Key Parameters

V_{RRM} = 2000 V
I_{FAVM} = 2700 A
I_{FSM} = 31.0 kA
V_{F0} = 0.79 V
r_F = 0.09 mΩ

Avalanche Rectifier Diode
5SDA 27F2002

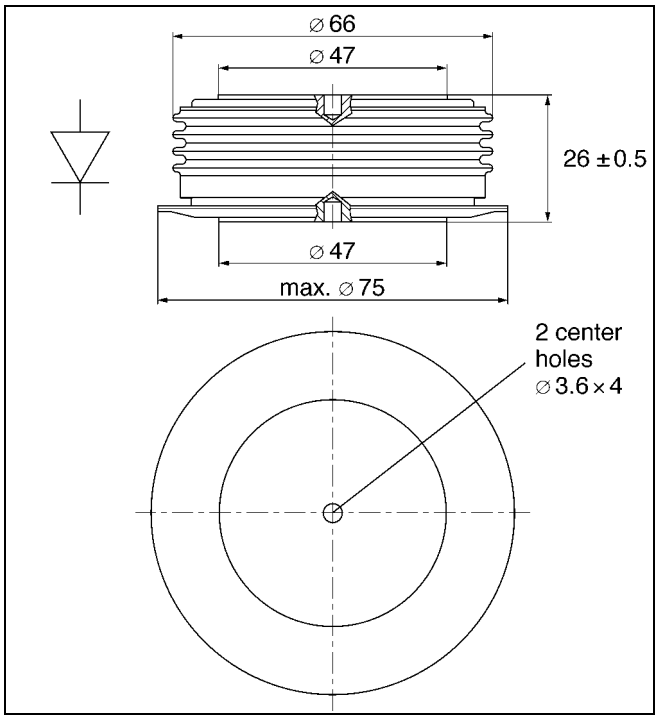
Doc. No. 5SYA 1127 - 01 Apr-98

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 27F2002	5SDA 27F1702	5SDA 27F1402	Condition
V_{RRM}	2000	1700	1400	f = 50 Hz t_P = 10 ms
V_{RSM}	2200	1870	1540	t_P = 10 ms T_j = 160°C
I_{RRM}	≤ 50 mA			V_{RRM} T_j = 160°C
P_{RSM}	≤ 140 kW			t_P = 20 µs T_j = 45°C
	≤ 100 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

On-state

I_{FAVM}	Max. average on-state current	2700 A	Half sine wave, T_C = 85°C			
I_{FRMS}	Max. RMS on-state current	4240 A				
I_{FSM}	Max. peak non-repetitive surge current	31.0 kA	tp = 10 ms		T_j = 160°C	
		33.5 kA	tp = 8.3 ms		After surge:	
I^2t	Limiting load integral	$4805 \cdot 10^3$ A^2s	tp = 10 ms		$V_R \approx 0V$	
		$4680 \cdot 10^3$ A^2s	tp = 8.3 ms			
V_{F0}	Threshold voltage	0.79 V	I_F = 2000 - 6000 A		T_j = 160°C	
r_F	Slope resistance	0.09 mΩ				
$V_{F\,min}$	On-state voltage	1.05 V	I_F = 4000 A		T_j = 25°C	
$V_{F\,max}$	On-state voltage	1.20 V				

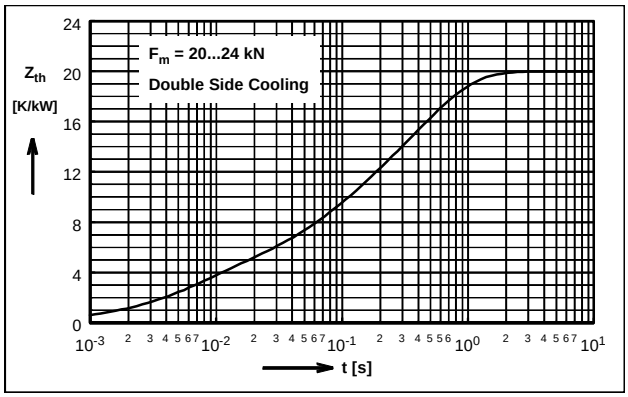
Thermal

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:

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

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

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

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