

4855452 INTERNATIONAL RECTIFIER

55C 05067 D

Data Sheet No. PD-2.056A

T-03-19

INTERNATIONAL RECTIFIER 

20CTQ & 30CTQ SERIES

20 & 30 Amp Dual Schottky Center Tap Rectifiers

Major Ratings and Characteristics

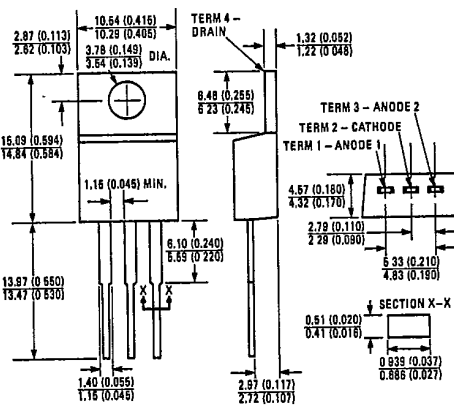
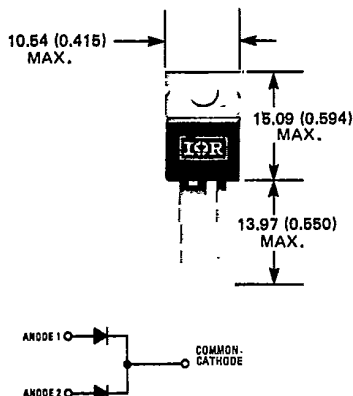
Characteristic	20CTQ	30CTQ	Units
I_O Rectangular Waveform	20	30	A
	Sinusoidal Waveform	18	
I_{FSM} @ 50 Hz	260	285	A
	@ 60 Hz	275	
I^2t @ 50 Hz	340	405	A^2s
	@ 60 Hz	310	
$I^2\sqrt{t}$	4650	5450	$A^2\sqrt{s}$
V_{RWM}	30 to 45	30 to 45	V
T_J	-40 to 150	-40 to 150	$^{\circ}C$
$C_t @ -5V$	1000	1000	pF

The 20CTQ and 30CTQ Schottky Rectifier Series employ the "830" process which results in a very low ratio of reverse leakage current to junction temperature. In addition to offering improved reliability and performance, they are rugged devices with a guaranteed repetitive peak reverse voltage capability, and excellent ability to withstand reverse energy transients. They can be used in both existing and new designs.

- $T_J = 150^{\circ}C$ (rep), $T_J = 175^{\circ}C$ (non-rep)
- 20 and 30A continuous DC output
- 275 and 300A surge, 60 Hz, one cycle (per junction)
- Extrémely low reverse leakage: 6 mA at $25^{\circ}C$
- 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-220AB
Dimensions in Millimeters and (Inches).

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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) (2) (200ns Max. Pulse Width)	V_R - Max. Direct Reverse Voltage (V) (3)
20CTQ030	30CTQ030	30	36	30
20CTQ035	30CTQ035	35	42	35
20CTQ040	30CTQ040	40	48	40
20CTQ045	30CTQ045	45	54	45

