Data Sheet No. PD-2.047B

INTERNATIONAL RECTIFIER IOR

T-03-17

# 80SQ SERIES

## 8 Amp Schottky Power Rectifiers

### Major Ratings and Characteristics

| Characteristic | | 80SQ | Units |
|---|---|---|---|
| $I_{F(AV)}$ @ 180° Rectangular | | 8 | A |
| @ 180° Half Sine Wave | | 7.2 | A |
| $I_{FSM}$ | 50 Hz | 380 | A |
| | 60 Hz | 400 | |
| $I^2t$ | @ 50 Hz | 730 | $A^2s$ |
| | @ 60 Hz | 665 | $A^2s$ |
| $I^2\sqrt{t}$ | | 10,330 | $A^2\sqrt{s}$ |
| $C_t$ @ -5V | | 1000 | pF |
| $T_J$ | | -65 to 175 | °C |
| $V_{RWM}$ | | 30 to 45 | V |

### Description/Features

The 80SQ Schottky is designed to be operated at 175°C $T_J$. It employs the "830" process which results in a very low ratio of reverse leakage current to junction temperature. In addition to improvements in reliability and performance, it is a rugged device with a guaranteed repetitive peak reverse voltage capability and excellent ability to withstand reverse energy transients. It can be used in both existing and new designs.

- Economical axial lead package
- 175°C $T_J$ operation
- Extremely low reverse leakage: 13 mA at 125°C
- No voltage derating on $V_{RWM}$ over temperature range
- Provides extremely high power supply reliability
- No thermal runaway at rated temperature and operating parameters
- A guaranteed repetitive peak reverse voltage capability for short pulses which is 20% above $V_{RWM}$
- Ability to withstand reverse energy transients

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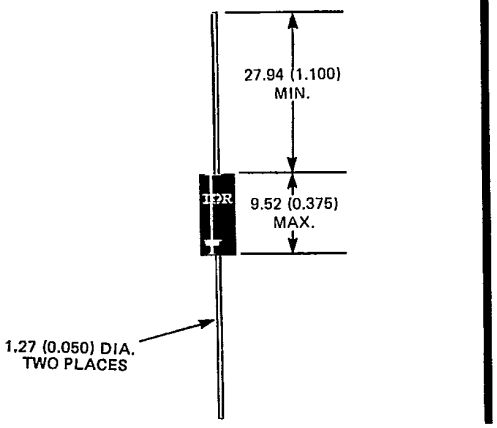
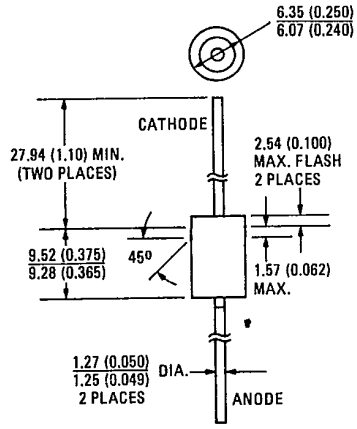
### CASE STYLE AND DIMENSIONS




Case Style C-24
All Dimensions in Millimeters and (Inches)

**80SQ Series**

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## VOLTAGE RATINGS

| Part Numbers | $V_{RWM}$ – Max. Working Peak Reverse Voltage (V)① | $V_{RRM}$ – Max. Repetitive Peak Reverse Voltage (V)② (200 ns Max. Pulse Width) | $V_R$ – Max. Direct Reverse Voltage (V) ③ |
|---|---|---|---|
| 80SQ030 | 30 | 36 | 30 |
| 80SQ035 | 35 | 42 | 35 |
| 80SQ040 | 40 | 48 | 40 |
| 80SQ045 | 45 | 54 | 45 |

