Data Sheet No. PD-2.054A

T-03-17

INTERNATIONAL RECTIFIER IOR

12CTQ SERIES

12 Amp Dual Schottky Center Tap Rectifiers

Major Ratings and Characteristics

Characteristic		12CTQ	Units
I_O	Rectangular Waveform	12	A
	Sinusoidal Waveform	10.8	A
I_{FSM}	@ 50 Hz	135	A
	@ 60 Hz	140	A
I^2t	@ 50 Hz	125	A^2s
	@ 60 Hz	115	A^2s
$I^2\sqrt{t}$		1250	$A^2\sqrt{s}$
V_{RWM}		30 to 45	V
C_t @ −5V		500	pF
T_J		−40 to 150	°C

Description/Features

The 12CTQ 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)
- 12A continuous DC output
- 140A surge, 60 Hz, one cycle (per junction)
- Extremely low reverse leakage: 6 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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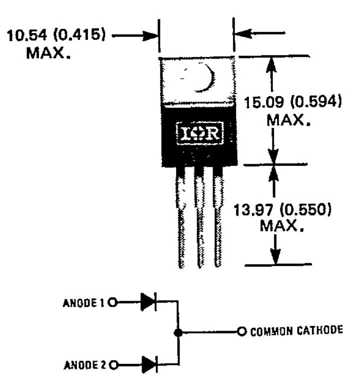
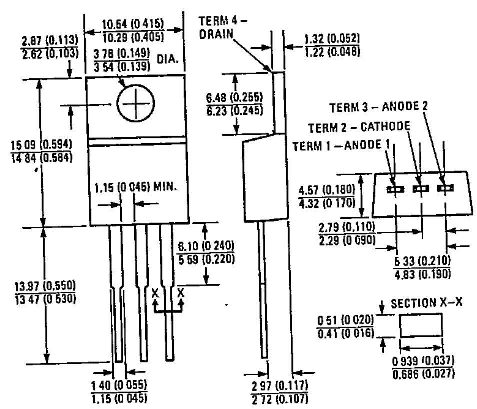
CASE STYLE AND DIMENSIONS





Conforms to JEDEC Outline TO-220AB
Dimensions in Millimeters and (Inches).

12CTQ Series

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VOLTAGE RATINGS PER JUNCTION

Part Numbers	V_{RWM} – Max. Working Peak Reverse Voltage (V) ①	V_{RRM} – Max. Repetitive Peak Reverse Voltage (V) (200 ns Max.) ②	V_R – Max. Direct Reverse Voltage (V) ①
12CTQ030	30	36	30
12CTQ035	35	42	35
12CTQ040	40	48	40
12CTQ045	45	54	45

ELECTRICAL SPECIFICATIONS

		12CTQ	Units	Conditions
I_O	Max. average output current from centre tap circuit	12.0	A	180° conduction @ T_C = –40 to 121°C, rectangular waveform
		10.8		180° conduction @ T_C = –40 to 120°C, sinusoidal waveform
I_{FSM}	Max. peak one cycle, non-repetitive surge current, per junction	135	A	50 Hz half cycle sine wave or 6 ms rectangular pulse. Following any rated load condition and with rated V_{RWM} applied.
		140		60 Hz half cycle sine wave or 5 ms rectangular pulse.
		160	A	50 Hz half cycle sine wave or 6 ms rectangular pulse. With V_{RWM} = 0 following surge, initial T_J = 150°C.
		165		60 Hz half cycle sine wave or 5 ms rectangular pulse.
I^2t	Max. I^2t for fusing	90	A^2s	t = 10 ms; Rated V_{RWM} following surge, initial T_J = 150°C
		80		t = 8.3 ms
I^2t	Max. I^2t for individual junction fusing	125	A^2s	t = 10 ms; V_{RWM} following surge = 0, initial T_J = 150°C
		115		t = 8.3 ms
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for individual junction fusing ④	1250	$A^2\sqrt{s}$	t = 0.1 to 10 ms, initial T_J = 150°C. V_{RWM} = 0 following surge.
V_{FM}	Max. peak forward voltage, per junction	0.77	V	T_J = 25°C; Rated $I_{F(AV)}$ (12A peak) 180° rectangular waveform
		0.64		T_J = 150°C
I_{RM}	Max. peak reverse current, per junction	2.5	mA	T_J = 25°C; V_{RM} = rated V_{RWM}
		6		T_J = 125°C
I_{RRM}	Max. repetitive peak reverse current	0.5	A	T_C = 25°C, f = 1 kHz see fig. 8 for test circuit
C_t	Max. capacitance, per junction	500	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 application of reverse voltage, per junction	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	Max. T_J for t 5ms = 175°C (Temperature of case should not exceed 150°C)
T_{stg}	Max. storage temperature range	–40 to 150	°C	
R_{thJC}	Max. thermal resistance, junction-to-case, DC operation	6	deg C/W	Based on power dissipated in one junction, both junctions operating
	Max. composite thermal resistance, junction-to-case, DC operation	3		Based on power dissipated in both junctions
R_{thJA}	Max. composite thermal resistance, junction-to-ambient, DC operation	75	deg C/W	Based on power dissipated in both junctions, 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-220AB		Terminals 1 and 3: Anodes Terminal 2 and Tab: Common Cathodes JEDEC

