Key Parameters

V_{RRM}	=	2300	V
I_{FAVM}	=	1140	A
I_{FSM}	=	13.5	kA
V_{F0}	=	0.83	V
r_F	=	0.30	mΩ

Avalanche Rectifier Diode
5SDA 10D2303

Doc. No. 5SYA 1120 - 01 Apr-98

Features

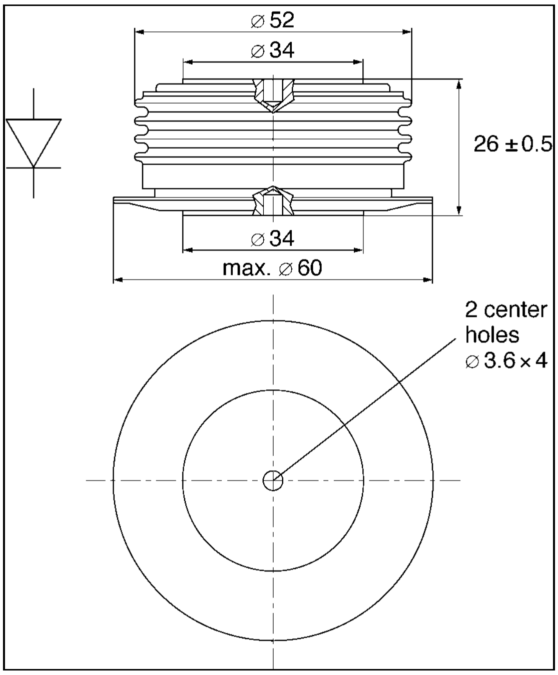
- **Optimized for line frequency rectifiers**
- **Low on-state voltage, narrow V_F-bands for parallel operation**
- **Self protected against transient overvoltages**
- **Guaranteed maximum avalanche power dissipation**
- **Industry standard housing**

Blocking

Part number	5SDA 10D2303	5SDA 10D2003	5SDA 10D1703	Condition
V_{RRM}	2300	2000	1700	f = 50 Hz, t_P = 10 ms
V_{RSM}	2530	2200	1870	t_P = 10 ms, T_j = 160°C
I_{RRM}	≤ 50 mA			V_{RRM}, T_j = 160°C
P_{RSM}	≤ 70 kW			t_P = 20 µs, T_j = 45°C
	≤ 50 kW			t_P = 20 µs, T_j = 160°C

Mechanical data

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



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On-state

I_{FAVM}	Max. average on-state current	1140 A	Half sine wave, T_C = 85°C	
I_{FRMS}	Max. RMS on-state current	1790 A		
I_{FSM}	Max. peak non-repetitive surge current	13.5 kA	tp = 10 ms	T_j = 160°C After surge: $V_R \approx$ 0V
		14.5 kA	tp = 8.3 ms	
I^2t	Limiting load integral	$910{\cdot}10^3$ A^2s	tp = 10 ms	
		$875{\cdot}10^3$ A^2s	tp = 8.3 ms	
V_{F0}	Threshold voltage	0.83 V	I_F = 1000 - 3000 A	T_j = 160°C
r_F	Slope resistance	0.30 mΩ		
$V_{F\,min}$	On-state voltage	1.20 V	I_F = 1800 A	T_j = 25°C
$V_{F\,max}$	On-state voltage	1.35 V		

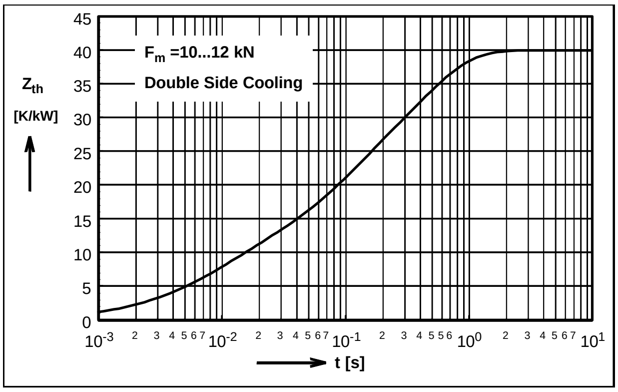
Thermal

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:

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

i	1	2	3	4
R (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 $P = \dfrac{T_{J\,max} - T_C}{R_{thjc}}$ or $P = \dfrac{T_{J\,max} - T_A}{R_{thja}}$

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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