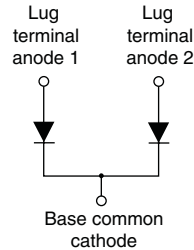


## Schottky Rectifier, 400 A



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
- Lead (Pb)-free
- Designed and qualified for industrial level



### DESCRIPTION

The 401CNQ... 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, converters, freewheeling diodes, welding and reverse battery protection.

### PRODUCT SUMMARY

$I_{F(AV)}$	400 A
$V_R$	40/45 V

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	400	A
$V_{RRM}$	Range	40/45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	25 000	A
$V_F$	200 Apk, $T_J = 125 \text{ }^\circ\text{C}$ (per leg)	0.56	V
$T_J$	Range	- 55 to 175	$^\circ\text{C}$

### VOLTAGE RATINGS

PARAMETER	SYMBOL	401CNQ040PbF	401CNQ045PbF	UNITS
Maximum DC reverse voltage	$V_R$	40	45	V
Maximum working peak reverse voltage	$V_{RWM}$			

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg See fig. 5 per device	$I_{F(AV)}$	50 % duty cycle at $T_C = 147 \text{ }^\circ\text{C}$ , 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	25 000	
		10 ms sine or 6 ms rect. pulse	3450	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25 \text{ }^\circ\text{C}$ , $I_{AS} = 24 \text{ A}$ , $L = 1 \text{ mH}$	270	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

ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	200 A	$T_J = 25\text{ }^\circ\text{C}$	0.67	V
		400 A		0.78	
		200 A	$T_J = T_J \text{ maximum}$	0.56	
		400 A		0.69	
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
		$T_J = 125\text{ }^\circ\text{C}$		180	
Maximum junction capacitance per leg	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		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/ $\mu\text{s}$