① T_C = -40 to 147°C, 180° conduction. ③ T_C = -40 to 145°C.

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

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IOR INTERNATIONAL RECTIFIER

12CTQ Series

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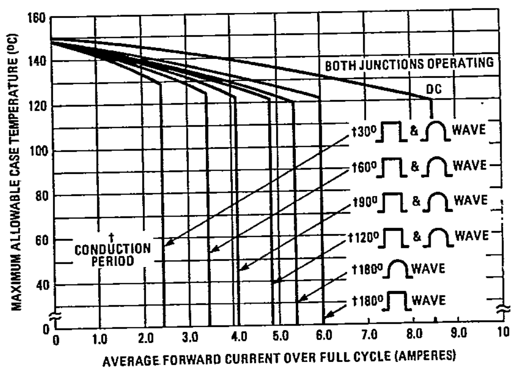

Fig. 1 — Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction

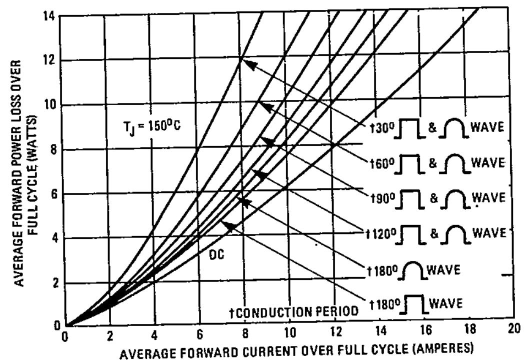

Fig. 2 — Maximum Forward Power Loss Vs. Average Forward Current, Per Junction

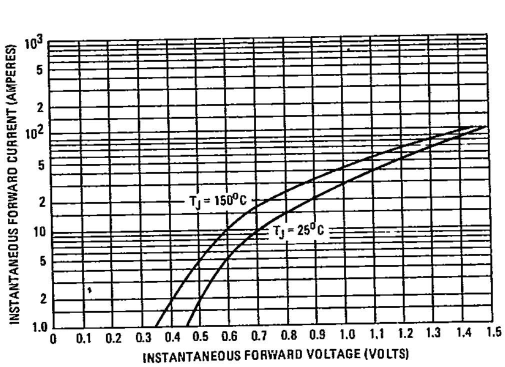

Fig. 3 — Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction

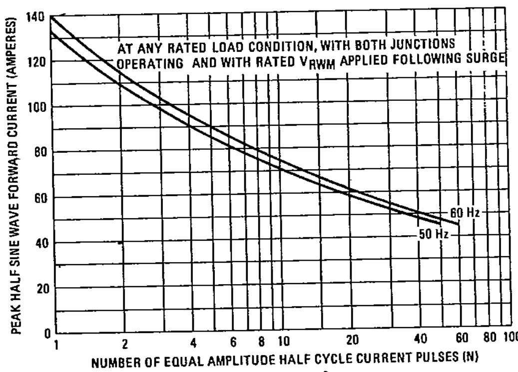

Fig. 4 — Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction

