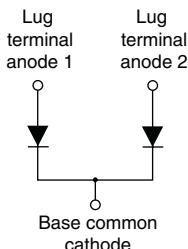


Schottky Rectifier, 400 A



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, $T_J = 125$ °C (per leg)	0.56	V
T_J	Range	- 55 to 175	°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	$I_{F(AV)}$	50 % duty cycle at $T_C = 147$ °C, rectangular waveform	200	A
			400	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I_{FSM}	5 μs sine or 3 μs rect. pulse 10 ms sine or 6 ms rect. pulse	25 000	
			3450	
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 24$ A, $L = 1$ mH	270	mJ
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ 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	$V_R = 5 \text{ V}_{\text{DC}}$ (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 < 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	°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	

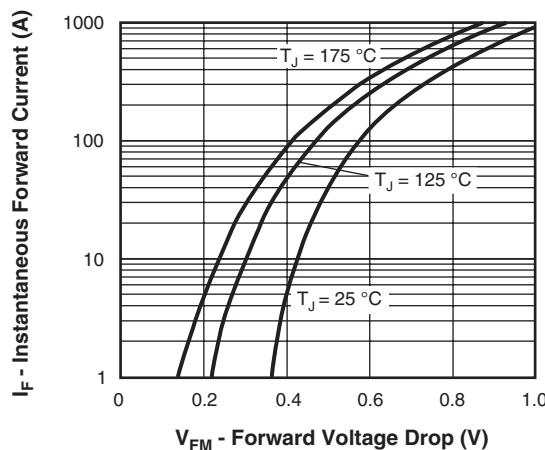


Fig. 1 - Maximum Forward Voltage Drop Characteristics

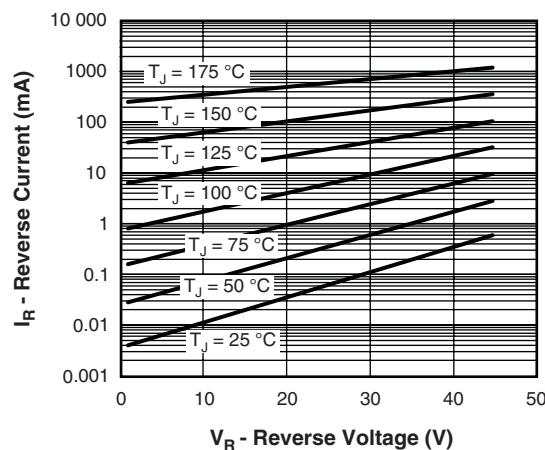


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

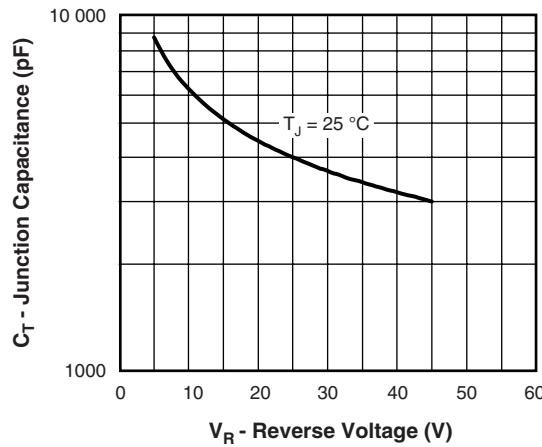
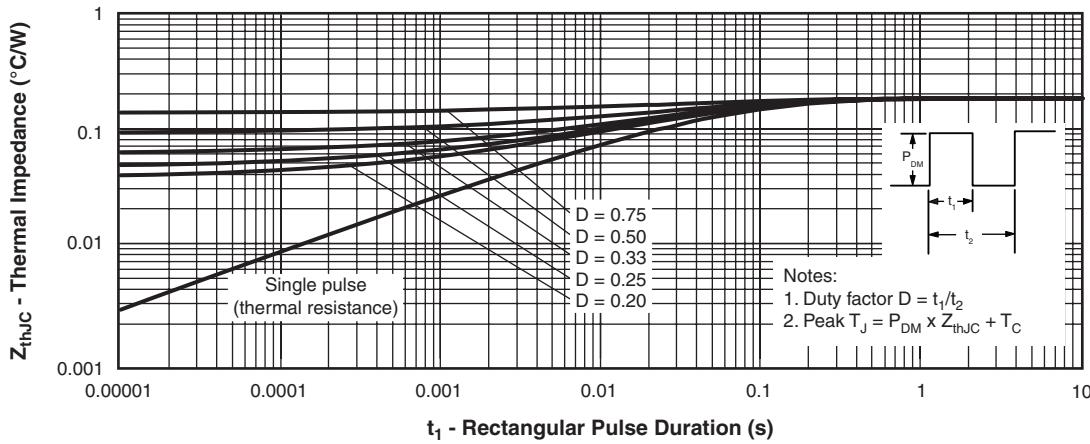


