

4855452 INTERNATIONAL RECTIFIER

55C 05063 D

Data Sheet No. PD-2.054A

INTERNATIONAL RECTIFIER 

12CTQ SERIES

12 Amp Dual Schottky Center Tap Rectifiers

Major Ratings and Characteristics

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

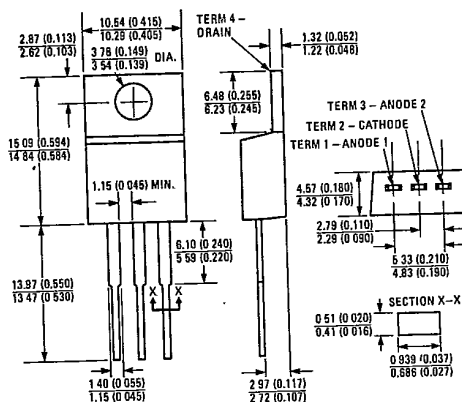
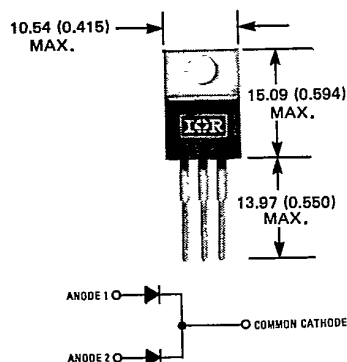
Description/Features

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.

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

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VOLTAGE RATINGS PER JUNCTION

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Part Numbers	V_{RWM} - Max. Working Peak Reverse Voltage (V) ①	V_{RRM} - Max. Repetitive Peak Reverse Voltage (V) (200 ns Max.) ①	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 10.8	A	180° conduction @ $T_C = -40$ to 121°C , rectangular waveform 180° conduction @ $T_C = -40$ to 120°C , sinusoidal waveform
I_{FSM} Max. peak one cycle, non-repetitive surge current, per junction	135 140 160 165	A	50 Hz half cycle sine wave or 6 ms rectangular pulse. Following any rated load condition and with rated V_{RWM} applied. 60 Hz half cycle sine wave or 6 ms rectangular pulse. 50 Hz half cycle sine wave or 6 ms rectangular pulse. With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$. 60 Hz half cycle sine wave or 6 ms rectangular pulse.
I^2t Max. I^2t for fusing	90 80	A^2s	$t = 10$ ms $t = 8.3$ ms Rated V_{RWM} following surge, initial $T_J = 150^\circ\text{C}$
I^2t Max. I^2t for individual junction fusing	125 115	A^2s	$t = 10$ ms $t = 8.3$ ms V_{RWM} following surge = 0, initial $T_J = 150^\circ\text{C}$
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for individual junction fusing ④	1250	$\text{A}^2\sqrt{\text{s}}$	$t = 0.1$ to 10 ms, initial $T_J = 150^\circ\text{C}$. $V_{RWM} = 0$ following surge.
V_{FM} Max. peak forward voltage, per junction	0.77 0.64	V	$T_J = 25^\circ\text{C}$ Rated $I_F(AV)$ (12A peak) 180° rectangular waveform $T_J = 150^\circ\text{C}$
I_{RM} Max. peak reverse current, per junction	2.5 6	mA	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $V_{RM} = \text{rated } V_{RWM}$
I_{RRM} Max. repetitive peak reverse current	0.5	A	$T_C = 25^\circ\text{C}$, $f = 1$ kHz see fig. 8 for test circuit
C_t Max. capacitance, per junction	500	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 application of reverse voltage, per junction	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	$^\circ\text{C}$	Max. T_J for $t = 5$ ms = 175°C (Temperature of case should not exceed 150°C)
T_{stg} Max. storage temperature range	-40 to 150	$^\circ\text{C}$	
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. ② $T_C = -40$ to 145°C .
 ③ $T_C = 0$ to 147°C , 180° conduction. ④ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

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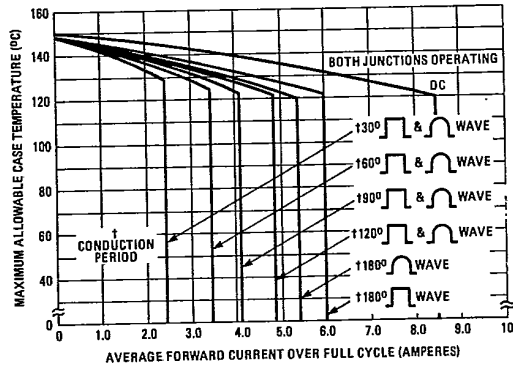


