

4855452 INTERNATIONAL RECTIFIER

55C 05059 D

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	
I_{FSM}		
@ 50 Hz	260	A
@ 60 Hz	275	
I^2_t		
@ 50 Hz	340	A^2s
@ 60 Hz	310	
$I^2\sqrt{t}$	4850	$A^2\sqrt{s}$
V_{RWM}	30 to 45	V
$C_t @ -5V$	1000	pF
T_J	-40 to 150	°C

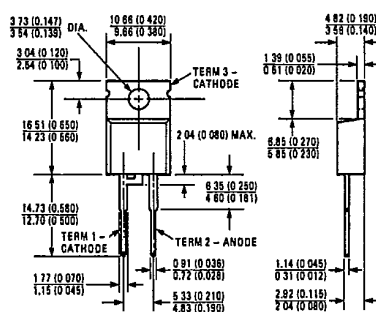
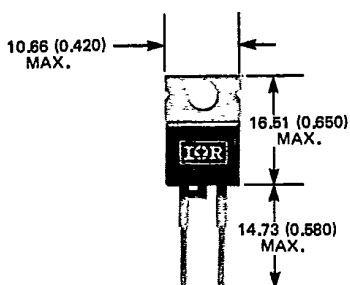
Description/Features

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.

- $T_J = 150^\circ\text{C}$ (rep), $T_J = 175^\circ\text{C}$ (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

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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 9	A	180° conduction, rectangular waveform @ $T_C = -40$ to 110°C 180° conduction, sinusoidal waveform
I_{FSM} Max. peak one cycle, non-repetitive surge current	260 275 305 320	A	50 Hz Half sine wave or 6 ms rectangular pulse, following any rated load condition, and with rated V_{RWM} applied. 60 Hz Half sine wave or 5 ms rectangular pulse, following any rated load condition, and with rated V_{RWM} applied. 50 Hz With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$. 60 Hz
I^2t Max. I^2t for fusing Max. I^2t for individual junction fusing	340 310 465 425	A ² s	$t = 10$ ms With rated V_{RWM} applied following surge, initial $T_J = 150^\circ\text{C}$. $t = 8.3$ ms $t = 10$ ms With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$. $t = 8.3$ ms
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for individual junction fusing ④	4650	A ² $\sqrt{s}$	$t = 0.1$ to 10 ms, initial $T_J = 150^\circ\text{C}$, $V_{RWM} = 0$ following surge.
V_{FM} Max. peak forward voltage	0.76 0.66	V	$T_J = 25^\circ\text{C}$ Rated $I_{F(AV)}$ (20A peak) 180° conduction $T_J = 150^\circ\text{C}$ rectangular waveform
I_{RM} Max. peak reverse current	6 15	mA	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ At max. rated V_{RWM}
I_{RRM} Max. repetitive peak reverse current	1.0	A	$T_C = 125^\circ\text{C}$, $f = 1$ kHz see fig. 8 for test circuit.
C_t Max. capacitance	1000	pF	$T_C = 25^\circ\text{C}$, $V_R = 5$ Vdc (Test signal in the range of 100 kHz to 1 MHz.)
dv/dt Max. rate of reverse voltage application	1000	V/ μs	$T_C = 25^\circ\text{C}$, $V_{RM} = \text{rated } V_{RWM}$

THERMAL-MECHANICAL SPECIFICATIONS

T_J Max. operating junction temperature range	-40 to 150	$^\circ\text{C}$	
T_{stg} Max. storage temperature range	-40 to 150	$^\circ\text{C}$	
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 $T_C = -40^\circ\text{C}$ to 147°C , 180° conduction② $T_C = -40^\circ\text{C}$ to 139°C ③ $T_C = 0^\circ\text{C}$ to 147°C , 180° conduction④ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

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IR INTERNATIONAL RECTIFIER

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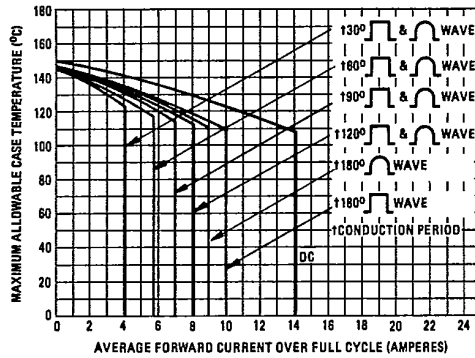