**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	-	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	

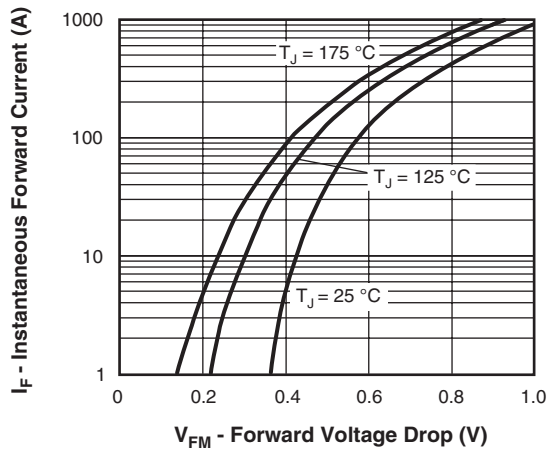


Fig. 1 - Maximum Forward Voltage Drop Characteristics

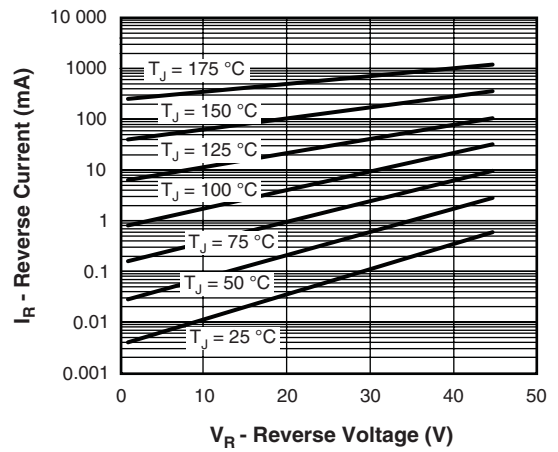


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

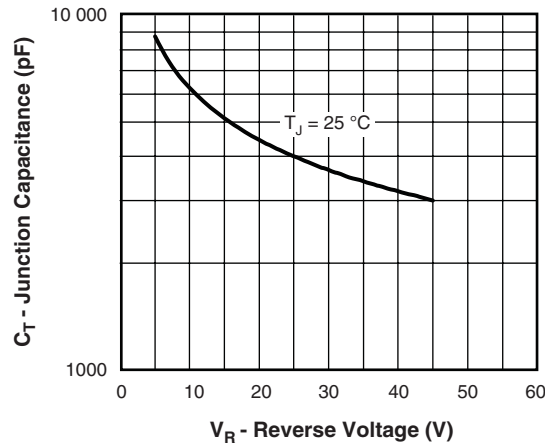


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

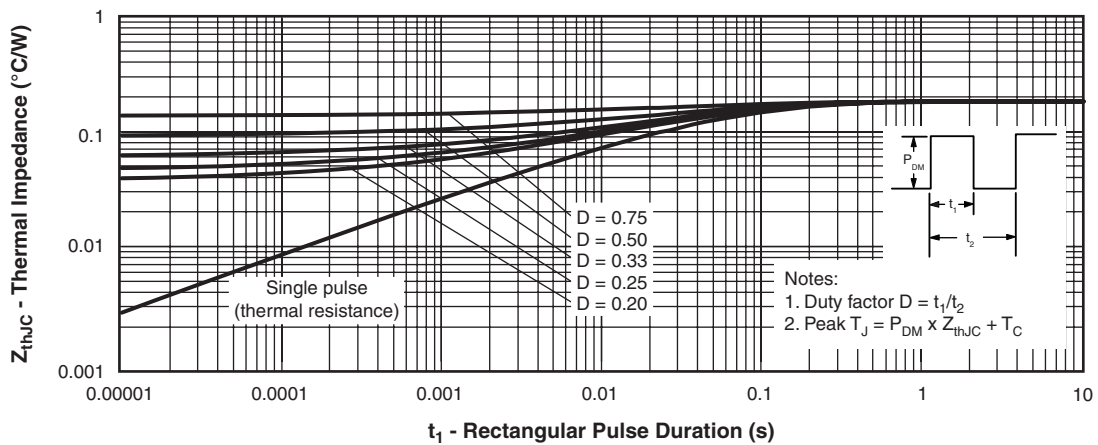


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

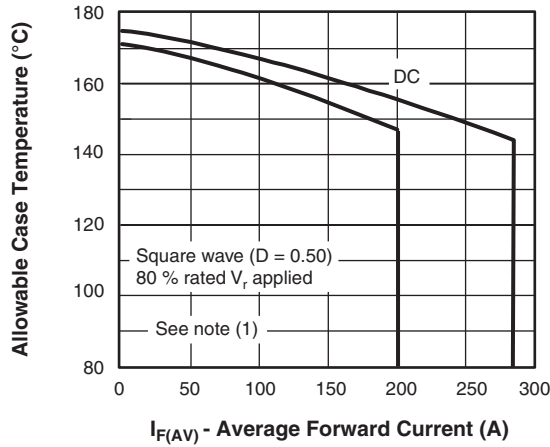


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

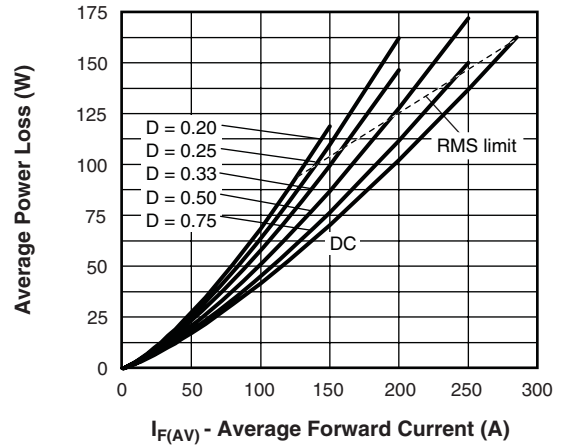


