4855452 INTERNATIONAL RECTIFIER 55C 05091 D
Data Sheet No. PD-2.039B
T-03-19

INTERNATIONAL RECTIFIER IOR

30FQ & 30FQ-A SERIES

30 Amp Schottky Power Rectifiers

Major Ratings and Characteristics

Characteristic	30FQ	30FQ-A	Units
$I_{F(AV)}$			
@ 180° Rectangular	30		A
@ 180° Half Sine Wave	27		
I_{FSM}			
@ 50 Hz	575	590	A
@ 60 Hz	600	620	
I^2t			
@ 50 Hz	1650	1750	A^2s
@ 60 Hz	1500	1600	
$I^2\sqrt{t}$	23,000	25,000	$A^2\sqrt{s}$
V_{RWM}	30 to 45		V
C_t @ -5V	2000		pF
T_J	-65 to 175		°C

Description/Features

The 30FQ and 30FQ-A Series Schottky rectifiers are designed to be operated at 175°C T_J. They employ 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, they are rugged devices with a guaranteed repetitive peak reverse voltage capability and excellent ability to withstand reverse energy transients. They can be used for both existing and new designs.

- 175°C T_J operation
- High current at high temperature
- Extremely low reverse leakage: 25 mA at 125°C
- No voltage derating up to 175°C
- Provides extremely high power supply reliability
- No thermal runaway within operating and temperature parameters.
- A guaranteed repetitive peak reverse voltage capability for short pulses which is 20% above V_{RWM}
- Ability to withstand reverse energy transients
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements.

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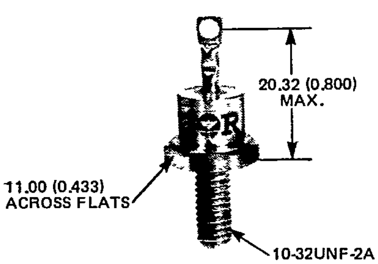
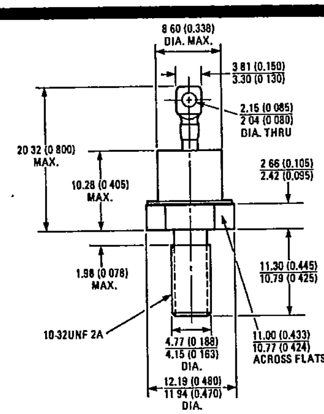
CASE STYLE AND DIMENSIONS





Case Style DO-203AA (DO-4)
All Dimensions in Millimeters and (Inches)

30FQ & 30FQ-A Series

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VOLTAGE RATINGS

Part Numbers		V_{RWM} – Max. Working Peak Reverse Voltage (V) ①	V_{RRM} – Max. Repetitive Peak Reverse Voltage (V) ② (200 ns Max. Pulse Width)	V_R – Max. Direct Reverse Voltage (V) ③
30FQ030	30FQ030A	30	36	30
30FQ035	30FQ035A	35	42	35
30FQ040	30FQ040A	40	48	40
30FQ045	30FQ045A	45	54	45

ELECTRICAL SPECIFICATIONS

		30FQ	30FQ-A	Units	Conditions	
$I_{F(AV)}$	Max. average forward current	30		A	180° conduction, rectangular waveform	@ T_C = –65 to 119°C for 30FQ, and @ T_C = –65 to 123°C for 30FQ-A.
		27			180° conduction, sinusoidal waveform	
I_{FSM}	Max. peak one cycle, non-repetitive surge current	575	590	A	50 Hz	Half cycle, sine wave or 6 ms rectangular pulse, following any rated load condition, and with rated V_{RWM} applied following surge.
		600	620		60 Hz	Half cycle, sine wave or 5 ms rectangular pulse, following any rated load condition, and with rated V_{RWM} applied following surge.
		680	705		50 Hz	With V_{RWM} = 0 following surge, Initial T_J = 175°C
		715	735		60 Hz	
I^2t	Max. I^2t for fusing	1,650	1,750	A^2s	10 ms	With rated V_{RWM} applied following surge, initial T_J = 175°C.
		1,500	1,600		8.3 ms	
I^2t	Max. I^2t for individual device fusing	2,300	2,500		10 ms	With V_{RWM} applied following surge = 0, Initial T_J = 175°C.
		2,100	2,250		8.3 ms	
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for individual device fusing ④	23,000	25,000	$A^2\sqrt{s}$	t = 0.1 to 10 ms, V_{RWM} following surge = 0, initial T_J = 175°C	
V_{FM}	Max. peak forward voltage	0.83	0.75	V	T_J = 25°C	Rated $I_{F(AV)}$ (60A peak) 180° conduction, rectangular waveform
		0.73	0.67		T_J = 175°C	
		0.67	0.60		T_J = 25°C @ I_{FM} = 30A	
		0.60	0.54		T_J = 25°C @ I_{FM} = 20A	
I_{RM}	Max. peak reverse current	15		mA	T_J = 25°C	At max. rated V_{RWM}
		30			T_J = 125°C	
I_{RRM}	Max. repetitive peak reverse current	2.0		A	T_C = 25°C, f = 1 kHz, see fig. 16 for test circuit	
C_t	Max. capacitance	2000		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		–65 to 175	°C	
T_{stg}	Max. storage temperature range		–65 to 175	°C	
R_{thJC}	Max. thermal resistance, junction-to-case		2.0	deg C/W	DC operation
R_{thCS}	Max. thermal resistance, case-to-sink		0.50	deg C/W	Mounting surface flat, smooth and greased
T	Mounting torque	Min.	1.35 (12)	Nm	Non-lubricated threads
		Max.	1.70 (15)	(lbf in)	
wt	Approximate weight		5.7 (0.20)	g (oz)	
	Case style		DO-203AA (DO-4)		JEDEC

