

Key Parameters

V_{RRM}	=	2600 V
I_{FAVM}	=	1020 A
I_{FSM}	=	11.5 kA
V_{F0}	=	0.87 V
r_F	=	0.39 mΩ

Avalanche Rectifier Diode

5SDA 09D2604

Doc. No. 5SYA 1121 - 01 Apr-98

Features

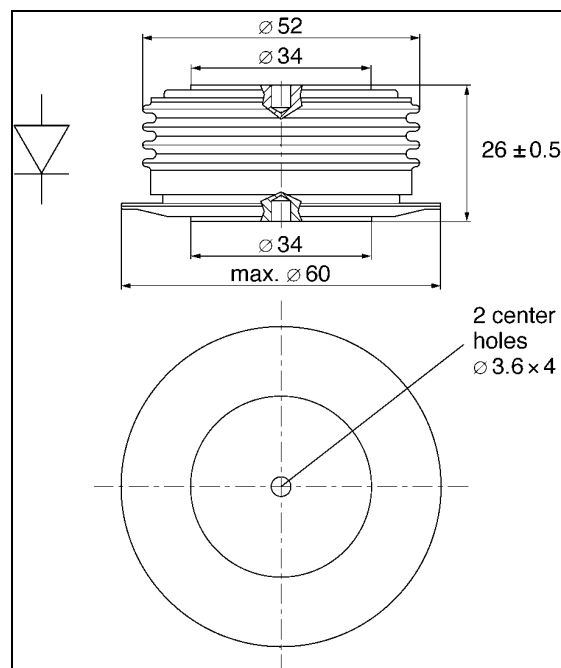
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow V_F -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

Blocking

Part number	5SDA 09D2604	5SDA 09D2304	5SDA 09D2004	Condition
V_{RRM}	2600	2300	2000	$f = 50 \text{ Hz}$ $t_p = 10 \text{ ms}$
V_{RSM}	2860	2530	2200	$t_p = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
I_{RRM}	$\leq 50 \text{ mA}$			V_{RRM} $T_j = 160^\circ\text{C}$
P_{RSM}	$\leq 70 \text{ kW}$			$t_p = 20 \mu\text{s}$ $T_j = 45^\circ\text{C}$
	$\leq 50 \text{ kW}$			$t_p = 20 \mu\text{s}$ $T_j = 160^\circ\text{C}$

Mechanical data

F_M	Mounting force	min.	10 kN
		max.	12 kN
a	Acceleration		
	Device unclamped		50 m/s ²
	Device clamped		200 m/s ²
m	Weight		0.25 kg
D_s	Surface creepage distance		30 mm
D_a	Air strike distance		20.5 mm



On-state

I_{FAVM}	Max. average on-state current	1020 A	Half sine wave, $T_c = 85^\circ\text{C}$	
I_{FRMS}	Max. RMS on-state current	1600 A		
I_{FSM}	Max. peak non-repetitive surge current	11.5 kA	$t_p = 10 \text{ ms}$	$T_j = 160^\circ\text{C}$ After surge: $V_D = V_R = 0\text{V}$
		12.5 kA	$t_p = 8.3 \text{ ms}$	
I^2t	Limiting load integral	$660 \cdot 10^3 \text{ A}^2\text{s}$	$t_p = 10 \text{ ms}$	
		$650 \cdot 10^3 \text{ A}^2\text{s}$	$t_p = 8.3 \text{ ms}$	
V_{F0}	Threshold voltage	0.87 V	$I_F = 1000 - 3000 \text{ A}$	$T_j = 160^\circ\text{C}$
r_F	Slope resistance	0.39 mΩ		
V_{Fmin}	On-state voltage	1.35 V	$I_F = 1800 \text{ A}$	$T_j = 25^\circ\text{C}$
V_{Fmax}	On-state voltage	1.50 V		

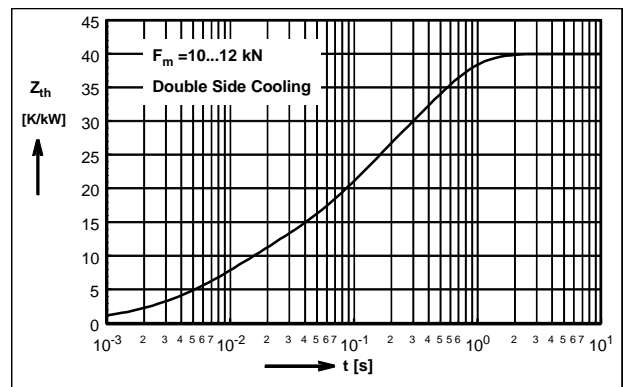
Thermal

T_j	Storage and operating junction temperature range	-40...160°C	
R_{thJC}	Thermal resistance junction to case	80 K/kW	Anode side cooled
		80 K/kW	Cathode side cooled
		40 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	16 K/kW	Single side cooled
		8 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_i (K/kW)	20.95	10.57	7.15	1.33
τ_i (s)	0.396	0.072	0.009	0.0044



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 $P = \frac{T_{Jmax} - T_c}{R_{thjc}}$ 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		

