

## 181NQ... SERIES

### SCHOTTKY RECTIFIER

180 Amp

#### Major Ratings and Characteristics

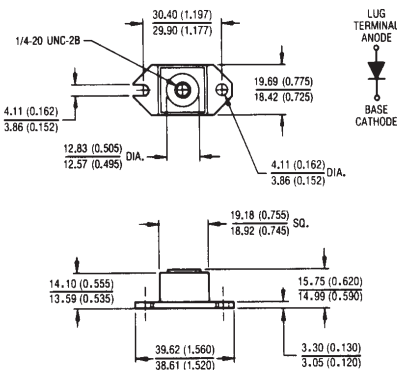
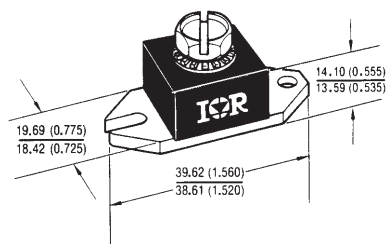
| Characteristics                     | 181NQ...   | Units      |
|-------------------------------------|------------|------------|
| $I_{F(AV)}$ Rectangular waveform    | 180        | A          |
| $V_{RRM}$ range                     | 35 to 45   | V          |
| $I_{FSM}$ @ $t_p = 5 \mu s$ sine    | 22,000     | A          |
| $V_F$ @ 180Apk, $T_J = 125^\circ C$ | 0.56       | V          |
| $T_J$ range                         | -55 to 175 | $^\circ C$ |

#### Description/Features

The 181NQ 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  $175^\circ C$  junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- $175^\circ C$   $T_J$  operation
- Unique high power, Half-Pak module
- Replaces three parallel DO-5's
- Easier to mount and lower profile than DO-5's
- 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

#### CASE STYLE AND DIMENSIONS



#### Outline HALF PAK Module

Dimensions in millimeters and inches

## Voltage Ratings

| Part number                                     | 181NQ035 | 181NQ040 | 181NQ045 |
|-------------------------------------------------|----------|----------|----------|
| $V_R$ Max. DC Reverse Voltage (V)               | 35       | 40       | 45       |
| $V_{RWM}$ Max. Working Peak Reverse Voltage (V) |          |          |          |

## Absolute Maximum Ratings

| Parameters         |                                                               | 181NQ  | Units | Conditions                                                                                                                           |                                                                            |  |
|--------------------|---------------------------------------------------------------|--------|-------|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|--|
| I <sub>F(AV)</sub> | Max. Average Forward Current<br>* See Fig. 5                  | 180    | A     | 50% duty cycle @ T <sub>C</sub> = 125°C, rectangular wave form                                                                       |                                                                            |  |
| I <sub>FSM</sub>   | Max. Peak One Cycle Non-Repetitive Surge Current * See Fig. 7 | 22,000 | A     | 5μs Sine or 3μs Rect. pulse                                                                                                          | Following any rated load condition and with rated V <sub>RRM</sub> applied |  |
|                    |                                                               | 2500   |       | 10ms Sine or 6ms Rect. pulse                                                                                                         |                                                                            |  |
| E <sub>AS</sub>    | Non-Repetitive Avalanche Energy                               | 243    | mJ    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 36 Amps, L = 0.38 mH                                                                       |                                                                            |  |
| I <sub>AR</sub>    | Repetitive Avalanche Current                                  | 36     | A     | Current decaying linearly to zero in 1μsec<br>Frequency limited by T <sub>J</sub> max. V <sub>A</sub> = 1.5 x V <sub>R</sub> typical |                                                                            |  |

## Electrical Specifications

| Parameters      |                                                        | 181NQ  | Units | Conditions                                                                   |                                       |
|-----------------|--------------------------------------------------------|--------|-------|------------------------------------------------------------------------------|---------------------------------------|
| V <sub>FM</sub> | Max. Forward Voltage Drop (1)<br>* See Fig. 1          | 0.66   | V     | @ 180A                                                                       | T <sub>J</sub> = 25 °C                |
|                 |                                                        | 0.80   | V     | @ 360A                                                                       |                                       |
|                 |                                                        | 0.56   | V     | @ 180A                                                                       | T <sub>J</sub> = 125 °C               |
|                 |                                                        | 0.69   | V     | @ 360A                                                                       |                                       |
| I <sub>RM</sub> | Max. Reverse Leakage Current (1)<br>* See Fig. 2       | 15     | mA    | T <sub>J</sub> = 25 °C                                                       | V <sub>R</sub> = rated V <sub>R</sub> |
|                 |                                                        | 135    | mA    | T <sub>J</sub> = 125 °C                                                      |                                       |
| C <sub>T</sub>  | Max. Junction Capacitance                              | 7800   | pF    | V <sub>R</sub> = 5V <sub>DC</sub> , (test signal range 100Khz to 1Mhz) 25 °C |                                       |
| L <sub>S</sub>  | Typical Series Inductance                              | 6.0    | nH    | From the top of terminal hole to mounting plane                              |                                       |
| dv/dt           | Max. Voltage Rate of Change<br>(Rated V <sub>R</sub> ) | 10,000 | V/ μs |                                                                              |                                       |

