Data Sheet No. PD-2.043B

T-03-19

INTERNATIONAL RECTIFIER IOR

21FQ & SD41 SERIES

30 Amp Schottky Power Rectifiers

Major Ratings and Characteristics

Characteristic	21FQ	SD41	Units
$I_{F(AV)}$ @ 180° Rectangular	30		A
@ 180° Half Sine Wave	27		
I_{FSM} @ 50 Hz	575		A
@ 60 Hz	600		
I^2t @ 50 Hz	1650		A^2s
@ 60 Hz	1500		
$I^2\sqrt{t}$	23,000		$A^2\sqrt{s}$
V_{RWM}	30-45	35	V
C_t @ −5V	2,000		pF
T_J	−65 to 150		°C

Description/Features

The 21FQ Schottky rectifier is a low V_F device designed for 150°C T_J operation without voltage derating. In addition to improved performance characteristics, this rugged device provides a 20% safety margin for short pulses over the working peak voltage rating to protect against voltage transients, and guard ring construction to withstand reverse energy transients.

Applications for the 21FQ Schottky rectifier series include both existing and new switching power supply designs.

- Extremely low V_F
- Excellent parameter stability over the operating range
- No voltage derating to 150°C T_J
- A guaranteed non-repetitive peak voltage capability for short pulses which is 20% above V_{RWM}, to protect devices against voltage transients
- Ultra-fast switching
- Popular DO-203AA (DO-4) package)
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements.

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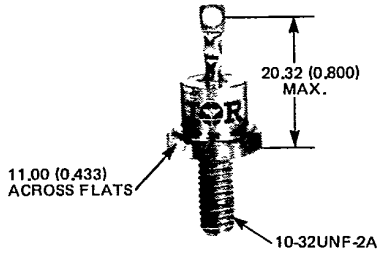
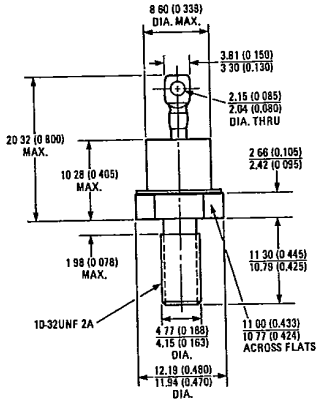
CASE STYLE AND DIMENSIONS





Conforms to JEDEC Outline DO-203AA (DO-4)
Dimensions in Millimeters and (Inches)

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VOLTAGE RATINGS

Part Numbers	V_{RWM} – Max. Working Peak Reverse Voltage ① (V)	V_{RRM} – Max. Repetitive Peak Reverse Voltage ① (V) (t_p = 200 ns max.)	V_R – Max. Direct Reverse Voltage ① (V)
21FQ030	30	36	30
21FQ035, SD41	35 ④	42 ④	35
21FQ040	40	48	40
21FQ045	45	54	45

ELECTRICAL SPECIFICATIONS

		21FQ, SD41	Units	Conditions
$I_{F(AV)}$	Max. average forward current	30	A	180° conduction @ T_C = –65 to 96°C rectangular waveform
		27		180° conduction @ T_C = –65 to 94°C sinusoidal waveform
I_{FSM}	Max. peak one cycle, non-repetitive surge current	575	A	50 Hz supply: Half cycle, sine wave or 6 ms rectangular pulse, following any rated load condition, and with rated V_{RWM} applied following surge.
		600		60 Hz supply: Half cycle, sine wave or 5 ms rectangular pulse, following any rated load condition, and with rated V_{RWM} applied following surge.
		680	A	50 Hz supply: With V_{RWM} = 0 following surge, initial T_J = 150°C
		715		60 Hz supply
I^2t	Max. I^2t for fusing	1650	A^2s	t = 10 ms: With rated V_{RWM} applied following surge,
		1500		t = 8.3 ms: initial T_J = 150°C
I^2t	Max I^2t for individual device fusing	2300	A^2s	t = 10 ms: With V_{RWM} = 0 following surge,
		2100		t = 8.3 ms: initial T_J = 150°C
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for individual device fusing ⑤	23,000	$A^2\sqrt{s}$	t = 0.1 to 10 ms. V_{RWM} following surge = 0, initial T_J = 150°C
V_{FM}	Max. peak forward voltage	0.58	V	T_J = 25°C, I_{FM} = 30A
		0.75		T_J = 25°C: Rated $I_{F(AV)}$ (60A peak) 180° conduction,
		0.70		T_J = 150°C: rectangular waveform
I_{RM}	Max. peak reverse current	50	mA	T_J = 25°C: At max. rated V_{RWM}
		125		T_J = 125°C
I_{RRM}	Max. repetitive peak reverse current	2.0	A	T_C = 25°C, f = 1 kHz, see fig. 8 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 150	°C	
T_{stg}	Max. storage temperature range		–65 to 150	°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		5.78 (0.2)	g (oz)	
	Case style		DO-203AA (DO-4)		JEDEC

