

## High Performance Schottky Rectifier, 440 A



TO-244



### FEATURES

- 150 °C T<sub>J</sub> operation
- Center tap module
- Very 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](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### PRIMARY CHARACTERISTICS

I <sub>F(AV)</sub>	440 A
V <sub>R</sub>	30 V
Package	TO-244
Circuit configuration	Two diodes common cathode

### DESCRIPTION / APPLICATIONS

The VS-440CNQ030PbF center tap, high current, Schottky rectifier module has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in 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	440	A
V <sub>RRM</sub>		30	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	27 000	A
V <sub>F</sub>	220 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg)	0.41	V
T <sub>J</sub>	Range	-55 to +150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-440CNQ030PbF	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	30	V
Maximum working peak reverse voltage	V <sub>RWM</sub>		

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current (fig. 5)	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 125 °C, rectangular waveform	440	A
			220	
Maximum peak one cycle non-repetitive surge current per leg (fig. 7)	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	27 000	
		10 ms sine or 6 ms rect. pulse	3000	
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 20 A, L = 1 mH	198	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	44	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg (fig. 1)	$V_{FM}^{(1)}$	220 A	$T_J = 25\text{ }^\circ\text{C}$	0.51	V
		440 A		0.63	
		220 A	$T_J = 125\text{ }^\circ\text{C}$	0.41	
		440 A		0.55	
Maximum reverse leakage current per leg (fig. 2)	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	20	mA
		$T_J = 125\text{ }^\circ\text{C}$		1120	
Maximum junction capacitance per leg	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		14 800	pF
Typical series inductance per leg	$L_S$	From top of terminal hole to mounting plane		5	nH
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/ $\mu\text{s}$

Note

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$	-55	-	150	$^\circ\text{C}$
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	

