4855452 INTERNATIONAL RECTIFIER 55C 05051 D

Data Sheet No. PD-2.060A

T-03-17

INTERNATIONAL RECTIFIER IOR

50SQ SERIES

5 Amp Schottky Power Rectifiers

Major Ratings and Characteristics

Characteristic		50SQ	Units
$I_{F(AV)}$			
@ 180° Rectangular		5	A
@ 180° Half Sine Wave		4.5	A
I_{FSM}	50 Hz	215	A
	60 Hz	225	
I^2t	@ 50 Hz	230	A^2s
	@ 60 Hz	210	
$I^2\sqrt{t}$		3250	$A^2\sqrt{s}$
C_t @ -5V		1000	pF
T_J		-65 to 150	°C
V_{RWM}		30 to 100	V

Description/Features

The 50SQ, 100V Schottky family employs 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, it is a rugged device with a guaranteed repetitive peak reverse voltage capability and excellent ability to withstand reverse energy transients. It can be used in both existing and new designs.

- V_{RWM} 30 to 100 Volts
- Ultra fast switching
- Extremely low V_F
- Economical axial lead package
- T_J = 150°C (rep.), T_J = 175°C (non-rep.) (T_J is limited to 150°C because of plastic case)
- Extremely low reverse leakage: 13 mA at 125°C
- No voltage derating on V_{RWM} over temperature range
- Provides extremely high power supply reliability
- No thermal runaway at rated temperature and operating parameters
- A guaranteed repetitive peak reverse voltage capability for short pulses which is 20% above V_{RWM}
- Ability to withstand reverse energy transients

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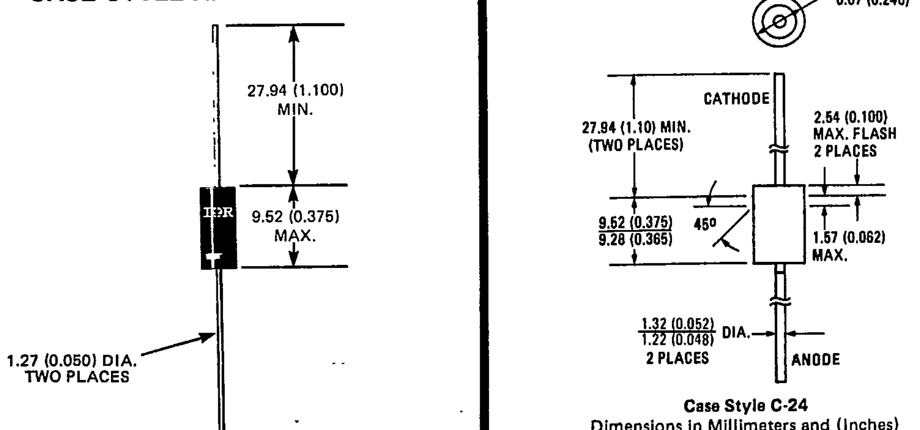
CASE STYLE AND DIMENSIONS



Case Style C-24
Dimensions in Millimeters and (Inches)

50SQ 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
50SQ030	30	36	30
50SQ035	35	42	35
50SQ040	40	48	40
50SQ045	45	54	45
50SQ060	60	72	60
50SQ080	80	96	80
50SQ090	90	108	90
50SQ100	100	120	100

