

4855452 INTERNATIONAL RECTIFIER

55C 05111 0

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 @ 180° Half Sine Wave	60		A
	54		
I_{FSM} @ 50 Hz @ 60 Hz	765		A
	800		
I^2t @ 50 Hz @ 60 Hz	2900		A^2s
	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

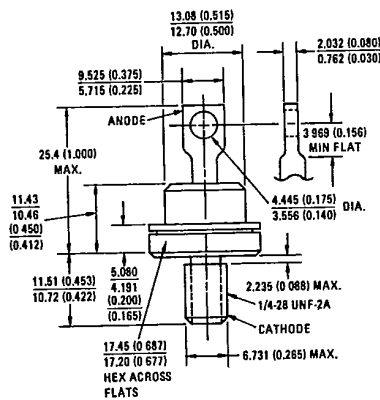
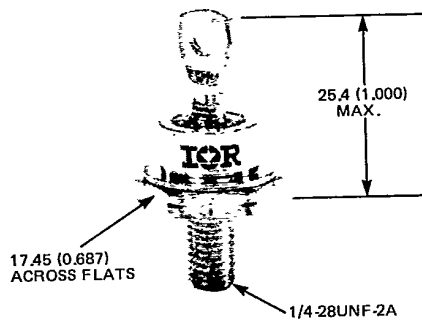
The 51HQ and 52HQ Schottky rectifier series feature guard ring construction to protect against reverse energy transients. These rugged devices offer a 20% safety margin for a pulse over the working peak reverse voltage rating, to protect against voltage transients.

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.

C

CASE STYLE AND DIMENSIONS



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

4855452 INTERNATIONAL RECTIFIER

55C 05112 D

51HQ, SD51 & 52HQ Series

INTERNATIONAL RECTIFIER 

T-03-21

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
51HQ045, SD51	52HQ030	30	36	30
	52HQ035	35 ④	42 ④	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 51HQ 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 $T_J = 150^\circ C$
	950	950	A	60 Hz V_{RWM} following surge = 0, initial $T_J = 150^\circ C$
I^2t Max. I^2t capability for fusing	2900	2900	A^2s	$t = 10$ ms Rated V_{RWM} applied following surge, initial $T_J = 150^\circ C$
	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 $T_J = 150^\circ C$
	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 $T_J = 150^\circ C$. V_{RWM} following surge = 0
V_{FM} Max. peak forward voltage	0.58	0.58	V	$T_J = 25^\circ C$, $I_{FM} = 35A$
	0.66	0.66		$T_J = 25^\circ C$, $I_{FM} = 60A$
	0.86	0.86		$T_J = 25^\circ C$ Rated $I_F(AV)$ (120A peak)
	0.75	0.75		$T_J = 150^\circ C$ 180° conduction, rectangular waveform
I_{RM} Max. peak reverse current	50	75	mA	$T_J = 25^\circ C$ $V_{RWM} = \text{rated value}$
	200	230		$T_J = 125^\circ C$
I_{RRM} Max. repetitive peak reverse current	2.0	2.0	A	$T_C = 25^\circ C$, $f = 1$ kHz, see fig. 8 for test circuit
C_t Max. capacitance	2900	2900	pF	$T_C = 25^\circ C$, $V_R = 5$ Vdc (Test signal in the range of 100 kHz to 1 MHz)
dv/dt Max. rate of reverse voltage application	1000	1000	V/ μs	$T_C = 25^\circ C$, $V_{RM} = \text{rated } V_{RWM}$

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)
	Max.	3.39 (30)	
wt Approximate weight	15.6 (0.55)	g (oz)	
Case Style	DO-203AB (DO-5)		JEDEC

① $T_C = -65^\circ C$ to $141^\circ C$, 180° conduction.

② $T_C = 0^\circ C$ to $141^\circ C$, 180° conduction.

③ $T_C = -65^\circ C$ to $121^\circ C$.