## ELECTRICAL SPECIFICATIONS

| | | 80SQ | Units | Conditions |
|---|---|---|---|---|
| $I_{F(AV)}$ | Max. average forward current | 8 | A | 180° conduction @ $T_L$ = –65 to 92° rectangular waveform④ |
| | | 7.2 | | 180° conduction @ $T_L$ = –65 to 97°C sinusoidal waveform④ |
| $I_{FSM}$ | Max. peak one cycle, non-repetitive surge current | 380 | A | Half cycle 50 Hz sine wave or 8 ms rectangular pulse — Following any rated load condition and with rated $V_{RWM}$ reapplied. |
| | | 400 | | Half cycle 60 Hz sine wave or 5 ms rectangular pulse |
| | | 455 | | Half cycle 50 Hz sine wave or 8 ms rectangular pulse — Following any rated load condition and with $V_{RWM}$ = 0 following surge. |
| | | 475 | | Half cycle 60 Hz sine wave or 5 ms rectangular pulse |
| $I^2t$ | Maximum $I^2t$ (for fusing) | 730 | $A^2s$ | t = 10 ms — With rated $V_{RWM}$ following surge, initial $T_J \leq 175°C$. |
| | | 665 | | t = 8.3 ms |
| | Maximum $I^2t$ for individual device fusing | 1033 | | t = 10 ms — With $V_{RWM}$ = 0 following surge, initial $T_J \leq 175°C$. |
| | | 940 | | t = 8.3 ms |
| $I^2\sqrt{t}$ | Maximum $I^2\sqrt{t}$ for individual device fusing ⑥ | 10330 | $A^2\sqrt{s}$ | t = 0.1 to 10 ms, initial $T_J \leq 175°C$. $V_{RRM}$ = 0 following surge. |
| $V_{FM}$ | Max. peak forward voltage | 0.70 | V | $T_J$ = 25°C — Rated $I_{F(AV)}$ (16A peak) |
| | | 0.68 | | $T_J$ = 150°C — 180° conduction, |
| | | 0.56 | | $T_J$ = 175°C — rectangular waveform |
| | | 0.62 | | $T_J$ = 25°C, $I_{FM}$ = 8A |
| $I_{RM}$ | Max. peak reverse current | 5.0 | mA | $T_J$ = 25°C — $V_{RWM}$ = rated value |
| | | 13 | | $T_J$ = 125°C |
| $I_{RRM}$ | Max. repetitive peak reverse current | 1.0 | A | $T_C$ = 25°C, f = 1 kHz, see fig. 9 for test circuit |
| $C_t$ | Max. capacitance | 1000 | pF | $T_C$ = 25°C, $V_R$ = 5 Vdc (Test signal in the range of 100 kHz to 1 MHz) |
| dv/dt | Max. rate of reverse voltage application | 1000 | V/μs | $T_C$ = 25°C, $V_{RM}$ = rated $V_{RWM}$ |

## THERMAL-MECHANICAL SPECIFICATIONS

| | | | | | |
|---|---|---|---|---|---|
| $T_J$ | Max. operating junction temperature range | | –65 to 175 | °C | |
| $T_{stg}$ | Max. storage temperature range | | –65 to 175 | °C | |
| $R_{thJL}$ | Maximum thermal resistance, junction-to-leads, double side cooling (compositive values) | | | deg C/W | |
| | Lead length ⑤ | $\ell$ = 3.2mm (1/8 in.) | 11.0 | | |
| | | $\ell$ = 9.5mm (3/8 in.) | 14.7 | | |
| | | $\ell$ = 19.0mm (3/4 in.) | 20.0 | | |
| wt | Approximate weight | | 1.5 (0.053) | g (oz) | |
| | Case style | | C-24 | | |

① $T_C$ = -65°C to 158°C, 180° conduction

② $T_C$ = 0°C to 158°C, 180° conduction

③ $T_L$ = -65 to 111°C for lead length (ℓ) = 1/8 in. (3.2 mm)
$T_L$ = -65 to 89°C for lead lenght (ℓ) = 3/8 in. (9.5 mm)
$T_L$ = -65 to 59°C for lead length (ℓ) = 3/4 in. (19 mm)
(see note 5).

④ ℓ = 9.5 mm (3/8 in.)

⑤ Length of leads to temperature measurement points (heat sinks).

