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^2t @ 50 Hz	340	A^2s
@ 60 Hz	310	
$I^2\sqrt{t}$	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

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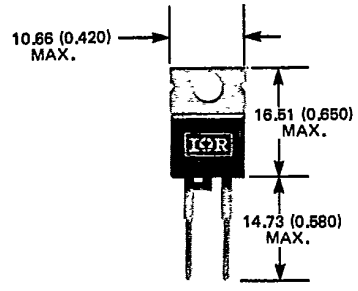
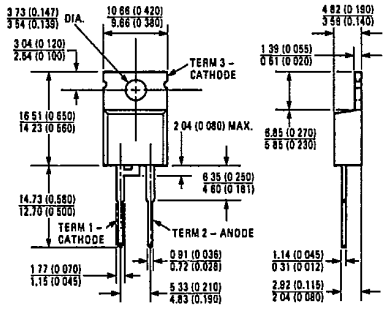
CASE STYLE AND DIMENSIONS





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

10TQ Series

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T-03-17

VOLTAGE RATINGS

Part Number	V_{RWM} – Max. Working Peak Reverse Voltage (V)①	V_{RRM} – Max. Repetitive Peak Reverse Voltage (V)① (200 ns Max. Pulse Width)	V_R – Max. Direct Reverse Voltage (V)①
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
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
		0.66		T_J = 150°C rectangular waveform
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 $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

IOR INTERNATIONAL RECTIFIER

10TQ Series

T-03-17

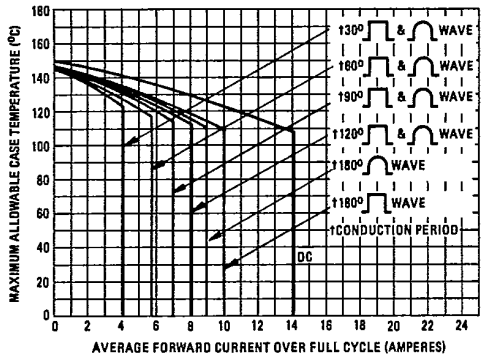

Fig. 1 – Maximum Allowable Case Temperature Vs. Average Forward Current

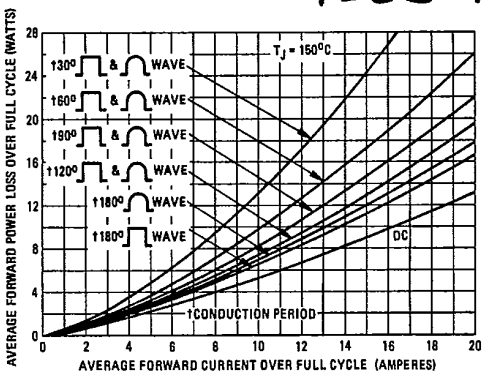

Fig. 2 – Maximum Forward Power Loss Vs. Average Forward Current

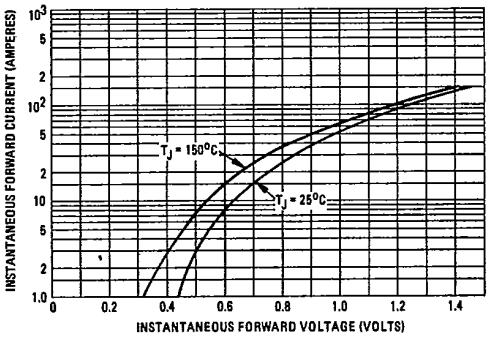

Fig. 3 – Maximum Forward Voltage Vs. Forward Current

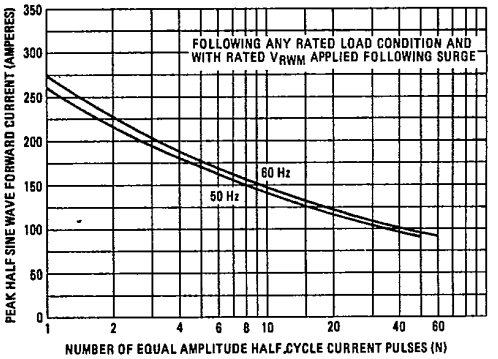

Fig. 4 – Maximum Non-Repetitive Surge Current Vs. Number of Cycles

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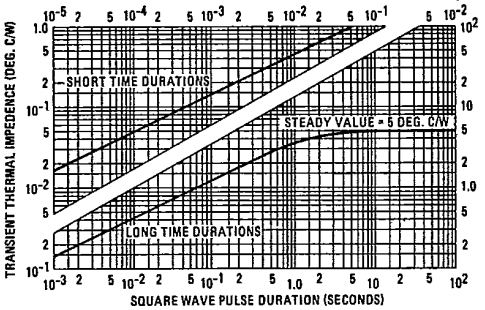