① T_C = -65°C to 167°C, 180° conduction.

② T_C = 0°C to 167°C, 180° conduction.

③ T_C = -65°C to 148°C

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

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30FQ Series

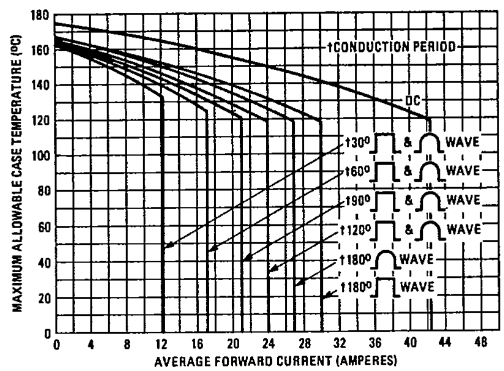

Fig. 1 – Maximum Allowable Case Temperature Vs. Forward Current

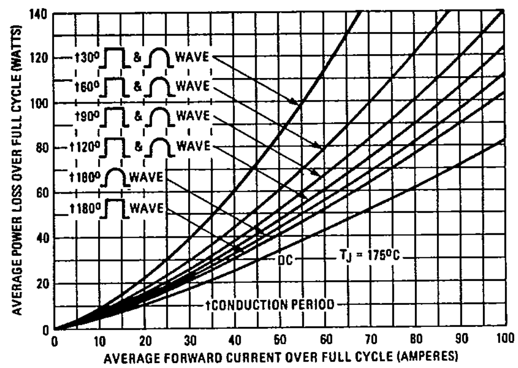

Fig. 2 – Maximum Forward Power Loss Vs. Forward Current

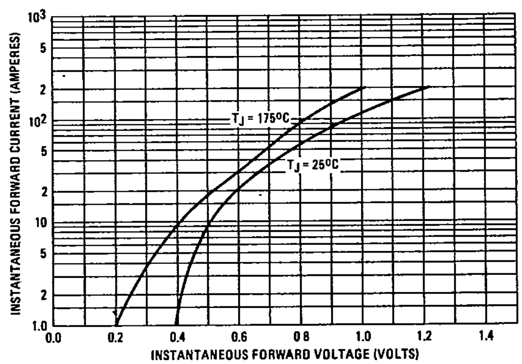

Fig. 3 – Maximum Forward Voltage Vs. Forward Current

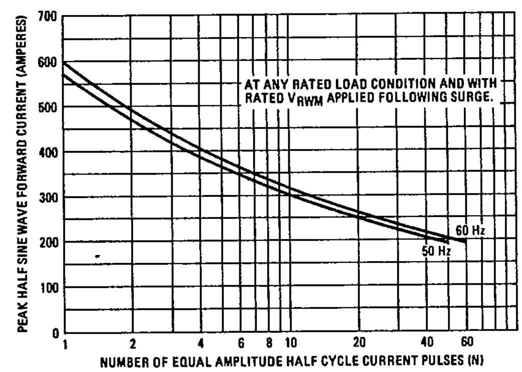

Fig. 4 – Maximum Non-Repetitive Surge Current Vs. Number of Cycles

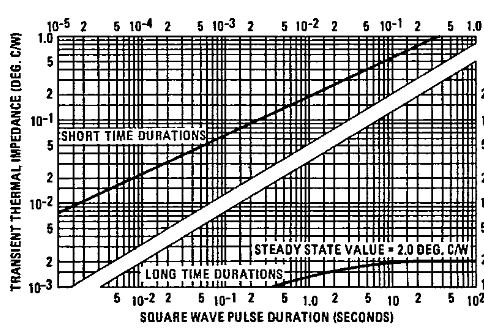

Fig. 5 – Maximum Transient Thermal Impedance, Junction-to-Case Vs. Square Wave Pulse Duration