⑥ $I^2t$ for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

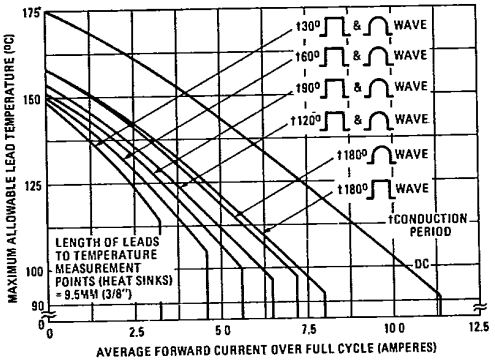


Fig. 1 – Maximum Allowable Lead Temperature Vs. Average Forward Current (50 Hz to 100 kHz)

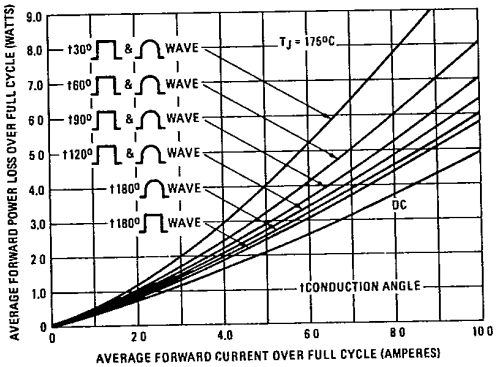


Fig. 2 – Maximum Forward Power Loss Vs. Forward Current (50 Hz to 100 kHz)

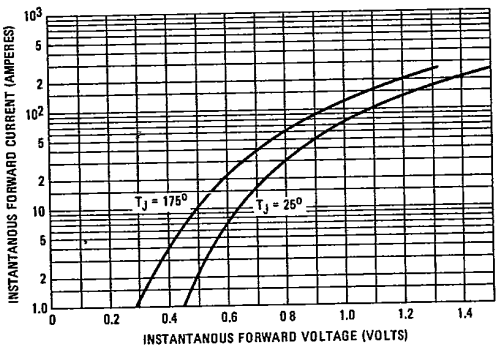


Fig. 3 – Maximum Forward Voltage Vs. Forward Current

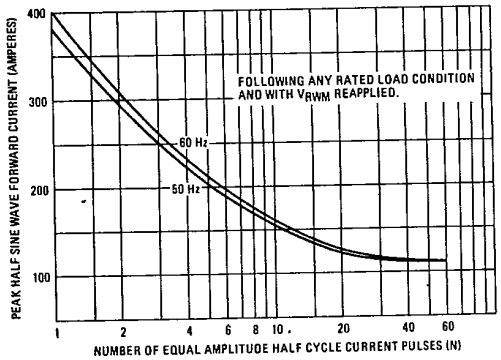


Fig. 4 – Maximum Non-Repetitive Surge Current Vs. Number of Cycles

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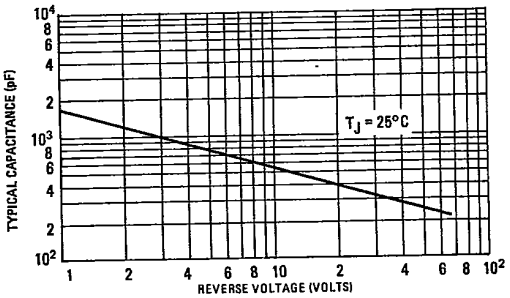


Fig. 5 – Typical Capacitance Vs. Reverse Voltage

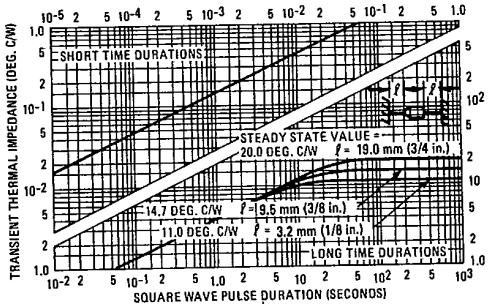


Fig. 6 – Maximum Transient Thermal Impedance, Junction-to-Lead Vs. Pulse Duration

