Data Sheet No. PD-2.056A

T-03-19

INTERNATIONAL RECTIFIER IOR

20CTQ & 30CTQ SERIES

20 & 30 Amp Dual Schottky Center Tap Rectifiers

Major Ratings and Characteristics

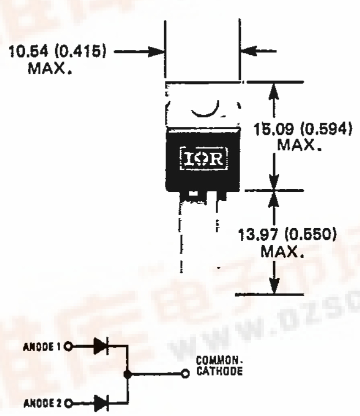
Characteristic		20CTQ	30CTQ	Units
I_O	Rectangular Waveform	20	30	A
	Sinusoidal Waveform	18	27	
I_{FSM}	@ 50 Hz	260	285	A
	@ 60 Hz	275	300	
I^2t	@ 50 Hz	340	405	A^2s
	@ 60 Hz	310	375	
$I^2\sqrt{t}$		4650	5450	$A^2\sqrt{s}$
V_{RWM}		30 to 45	30 to 45	V
T_J		–40 to 150	–40 to 150	°C
C_t @ –5V		1000	1000	pF

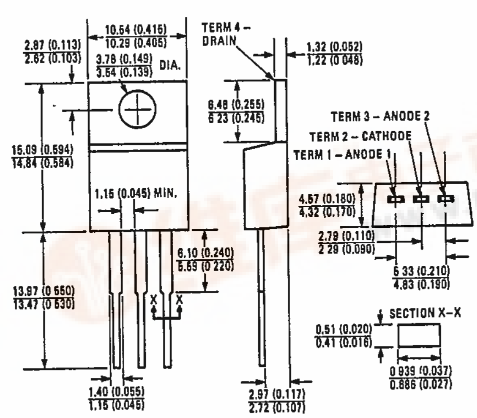
The 20CTQ and 30CTQ Schottky Rectifier Series employ the "830" process which results in a very low ratio of reverse leakage current to junction temperature. In addition to offering improved reliability and performance, they are rugged devices with a guaranteed repetitive peak reverse voltage capability,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

- T_J = 150°C (rep), T_J = 175°C (non-rep)
- 20 and 30A continuous DC output
- 275 and 300A surge, 60 Hz, one cycle (per junction)
- Extremely low reverse leakage: 6 mA at 25°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

C

CASE STYLE AND DIMENSIONS





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

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) ①
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 — Following any rated load condition and with rated V_{RWM} applied
		305	330		50 Hz half cycle sine wave or 6 ms rectangular pulse — With V_{RWM} = 0 following surge, initial T_J = 150°C
		320	350		60 Hz half cycle sine wave or 5 ms rectangular pulse — With V_{RWM} = 0 following surge, initial T_J = 150°C
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°C
		310	375		t = 8.3 ms — With rated V_{RWM} applied following surge, initial T_J = 150°C
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°C
		425	510		t = 8.3 ms — With V_{RWM} = 0 following surge, initial T_J = 150°C
$I^2\sqrt{t}$	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°C. V_{RWM} = 0 following surge.
V_{FM}	Max. peak forward voltage, per junction	0.76	–	V	T_J = 25°C — Rated $I_{F(AV)}$ (20A peak) 180° rectangular waveform
		0.66	–		T_J = 150°C — Rated $I_{F(AV)}$ (20A peak) 180° rectangular waveform
		–	0.82		T_J = 25°C — Rated $I_{F(AV)}$ (30A peak) 180° rectangular waveform
		–	0.72		T_J = 150°C — Rated $I_{F(AV)}$ (30A peak) 180° rectangular waveform
I_{RM}	Max. peak reverse current, per junction	6	6	mA	T_J = 25°C — V_{RM} = rated V_{RWM}
		15	15		T_J = 150°C — V_{RM} = rated V_{RWM}
I_{RRM}	Max. repetitive peak reverse current	1.0	1.0	A	T_C = 25°C, f = 1 kHz see fig.16 for test circuit
C_t	Max. capacitance, per junction	1000	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 application of reverse voltage, per junction	1000	1000	V/μs	T_C = 25°C, V_{RM} = rated V_{RWM}

