International IΩR Rectifier

# 401CNQ... SERIES

SCHOTTKY RECTIFIER

400 Amp

TO-244AB

Major Ratings and Characteristics

Characteristics		401CNQ...	Units
$I_{F(AV)}$	Rectangular waveform	400	A
V_{RRM}	range	35 to 45	V
I_{FSM}	@ tp = 5 µs sine	25,000	A
V_F	@200Apk, T_J=125°C (per leg)	0.56	V
T_J	range	-55 to 175	°C

Description/Features

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, free-wheeling diodes, welding and reverse battery protection.

- 175° C T_J operation
- Center tap module
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Low forward voltage drop
- High frequency operation
  Guard ring for enhanced ruggedness and long term reliability

COMMON CATHODE

80.01 [3.150]
40.26 [1.585]
39.75 [1.565]
Ø 10.41 [.410]
9.65 [.380]
20.32 [.800]
17.78 [.700]
2X Ø 7.49 [.295]
6.99 [.275]
34.925 [1.375] REF.
Ø 4.95 [.195]
4.70 [.185]

63.50 [2.500]
60.96 [2.400]
1/4-20 SLOTTED HEX
23.55 [.927]
20.42 [.804]
15.75 [.620]
14.99 [.590]
92.71 [3.650]
90.17 [3.550]
3.35 [.132]
3.02 [.119]

LUG TERMINAL ANODE 1
LUG TERMINAL ANODE 2
BASE COMMON CATHODE

NOTES:
1. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
2. CONTROLLING DIMENSION: MILLIMETER

**Modified JEDEC
Outline TO-244AB**
Dimensions in millimeters and (inches)

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Voltage Ratings

Part number	401CNQ035	401CNQ040	401CNQ045
V_R Max. DC Reverse Voltage (V)			
V_{RWM} Max. Working Peak Reverse Voltage (V)	35	40	45

Absolute Maximum Ratings

	Parameters		401CNQ	Units	Conditions	
$I_{F(AV)}$	Max. Average Forward (Per Leg)		200	A	50% duty cycle @ T_C = 145°C, rectangular waveform	
	Current *See Fig. 5 (Per Device)		400			
I_{FSM}	Max. Peak One Cycle Non-Repetitive		25,000	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
	Surge Current (Per Leg) *See Fig. 7		3450		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repetitive Avalanche Energy (Per Leg)		270	mJ	T_J = 25°C, I_{AS} = 40 Amps, L = 0.34 mH	
I_{AR}	Repetitive Avalanche Current (Per Leg)		40	A	Current decaying linearly to zero in 1 µsec Frequency limited by T_J max. V_A = 1.5 x V_R typical	

Electrical Specifications

	Parameters		401CNQ	Units	Conditions	
V_{FM}	Max. Forward Voltage Drop		0.67	V	@ 200A	T_J = 25°C
	(Per Leg) * See Fig. 1 (1)		0.78	V	@ 400A	
			0.56	V	@ 200A	
			0.68	V	@ 400A	
I_{RM}	Max. Reverse Leakage Current		20	mA	T_J = 25°C	V_R = rated V_R
	(Per Leg) * See Fig. 2 (1)		180	mA	T_J = 125°C	
C_T	Max. Junction Capacitance (Per Leg)		10,300	pF	V_R = 5V_{DC}, (test signal range 100Khz to 1Mhz) 25°C	
L_S	Typical Series Inductance (Per Leg)		5.0	nH	From top of terminal hole to mounting plane	
dv/dt	Max. Voltage Rate of Change (Rated V_R)		10000	V/ µs		

(1) Pulse Width < 300µs, Duty Cycle <2%

Thermal-Mechanical Specifications

	Parameters		401CNQ	Units	Conditions
T_J	Max. Junction Temperature Range		-55 to 175	°C	
T_{stg}	Max. Storage Temperature Range		-55 to 175	°C	
R_{thJC}	Max. Thermal Resistance Junction to Case (Per Leg)		0.20	°C/W	DC operation *See Fig. 4
R_{thJC}	Max. Thermal Resistance Junction to Case (Per Package)		0.10	°C/W	DC operation
R_{thCS}	Typical Thermal Resistance, Case to Heatsink		0.10	°C/W	Mounting surface, smooth and greased
wt	Approximate Weight		79 (2.80)	g (oz.)	
T	Mounting Torque Base	Min.	24 (20)	Kg-cm (lbf-in)	
		Max.	35 (30)		
	Mounting Torque Center Hole	Typ.	13.5 (12)		
	Terminal Torque	Min.	35 (30)		
		Max.	46 (40)		
	Case Style		TO-244AB		Modified JEDEC

