

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

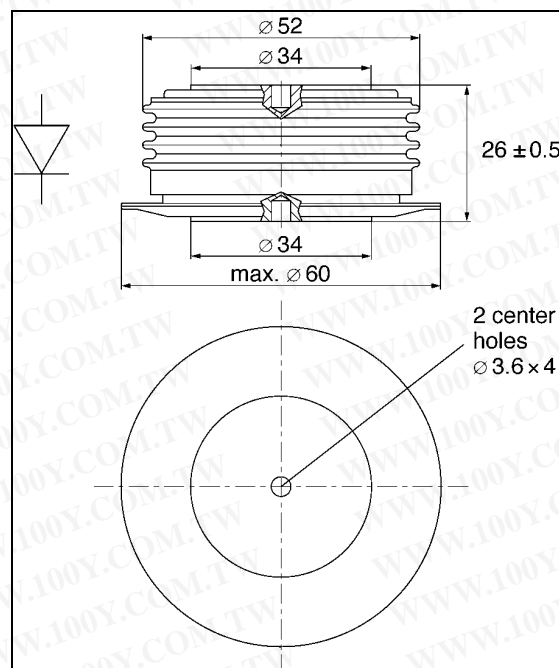
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow V_F -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

Blocking

Part number	5SDA 11D1702	5SDA 11D1402	5SDA 11D1102	Condition
V_{RRM}	1700	1400	1100	$f = 50 \text{ Hz}$ $t_p = 10 \text{ ms}$
V_{RSM}	1870	1540	1200	$t_p = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
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



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ABB

On-state

I_{FAVM}	Max. average on-state current	1310 A	Half sine wave, $T_c = 85^\circ\text{C}$	
I_{FRMS}	Max. RMS on-state current	2060 A		
I_{FSM}	Max. peak non-repetitive surge current	15 kA	$t_p =$	10 ms
		16 kA	$t_p =$	8.3 ms
I^2t	Limiting load integral	$1130 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	10 ms
		$1070 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	8.3 ms
V_{F0}	Threshold voltage	0.74 V	$I_F =$	1000 - 3000 A
r_F	Slope resistance	0.25 m Ω		
V_{Fmin}	On-state voltage	1.05 V	$I_F =$	1800 A
V_{Fmax}	On-state voltage	1.20 V		

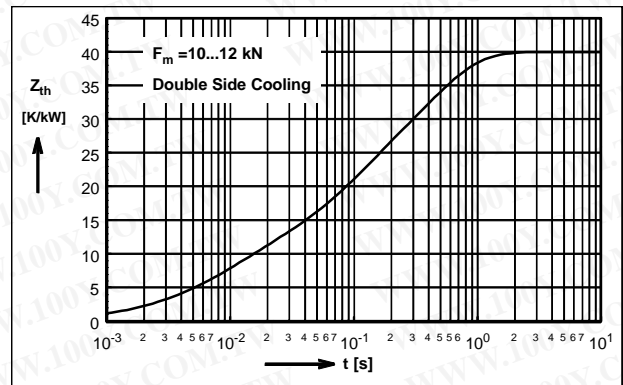
Thermal

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:

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

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:

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

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} ($^\circ\text{C}$) T_c ($^\circ\text{C}$) T_a ($^\circ\text{C}$)
 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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