① T_C = 65°C to 140°C, 180° conduction.
① T_C = 0°C to 140°C, 180° conduction.
① T_C = -65°C to 115°C

④ For SD41, rated V_{RWM} and V_{RRM} = 45V @ T_J = 25°C, = 35V @ T_J = 150°C.

⑤ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

IOR INTERNATIONAL RECTIFIER

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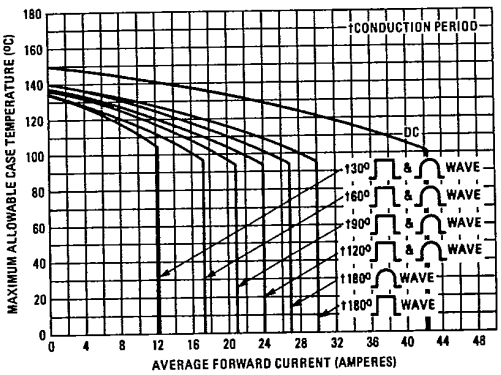

Fig. 1 – Maximum Allowable Case Temperature Vs. Average Forward Current

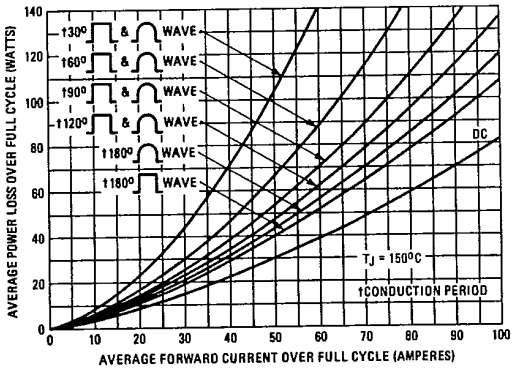

Fig. 2 – Maximum Forward Power Loss Vs. Average Forward Current

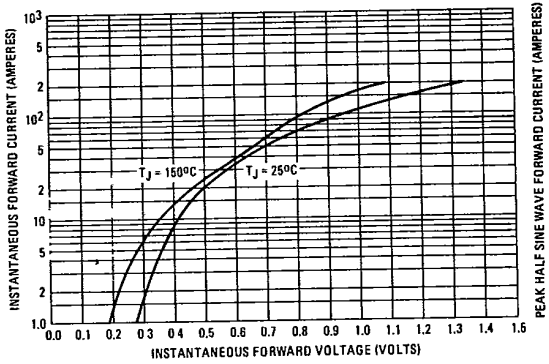

Fig. 3 – Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current

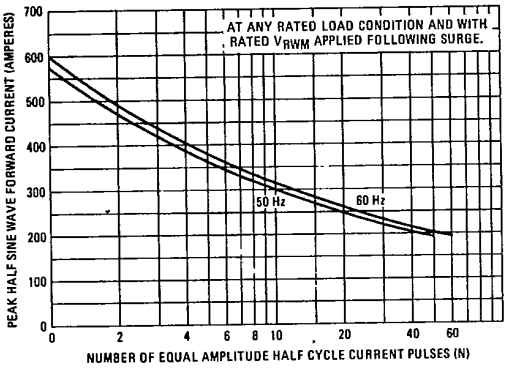

Fig. 4 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulse

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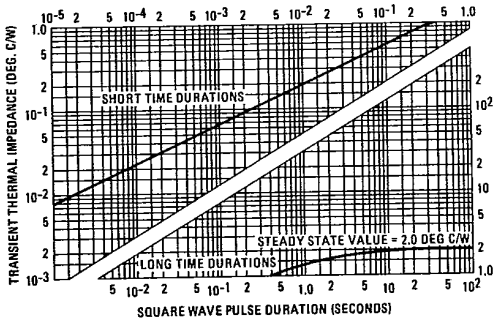