Fig. 6 - Forward Power Loss Characteristics

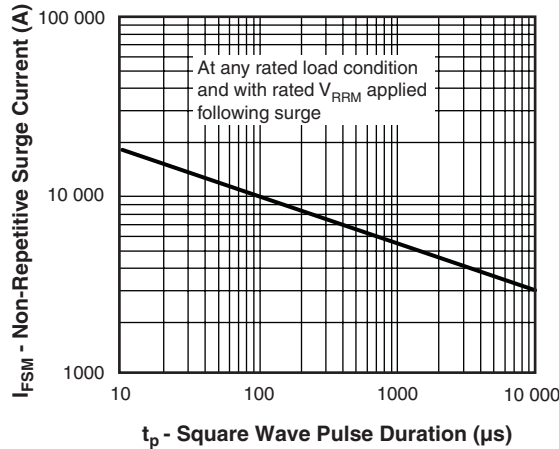


Fig. 7 - Maximum Non-Repetitive Surge Current

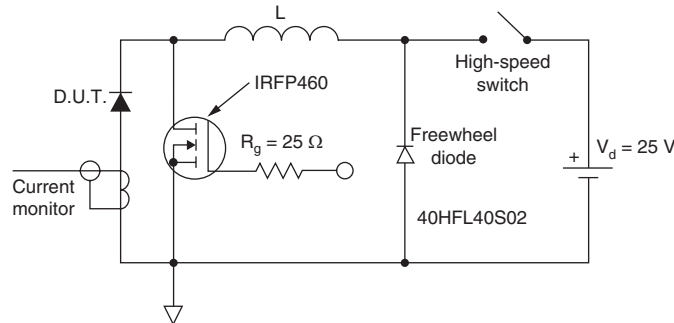


Fig. 8 - Unclamped Inductive Test Circuit

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



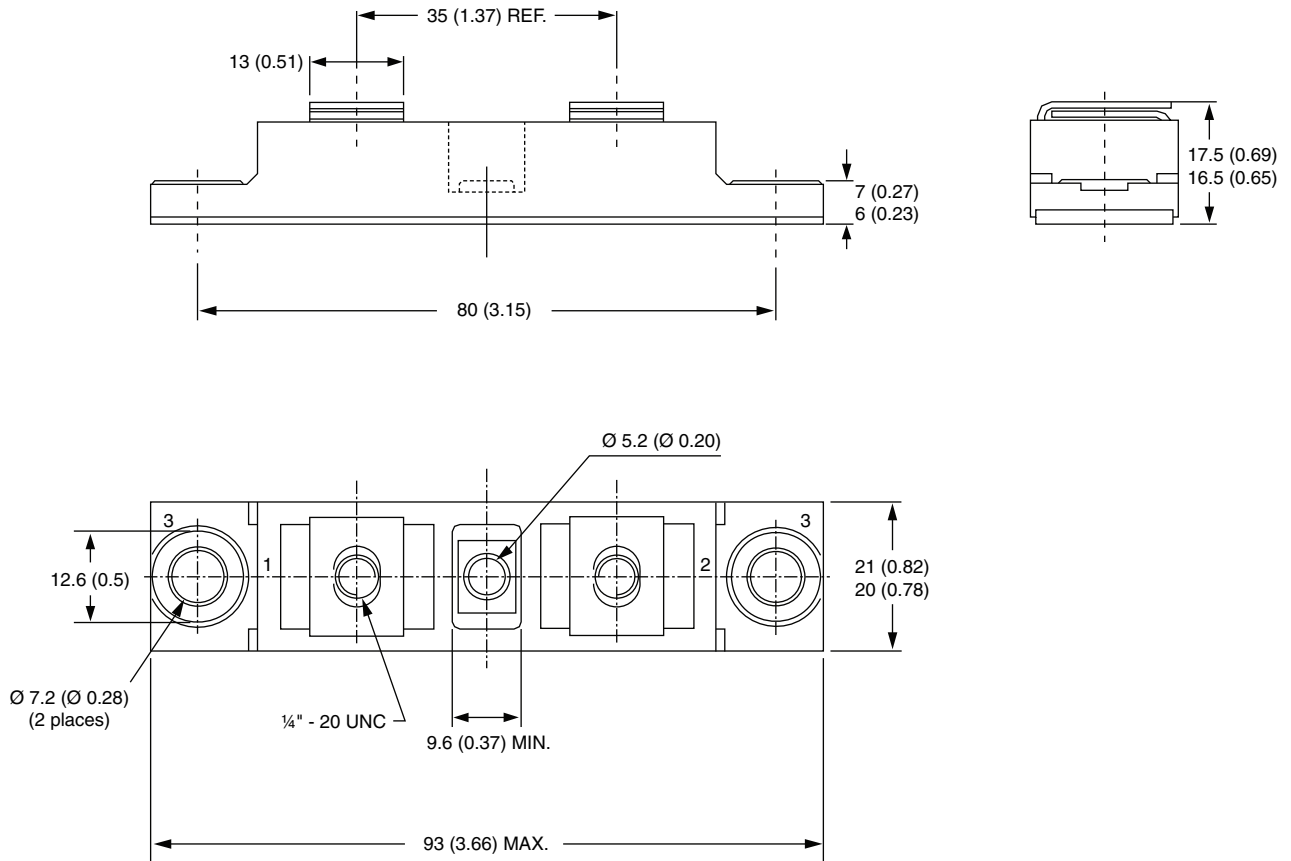
**ORDERING INFORMATION TABLE**

Device code	<b>40</b>	<b>1</b>	<b>C</b>	<b>N</b>	<b>Q</b>	<b>045</b>	<b>PbF</b>
	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 ratings			040 = 40 V 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>

## TO-244

**DIMENSIONS** in millimeters (inches)





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