ELECTRICAL SPECIFICATIONS

	20CTQ	30CTQ	Units	Conditions
I_O Max. average output current from center tap circuit	20	30	A	180° conduction @ $T_C = -40$ to 110°C for 20CTQ, $T_C = -40$ to 100°C for 30CTQ, rectangular waveform
	18	27		180° conduction @ $T_C = -40$ to 110°C for 20CTQ, $T_C = -40$ to 100°C for 30CTQ, sinusoidal waveform
I_{FSM} Max. peak one cycle, non-repetitive surge current, per junction	260	285	A	50 Hz half cycle sine wave or 6 ms rectangular pulse Following any rated load condition and with rated V_{RWM} applied
	275	300		60 Hz half cycle sine wave or 5 ms rectangular pulse
	305	330		50 Hz half cycle sine wave or 6 ms rectangular pulse With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$
	320	350		60 Hz half cycle sine wave or 5 ms rectangular pulse
I^2t Max. I^2t for fusing, per junction	340	405	A^2s	$t = 10$ ms With rated V_{RWM} applied following surge, initial $T_J = 150^\circ\text{C}$
	310	375		$t = 8.3$ ms
I^2t Max. I^2t for individual junction fusing	465	545	A^2s	$t = 10$ ms With $V_{RWM} = 0$ following surge, initial $T_J = 150^\circ\text{C}$
	425	510		$t = 8.3$ ms
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for individual junction fusing (4)	4650	5450	$A^2\sqrt{t}$	$t = 0.1$ to 10 ms, initial $T_J = 150^\circ\text{C}$. $V_{RWM} = 0$ following surge.
V_{FM} Max. peak forward voltage, per junction	0.76	-	V	$T_J = 25^\circ\text{C}$
	0.66	-		$T_J = 150^\circ\text{C}$ Rated $I_{F(AV)}$ (20A peak) 180° rectangular waveform
	-	0.82		$T_J = 25^\circ\text{C}$
	-	0.72		$T_J = 150^\circ\text{C}$ Rated $I_{F(AV)}$ (30A peak) 180° rectangular waveform
I_{RM} Max. peak reverse current, per junction	6	6	mA	$T_J = 25^\circ\text{C}$
	15	15		$T_J = 150^\circ\text{C}$ $V_{RM} = \text{rated } V_{RWM}$
I_{RRM} Max. repetitive peak reverse current	1.0	1.0	A	$T_C = 25^\circ\text{C}$, $f = 1$ kHz see fig. 16 for test circuit
C_t Max. capacitance, per junction	1000	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 application of reverse voltage, per junction	1000	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	°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	°C	
R_{thJC} Max. thermal resistance, junction-to-case, DC operation	5	4	deg C/W
	2.5	2	
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 Terminals 2 and Tab: Common Cathodes JEDEC

(1) $T_C = -40$ to 147°C, 180° conduction.

(2) $T_C = -40$ to 139°C for 20CTQ.

(3) I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

(4) $T_C = 0$ to 147°C, 180° conduction.

$T_C = -40$ to 141°C for 30CTQ.