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%

## Thermal-Mechanical Specifications

| Parameters        |                                              |      | 181NQ           | Units             | Conditions                           |
|-------------------|----------------------------------------------|------|-----------------|-------------------|--------------------------------------|
| T <sub>J</sub>    | Max. Junction Temperature Range              |      | -55 to 175      | °C                |                                      |
| T <sub>stg</sub>  | Max. Storage Temperature Range               |      | -55 to 175      | °C                |                                      |
| R <sub>thJC</sub> | Max. Thermal Resistance Junction to Case     |      | 0.30            | °C/W              | DC operation * See Fig. 4            |
| R <sub>thCS</sub> | Typical Thermal Resistance, Case to Heatsink |      | 0.10            | °C/W              | Mounting surface, smooth and greased |
| wt                | Approximate Weight                           |      | 25.6(0.9)       | g(oz.)            |                                      |
| T                 | Mounting Torque                              | Min. | 40(35)          | Kg-cm<br>(lbf-in) | Non-lubricated threads               |
|                   |                                              | Max. | 58(50)          |                   |                                      |
|                   | Terminal Torque                              | Min. | 58(50)          |                   |                                      |
|                   |                                              | Max. | 86(75)          |                   |                                      |
| Case Style        |                                              |      | HALF PAK Module |                   |                                      |

