

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

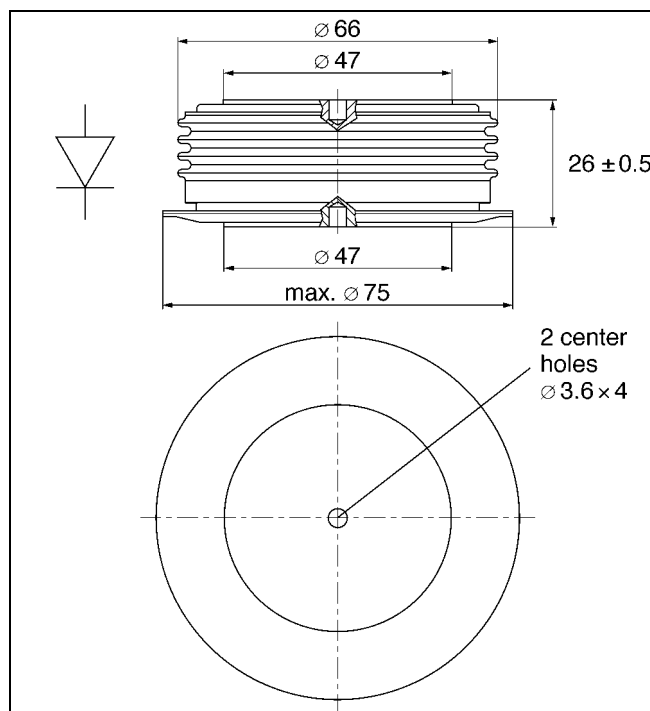
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow V_F -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

Blocking

Part number	5SDA 27F2002	5SDA 27F1702	5SDA 27F1402	Condition
V_{RRM}	2000	1700	1400	$f = 50 \text{ Hz}$ $t_P = 10 \text{ ms}$
V_{RSM}	2200	1870	1540	$t_P = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
I_{RRM}	$\leq 50 \text{ mA}$			V_{RRM} $T_j = 160^\circ\text{C}$
P_{RSM}	$\leq 140 \text{ kW}$			$t_P = 20 \mu\text{s}$ $T_j = 45^\circ\text{C}$
	$\leq 100 \text{ kW}$			$t_P = 20 \mu\text{s}$ $T_j = 160^\circ\text{C}$

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	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 ² t	Limiting load integral	4805·10 ³ A ² s	tp	=	10 ms	V _R ≈ 0V
		4680·10 ³ A ² s	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				

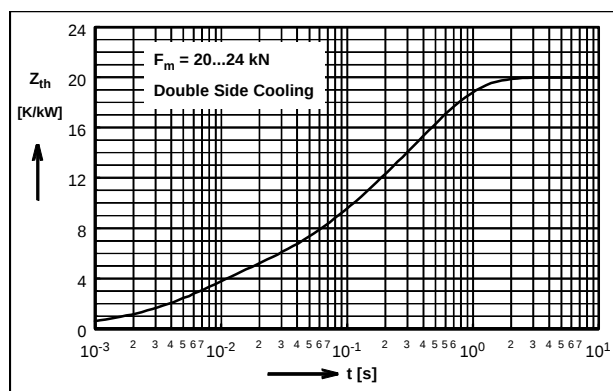
Thermal

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:

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

i	1	2	3	4
$R \text{ (K/kW)}$	11.83	4.26	1.63	2.28
$\tau_i \text{ (s)}$	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:

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

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

$I_{FAVM} \text{ (A)}$	$P \text{ (W)}$	$V_{F0} \text{ (V)}$	$r_f \text{ (}\Omega\text{)}$
$T_{\max} \text{ (}^\circ\text{C)}$	$T_c \text{ (}^\circ\text{C)}$	$T_a \text{ (}^\circ\text{C)}$	
$R_{thja} \text{ (K/kW)}$	$R_{thJC} \text{ (K/kW)}$		
$f^2 =$	1	for DC current	
	2.5	for half-sine wave	
	3.1	for 120° el., sine	
	6	for 60° el., sine	