THERMAL-MECHANICAL SPECIFICATIONS

		20CTQ	30CTQ	Units	Conditions
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	5	4	deg C/W	Based on power dissipated in one junction, both junctions operating
	Max. composite thermal resistance, junction-to-case, DC operation	2.5	2	deg C/W	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; Terminals 2 and Tab: Common Cathodes — JEDEC

① T_C = –40 to 147°C, 180° conduction.

② T_C = 0 to 147°C, 180° conduction.

③ T_C = –40 to 139°C for 20CTQ. T_C = –40 to 141°C for 30CTQ.

④ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

IOR INTERNATIONAL RECTIFIER

20CTQ & 30CTQ Series

T-03-19

20CTQ SERIES

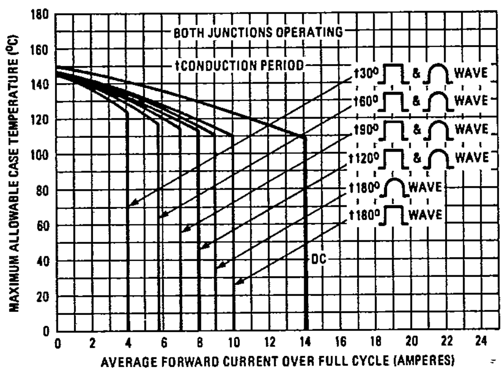


Fig. 1 — Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction

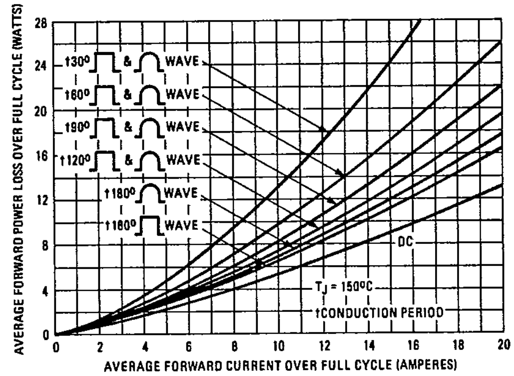


Fig. 2 — Maximum Forward Power Loss Vs. Average Forward Current, Per Junction

