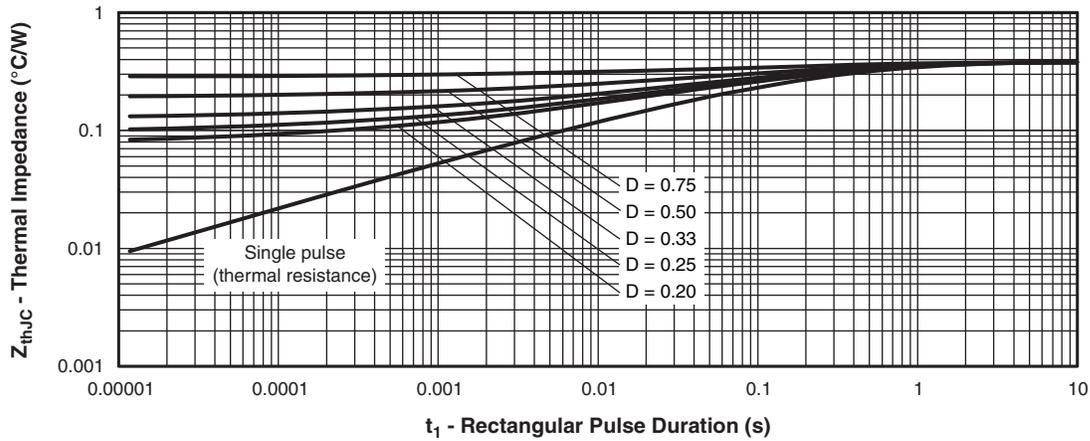


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

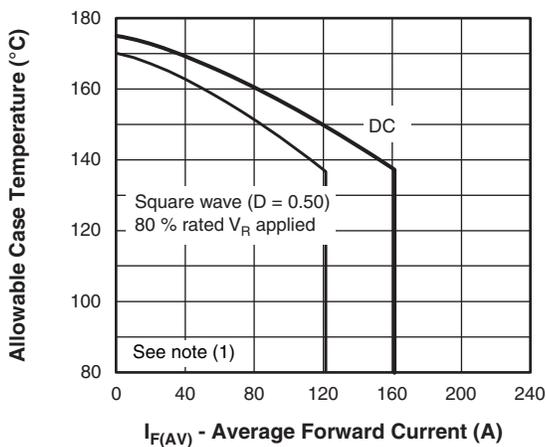


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

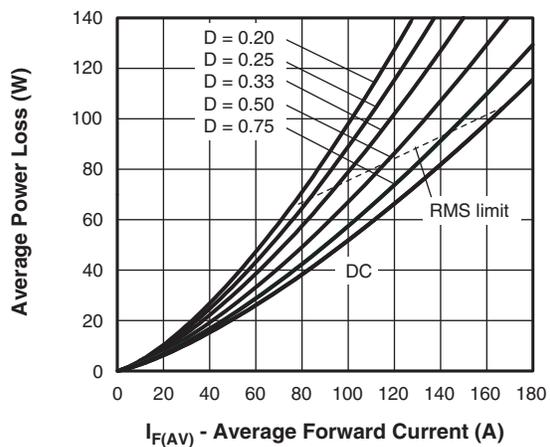


Fig. 6 - Forward Power Loss Characteristics

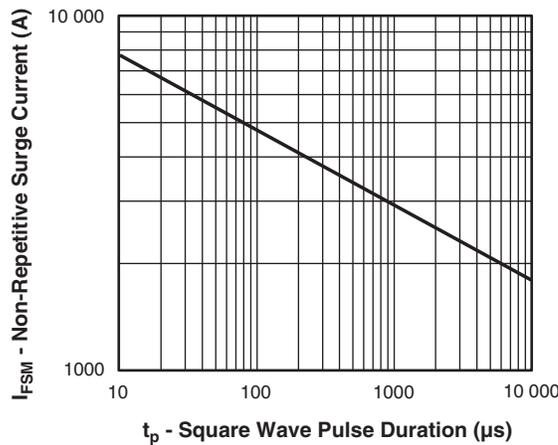


Fig. 7 - Maximum Non-Repetitive Surge Current

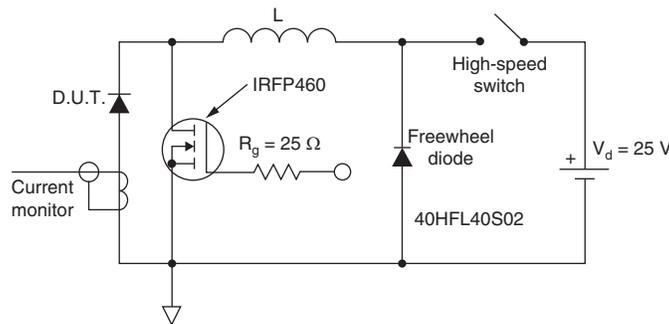


Fig. 8 - Unclamped Inductive Test Circuit

Note

(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} = rated V_R

ORDERING INFORMATION TABLE

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

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95020
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