Fig. 5 – Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration

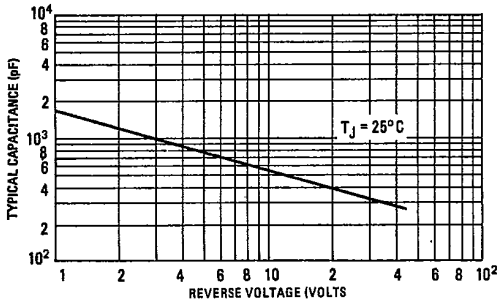

Fig. 6 – Typical Capacitance Vs. Reverse Voltage

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T-03-17

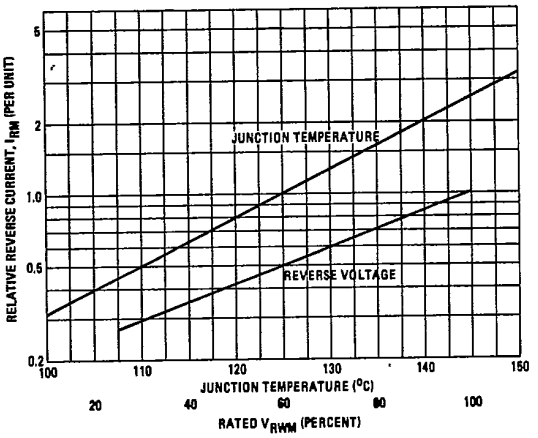


Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

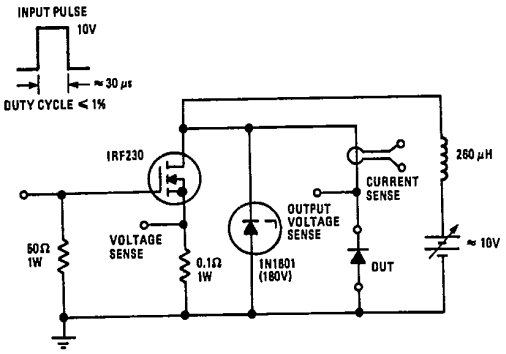
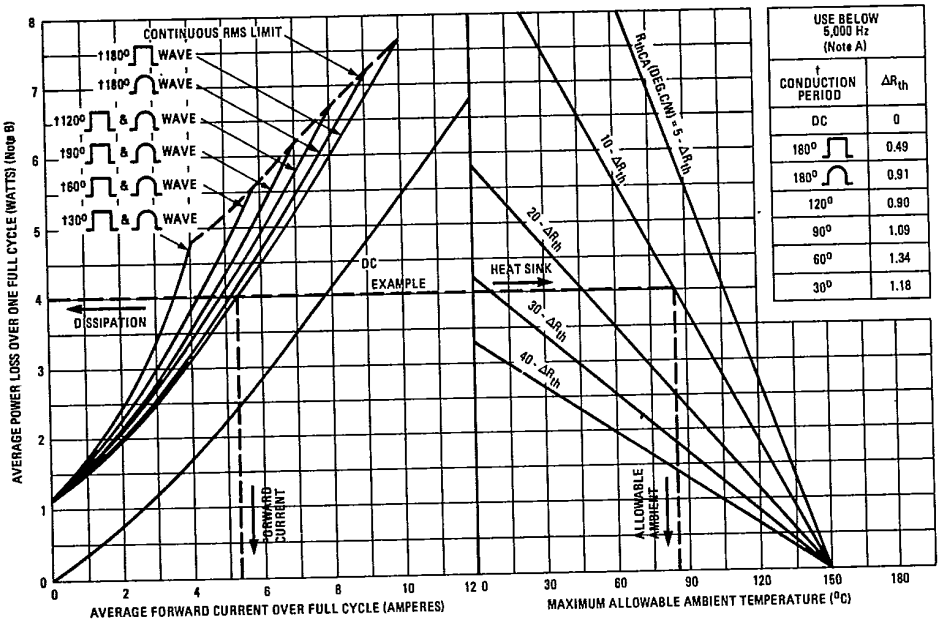


Fig. 8 – I_{RRM} Test Circuit



USE BELOW 5,000 Hz (Note A)	
t CONDUCTION PERIOD	ΔR_{th}
DC	0
180°	0.49
180°	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 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°C. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.