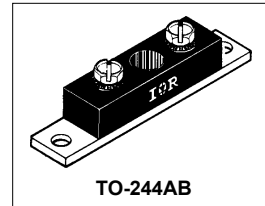


International IRF Rectifier

400CNQ... SERIES

SCHOTTKY RECTIFIER

400 Amp



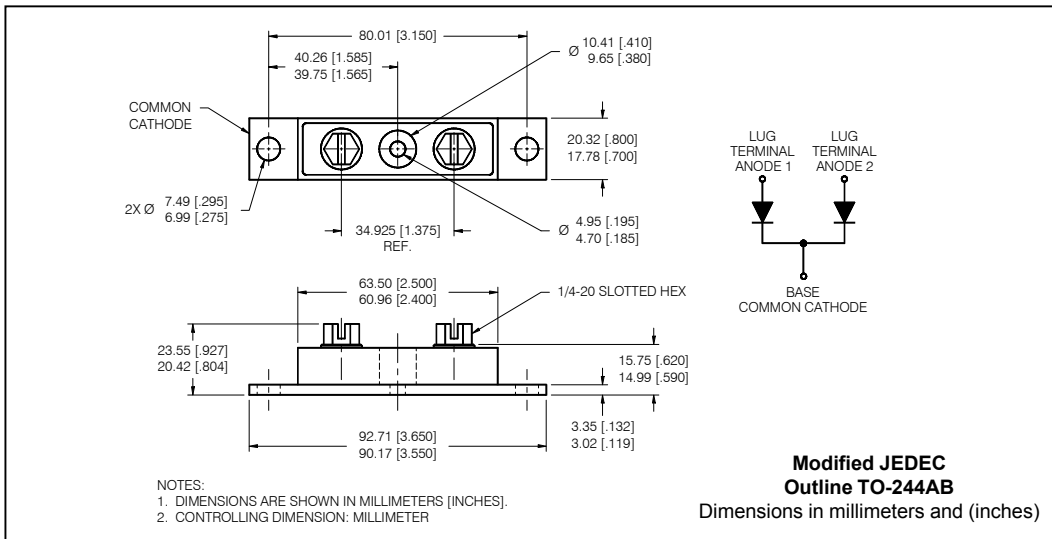
Major Ratings and Characteristics

| Characteristics | 400CNQ... | Units |
|--|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform | 400 | A |
| V_{RRM} range | 35 to 50 | V |
| I_{FSM} @tp = 5 μ s sine | 29,000 | A |
| V_F @200Apk, $T_J = 125^\circ\text{C}$ (per leg) | 0.52 | V |
| T_J range | -55 to 150 | $^\circ\text{C}$ |

Description/ Features

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 $^\circ\text{C}$ junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, welding, and reverse battery protection.

- 150 $^\circ\text{C}$ T_J operation
- Center tap module
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability



Voltage Ratings

| Part number | 400CNQ035 | 400CNQ040 | 400CNQ045 | 400CNQ050 |
|---|-----------|-----------|-----------|-----------|
| V_R Max. DC Reverse Voltage (V) | 35 | 40 | 45 | 50 |
| V_{RWM} Max. Working Peak Reverse Voltage (V) | | | | |

Absolute Maximum Ratings

| Parameters | 400CNQ | Units | Conditions |
|---|----------------|-------|--|
| $I_{F(AV)}$ Max. Average Forward Current (Per Leg) * See Fig. 5 (Per Device) | 200 400 | A | 50% duty cycle @ $T_C = 114^\circ\text{C}$, rectangular wave form |
| I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7 | 29,000 3400 | A | 5 μs Sine or 3 μs Rect. pulse 10ms Sine or 6ms Rect. pulse Following any rated load condition and with rated V_{RWM} applied |
| E_{AS} Non-Repetitive Avalanche Energy (Per Leg) | 180 | mJ | $T_J = 25^\circ\text{C}$, $I_{AS} = 40$ Amps, $L = 0.22$ mH |
| I_{AR} Repetitive Avalanche Current (Per Leg) | 40 | A | Current decaying linearly to zero in 1 μsec Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical |

Electrical Specifications

| Parameters | 400CNQ | Units | Conditions |
|--|--------|------------------|---|
| V_{FM} Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1) | 0.57 | V | @ 200A $T_J = 25^\circ\text{C}$ |
| | 0.73 | V | @ 400A |
| | 0.52 | V | @ 200A $T_J = 125^\circ\text{C}$ |
| | 0.68 | V | @ 400A |
| I_{RM} Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1) | 20 | mA | $T_J = 25^\circ\text{C}$ |
| | 1 | A | $T_J = 125^\circ\text{C}$ $V_R = \text{rated } V_R$ |
| $V_{F(TO)}$ Threshold Voltage | 0.32 | V | $T_J = T_J \text{ max.}$ |
| r_t Forward Slope Resistance | 0.81 | m Ω | |
| 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 | 10000 | V/ μs | (Rated V_R) |

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

Thermal-Mechanical Specifications

| Parameters | 400CNQ | Units | Conditions |
|---|------------|---------------------------|--------------------------------------|
| T_J Max. Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ | |
| T_{stg} Max. Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ | |
| R_{thJC} Max. Thermal Resistance Junction to Case (Per Leg) | 0.20 | $^\circ\text{C}/\text{W}$ | DC operation * See Fig. 4 |
| R_{thJC} Max. Thermal Resistance Junction to Case (Per Package) | 0.10 | $^\circ\text{C}/\text{W}$ | DC operation |
| R_{thCS} Typical Thermal Resistance, Case to Heatsink | 0.10 | $^\circ\text{C}/\text{W}$ | 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) | |
| | Typ. | 13.5 (12) | |
| | Min. | 35 (30) | |
| Terminal Torque | Max. | 46 (40) | |
| Case Style | TO-244AB | | Modified JEDEC |