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20CTQ SERIES

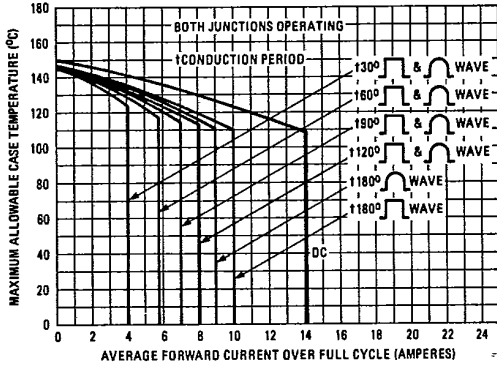


Fig. 1 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction

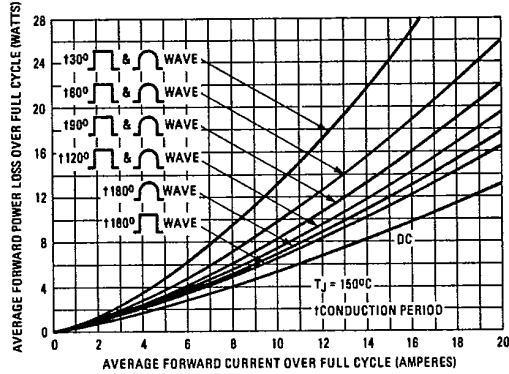


Fig. 2 - Maximum Forward Power Loss Vs. Average Forward Current, Per Junction

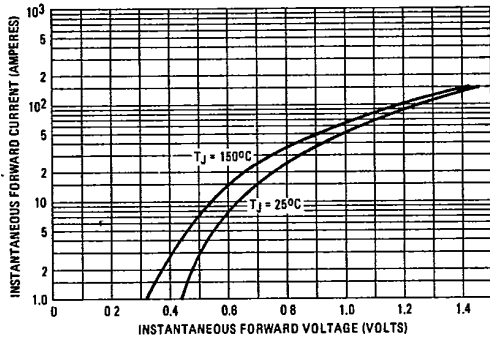


Fig. 3 - Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction

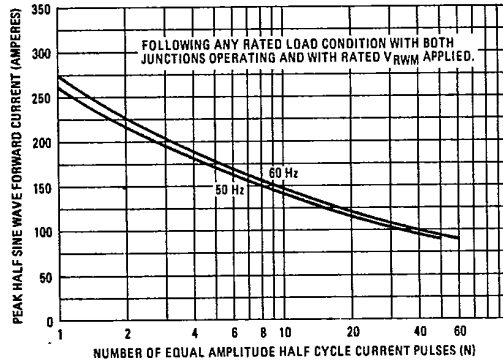


Fig. 4 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction

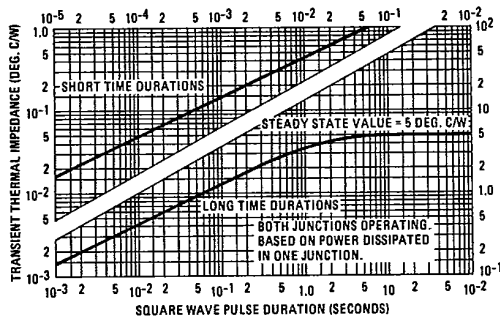


Fig. 5 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction

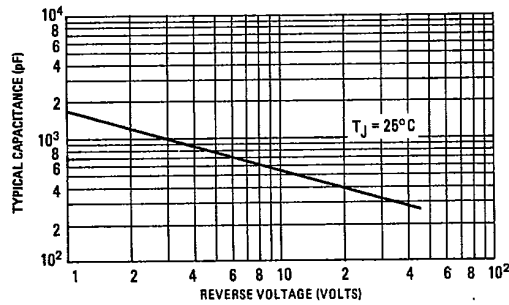


Fig. 6 - Typical Capacitance Vs. Reverse Voltage, Per Junction



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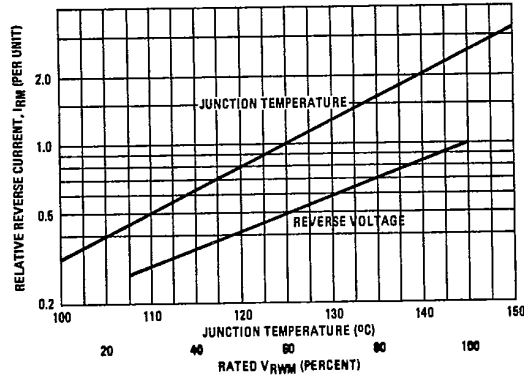


