

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

Doc. No. 5SYA 1128 - 01 Apr-98

Features

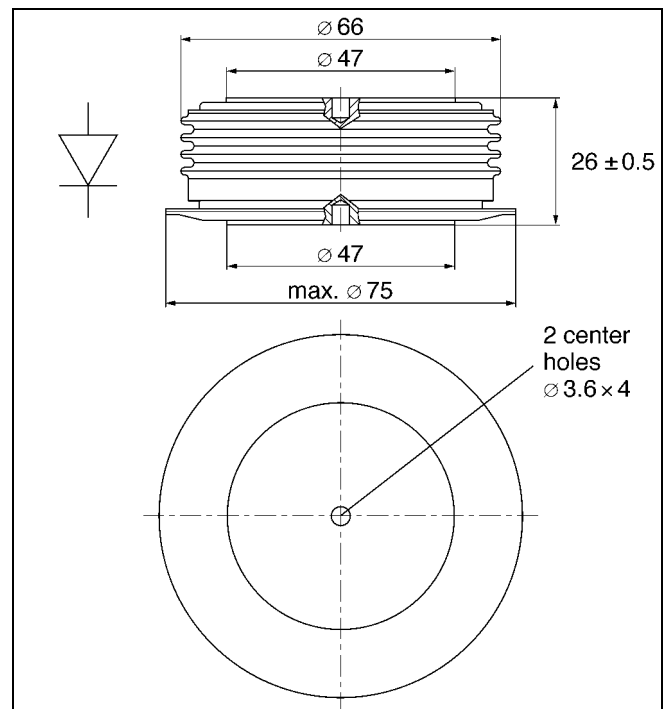
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow V_F -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

Blocking

Part number	5SDA 16F3806	5SDA 16F3206	Condition
V_{RRM}	3800	3200	$f = 50 \text{ Hz}$ $t_p = 10 \text{ ms}$
V_{RSM}	4180	3520	$t_p = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
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.	20 kN
		max.	24 kN
a	Acceleration	Device unclamped	50 m/s ²
		Device clamped	200 m/s ²
m	Weight		0.5 kg
D_s	Surface creepage distance		30 mm
D_a	Air strike distance		20 mm



On-state

I_{FAVM}	Max. average on-state current	1620 A	Half sine wave, $T_c = 85^\circ\text{C}$	
I_{FRMS}	Max. RMS on-state current	2540 A		
I_{FSM}	Max. peak non-repetitive surge current	20.5 kA	$t_p =$	10 ms
		22.3 kA	$t_p =$	8.3 ms
I^2t	Limiting load integral	$2100 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	10 ms
		$2070 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	8.3 ms
V_{F0}	Threshold voltage	1.03 V	$I_F = 1000 - 3000 \text{ A}$	$T_j = 160^\circ\text{C}$
r_F	Slope resistance	0.32 m Ω		
V_{Fmin}	On-state voltage	1.70 V	$I_F = 4000 \text{ A}$	$T_j = 25^\circ\text{C}$
V_{Fmax}	On-state voltage	2.00 V		

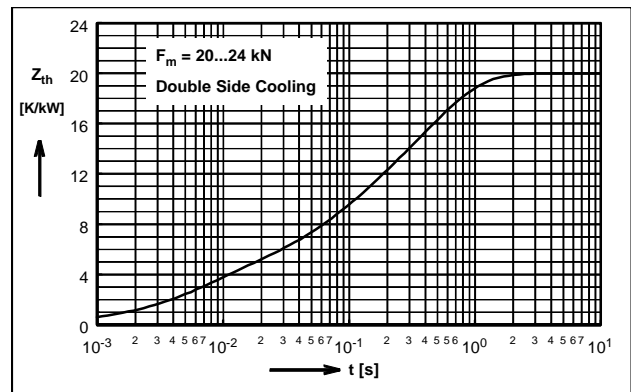
Thermal

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:

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

i	1	2	3	4
$R \text{ (K/kW)}$	11.83	4.26	1.63	2.28
$\tau_i \text{ (s)}$	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:

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

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)

where $P = \frac{T_{Jmax} - T_c}{R_{thjc}}$ or $P = \frac{T_{Jmax} - T_a}{R_{thja}}$

$f^2 =$ 1 for DC current
 2.5 for half-sine wave
 3.1 for 120° el., sine
 6 for 60° el., sine

