

## High Performance Schottky Rectifier, 200 A


**TO-244**

### FEATURES

- 175 °C T<sub>J</sub> operation
- Center tap module
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

PRIMARY CHARACTERISTICS	
I <sub>F(AV)</sub>	200 A
V <sub>R</sub>	50 V
Package	TO-244
Circuit configuration	Two diodes common cathode

### DESCRIPTION / APPLICATIONS

The VS-201CNQ050PbF center tap Schottky rectifier module 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, converters, freewheeling diodes, welding, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	200	A
V <sub>RRM</sub>		50	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	16 000	A
V <sub>F</sub>	100 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg)	0.58	V
T <sub>J</sub>	Range	-55 to +175	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	201CNQ050PbF	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	50	V
Maximum working peak reverse voltage	V <sub>RWM</sub>		

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 146 °C, rectangular waveform		200	A
				100	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V <sub>RRM</sub> applied	16 000	A
		10 ms sine or 6 ms rect. pulse		2000	
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 17 A, L = 1 mH		145	mJ
Repetitive avalanche current per leg	I <sub>AR</sub>	Current decaying linearly to zero in 1 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical		20	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	100 A	$T_J = 25\text{ }^\circ\text{C}$	0.67	V
		200 A		0.81	
		100 A	$T_J = 125\text{ }^\circ\text{C}$	0.58	
		200 A		0.71	
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	10	mA
		$T_J = 125\text{ }^\circ\text{C}$		90	
Maximum junction capacitance per leg	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C		5200	pF
Typical series inductance per leg	$L_S$	From top of terminal hole to mounting plane		7.0	nH
Maximum voltage rate of change	$dV/dt$	Rated $V_R$		10 000	V/ $\mu$ s

**Note**(1) Pulse width < 300  $\mu$ s, 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 per module	$R_{thJC}$	-	-	0.38	$^\circ\text{C/W}$
		-	-	0.19	
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 (Per Leg)