Fig. 7 - Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction

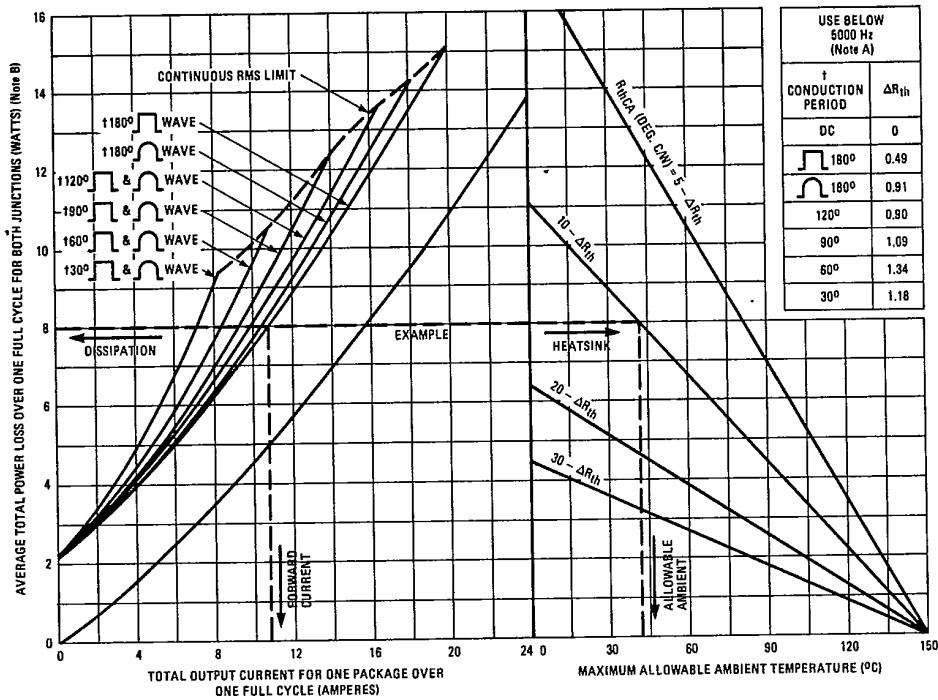


Fig. 8 - Thermal Nomogram

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_{RRM} and $T_J = 150^\circ\text{C}$. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