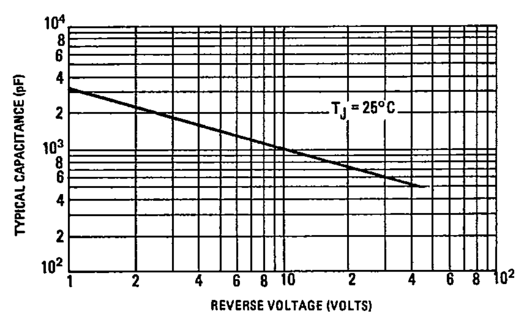

Fig. 6 – Typical Capacitance Vs. Reverse Voltage

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30FQ & 30FQ-A Series

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30FQ Series

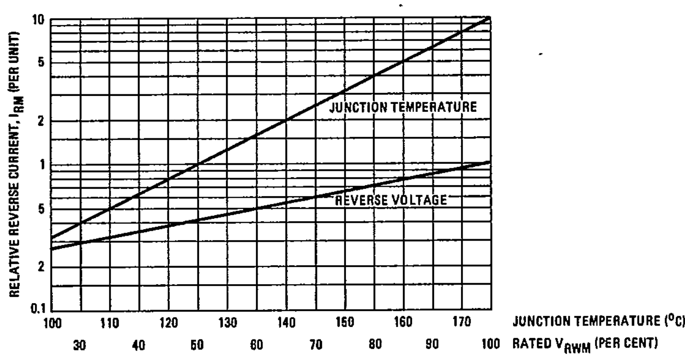
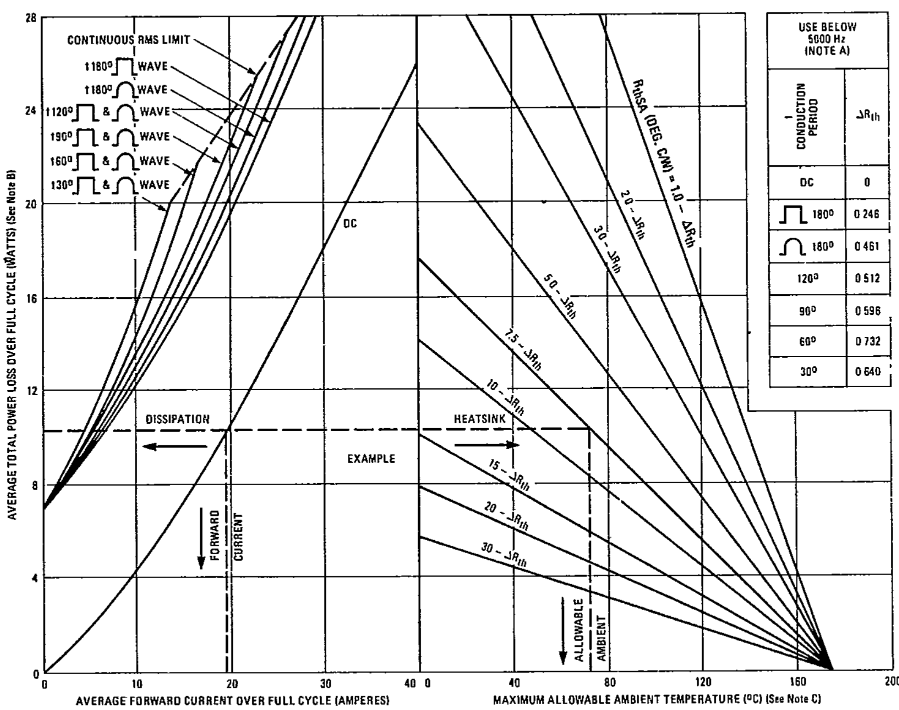


Fig. 7 — Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage



USE BELOW 5000 Hz (NOTE A)	
CONDUCTION PERIOD	ΔR_{th}
DC	0
⎍ 180°	0 246
⌒ 180°	0 461
120°	0 512
90°	0 596
60°	0 732
30°	0 640

Fig. 8 — Thermal Nomogram

Notes.
A. Maximum allowable heatsink thermal resistance, R_{thSA}, equals the graph value minus the ΔR_{th} factor which allows for instantaneous T_J excursion At frequencies above 5000 Hz, ΔR_{th} becomes essentially zero and can be ignored
B. The total power dissipation curves assume the worst case reverse conditions of halfwave (180°) rectangular reverse voltage, full rated V_R, and T_J = 175°C Lower reverse power losses allow higher operating ambient, smaller heatsinks or larger operating safety margin
C. Caution Data assumes that the rectifier is mounted with thermally conductive grease to achieve R_{thCS} = 0 50 deg. C/W.