④ For 51HQ and SD51 rated V_{RWM} and $V_{RRM} = 45V$ @ $T_J = 25^\circ C$

⑤ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x} = 35V$ @ $T_J = 150^\circ C$

4855452 INTERNATIONAL RECTIFIER

55C 05113 D

IR INTERNATIONAL RECTIFIER

51HQ, SD51 & 52HQ Series

51HQ, SD51, 52HQ Series

T-03-21

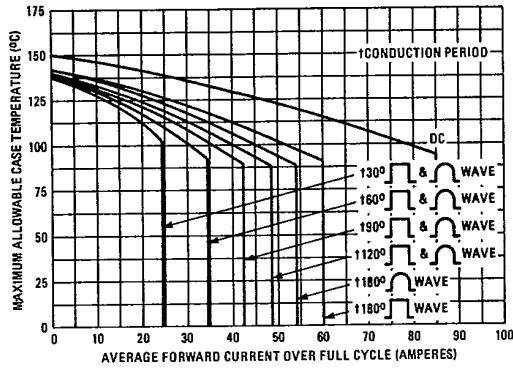


Fig. 1 - Average Forward Current Vs. Case Temperature

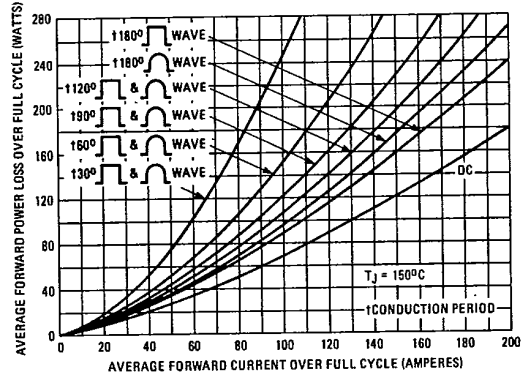


Fig. 2 - Maximum Average Forward Power Loss Vs. Average Forward Current

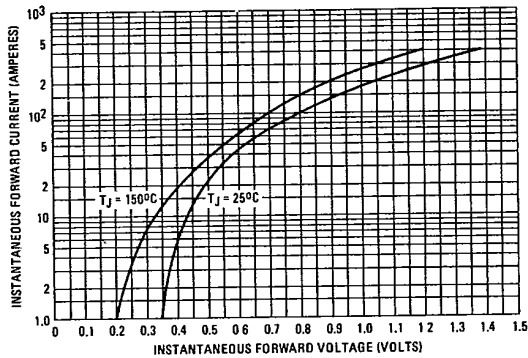


Fig. 3 - Maximum Forward Voltage Vs. Forward Current

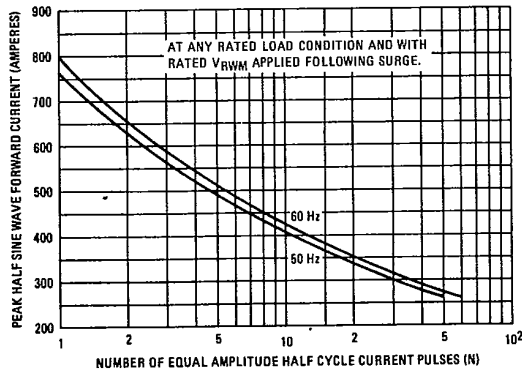


Fig. 4 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles

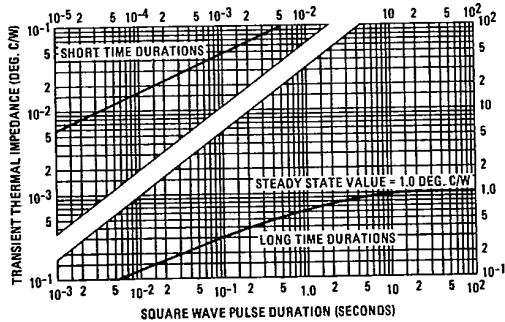