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International **IOR** Rectifier

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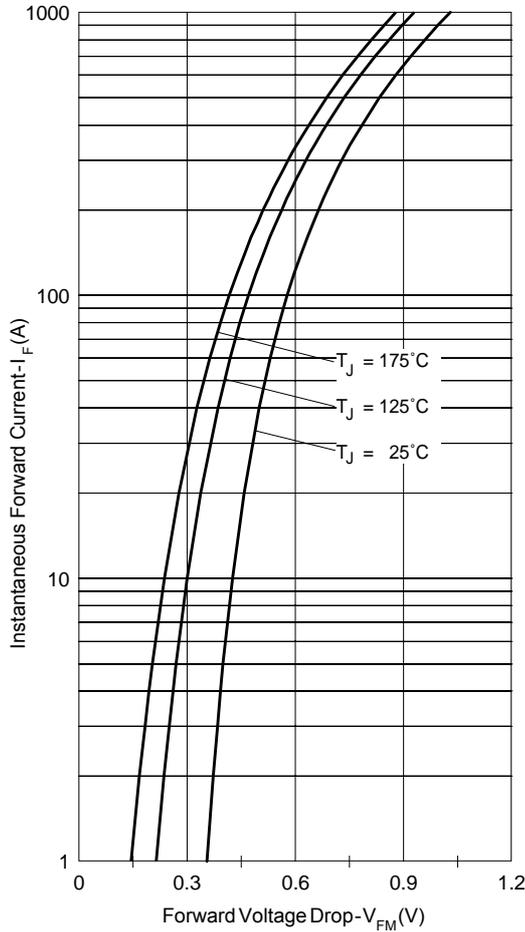
Fig. 1 - Max. Forward Voltage Drop Characteristics
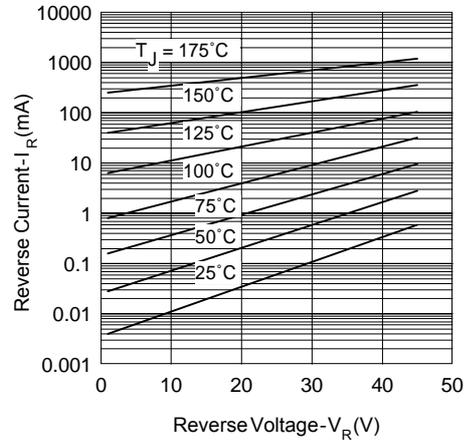
**Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage**
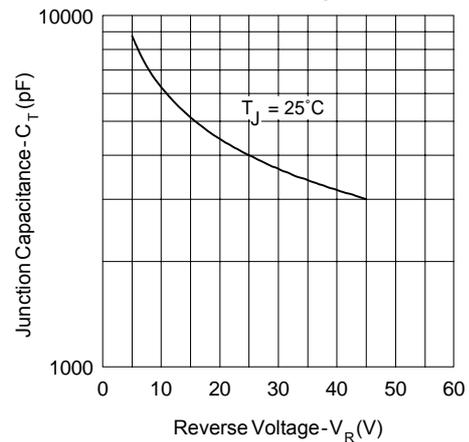

Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

Notes:

