

## Key Parameters

$V_{RRM}$	=	5000 V
$I_{FAVM}$	=	690 A
$I_{FSM}$	=	7.0 kA
$V_{F0}$	=	1.10 V
$r_F$	=	1.01 m $\Omega$

# Avalanche Rectifier Diode

## 5SDA 06D5007

Doc. No. 5SYA 1125 - 01 Apr-98

## Features

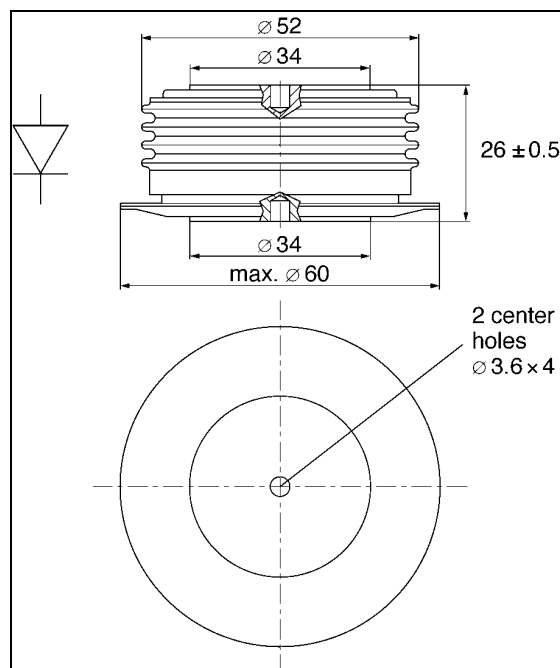
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow  $V_F$ -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

## Blocking

Part number	5SDA 06D5007	5SDA 06D4407	5SDA 06D3807	Condition
$V_{RRM}$	5000	4400	3800	$f = 50 \text{ Hz}$ $t_P = 10 \text{ ms}$
$V_{RSM}$	5500	4840	4180	$t_P = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
$I_{RRM}$	$\leq 50 \text{ mA}$			$V_{RRM}$ $T_j = 160^\circ\text{C}$
$P_{RSM}$	$\leq 70 \text{ kW}$			$t_P = 20 \mu\text{s}$ $T_j = 45^\circ\text{C}$
	$\leq 50 \text{ kW}$			$t_P = 20 \mu\text{s}$ $T_j = 160^\circ\text{C}$

## Mechanical data

$F_M$	Mounting force	min.	10 kN
		max.	12 kN
a	Acceleration		
	Device unclamped		50 m/s <sup>2</sup>
	Device clamped		200 m/s <sup>2</sup>
m	Weight		0.25 kg
$D_S$	Surface creepage distance		30 mm
$D_a$	Air strike distance		20.5 mm



### On-state

$I_{FAVM}$	Max. average on-state current	690 A	Half sine wave, $T_C = 85^\circ\text{C}$	
$I_{FRMS}$	Max. RMS on-state current	1090 A		
$I_{FSM}$	Max. peak non-repetitive surge current	7.0 kA	$t_p =$	10 ms
		7.6 kA	$t_p =$	8.3 ms
$I^2t$	Limiting load integral	$245 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	10 ms
		$240 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	8.3 ms
$V_{F0}$	Threshold voltage	1.10 V	$I_F = 700 - 2000 \text{ A}$	$T_j = 160^\circ\text{C}$
$r_F$	Slope resistance	1.01 m $\Omega$		
$V_{Fmin}$	On-state voltage	2.00 V	$I_F = 1800 \text{ A}$	$T_j = 25^\circ\text{C}$
$V_{Fmax}$	On-state voltage	2.40 V		

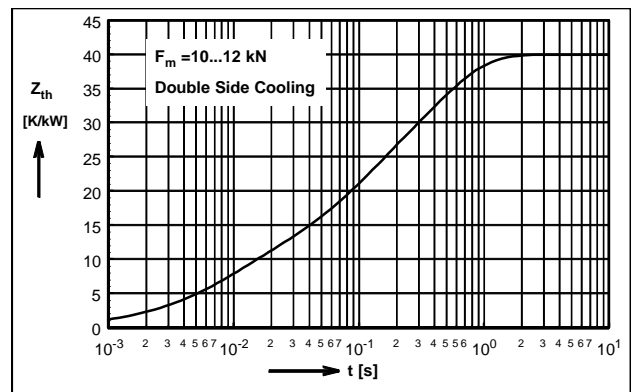
### Thermal

$T_j$	Storage and operating junction temperature range	-40...160 $^\circ\text{C}$	
$R_{thJC}$	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
$\tau_i$ (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:

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

$I_{FAVM}$  (A)      P (W)       $V_{F0}$  (V)       $r_f$  ( $\Omega$ )  
 $T_{max}$  ( $^\circ\text{C}$ )       $T_c$  ( $^\circ\text{C}$ )       $T_a$  ( $^\circ\text{C}$ )  
 $R_{thja}$  (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 $^\circ$ el., sine  
               6      for 60 $^\circ$  el., sine