ELECTRICAL SPECIFICATIONS

		50SQ	Units	Conditions	
$I_{F(AV)}$	Maximum average forward current	5	A	180° conduction @ T_L = –65 to 92°C rectangular waveform	④ ⑤
		4.5		180° conduction @ T_L = –65 to 96°C sinusoidal waveform	④ ⑤
I_{FSM}	Maximum peak one cycle, non-repetitive surge current	215	A	Half cycle 50 Hz sine wave or 6 ms rectangular pulse	Following any rated load condition and with rated V_{RWM} reapplied.
		225		Half cycle 60 Hz sine wave or 5 ms rectangular pulse	
		255		Half cycle 50 Hz sine wave or 6 ms rectangular pulse	Following any rated load condition and with V_{RWM} = 0 following surge.
		270		Half cycle 60 Hz sine wave or 5 ms rectangular pulse	
I^2t	Maximum I^2t (for fusing)	230	A^2s	t = 10 ms	With rated V_{RWM} following surge, Initial $T_J \leq 150°C$.
		210		t = 8.3 ms	
	Maximum I^2t for individual device fusing	325		t = 10 ms	With V_{RWM} = 0 following surge, initial $T_J \leq 150°C$.
		300		t = 8.3 ms	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for individual device fusing ⑥	3250	$A^2\sqrt{s}$	t = 0.1 to 10 ms, initial $T_J \leq 150°C$, V_{RWM} = 0 following surge.	
V_{FM}	Maximum peak forward voltage	0.79	V	T_J = 25°C, Rated $I_{F(AV)}$ (10A peak)	180° conduction, rectangular waveform
		0.65		T_J = 150°C, Rated $I_{F(AV)}$ (10A peak)	
		0.67		T_J = 25°C, 1/2 Rated $I_{F(AV)}$ (5A peak)	
I_{RM}	Maximum peak reverse current	5	mA	50SQ030 through 50SQ045	T_J = 25°C, rated V_{RWM}
		1		50SQ060 through 50SQ100	
		13		50SQ030 through 50SQ045	T_J = 125°C, rated V_{RWM}
		7		50SQ060 through 50SQ100	
I_{RRM}	Maximum repetitive peak reverse current	0.5 ⑦	A	T_C = 25°C, f = 1 kHz, see fig. 9 for test circuit	
C_t	Maximum capacitance	1000	pF	50SQ030 through 50SQ045	T_C = 25°C, V_R = 5 Vdc (Test signal in the range of 100 kHz to 1 MHz)
		600		50SQ060 through 50SQ100	
dv/dt	Maximum rate of reverse voltage application	1000	V/µs	T_C = 25°C, V_{RM} = rated V_{RWM}	

THERMAL-MECHANICAL SPECIFICATIONS

T_J	Maximum operating junction temperature range	–65 to 150	°C	
T_{stg}	Maximum storage temperature range	–65 to 150	°C	
R_{thL}	Maximum thermal resistance, dc operation, junction-to-leads, double side cooling (composite values) Lead Length = 3.2mm (1/8 in.)	11.0	deg C/W	
	= 9.5mm (3/8 in.)	14.7		
	= 19.0mm (3/4 in.)	20.0		
wt	Approximate weight	1.5 (0.053)	g (oz.)	
	Case Style	C-24		

① T_L = -65 to 141°C, 180° conduction. ② T_L = 0 to 141°C, 180° conduction.

③ T_L = -65 to 126°C for lead length (ℓ) = 1/8" (3.2 mm) ⑤
T_L = -65 to 118°C for lead length (ℓ) = 3/8" (9.5 mm) ⑤
T_L = -65 to 106°C for lead length (ℓ) = 3/4" (19.0 mm) ⑤

④ ℓ = 9.5 mm (3/8 in.)

⑤ Length of leads to temperature measurement points (heat sinks).

⑥ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

⑦ I_{RRM} = 1.0A for devices rated 45V or less.

INTERNATIONAL RECTIFIER

50SQ Series

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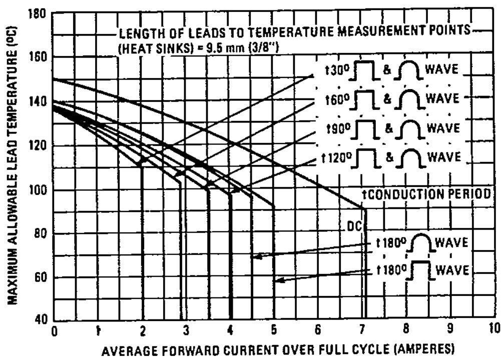

