

4855452 INTERNATIONAL RECTIFIER

55C 05091 D

Data Sheet No. PD-2.039B

T-03-19

INTERNATIONAL RECTIFIER 

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^2_t			
@ 50 Hz	1650	1750	A ² s
@ 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

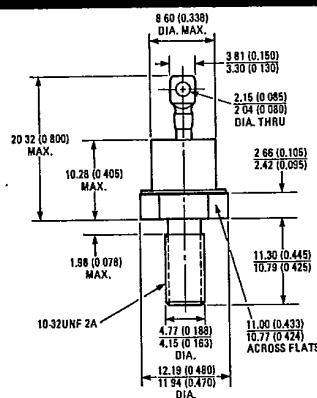
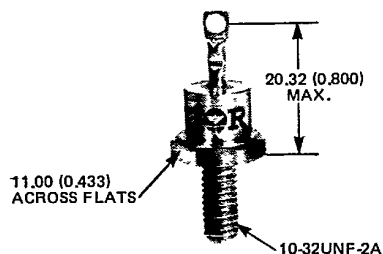
Description/Features

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)

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VOLTAGE RATINGS

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Part Numbers		V_{RWM} - Max. Working Peak Reverse Voltage (V) ①	V_{RRM} - Max. Repetitive Peak Reverse Voltage (V) ① (200 ns Max. Pulse Width)	V_R - Max. Direct Reverse Voltage (V) ①
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 $T_J = 175^\circ\text{C}$
		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 $T_J = 175^\circ\text{C}$.
		1,500	1,600		8.3 ms
I^2t	Max. I^2t for individual device fusing	2,300	2,500	A^2s	10 ms With V_{RWM} applied following surge = 0, initial $T_J = 175^\circ\text{C}$.
		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	$\text{A}^2\sqrt{\text{s}}$	$t = 0.1$ to 10 ms, V_{RWM} following surge = 0, initial $T_J = 175^\circ\text{C}$
V_{FM}	Max. peak forward voltage	0.83	0.75	V	$T_J = 25^\circ\text{C}$ Rated $I_{F(AV)}$ (60A peak) 180° conduction, rectangular waveform
		0.73	0.67		$T_J = 175^\circ\text{C}$
		0.67	0.60		$T_J = 25^\circ\text{C}$ @ $I_{FM} = 30\text{A}$
		0.60	0.54		$T_J = 25^\circ\text{C}$ @ $I_{FM} = 20\text{A}$
I_{RM}	Max. peak reverse current	15		mA	$T_J = 25^\circ\text{C}$
		30			$T_J = 125^\circ\text{C}$ At max. rated V_{RWM}
I_{RRM}	Max. repetitive peak reverse current	2.0		A	$T_C = 25^\circ\text{C}$, $f = 1$ kHz, see fig. 16 for test circuit
C_t	Max. capacitance	2000		pF	$T_C = 25^\circ\text{C}$, $V_R = 6$ Vdc (Test signal in the range of 100 kHz to 1 MHz.)
dv/dt	Max. rate of reverse voltage application	1000		V/ μs	$T_C = 25^\circ\text{C}$, $V_{RM} = \text{rated } V_{RWM}$

THERMAL-MECHANICAL SPECIFICATIONS

T_J	Max. operating junction temperature range	-65 to 175	$^\circ\text{C}$	
T_{stg}	Max. storage temperature range	-65 to 175	$^\circ\text{C}$	
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 $T_C = -65^\circ\text{C}$ to 167°C , 180° conduction.① $T_C = -65^\circ\text{C}$ to 148°C ① $T_C = 0^\circ\text{C}$ to 167°C , 180° conduction.① I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$

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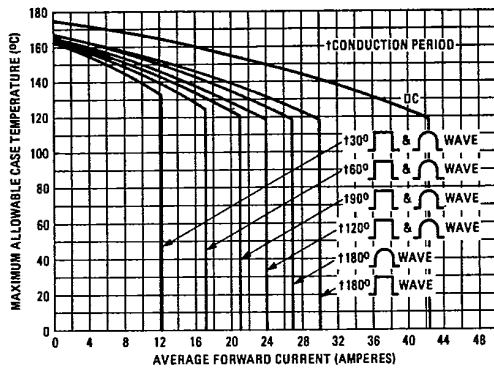