Fig. 1 - Maximum Allowable Case Temperature Vs. Average Forward Current

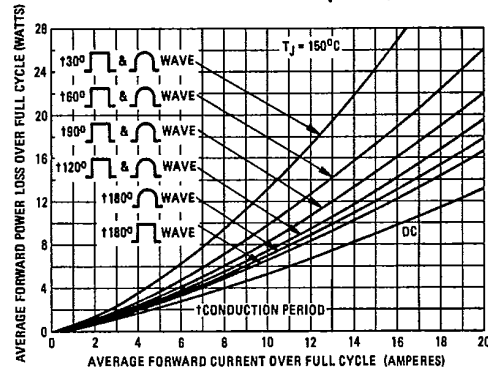


Fig. 2 - Maximum Forward Power Loss Vs. Average Forward Current

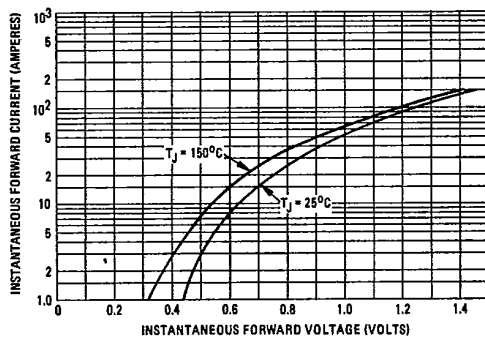


Fig. 3 - Maximum Forward Voltage Vs. Forward Current

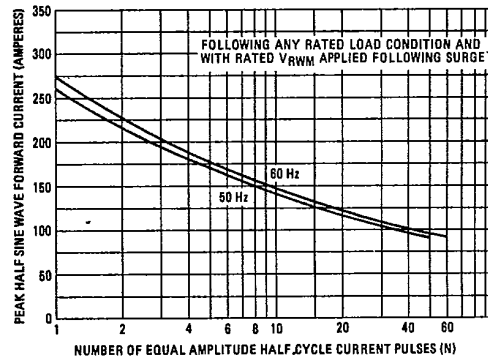


Fig. 4 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles

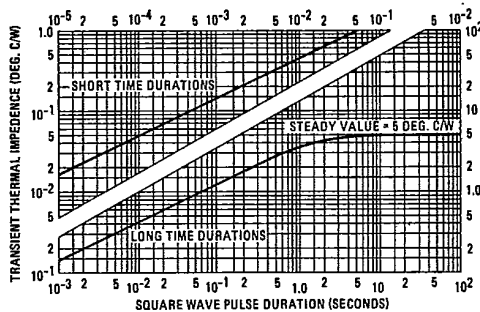


Fig. 5 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration

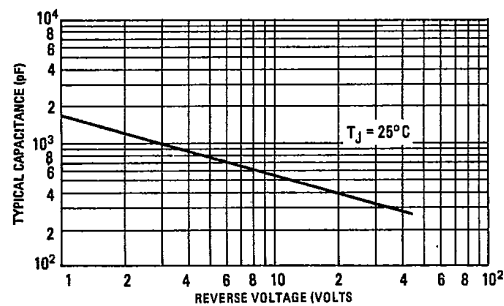


Fig. 6 - Typical Capacitance Vs. Reverse Voltage

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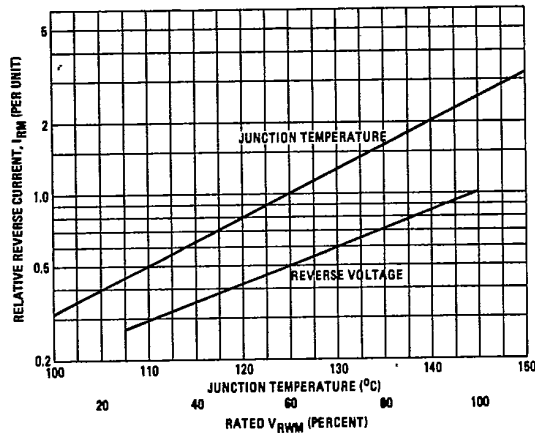


Fig. 7 - Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

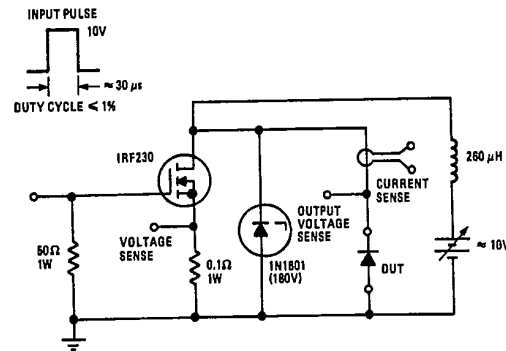


Fig. 8 - I_RRM Test Circuit

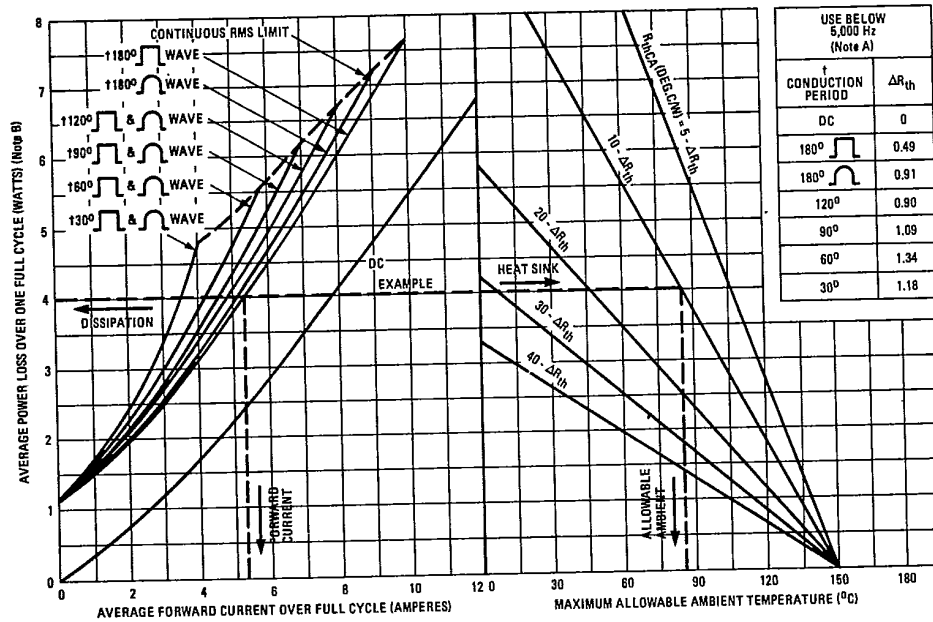


Fig. 9 - Thermal Nomogram

Notes: A. Maximum allowable heatsink thermal resistance, R_{thSA} , equals the graph value minus ΔR_{th} minus R_{thCS} . At frequencies above 5000Hz, ΔR_{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 $T_J = 150^\circ\text{C}$. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.