4855452 INTERNATIONAL RECTIFIER 55C 05111 D
Data Sheet No. PD-2.021B

INTERNATIONAL RECTIFIER IOR

T-03-21

51HQ, SD51 & 52HQ SERIES

60 Amp Schottky Power Rectifiers

Major Ratings and Characteristics

Characteristic	51HQ, SD51	52HQ	Units
$I_{F(AV)}$ @ 180° Rectangular	60		A
@ 180° Half Sine Wave	54		
I_{FSM} @ 50 Hz	765		A
@ 60 Hz	800		
I^2t @ 50 Hz	2900		A^2s
@ 60 Hz	2650		
$I^2\sqrt{t}$	41,000		$A^2\sqrt{s}$
V_{RWM}	35	30 to 45	V
C_t @ −5V	2900		pF
T_J	−65 to 150		°C

Description and Features

The 51HQ and 52HQ Schottky rectifier series feature guard ring construction to protect against reverse energy transients. These rugged devices offer a 20% safety margin for a pulse over the working peak reverse voltage rating, to protect against voltage transients.

Applications for the 51HQ and 52HQ Schottky rectifiers include both existing and new switching power supply designs.

- Ultra fast switching.
- Extremely low V_F.
- Excellent parameter stability over the operating range.
- A guaranteed non-repetitive peak reverse voltage capability which is 20% above V_{RWM} to protect against voltage transients.
- Industry-preferred DO-5 (DO-203AB) package.
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements.

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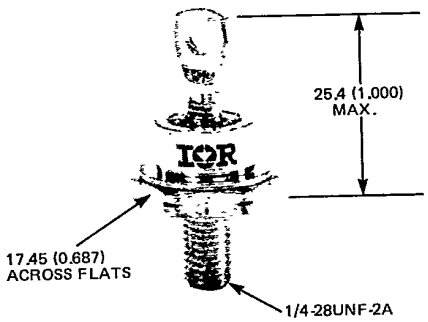
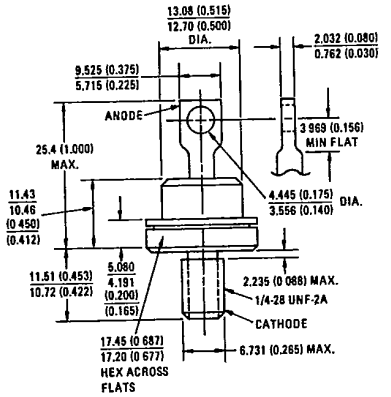
CASE STYLE AND DIMENSIONS





Conforms To JEDEC Outline DO-203AB (DO-5)
Dimensions in Millimeters and (Inches)

51HQ, SD51 & 52HQ 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) ① (200 ns Max. Pulse Width)	V_R – Max. ① Direct Reverse Voltage (V)
–	52HQ030	30	36	30
51HQ045, SD51	52HQ035	35④	42④	35
–	52HQ040	40	48	40
–	52HQ045	45	54	45

ELECTRICAL SPECIFICATIONS

		51HQ, SD51	52HQ	Units	Conditions
$I_{F(AV)}$	Max. average forward current	60	60	A	180° conduction @ T_C = –65 to 91°C for 51HQ and SD51, T_C = –65 to 90°C for 52HQ, rectangular waveform
		54	54		180° conduction @ T_C = –65 to 88°C for 51 HQ and SD51, T_C = –65 to 87°C for 52HQ, sinusoidal waveform
I_{FSM}	Max. peak one cycle, non-repetitive surge current	765	765	A	50 Hz half sine wave, or 6 ms rectangular pulse, following any rated load condition and with rated V_{RWM} applied following surge.
		800	800	A	60 Hz half sine wave, or 5 ms rectangular pulse, following any rated load condition and with rated V_{RWM} applied following surge.
		910	910	A	50 Hz V_{RWM} following surge = 0, initial T_J = 150°C
		950	950	A	60 Hz
I^2t	Max. I^2t capability for fusing	2900	2900	A^2s	t = 10 ms Rated V_{RWM} applied following surge, initial T_J = 150°C
		2650	2650	A^2s	t = 8.3 ms
I^2t	Max. I^2t capability for individual device fusing	4100	4100	A^2s	t = 10 ms V_{RWM} following surge = 0, initial T_J = 150°C
		3750	3750	A^2s	t = 8.3 ms
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for individual device fusing ⑤	41,000	41,000	$A^2\sqrt{s}$	t = 0.1 to 10 ms, initial T_J = 150°C. V_{RWM} following surge = 0
V_{FM}	Max. peak forward voltage	0.58	0.58	V	T_J = 25°C, I_{FM} = 35A
		0.66	0.66		T_J = 25°C, I_{FM} = 60A
		0.86	0.86		T_J = 25°C Rated $I_{F(AV)}$ (120A peak) 180° conduction, rectangular waveform
		0.75	0.75		T_J = 150°C
I_{RM}	Max. peak reverse current	50	75	mA	T_J = 25° C V_{RWM} = rated value
		200	230		T_J = 125°C
I_{RRM}	Max. repetitive peak reverse current	2.0	2.0	A	T_C = 25°C, f = 1 kHz, see fig. 8 for test circuit
C_t	Max. capacitance	2900	2900	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	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		1.0	deg C/W	DC operation.
R_{thCS}	Max. thermal resistance, case-to-sink		0.25	deg C/W	Mounting surface flat, smooth and greased
T	Mounting torque	Min.	2.26 (20)	N m (lbf in)	Non-lubricated threads
		Max.	3.39 (30)		
wt	Approximate weight		15.6 (0.55)	g (oz)	
	Case Style		DO-203AB (DO-5)		JEDEC

