

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 @ 180° Sinusoidal	10	A
	9	
$I_{FSM}$ @ 50 Hz @ 60 Hz	260	A
	275	
$I^2_t$ @ 50 Hz @ 60 Hz	340	A <sup>2</sup> s
	310	
$I^2\sqrt{t}$	4850	A <sup>2</sup> √s
$V_{RWM}$	30 to 45	V
$C_t @ -5V$	1000	pF
$T_J$	-40 to 150	°C

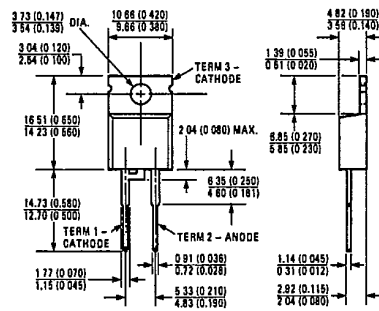
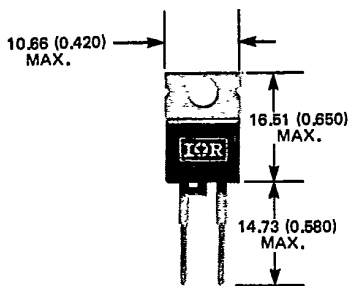
**Description/Features**

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



**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 $110^\circ\text{C}$
	9		180° conduction, sinusoidal waveform
$I_{FSM}$ 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 $T_J = 150^\circ\text{C}$ .
	320		60 Hz With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$ .
$I^2t$ Max. $I^2t$ for fusing Max. $I^2t$ for individual junction fusing	340	$A^2s$	$t = 10$ ms With rated $V_{RWM}$ applied following surge, initial $T_J = 150^\circ\text{C}$ .
	310		$t = 8.3$ ms With rated $V_{RWM}$ applied following surge, initial $T_J = 150^\circ\text{C}$ .
	465		$t = 10$ ms With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$ .
	425		$t = 8.3$ ms With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$ .
$I^2\sqrt{t}$ 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	V	$T_J = 25^\circ\text{C}$ Rated $I_{F(AV)}$ (20A peak) 180° conduction rectangular waveform
	0.66		$T_J = 150^\circ\text{C}$
$I_{RM}$ Max. peak reverse current	6	mA	$T_J = 25^\circ\text{C}$
	15		$T_J = 125^\circ\text{C}$ 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/ $\mu\text{s}$	$T_C = 25^\circ\text{C}$ , $V_{RM} = \text{rated } V_{RWM}$

## 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  $147^\circ\text{C}$ , 180° conduction②  $T_C = -40^\circ\text{C}$  to  $139^\circ\text{C}$ ③  $T_C = 0^\circ\text{C}$  to  $147^\circ\text{C}$ , 180° conduction④  $I^2t$  for time  $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$ .

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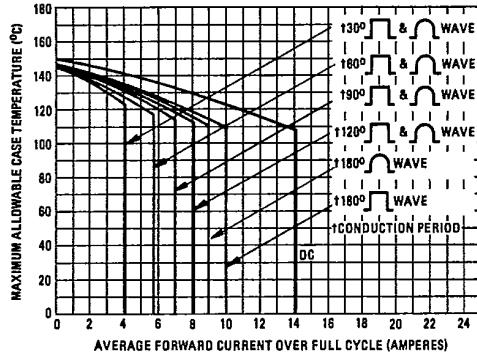