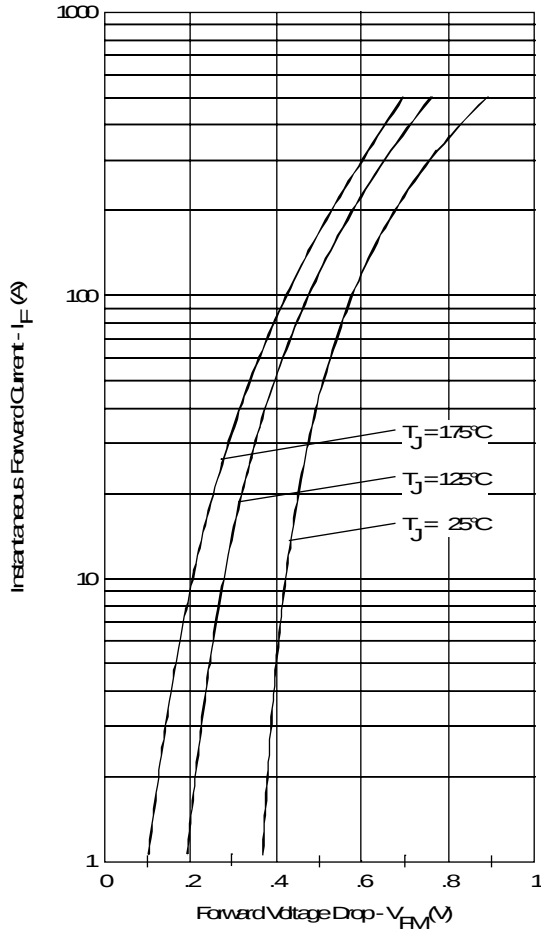


Fig. 1 - Maximum Forward Voltage Drop Characteristics

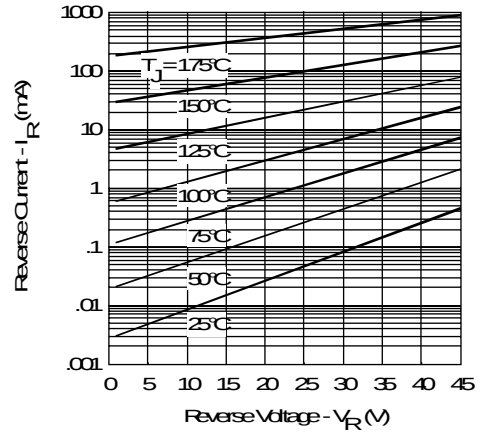


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

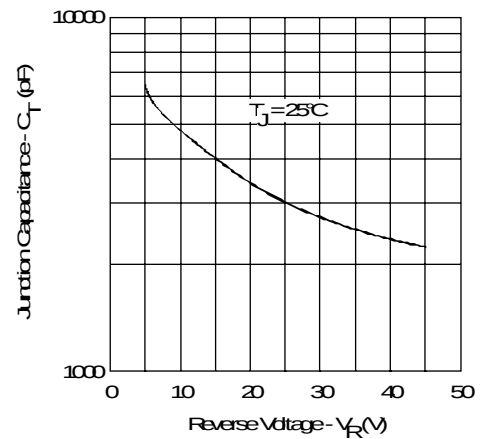


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

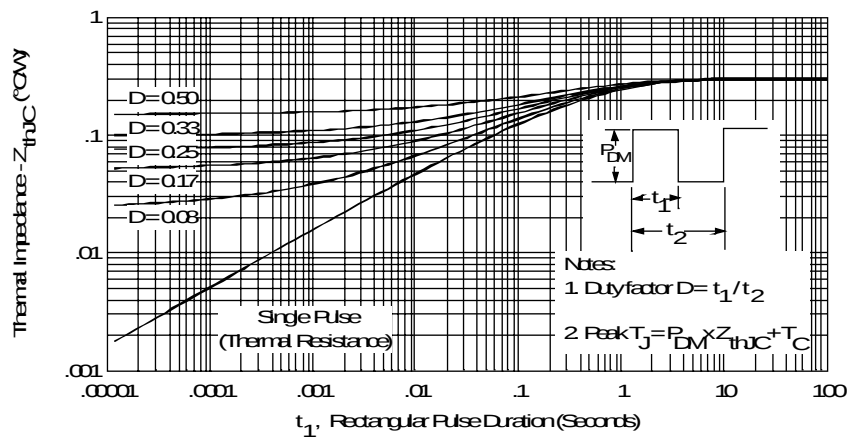


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

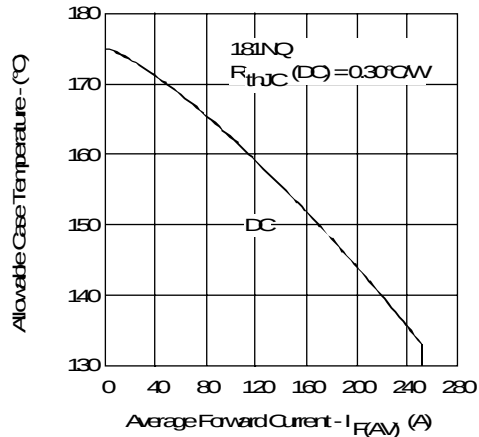


Fig. 5 - Maximum Allowable Case Temperature Vs. Average Forward Current

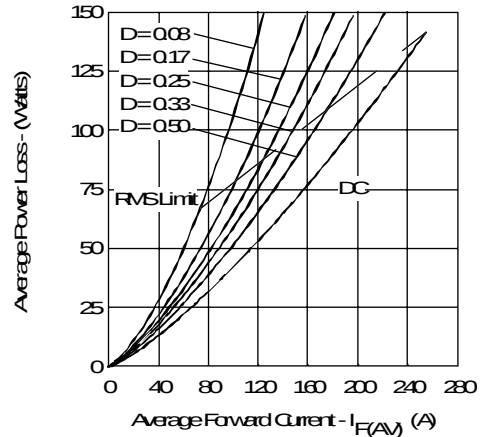


Fig. 6 - Forward Power Loss Characteristics

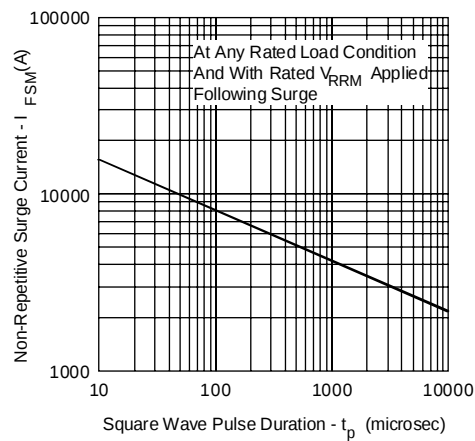


Fig. 7 - Maximum Non-Repetitive Surge Current

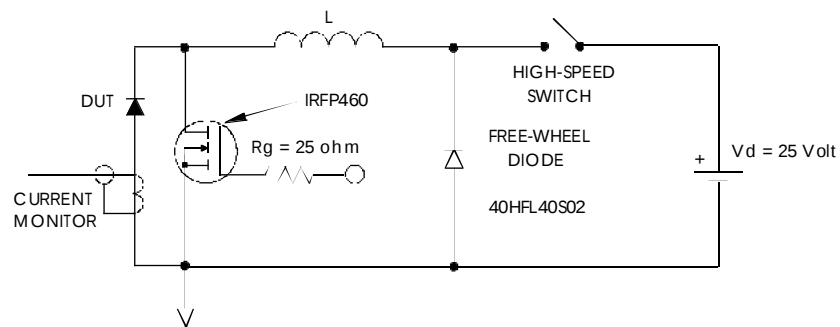


Fig. 8 - Unclamped Inductive Test Circuit