① T_C = -65°C to 141°C, 180° conduction.
② T_C = 0°C to 141°C, 180° conduction.
③ T_C = -65°C to 121°C.
④ For 51HQ and SD51 rated V_{RWM} and V_{RRM} = 45V @ T_J = 25°C = 35V @ T_J = 150°C
⑤ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

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51HQ, SD51, 52HQ Series

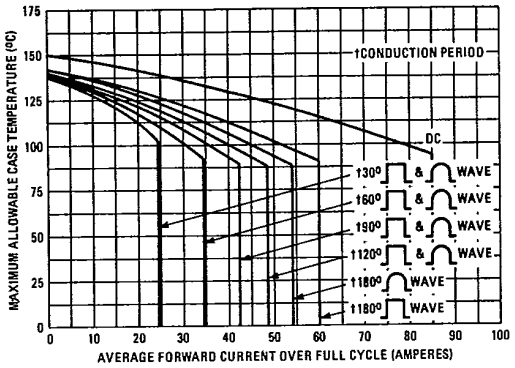

Fig. 1 – Average Forward Current Vs. Case Temperature

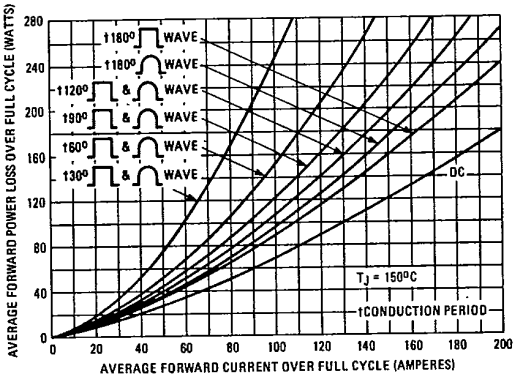

Fig. 2 – Maximum Average Forward Power Loss Vs. Average Forward Current

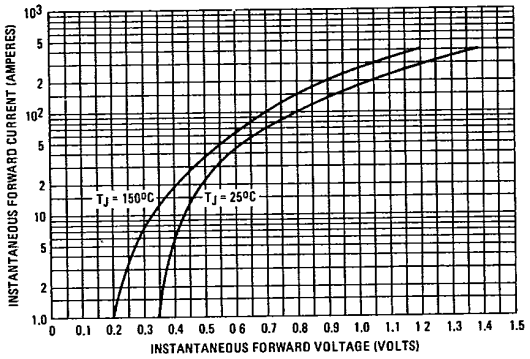

Fig. 3 – Maximum Forward Voltage Vs. Forward Current

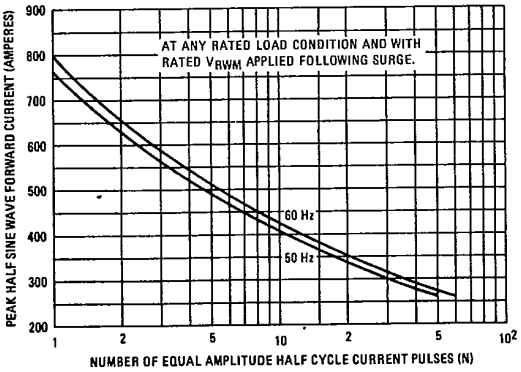

Fig. 4 – Maximum Non-Repetitive Surge Current Vs. Number of Cycles

