Data Sheet No. PD-2.057A

INTERNATIONAL RECTIFIER IOR

T-03-17

# 10TQ SERIES

## 10 Amp Schottky Rectifiers

### Major Ratings and Characteristics

| Characteristic | 10TQ | Units |
|---|---|---|
| $I_{F(AV)}$ | | |
| @ 180° Rectangular | 10 | A |
| @ 180° Sinusoidal | 9 | A |
| $I_{FSM}$ | | |
| @ 50 Hz | 260 | A |
| @ 60 Hz | 275 | A |
| $I^2t$ | | |
| @ 50 Hz | 340 | $A^2s$ |
| @ 60 Hz | 310 | $A^2s$ |
| $I^2\sqrt{t}$ | 4650 | $A^2\sqrt{s}$ |
| $V_{RWM}$ | 30 to 45 | V |
| $C_t$ @ −5V | 1000 | pF |
| $T_J$ | −40 to 150 | °C |

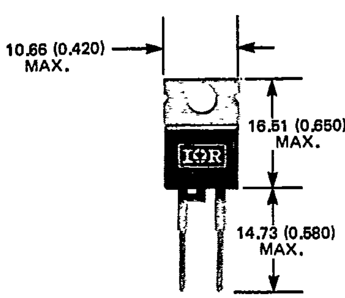
### Description/Features

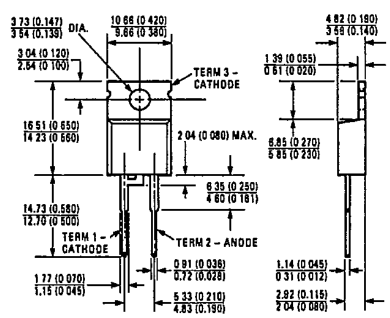
The 10TQ Schottky employs the "830" process which results in a very low ratio of reverse leakage current to junction temperature. In addition to improvements in reliability and performance, it is a rugged device with a guaranteed repetitive peak voltage capability, and excellent ability to withstand reverse energy transients. It can be used in both existing and new designs.

- $T_J$ = 150°C (rep), $T_J$ = 175°C (non-rep)
- 10A continuous DC output
- 275A surge, 60 Hz, one cycle
- Extremely low reverse leakage: 15 mA at 125°C
- No voltage derating on $V_{RWM}$ over temperature range
- A guaranteed repetitive peak voltage capability for short pulses which is 20% above $V_{RWM}$
- High power supply reliability
- Minimizes problem of thermal runaway
- Ability to withstand reverse energy transients

C

### CASE STYLE AND DIMENSIONS




Conforms to JEDEC Outline TO-220AC
All Dimensions in Millimeters and (Inches)

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## VOLTAGE RATINGS

| Part Number | $V_{RWM}$ – 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 |
|---|---|---|---|
| 10TQ030 | 30 | 36 | 30 |
| 10TQ035 | 35 | 42 | 35 |
| 10TQ040 | 40 | 48 | 40 |
| 10TQ045 | 45 | 54 | 45 |

## ELECTRICAL SPECIFICATIONS

| | | 10TQ | Units | Conditions |
|---|---|---|---|---|
| $I_{F(AV)}$ | Max. average forward current | 10 | A | 180° conduction, rectangular waveform @ $T_C$ = –40 to 110°C |
| | | 9 | | 180° conduction, sinusoidal waveform @ $T_C$ = –40 to 110°C |
| $I_{FSM}$ | Max. peak one cycle, non-repetitive surge current | 260 | A | 50 Hz Half sine wave or 6 ms rectangular pulse, following any rated load condition, and with rated $V_{RWM}$ applied. |
| | | 275 | | 60 Hz Half sine wave or 5 ms rectangular pulse, following any rated load condition, and with rated $V_{RWM}$ applied. |
| | | 305 | | 50 Hz With $V_{RWM}$ = 0 following surge, initial $T_J$ = 150°C. |
| | | 320 | | 60 Hz |
| $I^2t$ | Max. $I^2t$ for fusing | 340 | $A^2s$ | t = 10 ms With rated $V_{RWM}$ applied following surge, initial $T_J$ = 150°C. |
| | | 310 | | t = 8.3 ms |
| | Max. $I^2t$ for individual junction fusing | 465 | | t = 10 ms With $V_{RWM}$ = 0 following surge, initial $T_J$ = 150°C. |
| | | 425 | | t = 8.3 ms |
| $I^2\sqrt{t}$ | Max. $I^2\sqrt{t}$ for individual junction fusing④ | 4650 | $A^2\sqrt{s}$ | t = 0.1 to 10 ms, initial $T_J$ = 150°C, $V_{RWM}$ = 0 following surge. |
| $V_{FM}$ | Max. peak forward voltage | 0.76 | V | $T_J$ = 25°C Rated $I_{F(AV)}$ (20A peak) 180° conduction rectangular waveform |
| | | 0.66 | | $T_J$ = 150°C |
| $I_{RM}$ | Max. peak reverse current | 6 | mA | $T_J$ = 25°C At max. rated $V_{RWM}$ |
| | | 15 | | $T_J$ = 125°C |
| $I_{RRM}$ | Max. repetitive peak reverse current | 1.0 | A | $T_C$ = 125°C, f = 1 kHz see fig. 8 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 | –40 to 150 | °C | |
| $T_{stg}$ | Max. storage temperature range | –40 to 150 | °C | |
| $R_{thJC}$ | Max. thermal resistance, junction-to-case | 5.0 | deg. C/W | DC operation |
| $R_{thJA}$ | Max. thermal resistance, junction-to-ambient | 77.0 | deg. C/W | DC operation Device mounted in Amphenol socket or equivalent. |
| $R_{thCS}$ | Thermal resistance, case-to-sink | 1.0 | deg. C/W | Mounting surface flat, smooth and greased |
| wt | Approximate weight | 2.8 (0.1) | g (oz) | |
| | Case style | TO-220AC | | Terminal 1 and tab: Cathode, Terminal 2: Anode JEDEC |