Fig. 1 – Maximum Allowable Lead Temperature Vs. Average Forward Current

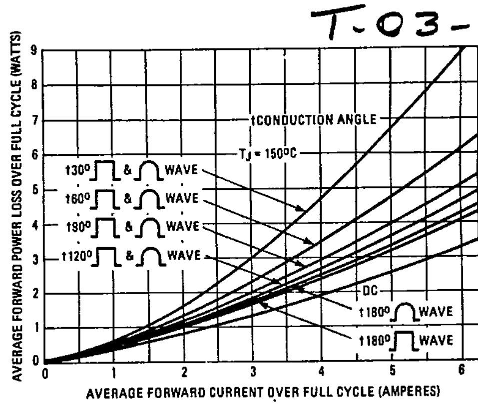

Fig. 2 – Maximum Forward Power Loss Vs. Average Forward Current

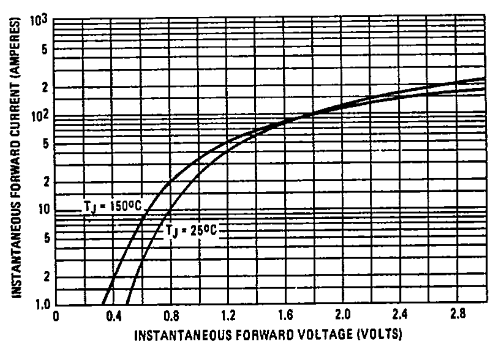

Fig. 3 – Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current

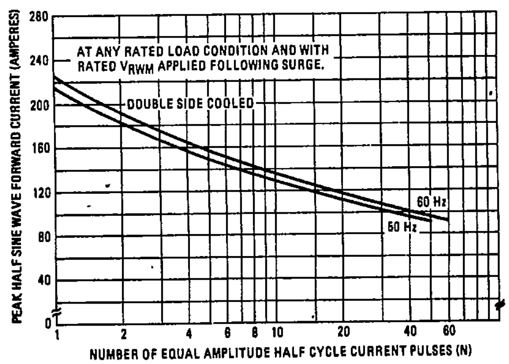

Fig. 4 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

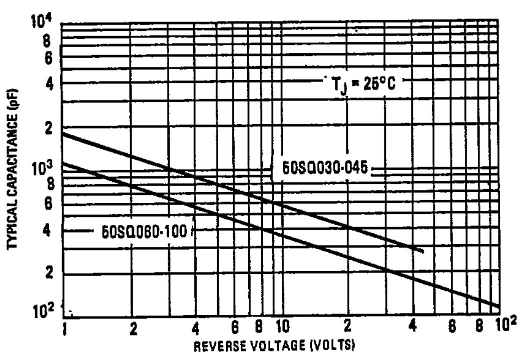

Fig. 5 – Typical Capacitance Vs. Reverse Voltage

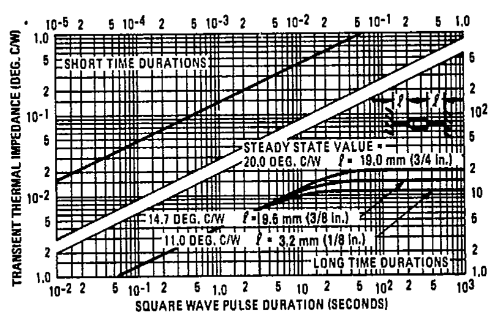

Fig. 6 – Maximum Transient Thermal Impedance, Junction-to-Lead Vs. Square Wave Duration

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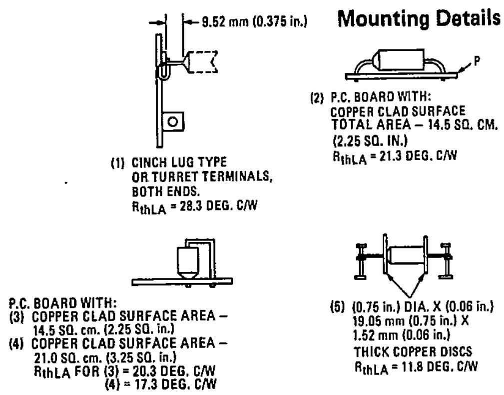
Mounting Details