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

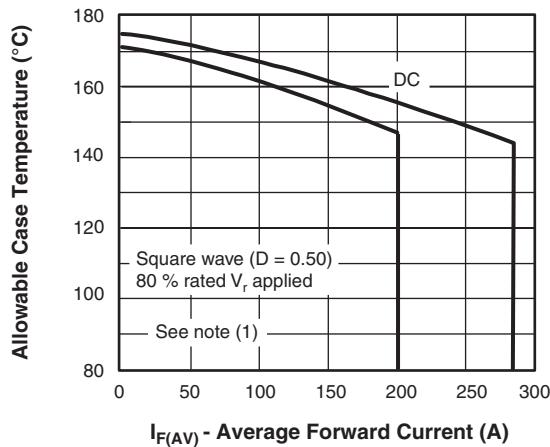


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

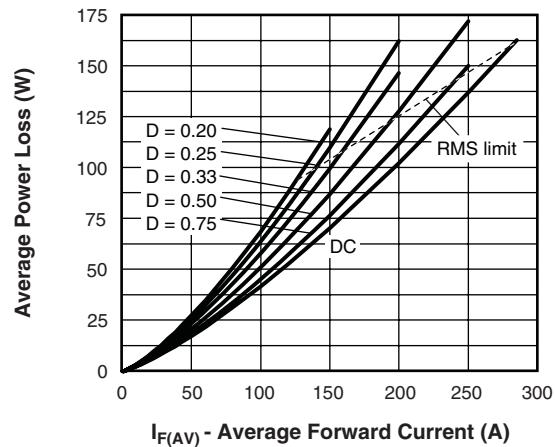


Fig. 6 - Forward Power Loss Characteristics

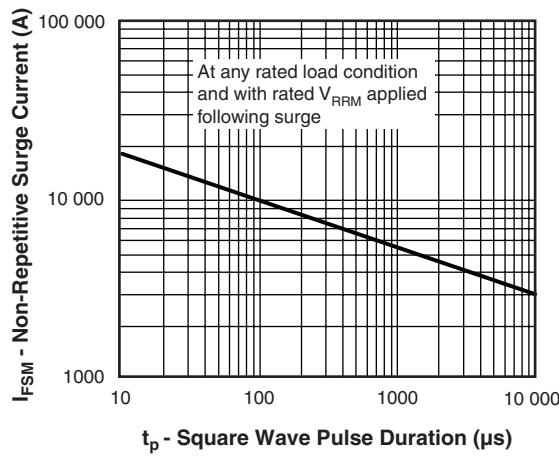


Fig. 7 - Maximum Non-Repetitive Surge Current

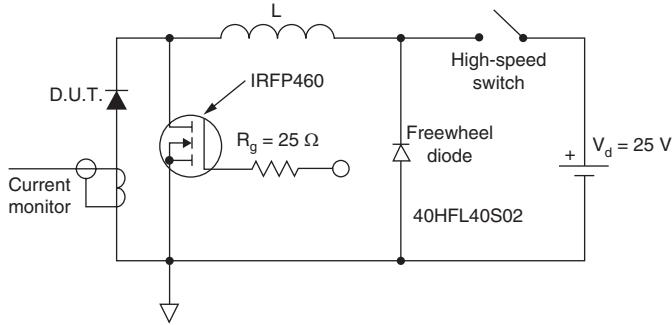


Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d,REV}) \times R_{thJC}$;
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM}$ 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

