ABB

Shairad Sanat

V_{RSM}	=	5500 V
$I_{F(AV)M}$	=	4570 A
$I_{F(RMS)}$	=	7180 A
I_{FSM}	=	$73 \cdot 10^3$ A
V_{F0}	=	0.8 V
r_F	=	0.107 m□

Rectifier Diode

5SDD 50N5500

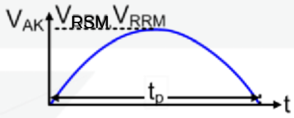
Doc. No. 5SYA1169-02 Jan. 17

- **Patented free-floating silicon technology**
- **Low on-state and switching losses**
- **Optimum power handling capability**

Blocking

Maximum rated values [1)]

Parameter	Symbol	Conditions	Value	Unit
Max repetitive peak reverse voltage	V_{RRM}	f = 50 Hz, t_p = 10 ms, T_{vj} = 0…150 °C	5000	V
Max non-repetitive peak reverse voltage	V_{RSM}	f = 5 Hz, t_p = 10 ms, T_{vj} = 0…150 °C	5500	V



Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse leakage current	I_{RRM}	V_{RRM}, T_{vj} = 150 °C			400	mA

Mechanical data

Maximum rated values [1)]

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	F_M		81	90	108	kN
Acceleration	a	Device unclamped			50	m/s²
Acceleration	a	Device clamped			100	m/s²

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Weight	m				2.8	kg
Housing thickness	H	F_M = 90 kN, T_a = 25 °C	34.5		35.2	mm
Surface creepage distance	D_s		56			mm
Air strike distance	D_a		22			mm

1) Maximum rated values indicate limits beyond which damage to the device may occur

On-state

***Maximum rated values* [1)]**

Parameter	Symbol	Conditions	min	typ	max	Unit
Average on-state current	$I_{F(AV)M}$	Half sine wave, Tc = 90 °C			4570	A
RMS on-state current	$I_{F(RMS)}$				7180	A
Peak non-repetitive surge current	I_{FSM}	t_p = 10 ms, T_{vj} = 150 °C, sine half wave, V_R= 0 V, after surge			$73 \cdot 10^3$	A
Limiting load integral	I^2t				$27.5 \cdot 10^6$	A^2s
Peak non-repetitive surge current	I_{FSM}	t_p = 10 ms, T_{vj} = 150 °C, sine half wave, V_R= 0.6·V_{RRM}, after surge				A
Limiting load integral	I^2t					A^2s

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V_F	I_F = 5000 A, T_{vj} = 150 °C		1.32	1.34	V
Threshold voltage	V_{F0}	T_{vj} = 150 °C I_F = 2500...8000 A			0.8	V
Slope resistance	r_F				0.107	m□

Switching

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse recovery charge	Q_{rr}	di_F/dt = -10 A/µs, V_R = 200 V I_F = 4000 A, T_{vj} = 150 °C		17500	20000	µAs
Reverse recovery current	I_{RM}			400	470	A

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	$R_{th(j-c)}$	Double-side cooled F_m = 81... 108 kN			5.7	K/kW
	$R_{th(j-c)A}$	Anode-side cooled F_m = 81... 108 kN			11.4	K/kW
	$R_{th(j-c)C}$	Cathode-side cooled F_m = 81... 108 kN			11.4	K/kW
Thermal resistance case to heatsink	$R_{th(c-h)}$	Double-side cooled F_m = 81... 108 kN			1	K/kW
	$R_{th(c-h)}$	Single-side cooled F_m = 81... 108 kN			2	K/kW

Thermal

Maximum rated values [1)]

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	T_{vj}		0		150	°C
Storage temperature range	T_{stg}		-40		150	°C

