Key Parameters

V_{RRM} = 3200 V
I_{FAVM} = 2110 A
I_{FSM} = 26.0 kA
V_{F0} = 0.89 V
r_F = 0.17 mΩ

Avalanche Rectifier Diode
5SDA 21F3204

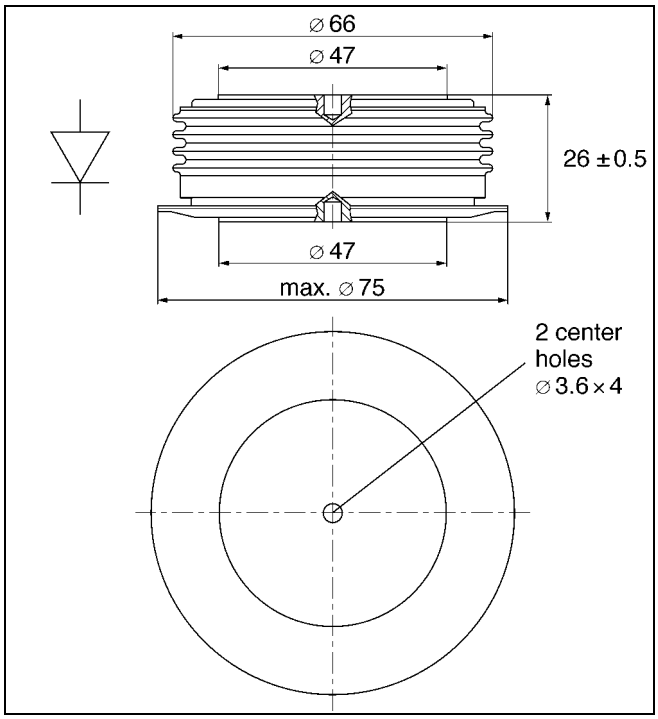
Doc. No. 5SYA 1130 - 01 Apr-98

Features

- **Optimized for line frequency rectifiers**
- **Low on-state voltage, narrow V_F-bands for parallel operation**
- **Self protected against transient overvoltages**
- **Guaranteed maximum avalanche power dissipation**
- **Industry standard housing**

Blocking

Part number	5SDA 21F3204	5SDA 21F2904	5SDA 21F2604	Condition
V_{RRM}	3200	2900	2600	f = 50 Hz t_P = 10 ms
V_{RSM}	3520	3140	2860	t_P = 10 ms T_j = 160°C
I_{RRM}	≤ 50 mA			V_{RRM} T_j = 160°C
P_{RSM}	≤ 100 kW			t_P = 20 µs T_j = 45°C
	≤ 75 kW			t_P = 20 µs T_j = 160°C



Mechanical data

F_M	Mounting force	min.	20	kN
		max.	24	kN
a	Acceleration Device unclamped Device clamped		 50 200	 m/s^2 m/s^2
m	Weight		0.5	kg
D_S	Surface creepage distance		30	mm
D_a	Air strike distance		20	mm

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On-state

I_{FAVM}	Max. average on-state current	2110 A	Half sine wave, T_C = 85°C			
I_{FRMS}	Max. RMS on-state current	3310 A				
I_{FSM}	Max. peak non-repetitive surge current	26.0 kA	tp = 10 ms		T_j = 160°C	
		28.0 kA	tp = 8.3 ms		After surge:	
I^2t	Limiting load integral	$4205 \cdot 10^3$ A^2s	tp = 10 ms		$V_D = V_R$ = 0V	
		$3270 \cdot 10^3$ A^2s	tp = 8.3 ms			
V_{F0}	Threshold voltage	0.89 V	I_F = 2000 - 6000 A		T_j = 160°C	
r_F	Slope resistance	0.17 mΩ				
$V_{F\,min}$	On-state voltage	1.35 V	I_F = 4000 A		T_j = 25°C	
$V_{F\,max}$	On-state voltage	1.50 V				

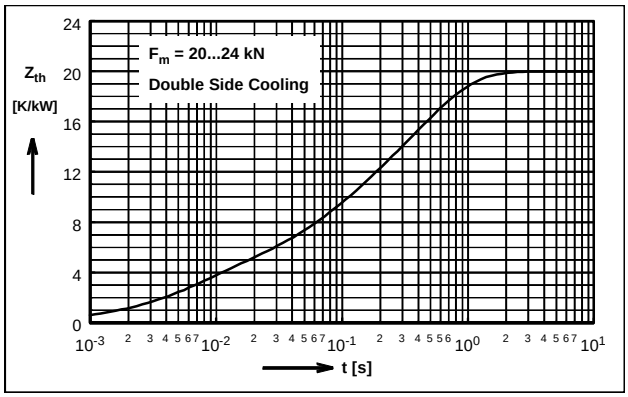
Thermal

T_j	Storage and operating junction temperature range	-40...160°C	
R_{thJC}	Thermal resistance junction to case	40 K/kW	Anode side cooled
		40 K/kW	Cathode side cooled
		20 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	10 K/kW	Single side cooled
		5 K/kW	Double side cooled

Analytical function for transient thermal impedance:

$$Z_{thJC}(t) = \sum_{i=1}^{4} R_i(1 - e^{-t/t_i})$$

i	1	2	3	4
$R_{(K/kW)}$	11.83	4.26	1.63	2.28
τ_i (s)	0.432	0.071	0.01	0.0054



For a given case temperature T_c at ambient temperature T_a the maximum on-state current can be calculated as follows:

$$I_{FAVM} = \frac{-V_{F0} + \sqrt{(V_{F0})^2 + 4 * f^2 * r_f * P}}{2 * f^2 * r_f}$$

I_{FAVM} (A) P (W) V_{F0} (V) r_F (Ω)
T_{max} (°C) T_c (°C) T_a (°C)
R_{thja} (K/kW) R_{thJC} (K/kW)

where $P = \frac{T_{J\,max} - T_C}{R_{thjc}}$ or $P = \frac{T_{J\,max} - T_A}{R_{thja}}$

f^2 =	1	for DC current
	2.5	for half-sine wave
	3.1	for 120°el., sine
	6	for 60° el., sine

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