Fig. 1 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction

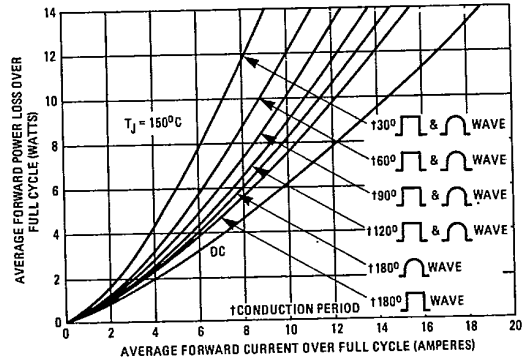


Fig. 2 - Maximum Forward Power Loss Vs. Average Forward Current, Per Junction

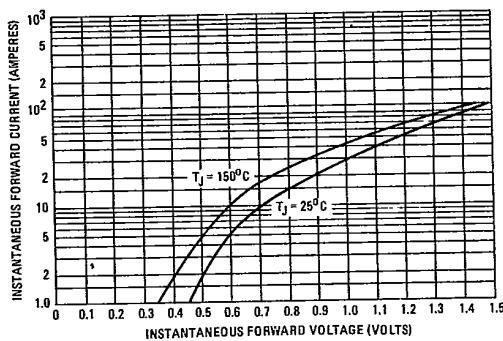


Fig. 3 - Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction

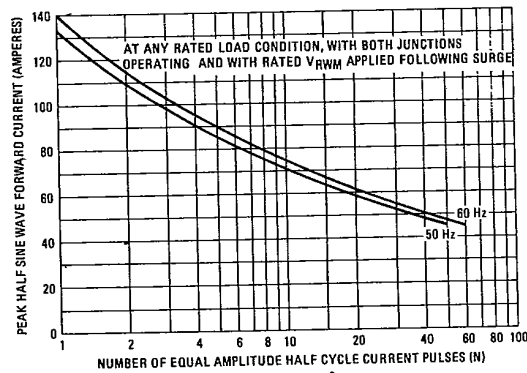


Fig. 4 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction

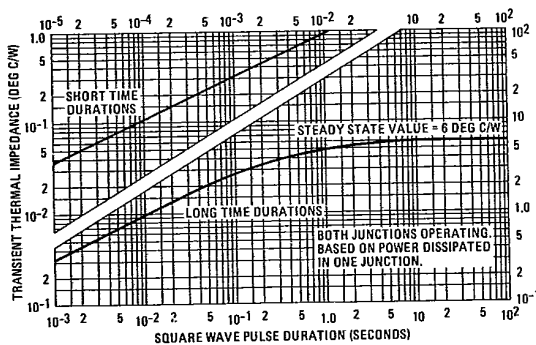


Fig. 5 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction

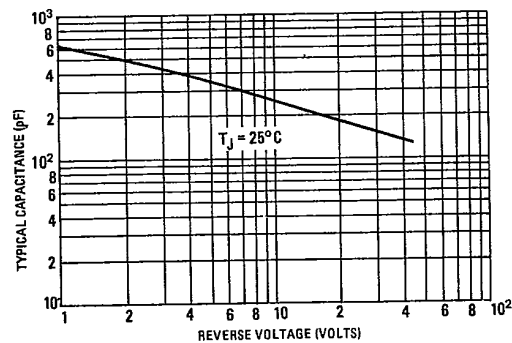


Fig. 6 - Typical Capacitance Vs. Reverse Voltage, Per Junction

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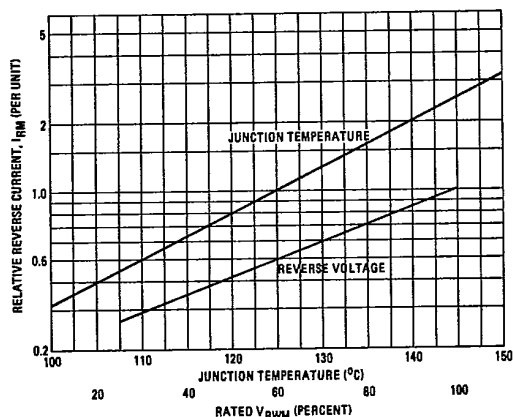


Fig. 7 - Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction

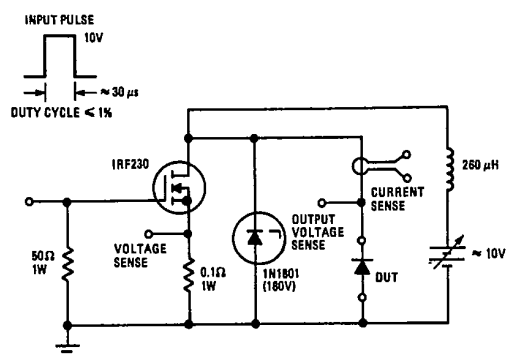


Fig. 8 - I_RRM Test Circuit

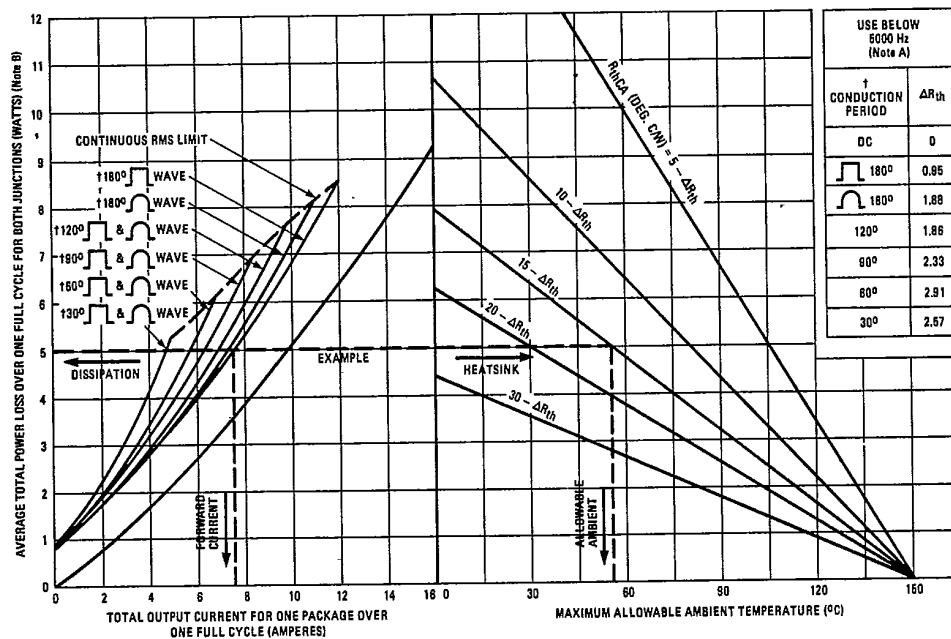


Fig. 9 - Thermal Nomogram

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