1. Duty factor D = t_1 / t_2

2. Peak T_J = P_{DM} x Z_{thJC} + T_C
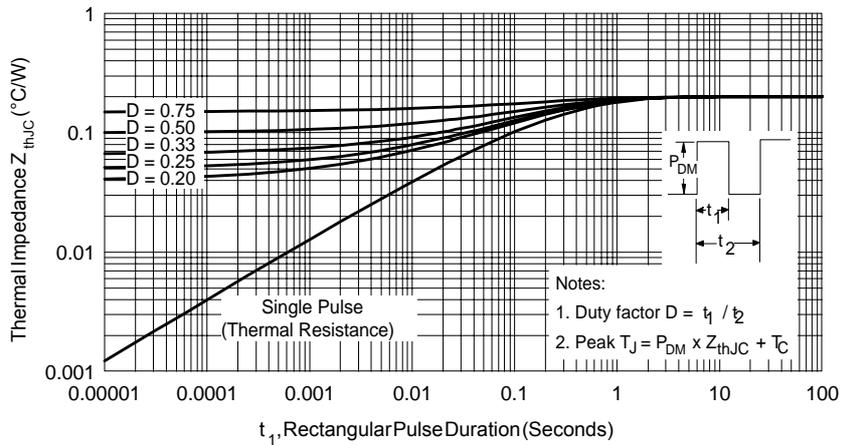
Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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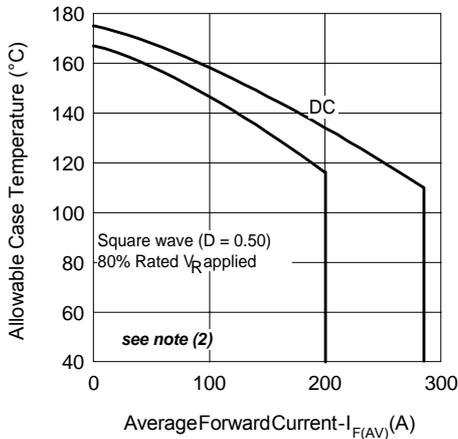
Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current
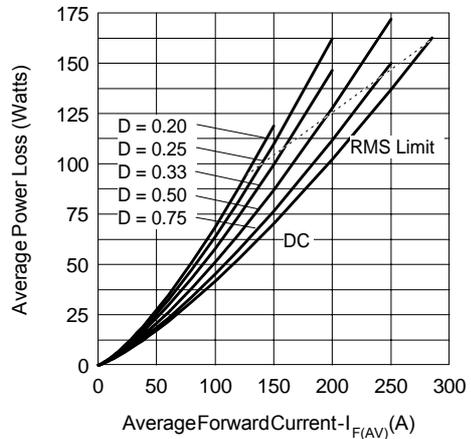
**Fig. 6 - Forward Power Loss Characteristics**
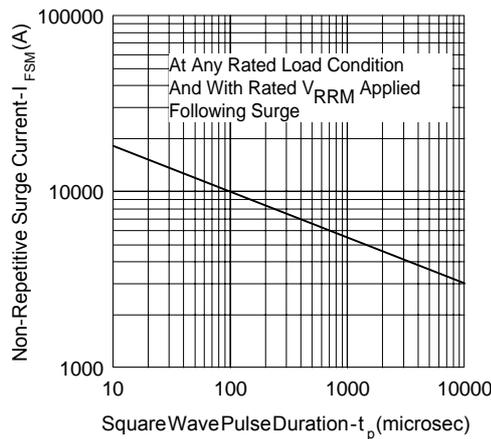
**Fig. 7 - Max. Non-Repetitive Surge Current**
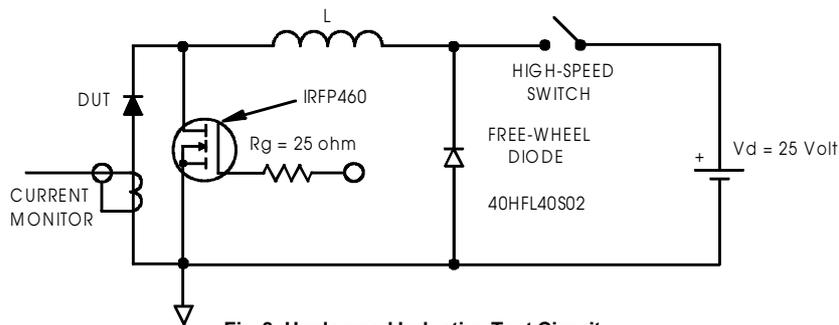
Fig. 8 - Unclamped Inductive Test Circuit

(2) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;

Pd = Forward Power Loss = $I_{F(AV)} \times V_{FM}$ @ ($I_{F(AV)}$ / D) (see Fig. 6);

Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R$ (1 - D); I_R @ V_{R1} = 80% rated V_R

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