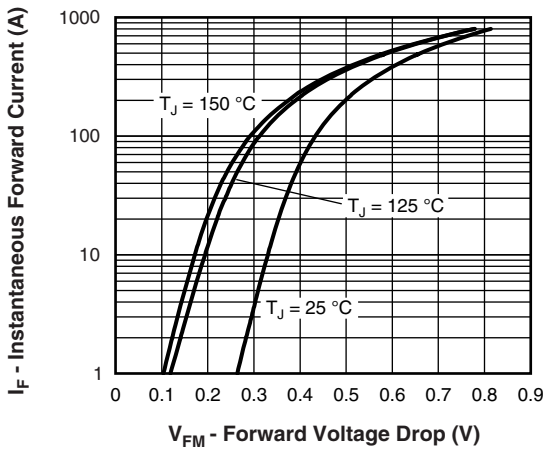


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

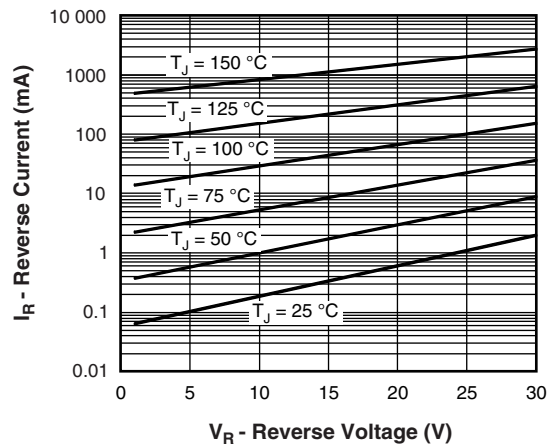


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

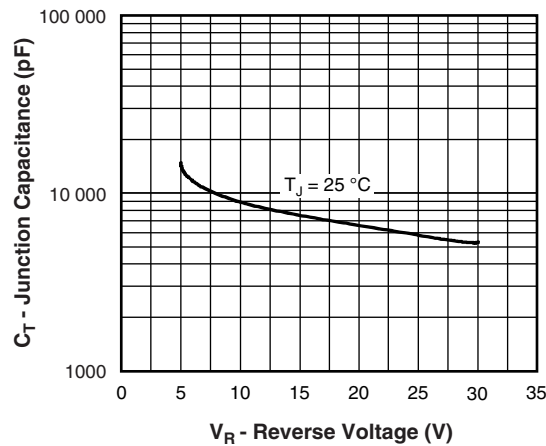


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

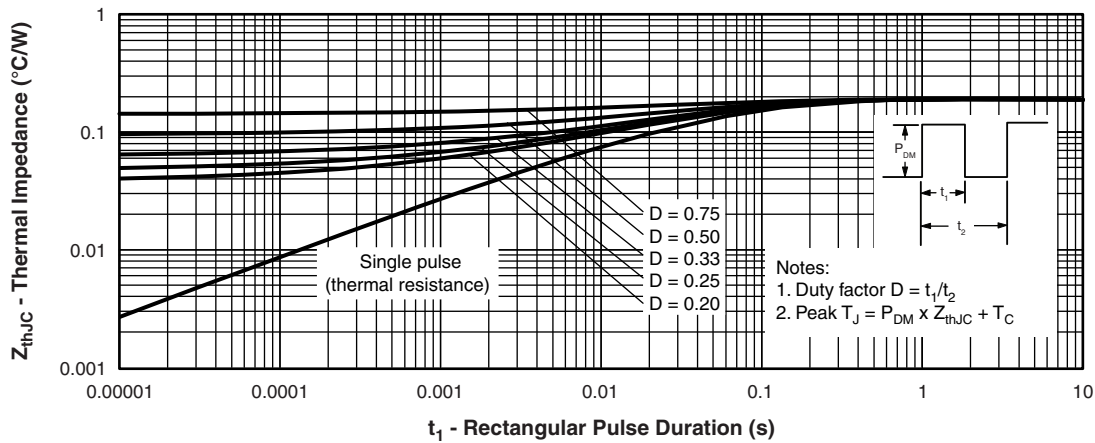


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

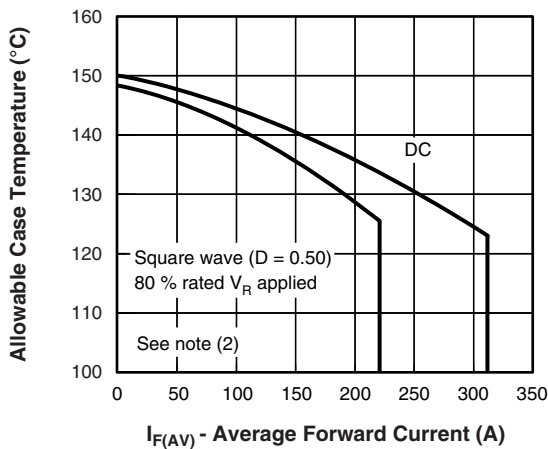


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

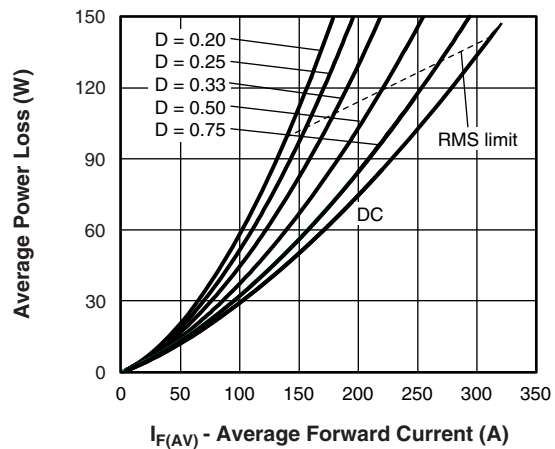


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

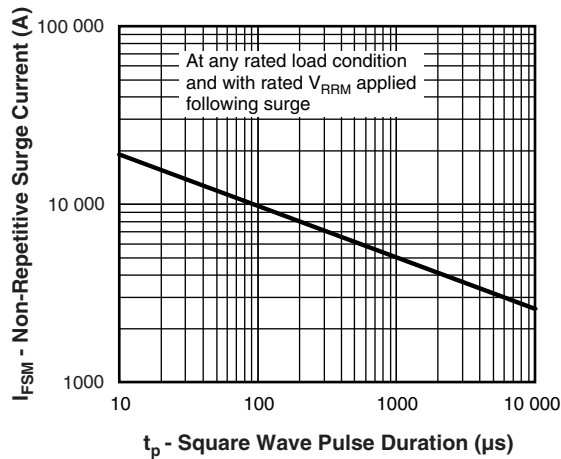


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

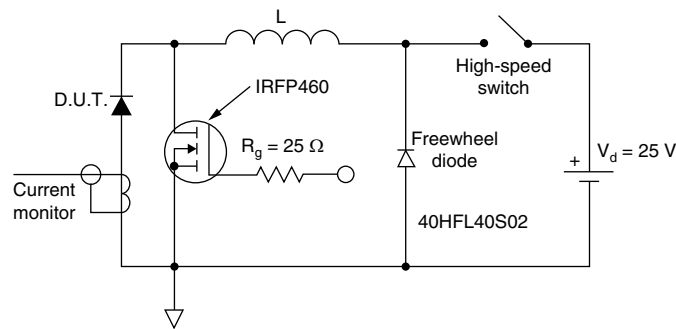


Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = 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  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>44</b>	<b>0</b>	<b>C</b>	<b>N</b>	<b>Q</b>	<b>030</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 (030 = 30 V)
- 8** - Lead (Pb)-free

Tube standard pack quantity: 25 pieces

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95021">www.vishay.com/doc?95021</a>
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## TO-244

**DIMENSIONS** in millimeters (inches)





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