Fig. 1 - Maximum Allowable Case Temperature Vs. Forward Current

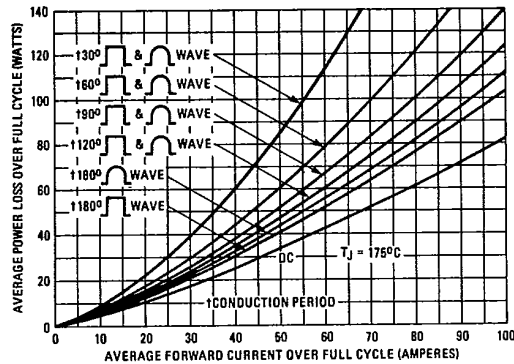


Fig. 2 - Maximum Forward Power Loss Vs. Forward Current

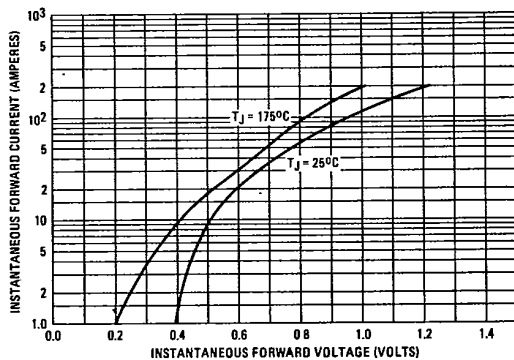


Fig. 3 - Maximum Forward Voltage Vs. Forward Current

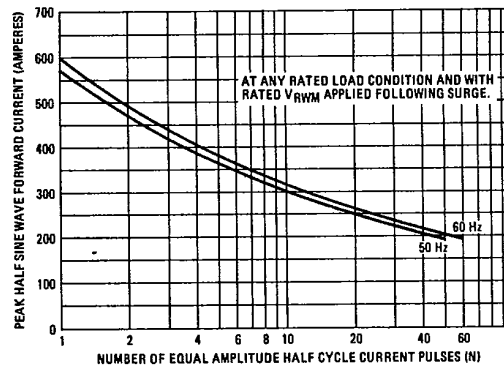


Fig. 4 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles

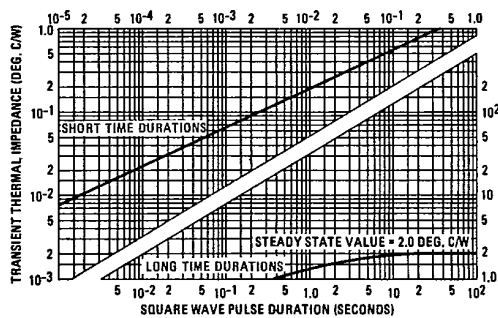


Fig. 5 - Maximum Transient Thermal Impedance, Junction-to-Case Vs. Square Wave Pulse Duration

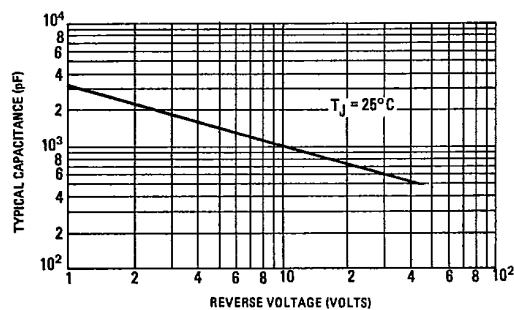


Fig. 6 - Typical Capacitance Vs. Reverse Voltage

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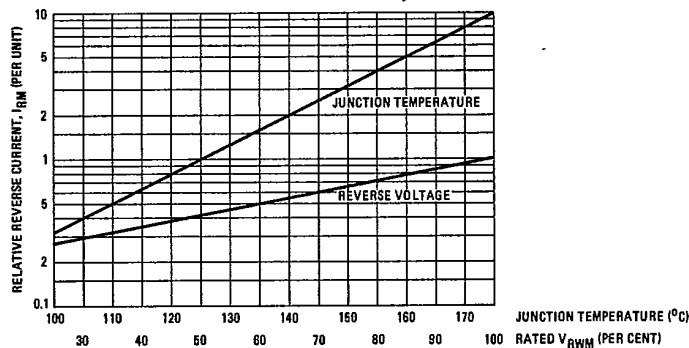


Fig. 7 - Typical Variation of Reverse Current Vs.
Junction Temperature and Reverse Voltage