IOR INTERNATIONAL RECTIFIER

30FQ & 30FQ-A Series

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30FQ-A Series

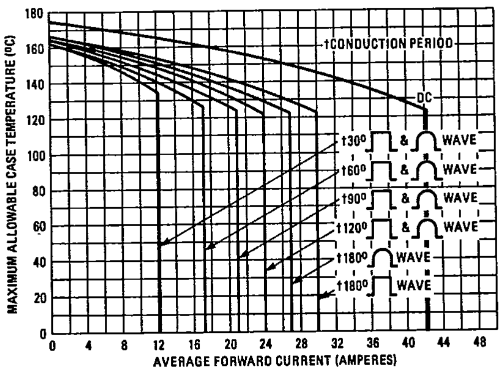

Fig. 9 – Maximum Allowable Case Temperature Vs. Forward Current

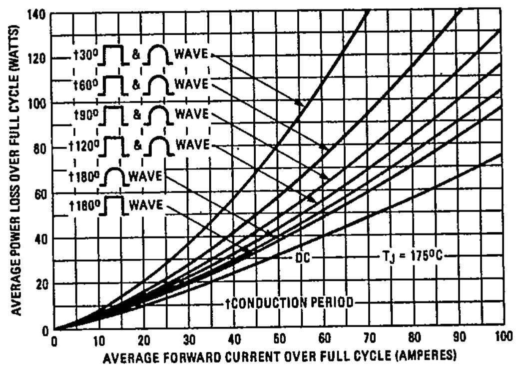

Fig. 10 – Maximum Forward Power Loss Vs. Forward Current

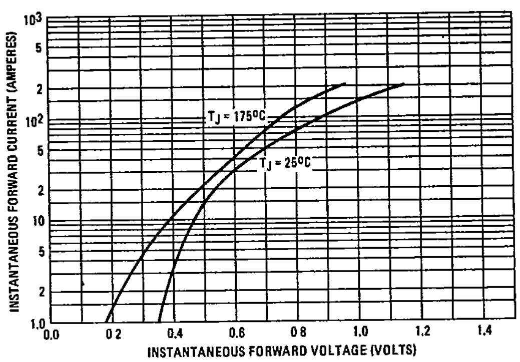

Fig. 11 – Maximum Instantaneous Forward Voltage Vs. Forward Current

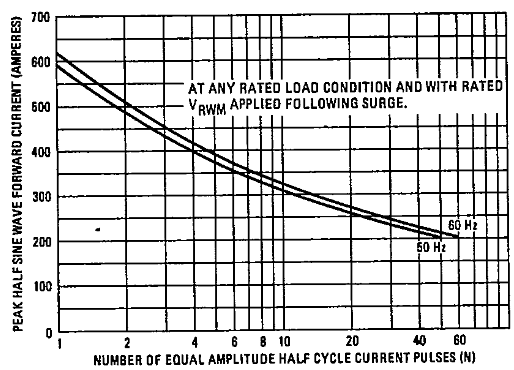

Fig. 12 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

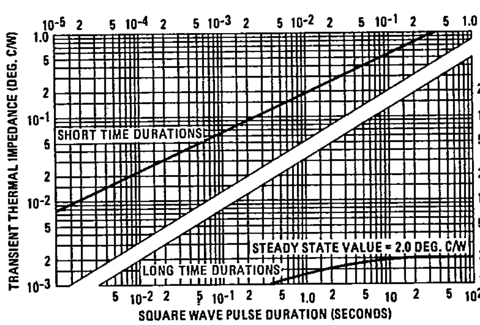

Fig. 13 – Maximum Transient Thermal Impedance, Junction-to-Case Vs. Square Wave Pulse Duration