Fig. 5 – Maximum Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

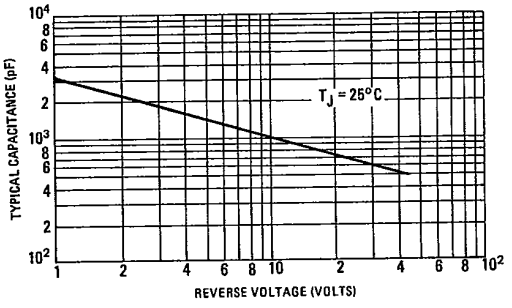

Fig. 6 – Typical Capacitance Vs. Reverse Voltage

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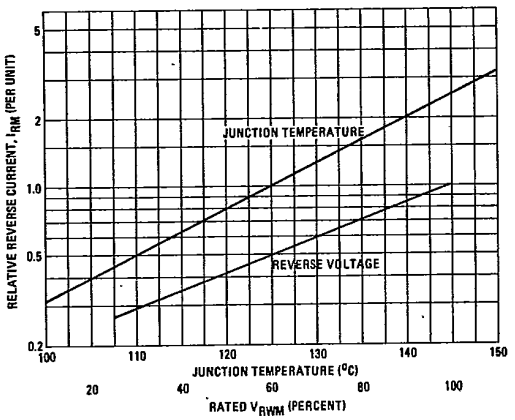

Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

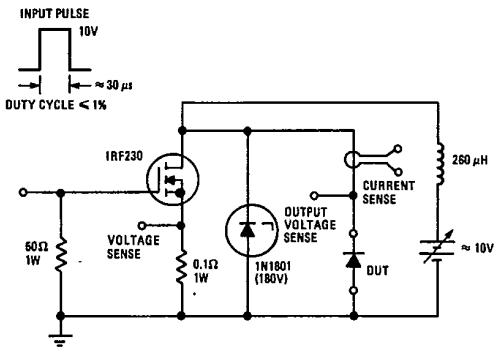

Fig. 8 – I_{RRM} Test Circuit

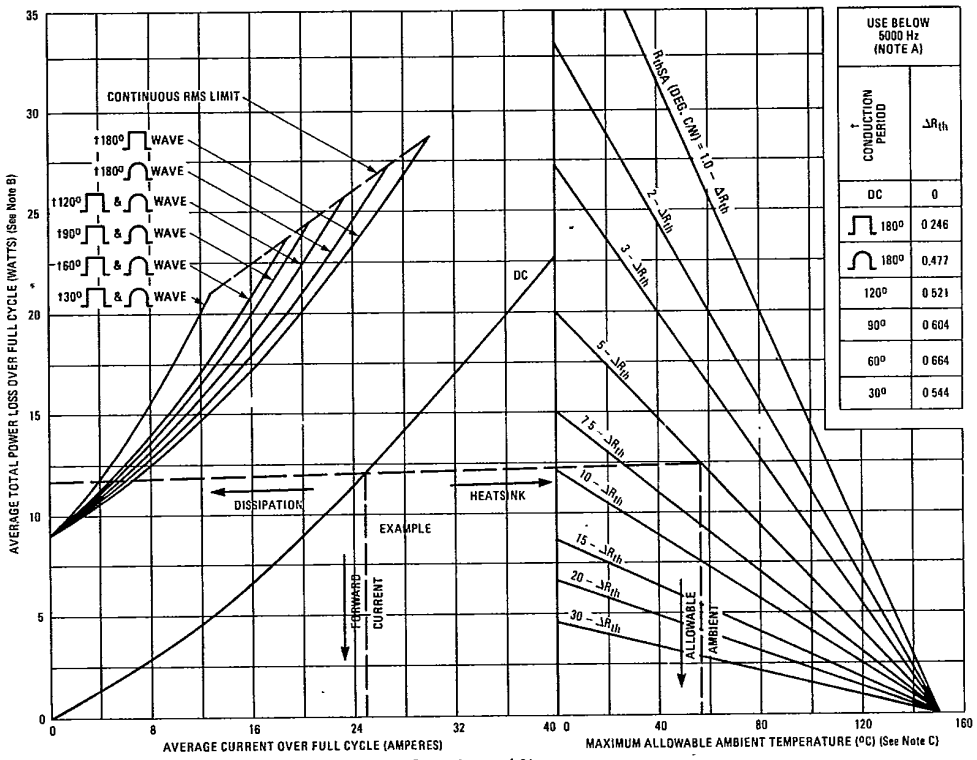

Fig. 9 – Thermal Nomogram

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 = 150°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.