Fig. 5 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Pulse Duration

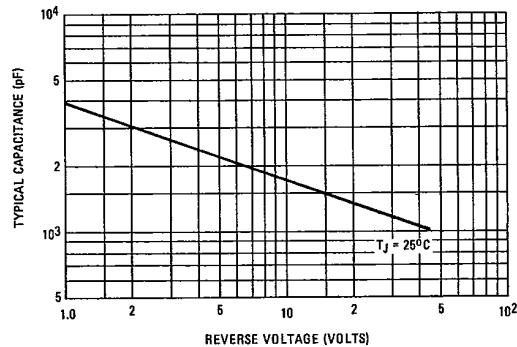


Fig. 6 - Typical Capacitance Vs. Reverse Voltage



4855452 INTERNATIONAL RECTIFIER

55C 05114 D

51HQ, SD51 & 52HQ Series

INTERNATIONAL RECTIFIER **IR**

51HQ, SD51, 52HQ Series

T-03-21

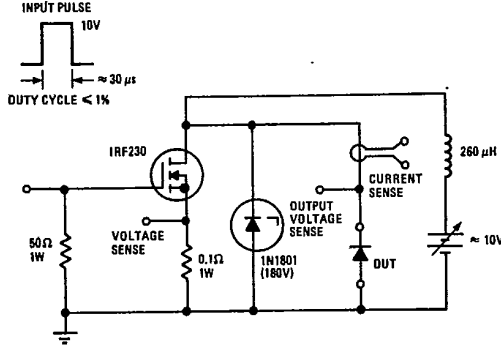
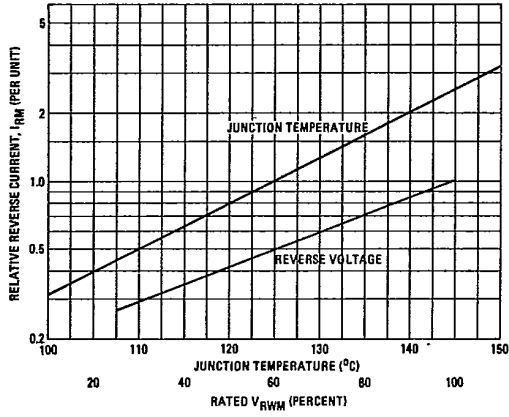


Fig. 8 - IRRM Test Circuit

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

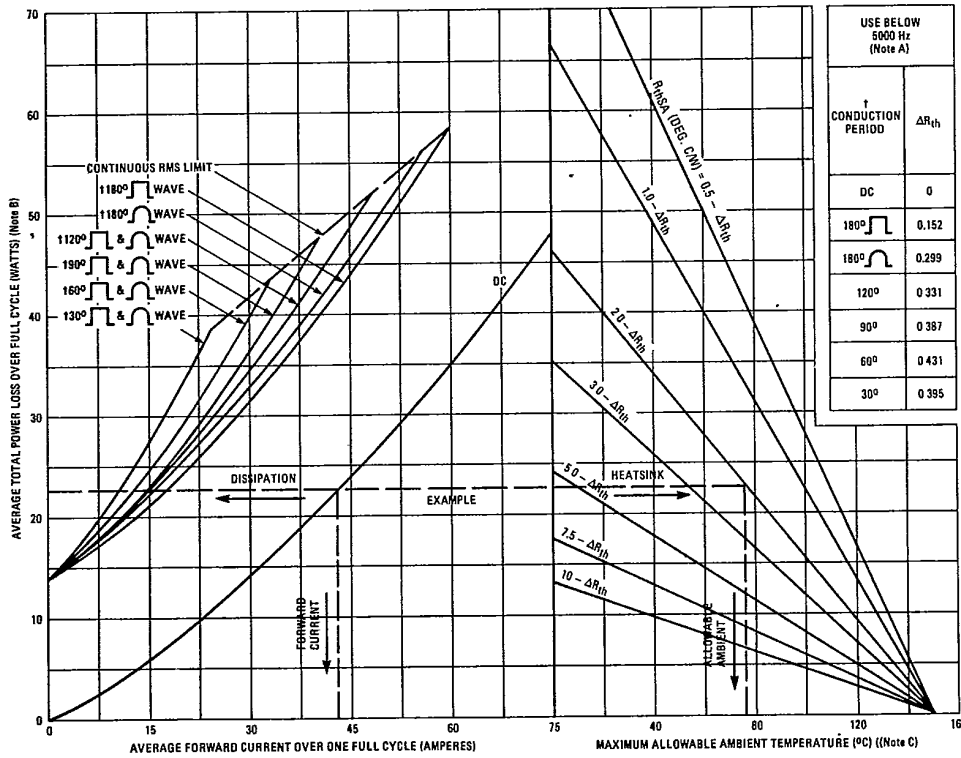


Fig. 9 - Thermal Nomogram

- 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 $T_j = 150^\circ\text{C}$. 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 $R_{thCS} = 0.25 \text{ deg. C/W}$.