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30CTQ SERIES

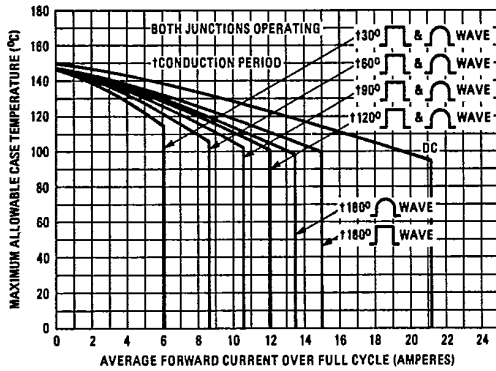


Fig. 9 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction

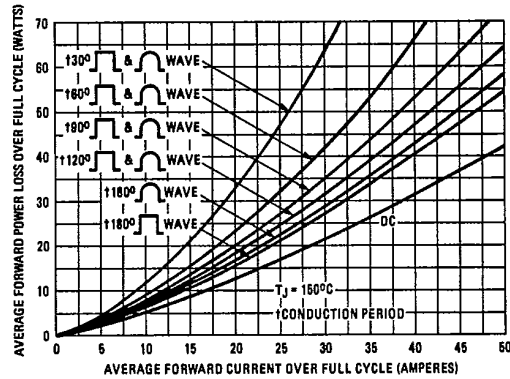


Fig. 10 - Maximum Forward Power Loss Vs. Average Forward Current, Per Junction

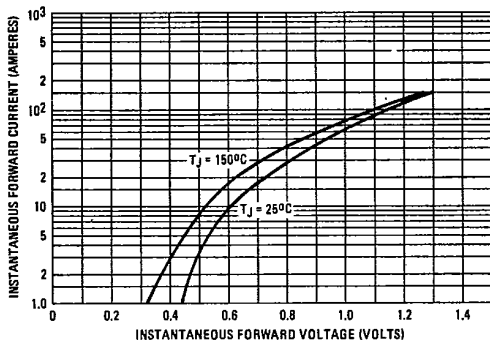


Fig. 11 - Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction

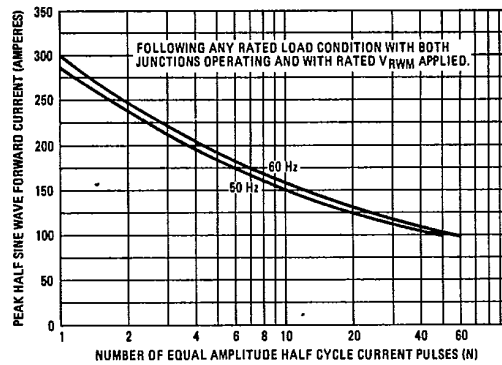


Fig. 12 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction

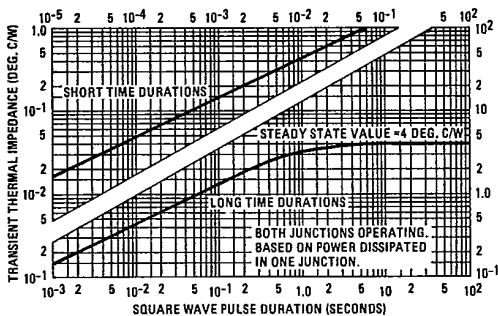


Fig. 13 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction

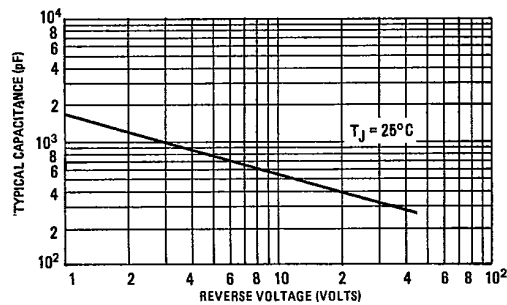


Fig. 14 - Typical Capacitance Vs. Reverse Voltage, Per Junction



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20CTQ & 30CTQ Series

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30CTQ SERIES

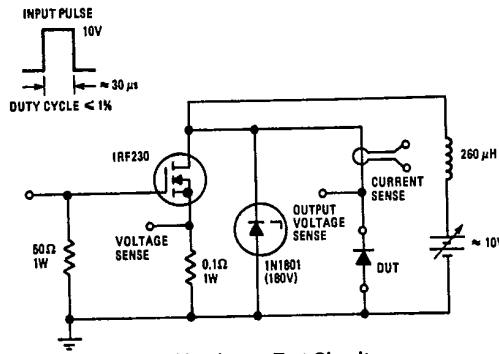
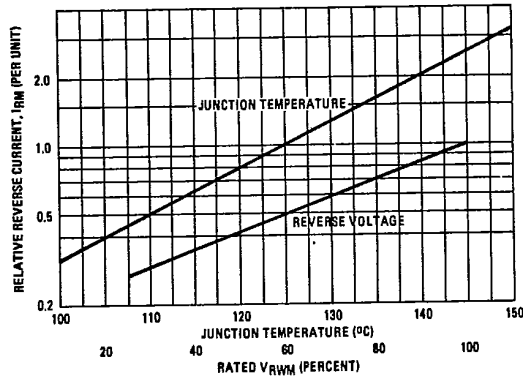


Fig. 16 - I_{RRM} Test Circuit

Fig. 15 - Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction

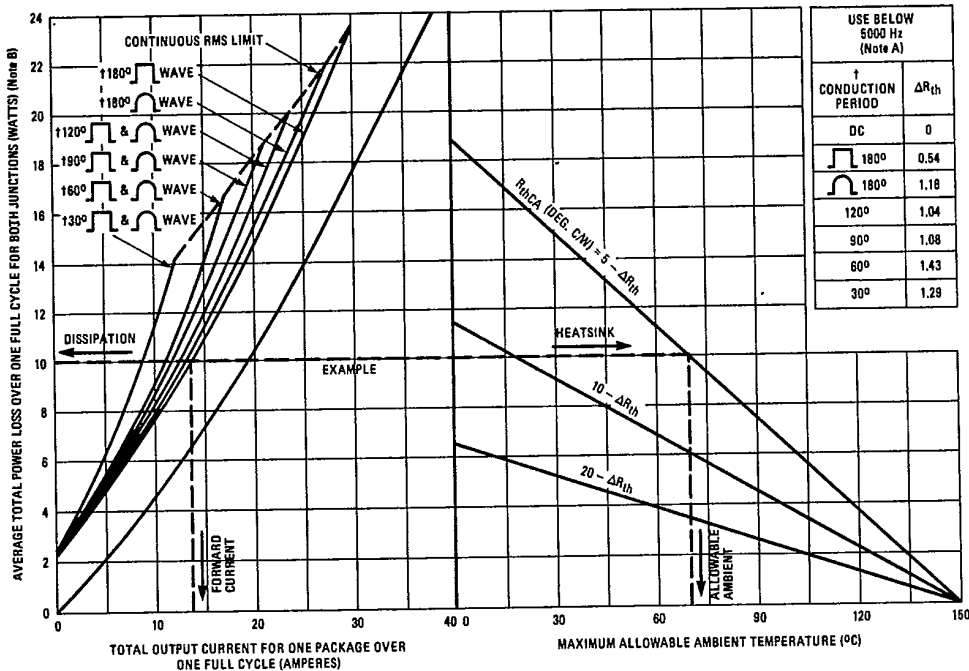


Fig. 17 - Thermal Nomogram

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_{RRM} and $T_J = 150^\circ\text{C}$. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

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