Key Parameters

V_{RRM} = 1700 V
I_{FAVM} = 1310 A
I_{FSM} = 15.0 kA
V_{F0} = 0.74 V
r_F = 0.25 mΩ

Avalanche Rectifier Diode
5SDA 11D1702

Doc. No. 5SYA 1119 - 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 11D1702	5SDA 11D1402	5SDA 11D1102	Condition			
V_{RRM}	1700	1400	1100	f = 50 Hz		t_P = 10 ms	
V_{RSM}	1870	1540	1200	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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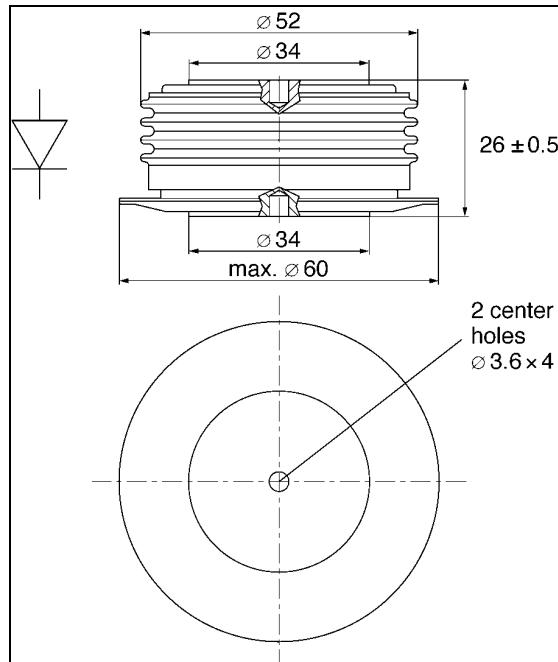
On-state

I_{FAVM}	Max. average on-state current	1310 A	Half sine wave, $T_C = 85°C$		
I_{FRMS}	Max. RMS on-state current	2060 A			
I_{FSM}	Max. peak non-repetitive	15 kA	tp = 10 ms	$T_j =$	160°C
	surge current	16 kA	tp = 8.3 ms	After surge:	
I^2t	Limiting load integral	$1130·10^3$ A^2s	tp = 10 ms	$V_R \approx 0V$	
		$1070·10^3$ A^2s	tp = 8.3 ms		
V_{F0}	Threshold voltage	0.74 V	I_F = 1000 - 3000 A	$T_j =$	160°C
r_F	Slope resistance	0.25 mΩ			
$V_{F\,min}$	On-state voltage	1.05 V	I_F = 1800 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	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:

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

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
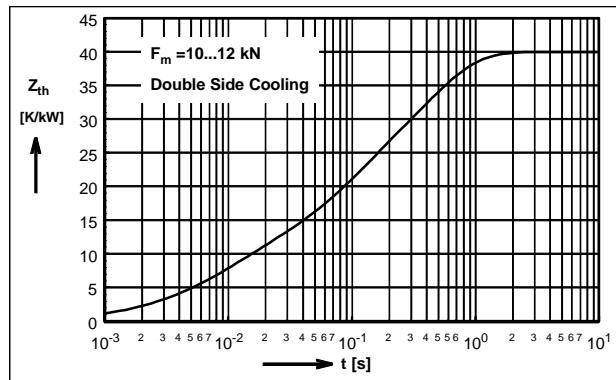
For a given case temperature T_c at ambient temperature T_a the maximum on-state current can be calculated as follows:

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

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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