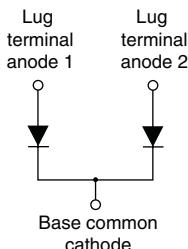


## Schottky Rectifier, 400 A



TO-244



### FEATURES

- 150 °C  $T_J$  operation
- Center tap module
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free
- Designed and qualified for industrial level

### DESCRIPTION

The 400CNQ... center tap, high current, Schottky rectifier module series 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.

### PRODUCT SUMMARY

$I_{F(AV)}$	400 A
$V_R$	45 V

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	400	A
$V_{RRM}$		45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	29 000	A
$V_F$	200 Apk, $T_J = 125$ °C (per leg)	0.52	V
$T_J$	Range	- 55 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	400CNQ045PbF	UNITS
Maximum DC reverse voltage	$V_R$		
Maximum working peak reverse voltage	$V_{RWM}$	45	V

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 114$ °C, rectangular waveform	200	A
			400	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse 10 ms sine or 6 ms rect. pulse	29 000	
			3400	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 19$ A, $L = 1$ mH	180	mJ
Repetitive avalanche current per leg	$I_{AR}$	Current decaying linearly to zero in 1 $\mu s$ Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical	40	A

**400CNQ045PbF**

Vishay High Power Products Schottky Rectifier, 400 A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	200 A	$T_J = 25 \text{ }^\circ\text{C}$	0.57	V	
		400 A		0.73		
		200 A	$T_J = 125 \text{ }^\circ\text{C}$	0.52		
		400 A		0.7		
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	20	mA	
		$T_J = 125 \text{ }^\circ\text{C}$		1.2	A	
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$			0.32 V	
Forward slope resistance	$r_t$				0.81 mΩ	
Maximum junction capacitance per leg	$C_T$	$V_R = 5 \text{ V}_\text{DC}$ (test signal range 100 kHz to 1 MHz) $25 \text{ }^\circ\text{C}$		10 300	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 &lt; 300 μs, duty cycle &lt; 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$	- 55	-	150	°C
Thermal resistance, junction to case per leg	$R_{thJC}$	-	-	0.19	°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	