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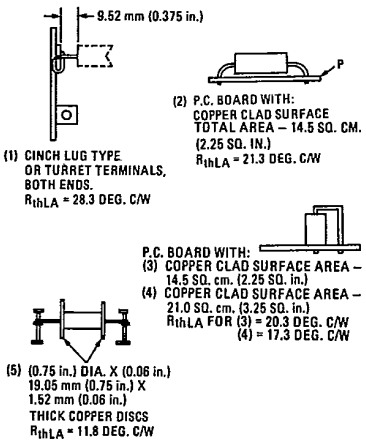
## Mounting Details



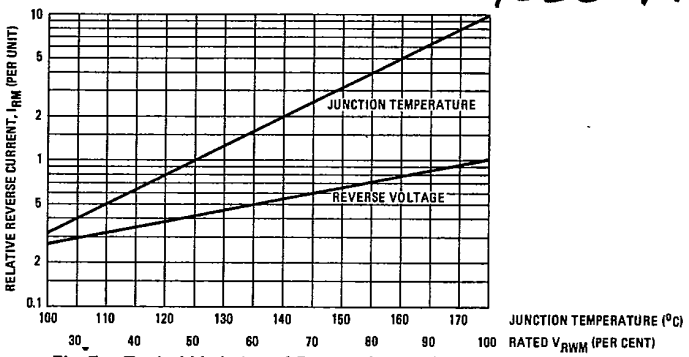




Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

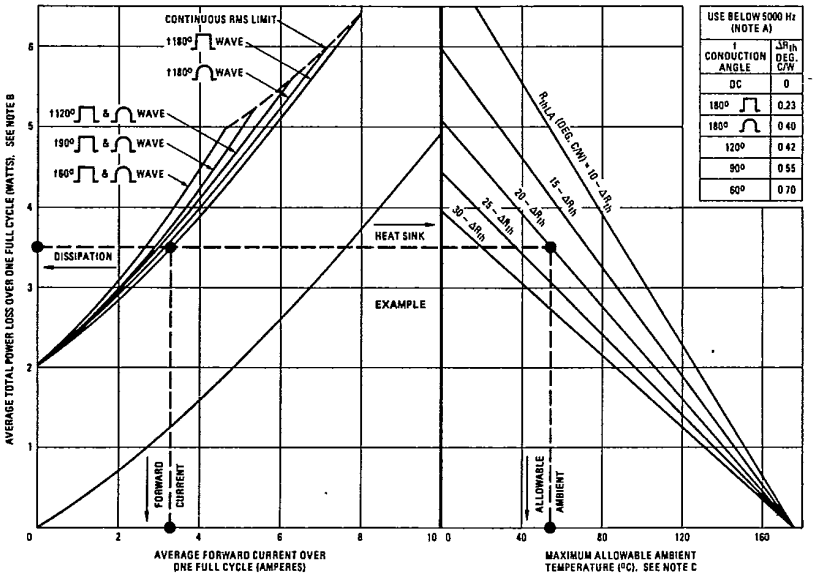



Fig. 8 – Thermal Nomogram

Notes: A. Maximum allowable heatsink thermal resistance, $R_{thLA}$, equals the graph value minus the $\Delta R_{th}$ factor which allows for instantaneous $T_J$ excursion. At frequencies above 5000 Hz, $\Delta R_{th}$ becomes essentially zero and can be ignored.

B. The total power dissipation curves assume the worst case reverse conditions of half wave (180°) rectangular reverse voltage, full rated $V_{RWM}$, and $T_J$ = 150°C. Lower reverse power losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

C. Caution: Data assumes that the rectifier is mounted with heatsinks attached to the leads at a maximum of 3/8 of an inch (9.5 mm) from the ends of the body of the rectifier.

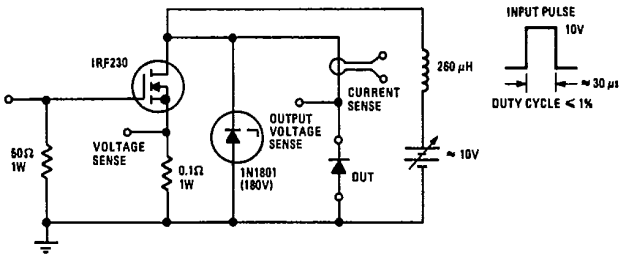



Fig. 9 – $I_{RRM}$ Test Circuit