Key Parameters			
V_{RRM}	=	3800	V
I_{FAVM}	=	1620	A
I_{FSM}	=	20.5	kA
V_{F0}	=	1.03	V
r_F	=	0.32	mΩ

Avalanche Rectifier Diode
5SDA 16F3806

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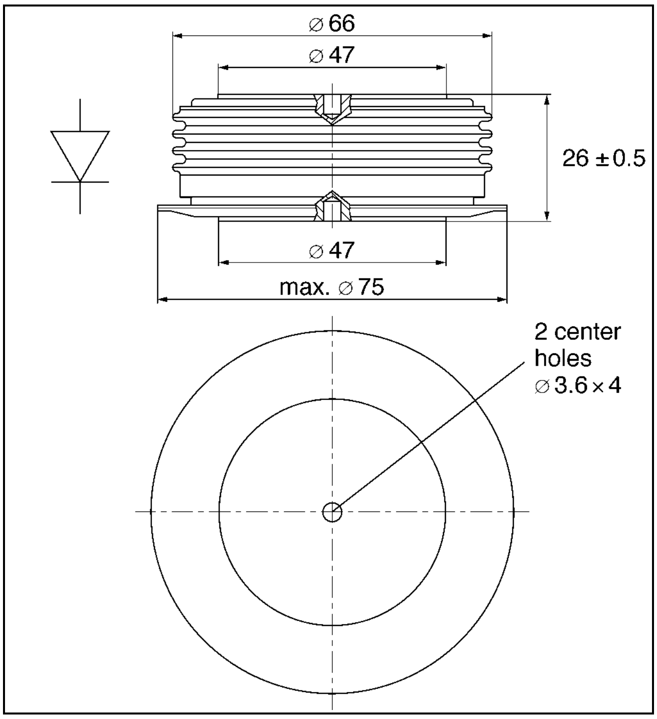
Features

- 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 16F3806	5SDA 16F3206	Condition
V_{RRM}	3800	3200	f = 50 Hz, t_P = 10 ms
V_{RSM}	4180	3520	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.	20	kN
		max.	24	kN
a	Acceleration Device unclamped Device clamped		 50 200	 m/s^2 m/s^2
m	Weight		0.5	kg
D_S	Surface creepage distance		30	mm
D_a	Air strike distance		20	mm

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On-state

I_{FAVM}	Max. average on-state current	1620 A	Half sine wave, T_C = 85°C	
I_{FRMS}	Max. RMS on-state current	2540 A		
I_{FSM}	Max. peak non-repetitive surge current	20.5 kA	tp = 10 ms	T_j = 160°C
		22.3 kA	tp = 8.3 ms	After surge:
I^2t	Limiting load integral	$2100 \cdot 10^3$ A^2s	tp = 10 ms	$V_D = V_R$ = 0V
		$2070 \cdot 10^3$ A^2s	tp = 8.3 ms	
V_{F0}	Threshold voltage	1.03 V	I_F = 1000 - 3000 A	T_j = 160°C
r_F	Slope resistance	0.32 mΩ		
$V_{F\,min}$	On-state voltage	1.70 V	I_F = 4000 A	T_j = 25°C
$V_{F\,max}$	On-state voltage	2.00 V		

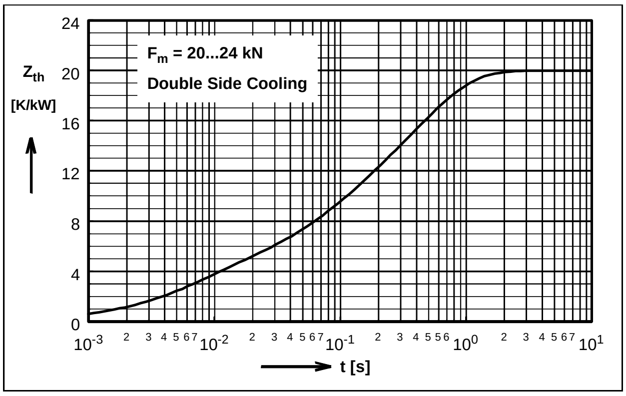
Thermal

T_j	Storage and operating junction temperature range	-40...160°C	
R_{thJC}	Thermal resistance junction to case	40 K/kW	Anode side cooled
		40 K/kW	Cathode side cooled
		20 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	10 K/kW	Single side cooled
		5 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)	11.83	4.26	1.63	2.28
τ_i (s)	0.432	0.071	0.01	0.0054



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

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

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)		

where $P = \frac{T_{J\,max} - T_C}{R_{thjc}}$ or $P = \frac{T_{J\,max} - T_A}{R_{thja}}$

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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