① $T_C$ = -40°C to 147°C, 180° conduction
② $T_C$ = 0°C to 147°C, 180° conduction
③ $T_C$ = -40°C to 139°C
④ $I^2t$ for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

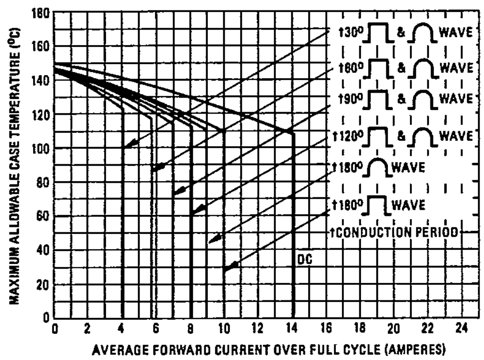


**Fig. 1 — Maximum Allowable Case Temperature Vs. Average Forward Current**

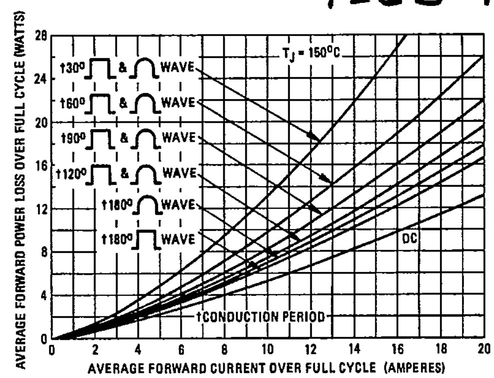


**Fig. 2 — Maximum Forward Power Loss Vs. Average Forward Current**

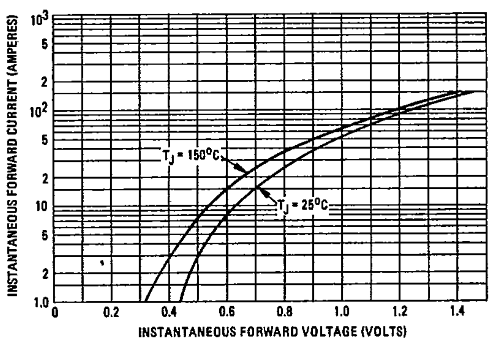


**Fig. 3 — Maximum Forward Voltage Vs. Forward Current**

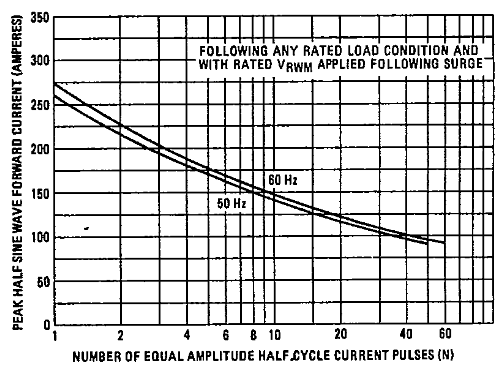


**Fig. 4 — Maximum Non-Repetitive Surge Current Vs. Number of Cycles**

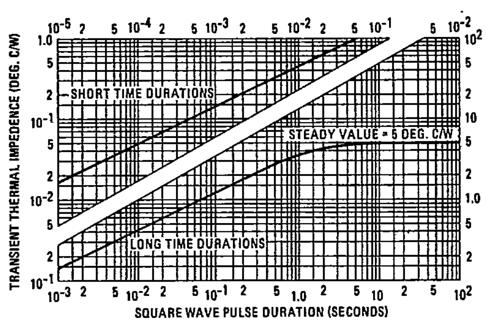


**Fig. 5 — Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration**

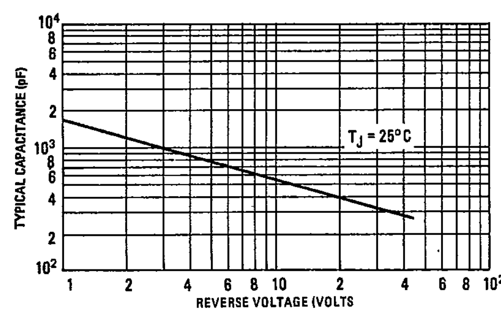