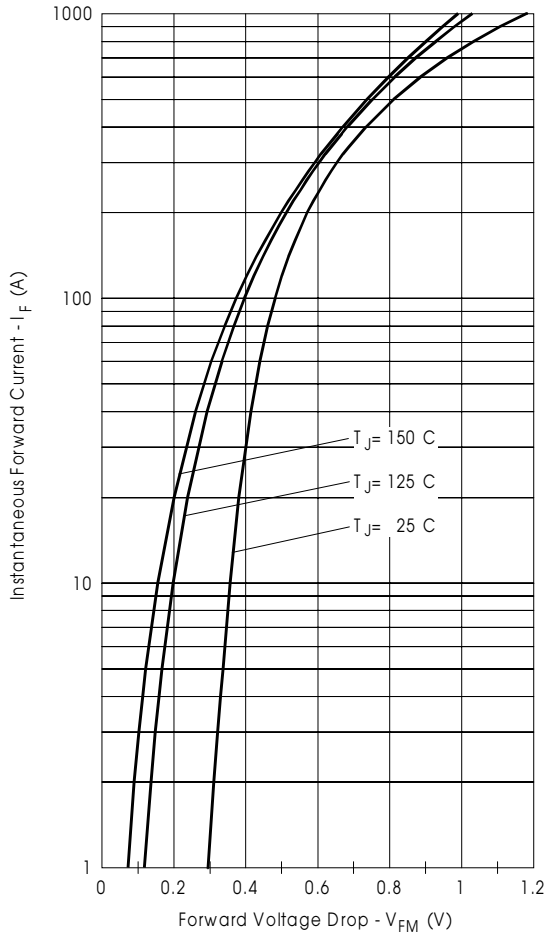


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

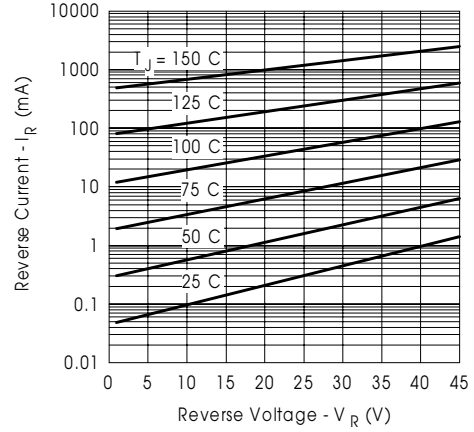


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

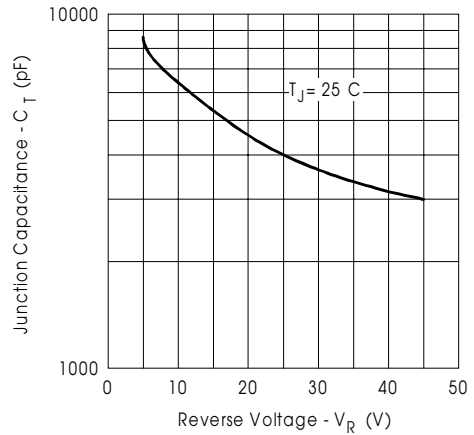


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

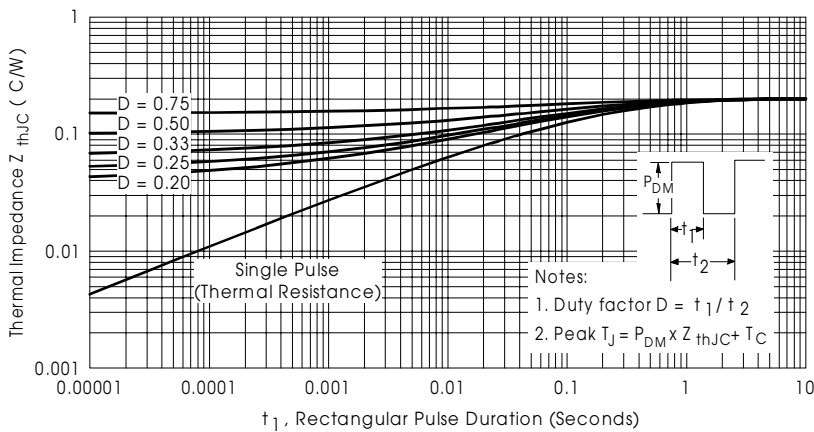


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

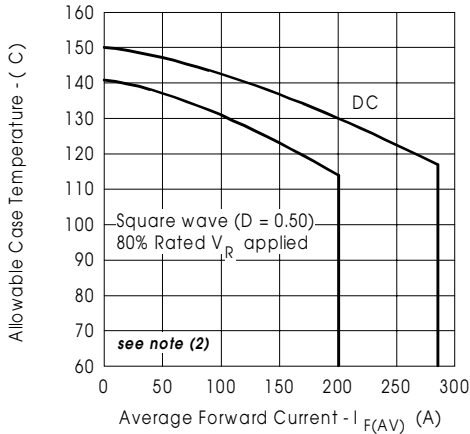


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

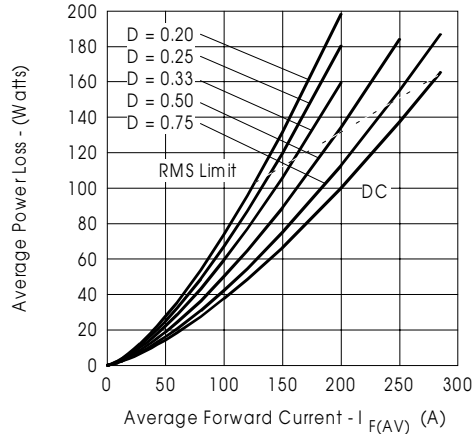


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

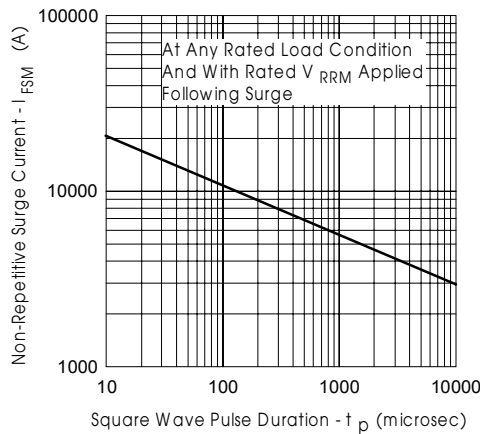


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

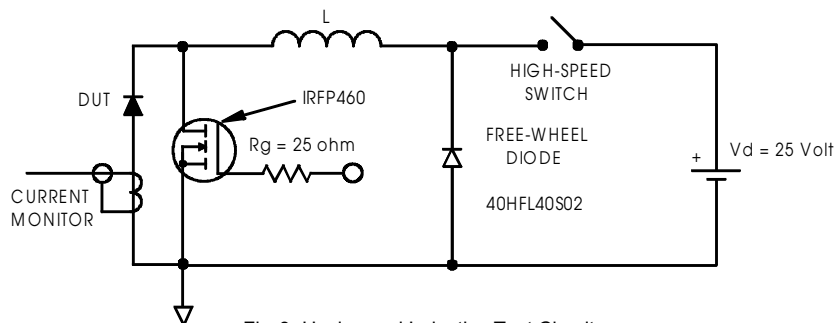


Fig. 8 - Unclamped Inductive Test Circuit

(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

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.

International
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IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
Visit us at www.irf.com for sales contact information. 05/02