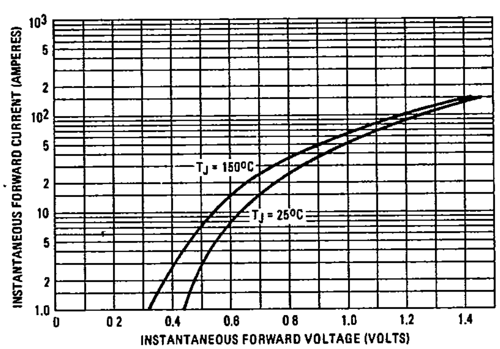


Fig. 3 — Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction

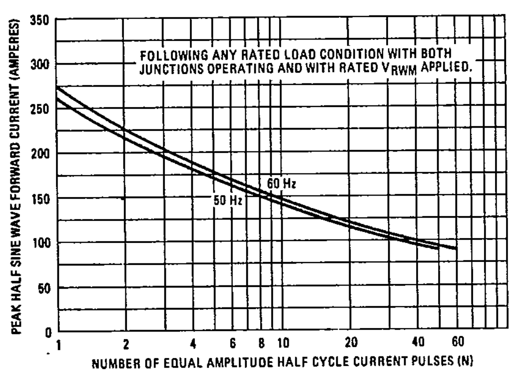


Fig. 4 — Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction

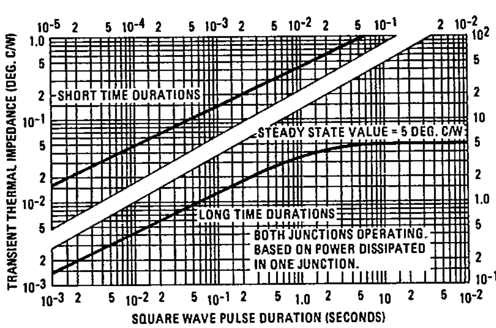


Fig.5 — Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction

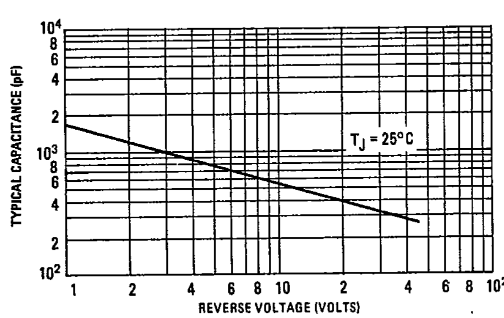


Fig. 6 — Typical Capacitance Vs. Reverse Voltage, Per Junction

T-03-19

20CTQ SERIES

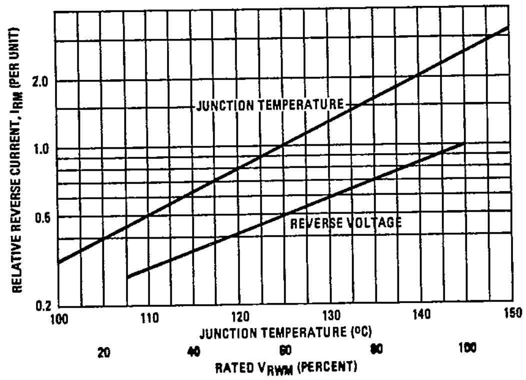
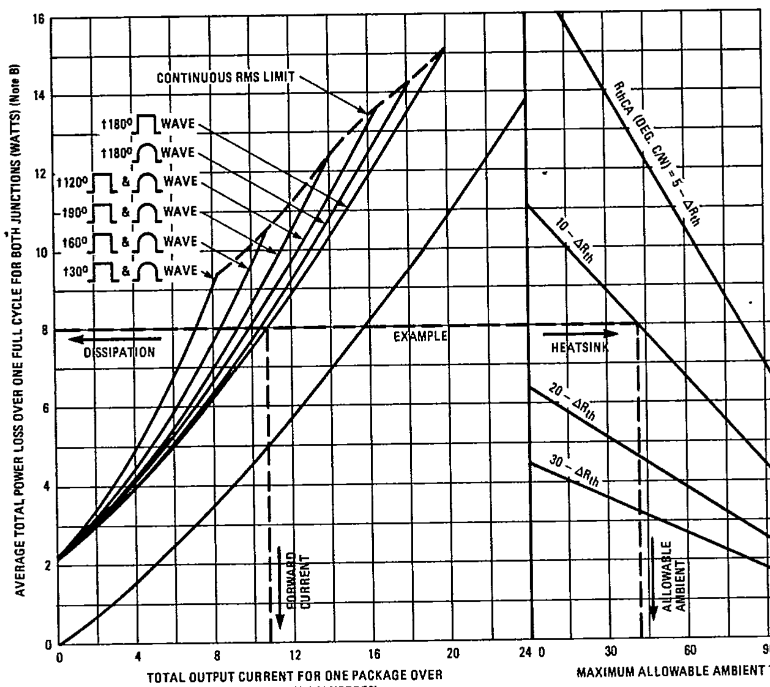


Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction



USE BELOW 5000 Hz (Note A)	
† CONDUCTION PERIOD	ΔR_{th}
DC	0
180° (rectangular)	0.49
180° (sine)	0.91
120°	0.90
90°	1.09
60°	1.34
30°	1.18

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_{RWM} and T_J = 150°C. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