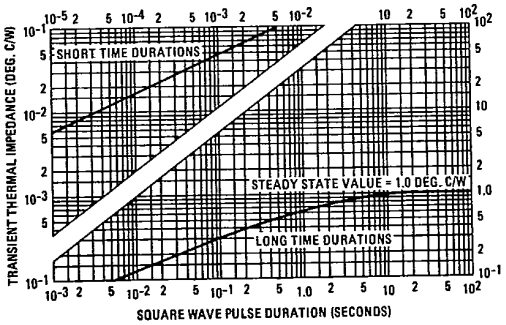

Fig. 5 – Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Pulse Duration

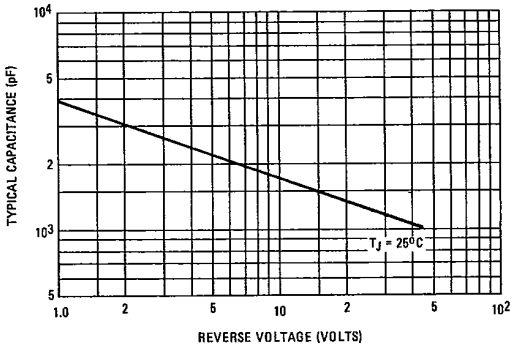

Fig. 6 – Typical Capacitance Vs. Reverse Voltage

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51HQ, SD51, 52HQ Series

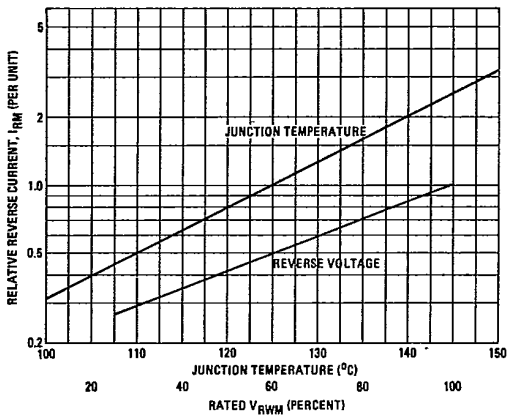


Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage

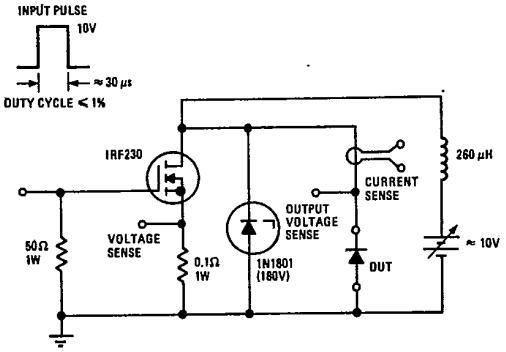
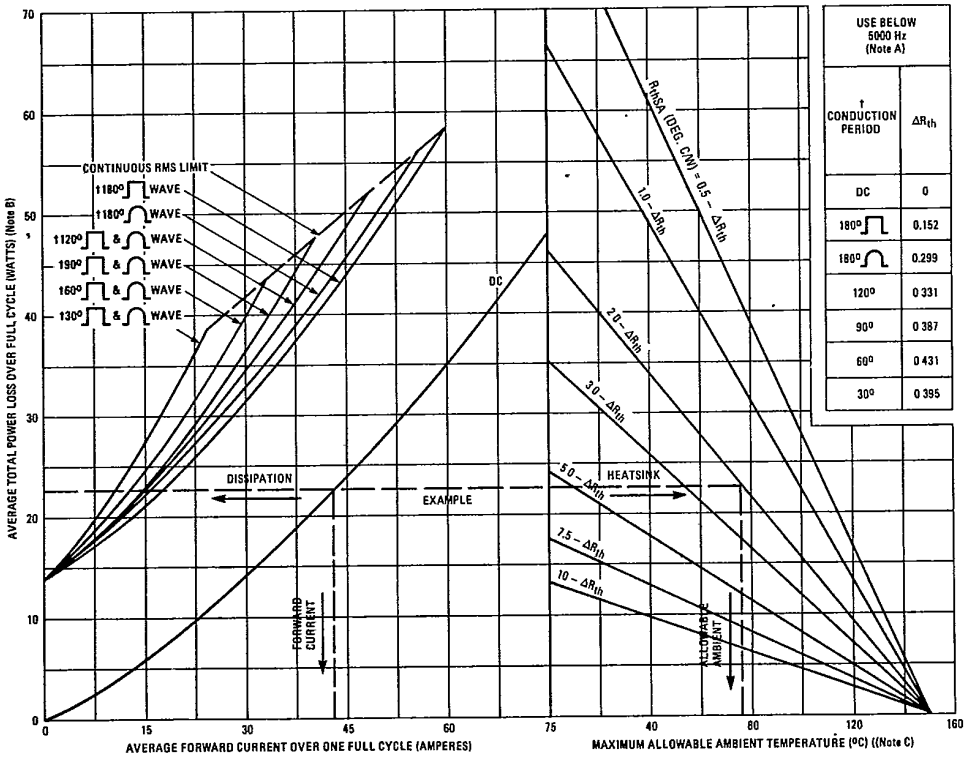


Fig. 8 – I_{RRM} Test Circuit



USE BELOW 5000 Hz (Note A)	
↑ CONDUCTION PERIOD	ΔR_{th}
DC	0
180°	0.152
180°	0.299
120°	0.331
90°	0.387
60°	0.431
30°	0.395

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} = 0.25 deg. C/W.