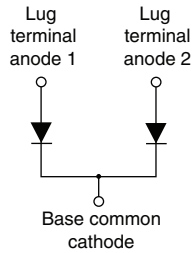


High Performance Schottky Rectifier, 400 A



TO-244



FEATURES

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



PRODUCT SUMMARY

I _{F(AV)}	400 A
V _R	135 V, 150 V
Package	TO-244
Circuit	Two diodes common cathode

DESCRIPTION

The VS-409CNQ... center tap 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	400	A
V _{RRM}	Range	135/150	V
I _{FSM}	t _p = 5 μs sine	20 000	A
V _F	200 A _{pk} , T _J = 125 °C (per leg)	0.75	V
T _J	Range	-55 to 175	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-409CNQ135PbF	VS-409CNQ150PbF	UNITS
Maximum DC reverse voltage	V _R	135	150	V
Maximum working peak reverse voltage	V _{RWM}			

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current (fig. 5)	I _{F(AV)}	50 % duty cycle at T _C = 129 °C, rectangular waveform	200	A
			400	
Maximum peak one cycle non-repetitive surge current per leg (fig. 7)	I _{FSM}	5 μs sine or 3 μs rect. pulse	20 000	A
		10 ms sine or 6 ms rect. pulse	2300	
Non-repetitive avalanche energy per leg	E _{AS}	T _J = 25 °C, I _{AS} = 5.5 A, L = 1 mH	15	mJ
Repetitive avalanche current per leg	I _{AR}	Current decaying linearly to zero in 1 μs Frequency limited by T _J maximum V _A = 1.5 x V _R typical	1	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	200 A	$T_J = 25\text{ }^\circ\text{C}$	1.13	V
		400 A		1.46	
		200 A	$T_J = 125\text{ }^\circ\text{C}$	0.75	
		400 A		0.89	
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	6	mA
		$T_J = 125\text{ }^\circ\text{C}$		85	
Maximum junction capacitance per leg	C_T	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		6000	pF
Typical series inductance per leg	L_S	From top of terminal hole to mounting plane		5.0	nH
Maximum voltage rate of change	dV/dt	Rated V_R		10 000	V/ μs

Note

(1) Pulse width < 300 μs , duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}	-55	-	175	$^\circ\text{C}$
Thermal resistance, junction to case per leg	R_{thJC}	-	-	0.19	$^\circ\text{C/W}$
Thermal resistance, junction to case per module		-	-	0.095	
Thermal resistance, case to heatsink	R_{thCS}	-	0.10	-	
Weight		-	68	-	g
		-	2.4	-	oz.
Mounting torque		35.4 (4)		53.1 (6)	lbf · in (N · m)
Mounting torque center hole		30 (3.4)		40 (4.6)	
Terminal torque		30 (3.4)	-	44.2 (5)	
Vertical pull		-	-	80	lbf · in
2" lever pull		-	-	35	