Fig. 1 - Maximum Allowable Case Temperature Vs. Average Forward Current

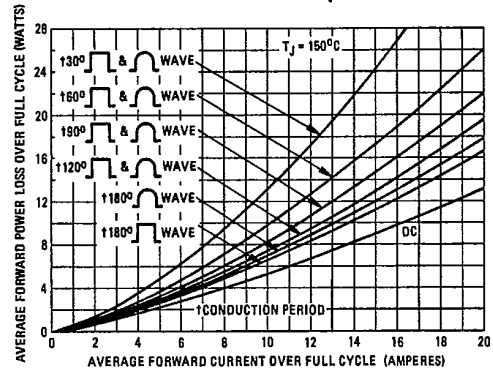


Fig. 2 - Maximum Forward Power Loss Vs. Average Forward Current

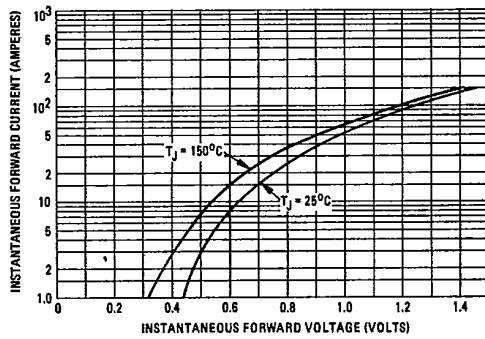


Fig. 3 - Maximum Forward Voltage Vs. Forward Current

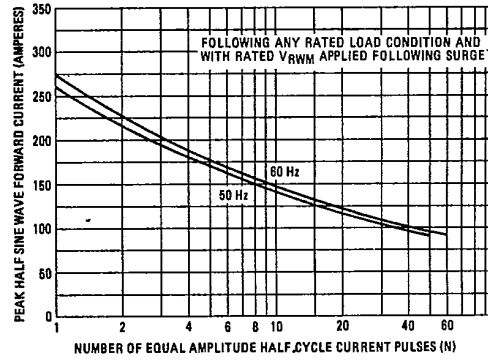


Fig. 4 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles

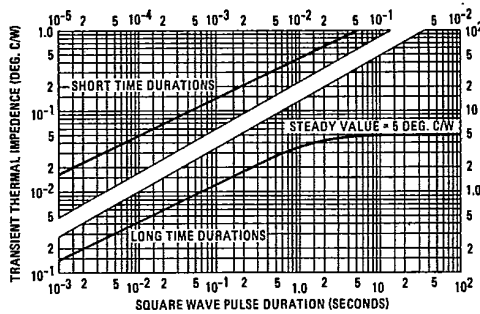


Fig. 5 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration

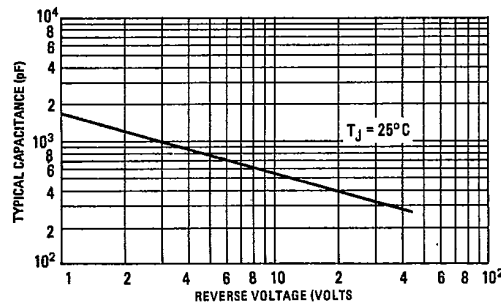


Fig. 6 - Typical Capacitance Vs. Reverse Voltage



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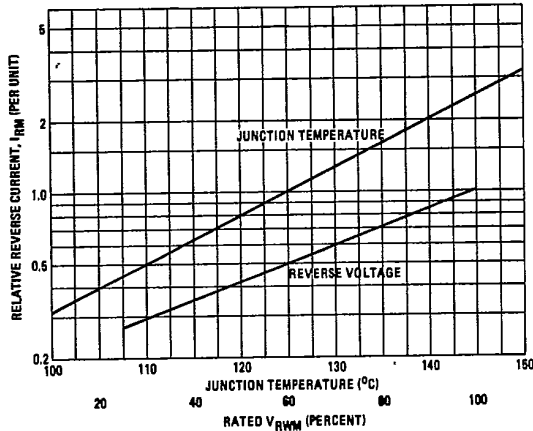


Fig. 7 - Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

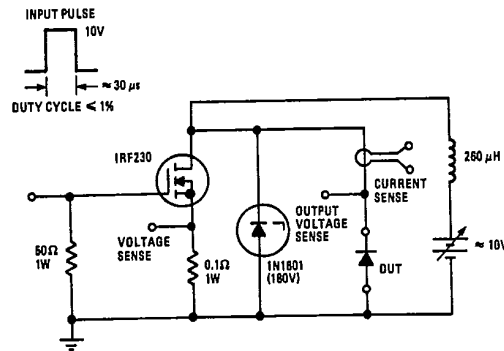


Fig. 8 - IRRM Test Circuit

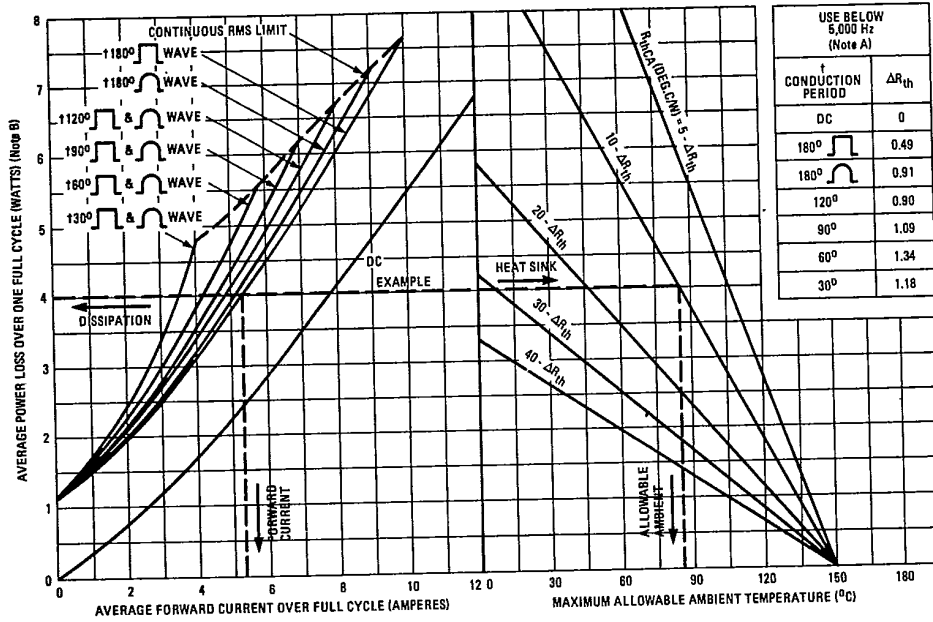


Fig. 9 - Thermal Nomogram

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  $T_J = 150^\circ C$ . Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.