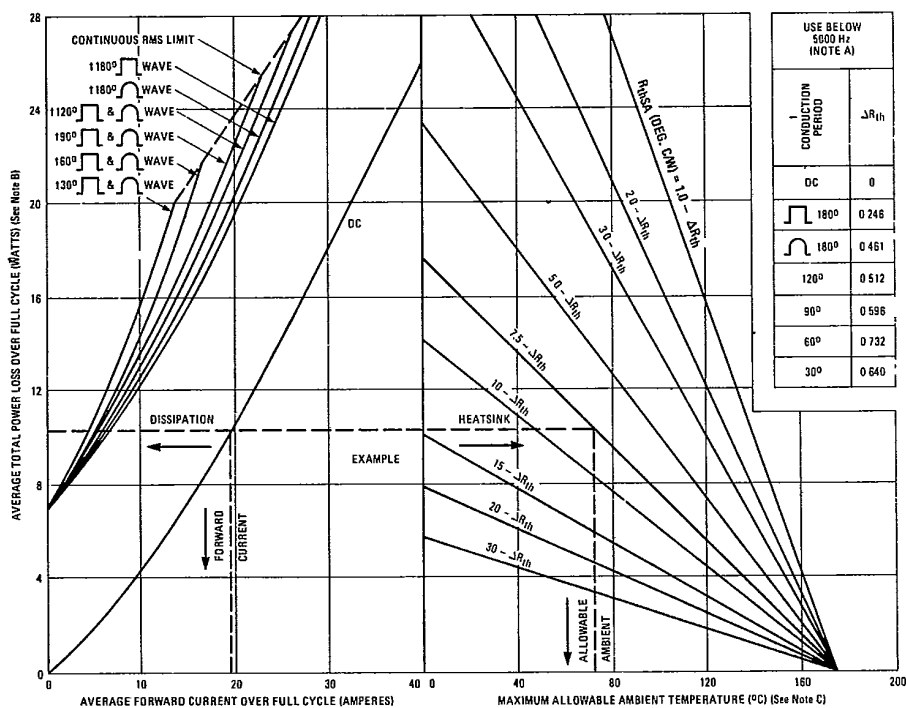


Fig. 8 - Thermal Nomogram

- 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 $T_J = 175^\circ\text{C}$. 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 $R_{thCS} = 0.50^\circ\text{C/W}$.

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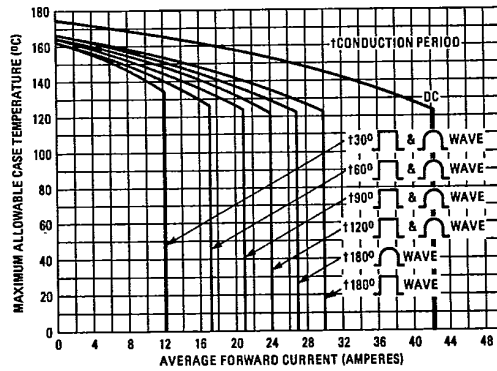


Fig. 9 - Maximum Allowable Case Temperature Vs. Forward Current

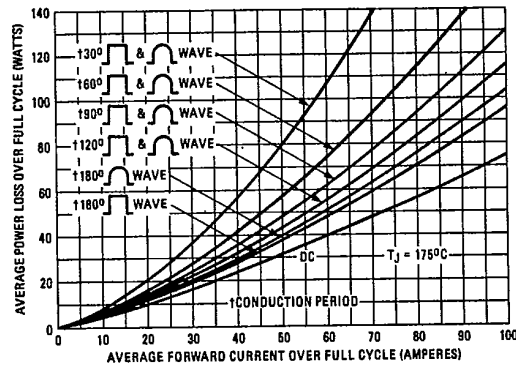


Fig. 10 - Maximum Forward Power Loss Vs. Forward Current

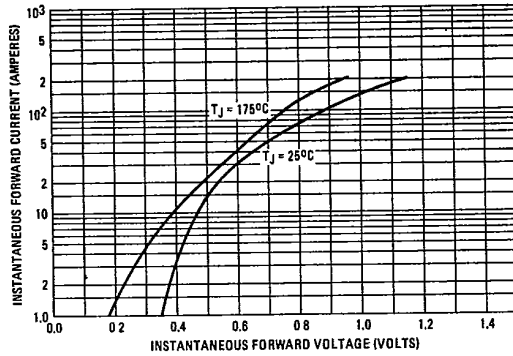


Fig. 11 - Maximum Instantaneous Forward Voltage Vs. Forward Current

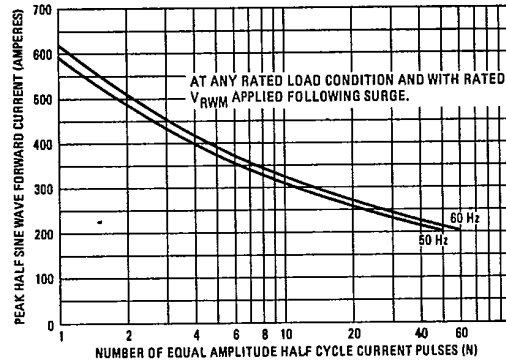


Fig. 12 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

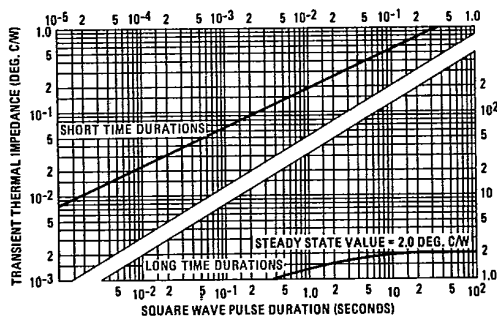


Fig. 13 - Maximum Transient Thermal Impedance, Junction-to-Case Vs. Square Wave Pulse Duration