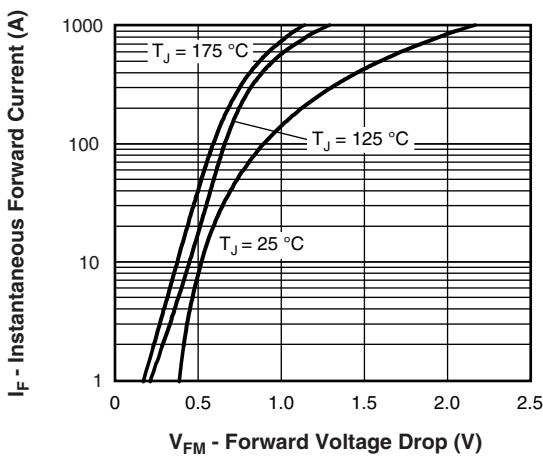


Fig. 1 - Maximum Forward Voltage Drop Characteristics

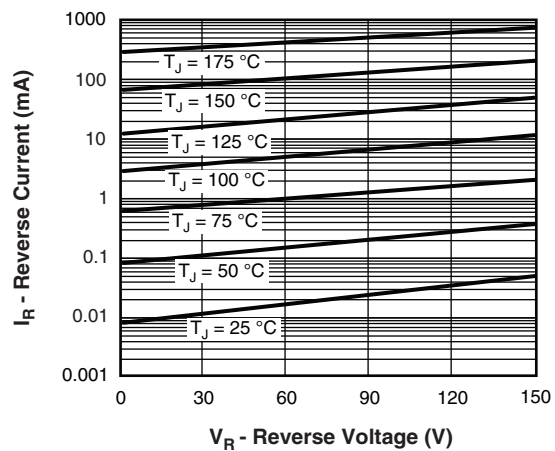


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

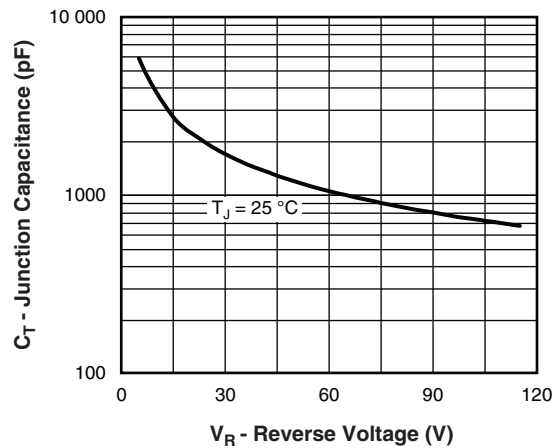


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

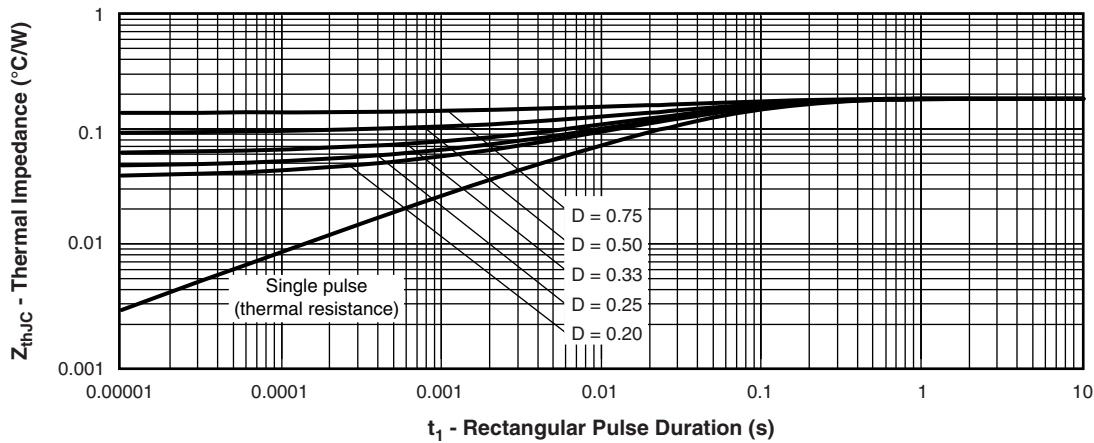


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

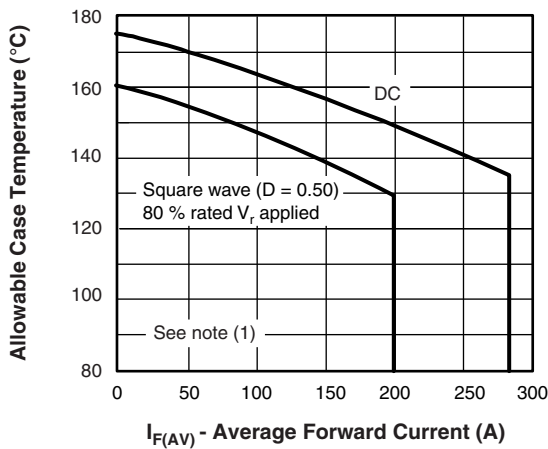


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

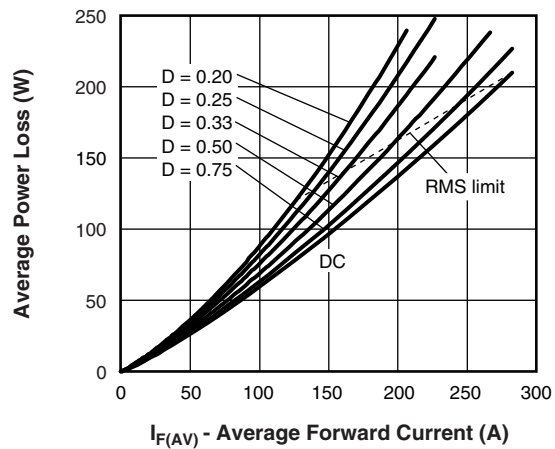


Fig. 6 - Forward Power Loss Characteristics

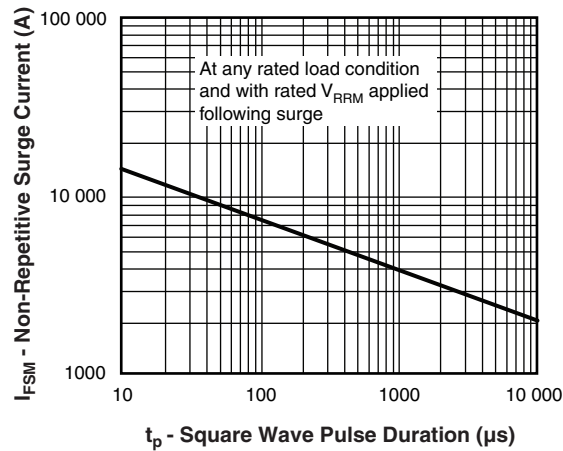


Fig. 7 - Maximum Non-Repetitive Surge Current

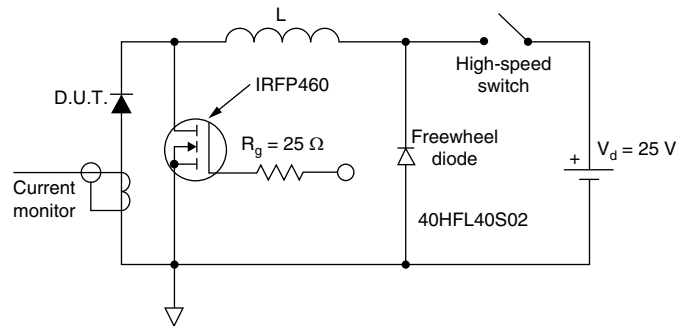


Fig. 8 - Unclamped Inductive Test Circuit

Note

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

ORDERING INFORMATION TABLE

Device code	VS-	40	9	C	N	Q	135	PbF	
	①	②	③	④	⑤	⑥	⑦	⑧	
	1	-	Vishay Semiconductors product	2	-	Average current rating (x 10)	3	-	Product silicon identification
	4	-	C = Circuit configuration	5	-	N = Not isolated	6	-	Q = Schottky rectifier diode
	7	-	Voltage ratings	8	-	Lead (Pb)-free	<div style="border: 1px solid black; padding: 2px;"> 135 = 135 V 150 = 150 V </div>		

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95021
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