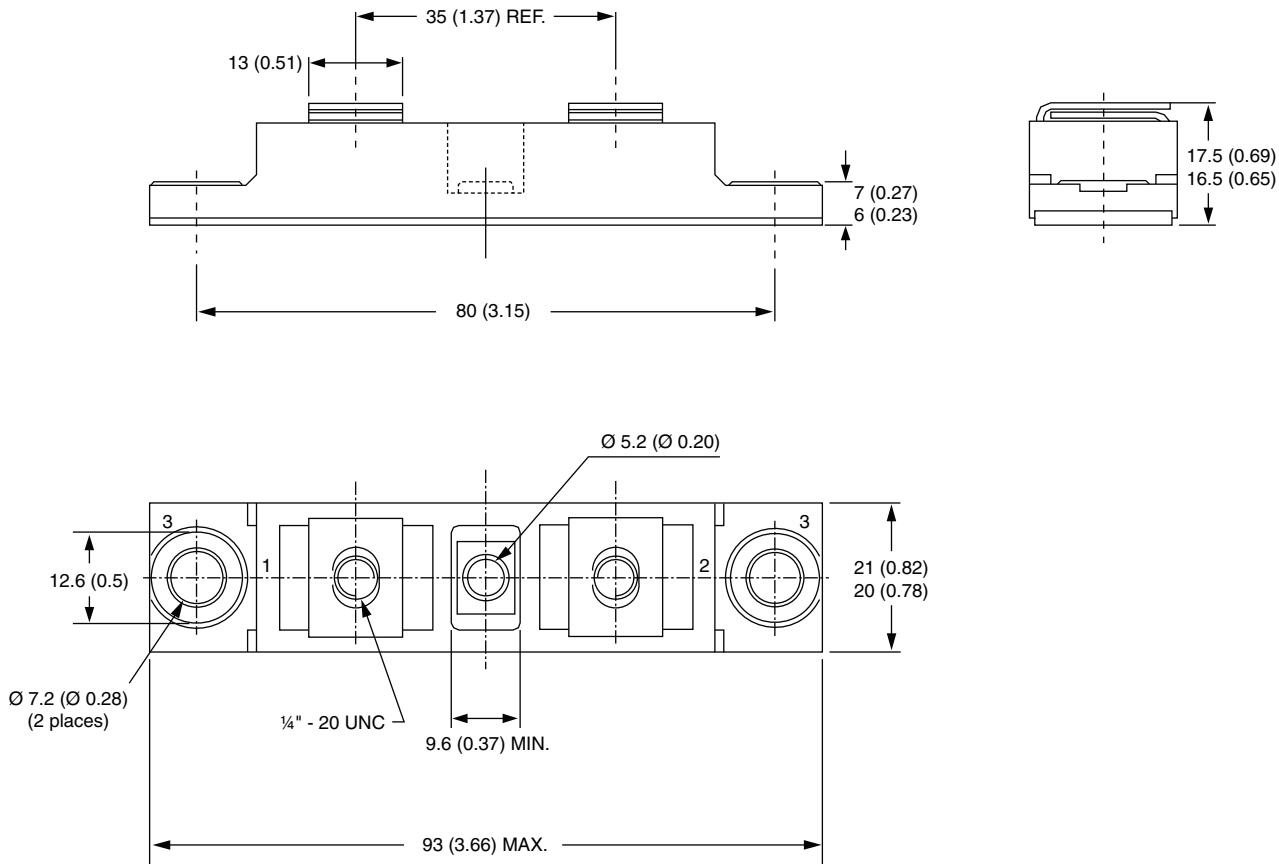
Device code	40	1	C	N	Q	045	PbF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

- | | |
|----------|----------------------------------|
| 1 | - Average current rating (x 10) |
| 2 | - Product silicon identification |
| 3 | - C = Circuit configuration |
| 4 | - N = Not isolated |
| 5 | - Q = Schottky rectifier diode |
| 6 | - Voltage ratings |
| 7 | - Lead (Pb)-free |
- 040 = 40 V
045 = 45 V

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95021

TO-244

DIMENSIONS in millimeters (inches)



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