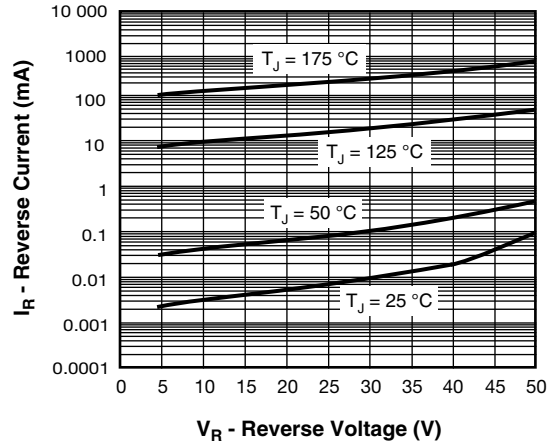


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

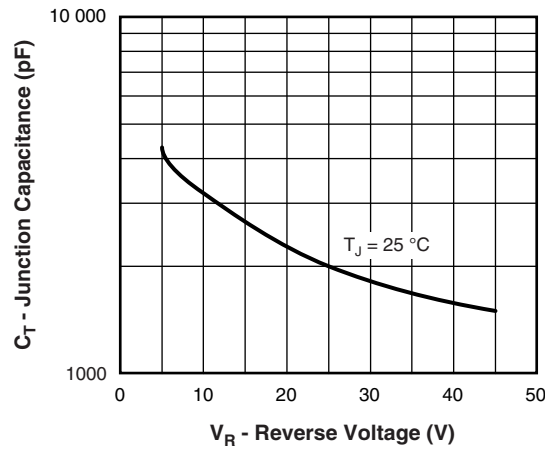


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

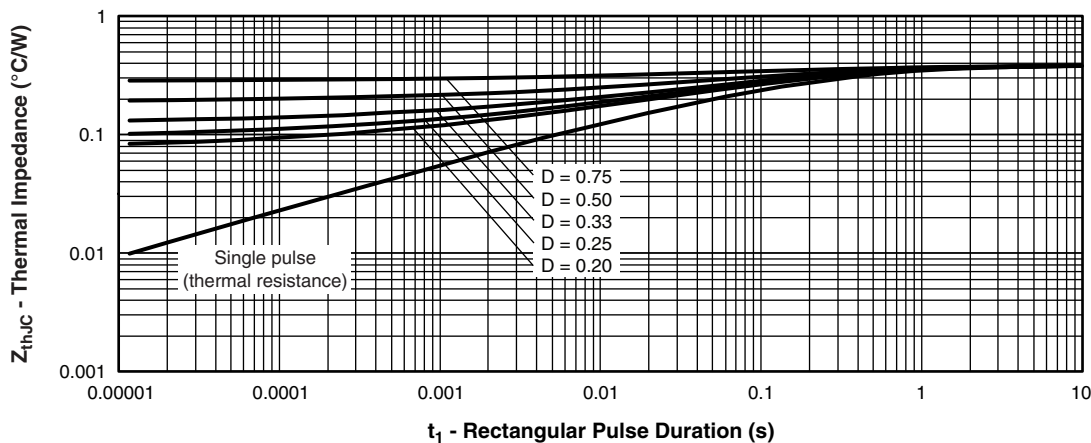


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

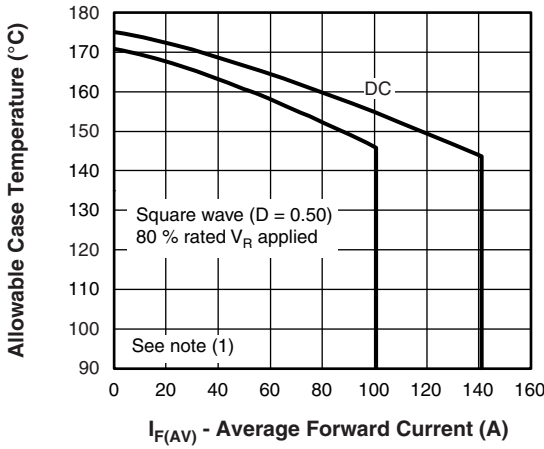


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

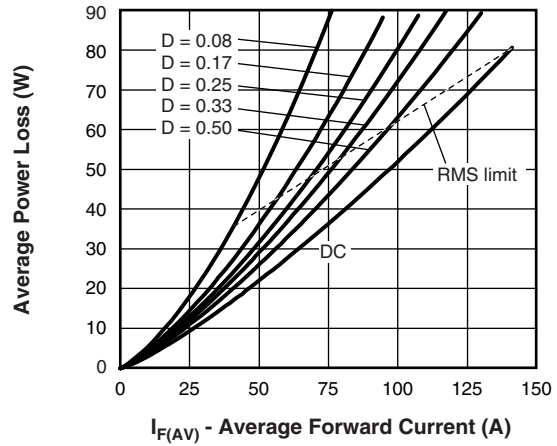


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

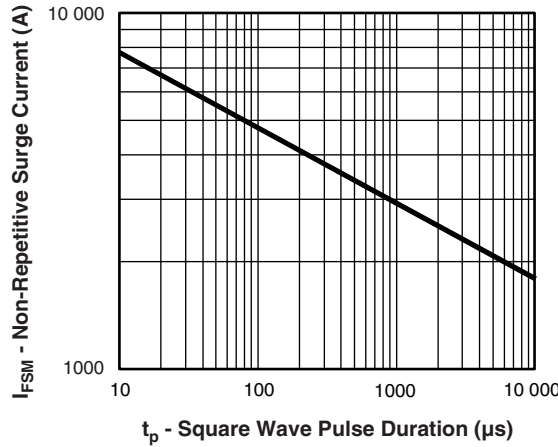


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)



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  $V_{R1} = 80\%$  rated  $V_R$



## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>20</b>	<b>1</b>	<b>C</b>	<b>N</b>	<b>Q</b>	<b>050</b>	<b>PbF</b>
	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 rating (050 = 50 V)
- 8** - Lead (Pb)-free

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95021">www.vishay.com/doc?95021</a>
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