**Fig. 6 — Typical Capacitance Vs. Reverse Voltage**

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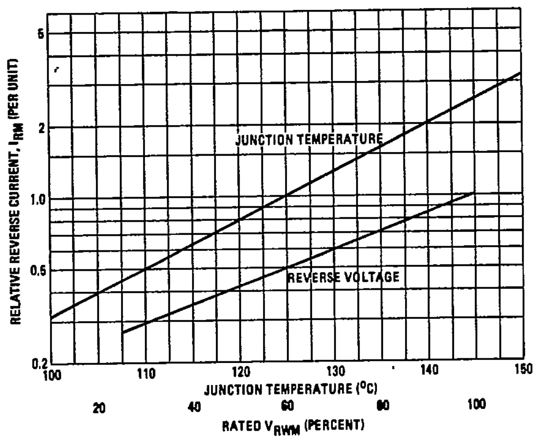



**Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage**

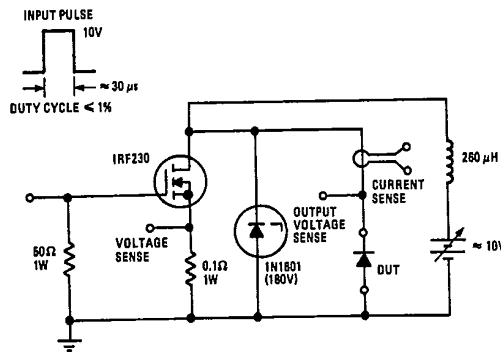
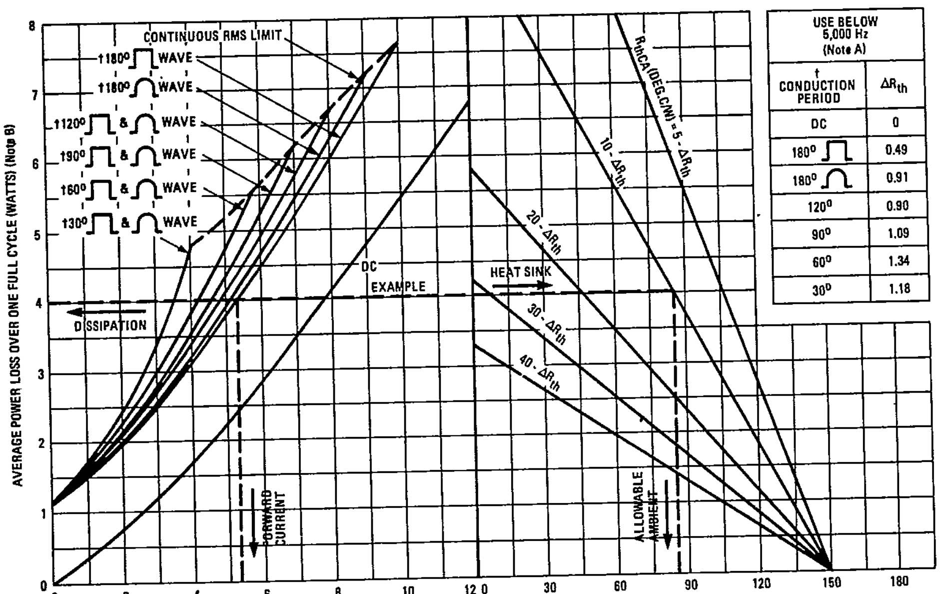



**Fig. 8 – $I_{RRM}$ Test Circuit**




USE BELOW 5,000 Hz (Note A)

| † CONDUCTION PERIOD | $\Delta R_{th}$ |
|---|---|
| DC | 0 |
| 180° (rectangular) | 0.49 |
| 180° (sine) | 0.91 |
| 120° | 0.90 |
| 90° | 1.09 |
| 60° | 1.34 |
| 30° | 1.18 |

**Fig. 9 – Thermal Nomogram**

Notes: A. Maximum allowable heatsink thermal resistance, $R_{thSA}$, equals the graph value minus $\Delta R_{th}$ minus $R_{thCS}$. At frequencies above 5000Hz, $\Delta R_{th}$ becomes essentially zero and can be ignored.

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