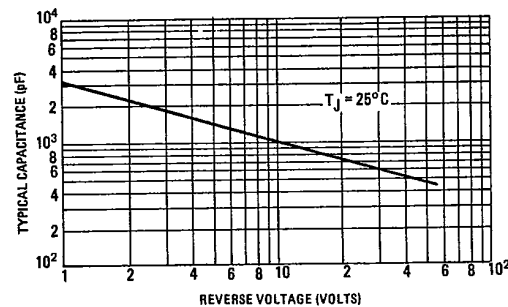


Fig. 14 - Typical Capacitance Vs. Reverse Voltage

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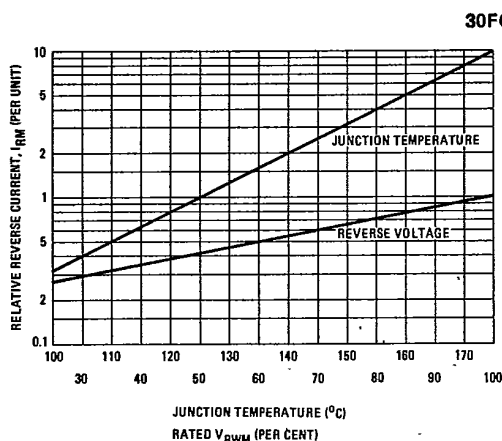


Fig. 15 — Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

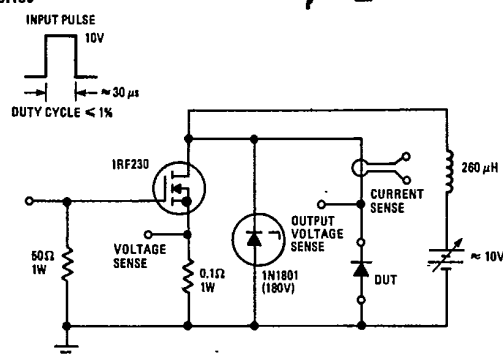


Fig. 16 — IRRM Test Circuit

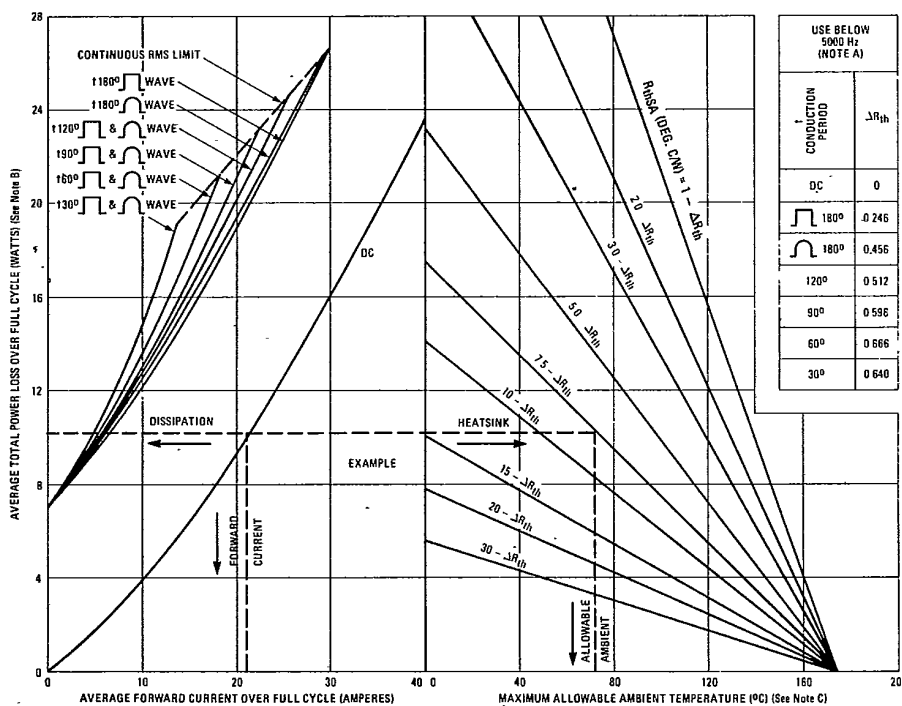


Fig. 17 — Thermal Nomogram

- Notes:
- 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.
 - The total power dissipation curves assume the worst case reverse conditions of halfwave (180°) rectangular reverse voltage, full rated V_R , and $T_J = 175^\circ\text{C}$. Lower reverse power losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.
 - Caution: Data assumes that the rectifier is mounted with thermally conductive grease to achieve $R_{thCS} = 0.50^\circ\text{C/W}$.