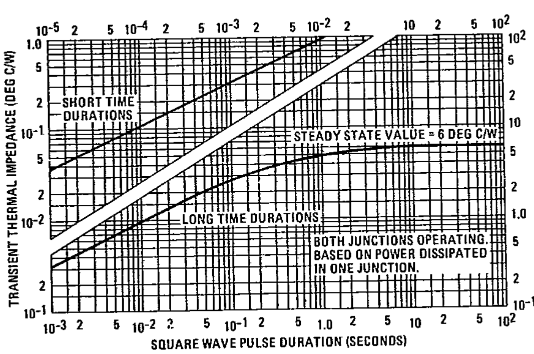

Fig. 5 — Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction

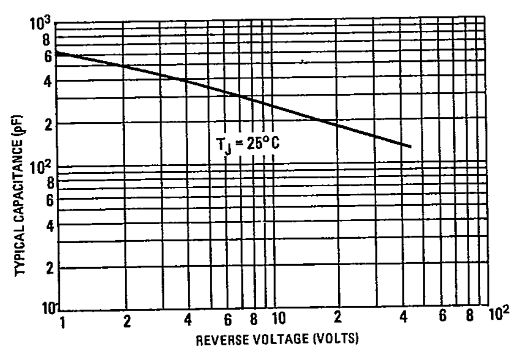

Fig. 6 — Typical Capacitance Vs. Reverse Voltage, Per Junction

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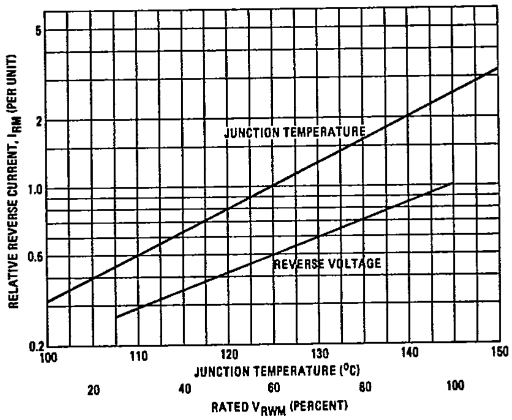


Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction

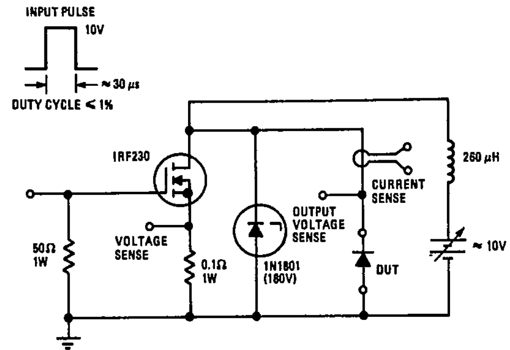
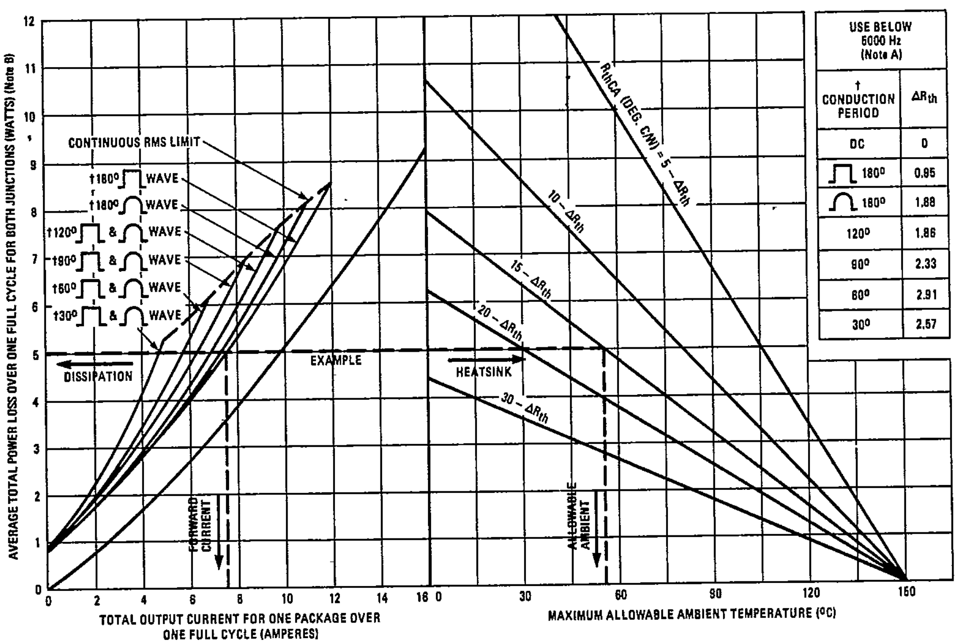


Fig. 8 – I_{RRM} Test Circuit



USE BELOW 5000 Hz (Note A)	
† CONDUCTION PERIOD	ΔR_{th}
DC	0
⊓ 180°	0.95
∩ 180°	1.88
120°	1.86
90°	2.33
60°	2.91
30°	2.57

Fig. 9 – Thermal Nomogram

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

Note 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.