Key Parameters

V_{RRM} = 5000 V
I_{FAVM} = 690 A
I_{FSM} = 7.0 kA
V_{F0} = 1.10 V
r_F = 1.01 mΩ

Avalanche Rectifier Diode

5SDA 06D5007

Doc. No. 5SYA 1125 - 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 06D5007	5SDA 06D4407	5SDA 06D3807	Condition
V_{RRM}	5000	4400	3800	f = 50 Hz t_P = 10 ms
V_{RSM}	5500	4840	4180	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

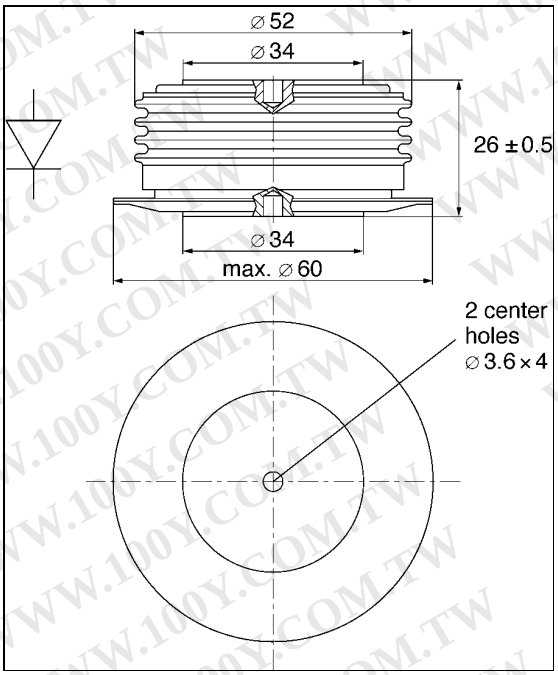


ABB Semiconductors AG

On-state

I_{FAVM}	Max. average on-state current	690 A	Half sine wave, T_C = 85°C	
I_{FRMS}	Max. RMS on-state current	1090 A		
I_{FSM}	Max. peak non-repetitive surge current	7.0 kA	tp = 10 ms	T_j = 160°C
		7.6 kA	tp = 8.3 ms	After surge:
I^2t	Limiting load integral	$245 \cdot 10^3$ A^2s	tp = 10 ms	$V_R \approx 0V$
		$240 \cdot 10^3$ A^2s	tp = 8.3 ms	
V_{F0}	Threshold voltage	1.10 V	I_F = 700 - 2000 A	T_j = 160°C
r_F	Slope resistance	1.01 mΩ		
$V_{F\,min}$	On-state voltage	2.00 V	I_F = 1800 A	T_j = 25°C
$V_{F\,max}$	On-state voltage	2.40 V		

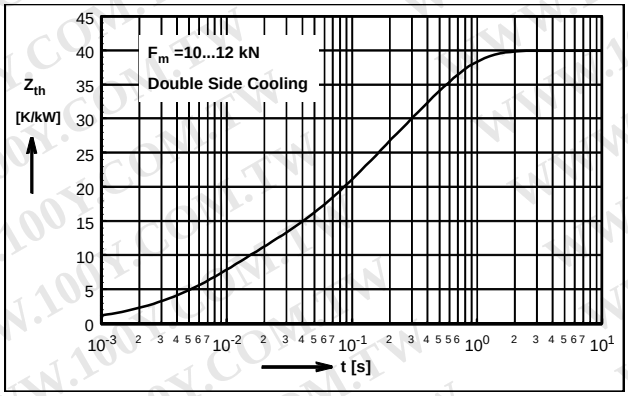
Thermal

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
$R_{(K/kW)}$	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 $P = \frac{T_{J\,max} - T_C}{R_{thjc}}$ or $P = \frac{T_{J\,max} - T_A}{R_{thja}}$

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