T-03-19

30CTQ SERIES

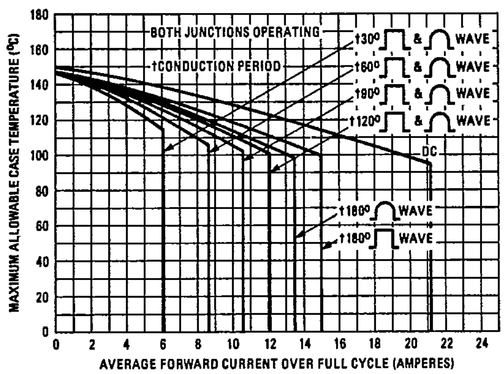


Fig. 9 — Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction

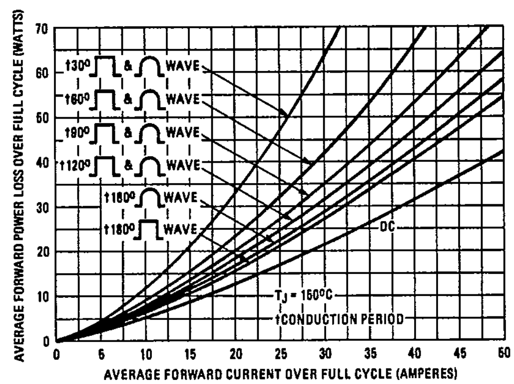


Fig. 10 — Maximum Forward Power Loss Vs. Average Forward Current, Per Junction

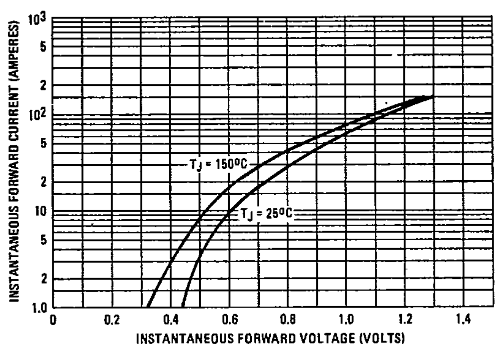


Fig. 11 — Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction

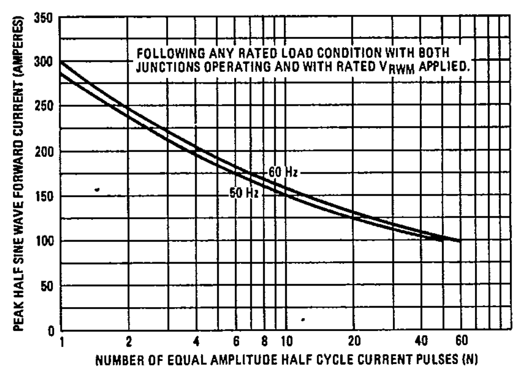


Fig. 12 — Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction

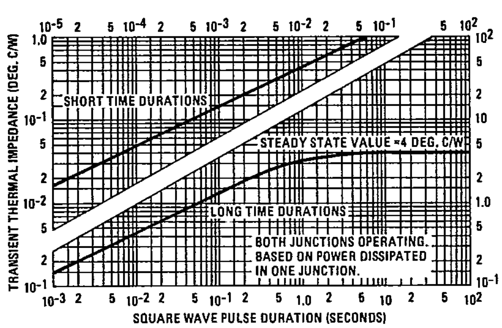


Fig. 13 — Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction

