

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

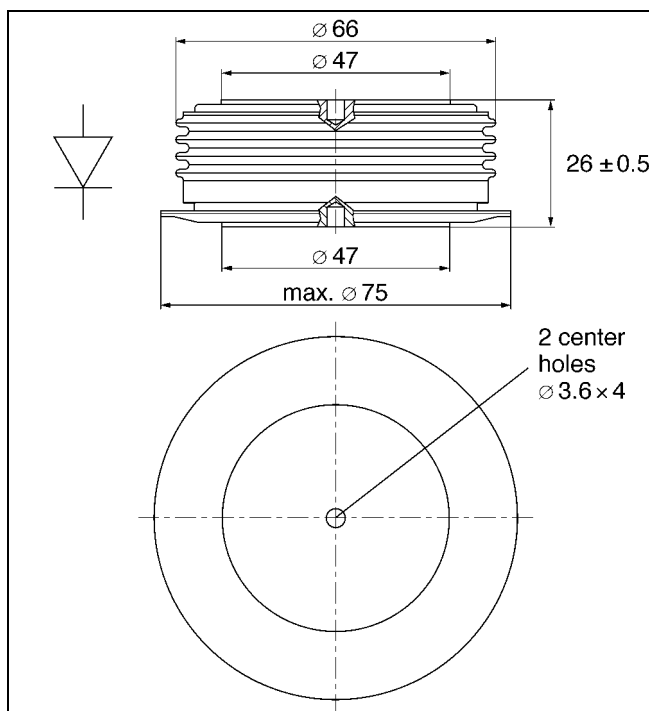
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow V_F -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

Blocking

Part number	5SDA 21F3204	5SDA 21F2904	5SDA 21F2604	Condition
V_{RRM}	3200	2900	2600	$f = 50 \text{ Hz}$ $t_p = 10 \text{ ms}$
V_{RSM}	3520	3140	2860	$t_p = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
I_{RRM}	$\leq 50 \text{ mA}$			V_{RRM} $T_j = 160^\circ\text{C}$
P_{RSM}	$\leq 100 \text{ kW}$			$t_p = 20 \mu\text{s}$ $T_j = 45^\circ\text{C}$
	$\leq 75 \text{ kW}$			$t_p = 20 \mu\text{s}$ $T_j = 160^\circ\text{C}$

Mechanical data

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



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 ² t	Limiting load integral	4205·10 ³ A ² s	tp	=	10 ms	V _D = V _R = 0V
		3270·10 ³ A ² s	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				

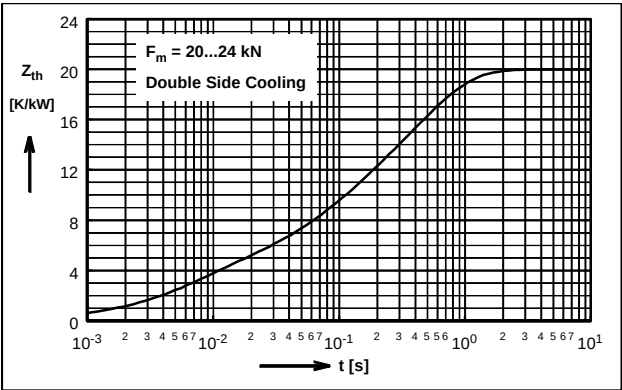
Thermal

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:

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

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:

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

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

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