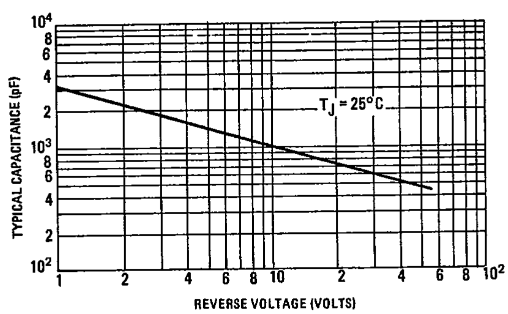

Fig. 14 – Typical Capacitance Vs. Reverse Voltage

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30FQ-A Series

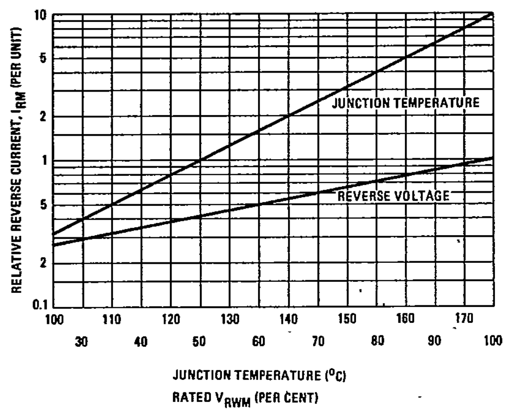


Fig. 15 — Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

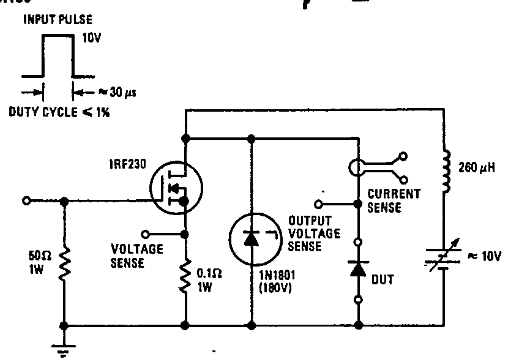
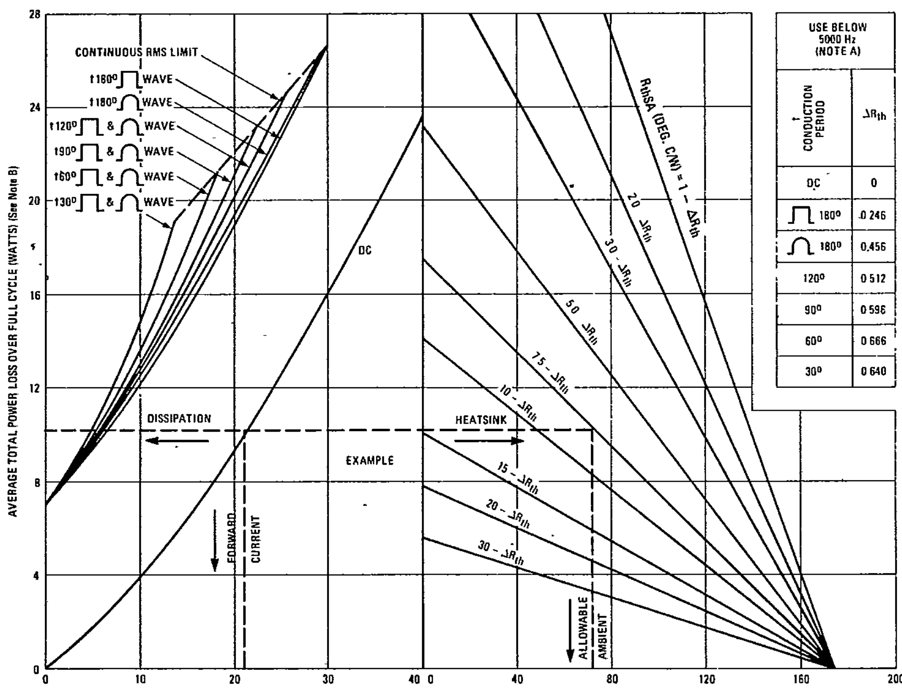


Fig. 16 — I_{RRM} Test Circuit



USE BELOW 5000 Hz (NOTE A)

CONDUCTION PERIOD	ΔR_{th}
DC	0
180° (rectangular)	0 246
180° (sine)	0.456
120°	0 512
90°	0 596
60°	0 666
30°	0 640

Fig. 17 — Thermal Nomogram

Notes: A. Maximum allowable heatsink thermal resistance, R_{thSA}, equals the graph value minus the ΔR_{th} factor which allows for instantaneous T_J excursion. At frequencies above 5000 Hz, ΔR_{th} becomes essentially zero and can be ignored

B. The total power dissipation curves assume the worst case reverse conditions of halfwave (180°) rectangular reverse voltage, full rated V_R, and T_J = 175°C. Lower reverse power losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

C. Caution: Data assumes that the rectifier is mounted with thermally conductive grease to achieve R_{thCS} = 0 50 deg. C/W