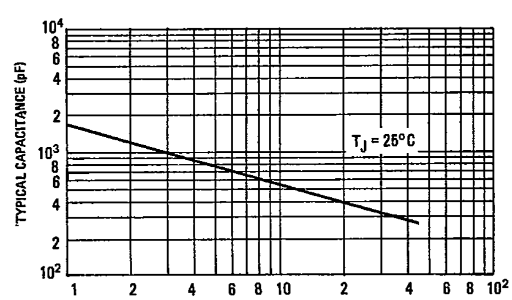


Fig. 14 — Typical Capacitance Vs. Reverse Voltage, Per Junction

C

T-03-19

30CTQ SERIES

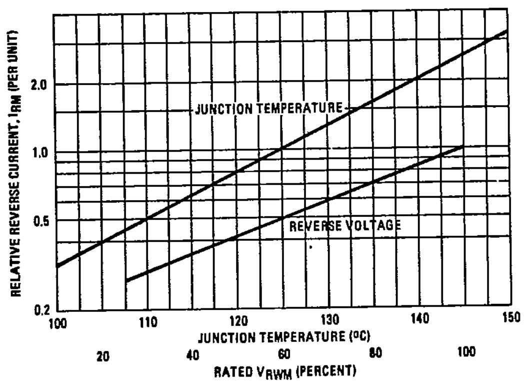


Fig. 15 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction

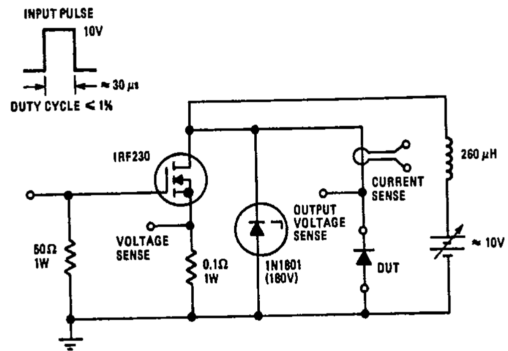
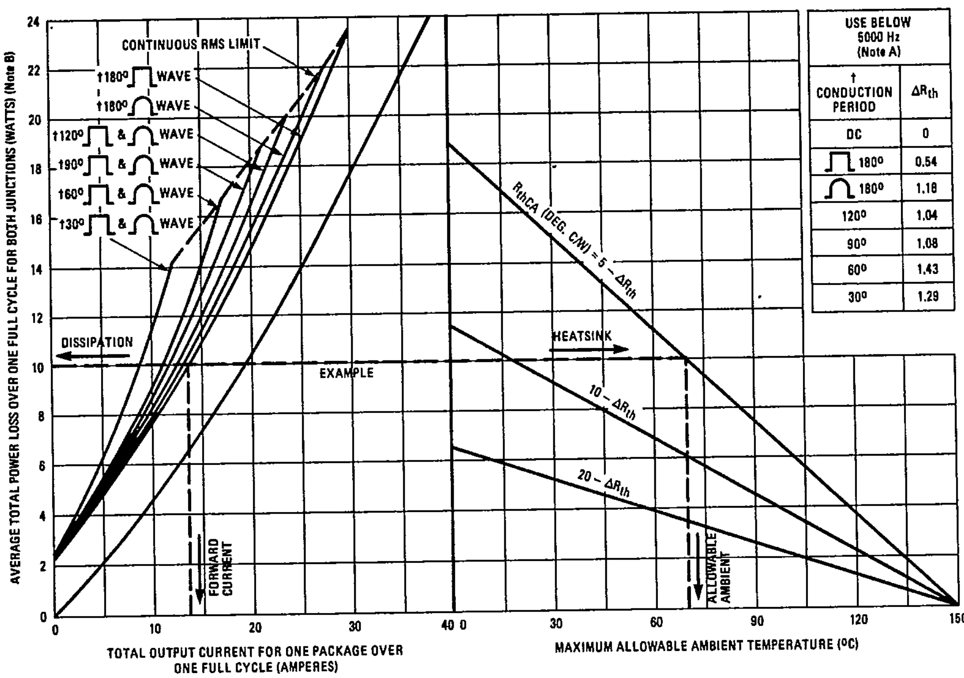


Fig. 16 – I_{RRM} Test Circuit



USE BELOW 5000 Hz (Note A)	
† CONDUCTION PERIOD	ΔR_{th}
DC	0
⊓ 180°	0.54
∩ 180°	1.18
120°	1.04
90°	1.08
60°	1.43
30°	1.29

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_{RWM} and T_J = 150°C. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.