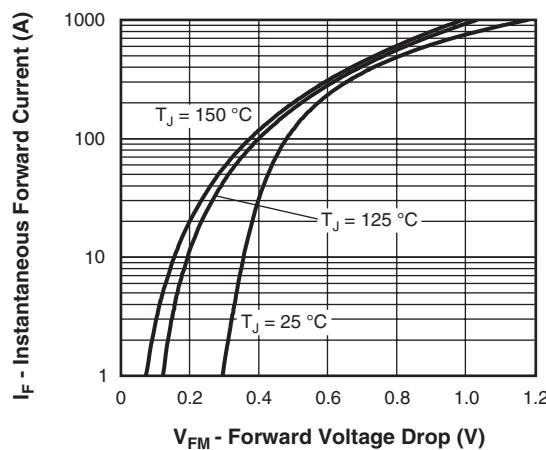


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

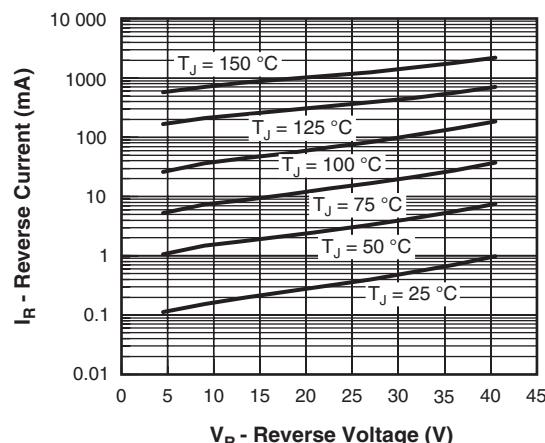


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

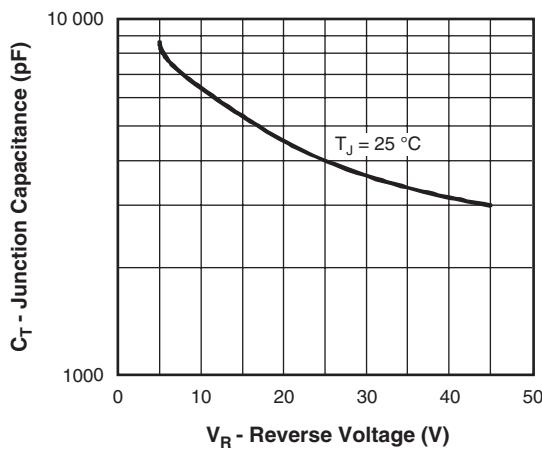


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

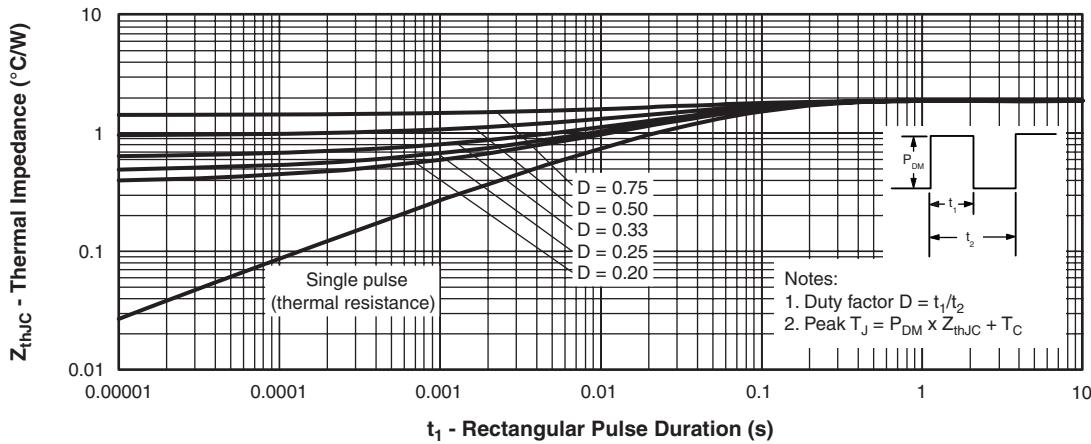


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

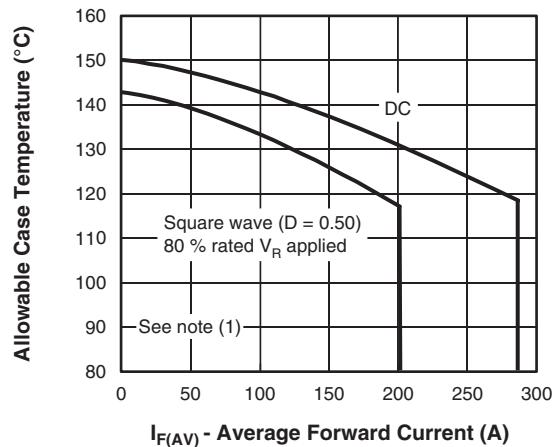


Fig. 5 - Maximum Allowable Case Temperature vs.  
Average Forward Current (Per Leg)

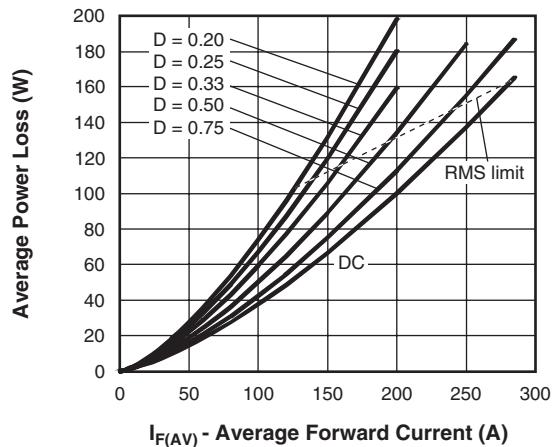


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

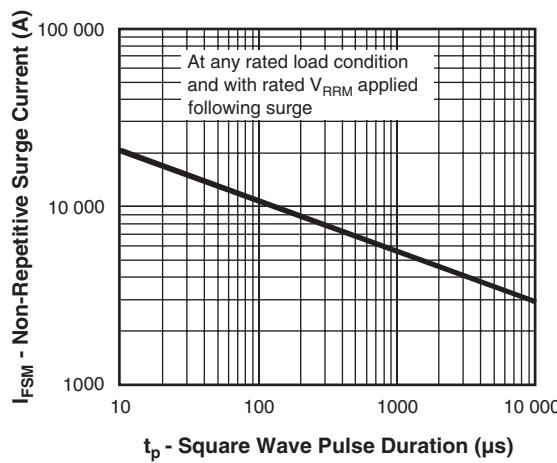


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

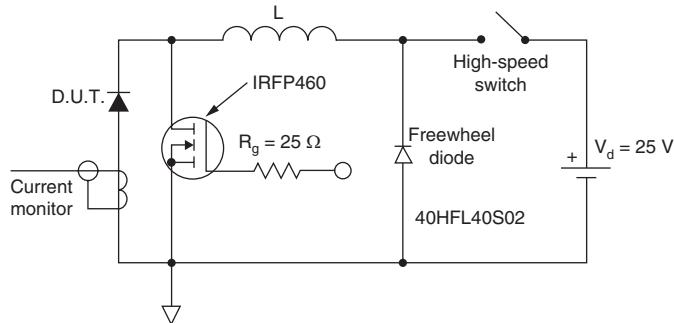


Fig. 8 - Unclamped Inductive Test Circuit

#### Note

(1) Formula used:  $T_C = T_J - (P_d + P_{d,REV}) \times R_{thJC}$   
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{d,REV} = \text{Inverse power loss} = V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

Device code	40	0	C	N	Q	045	PbF
	1	2	3	4	5	6	7

<b>1</b>	- Average current rating (x 10)
<b>2</b>	- Product silicon identification
<b>3</b>	- C = Circuit configuration
<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?95021">http://www.vishay.com/doc?95021</a>

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