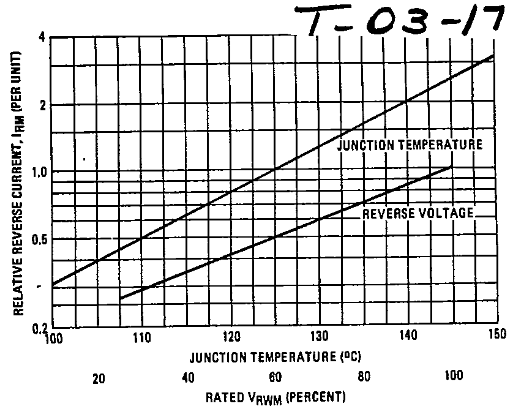
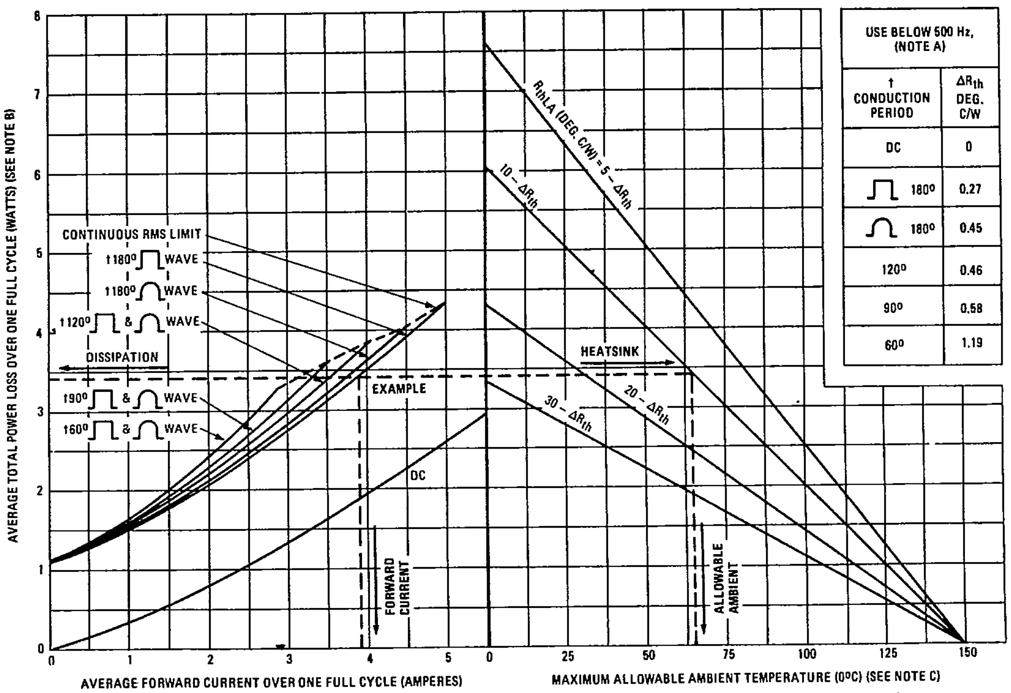


Fig. 7 – Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage



USE BELOW 500 Hz, (NOTE A)

t CONDUCTION PERIOD	ΔR_{th} DEG. C/W
DC	0
⎍ 180°	0.27
⌒ 180°	0.45
120°	0.46
90°	0.58
60°	1.19

Fig. 8 – Thermal Nomogram

Notes: A. Maximum allowable heatsink thermal resistance, R_{thLA}, 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 half wave (180°) rectangular reverse voltage, full rated V_{RWM}, 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 heatsinks attached to the leads at a maximum of 3/8 of an inch (9.5 mm) from the ends of the body of the rectifier.

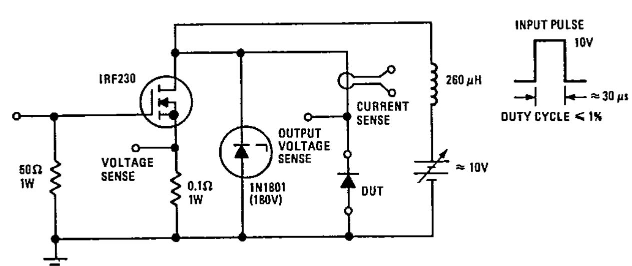


Fig. 9 – I_{RRM} Test Circuit