Characteristic values

Analytical function for transient thermal impedance:

$$Z_{th(j-c)}(t) = \sum_{i=1}^{n} R_i(1-e^{-t/\tau_i})$$

i	1	2	3	4
R_i(K/kW)	3.731	1.250	0.434	0.292
τ_i(s)	0.8113	0.1014	0.0089	0.0015

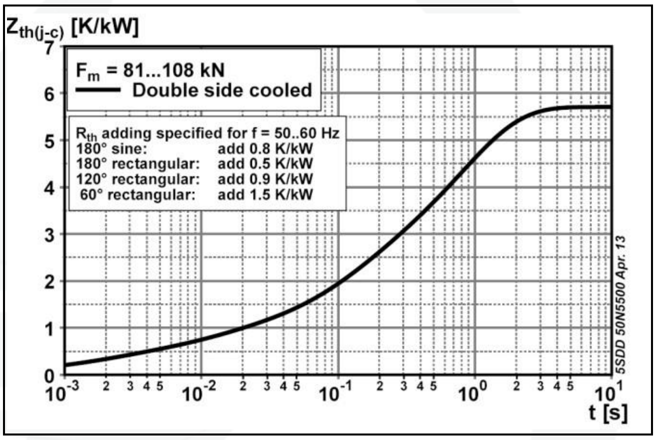


Fig. 1 Transient thermal impedance (junction-to-case) vs. time

Max. on-state characteristic model:

$$V_{F25} = A_{Tvj} + B_{Tvj} \cdot I_F + C_{Tvj} \cdot \ln(I_F + 1) + D_{Tvj} \cdot \sqrt{I_F}$$

Valid for I_F = 300 - 110000 A

A_{25}	B_{25}	C_{25}	D_{25}
$2.32 \cdot 10^{-6}$	$61.85 \cdot 10^{-6}$	$149.9 \cdot 10^{-3}$	$-2.67 \cdot 10^{-3}$

Max. on-state characteristic model:

$$V_{F150} = A_{Tvj} + B_{Tvj} \cdot I_F + C_{Tvj} \cdot \ln(I_F + 1) + D_{Tvj} \cdot \sqrt{I_F}$$

Valid for I_F = 300 - 110000 A

A_{150}	B_{150}	C_{150}	D_{150}
$-79.52 \cdot 10^{-6}$	$83.80 \cdot 10^{-6}$	$99.41 \cdot 10^{-3}$	$1.09 \cdot 10^{-3}$

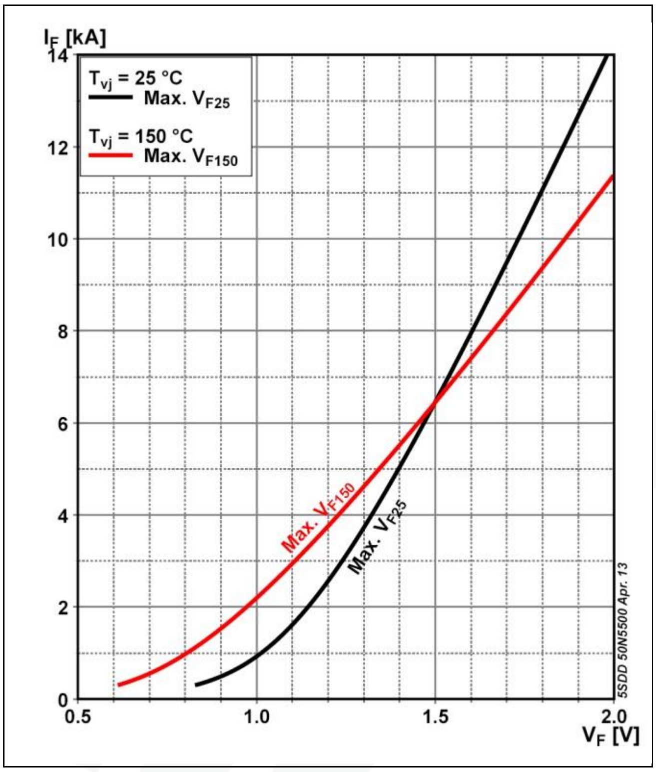


Fig. 2 On-state voltage characteristics

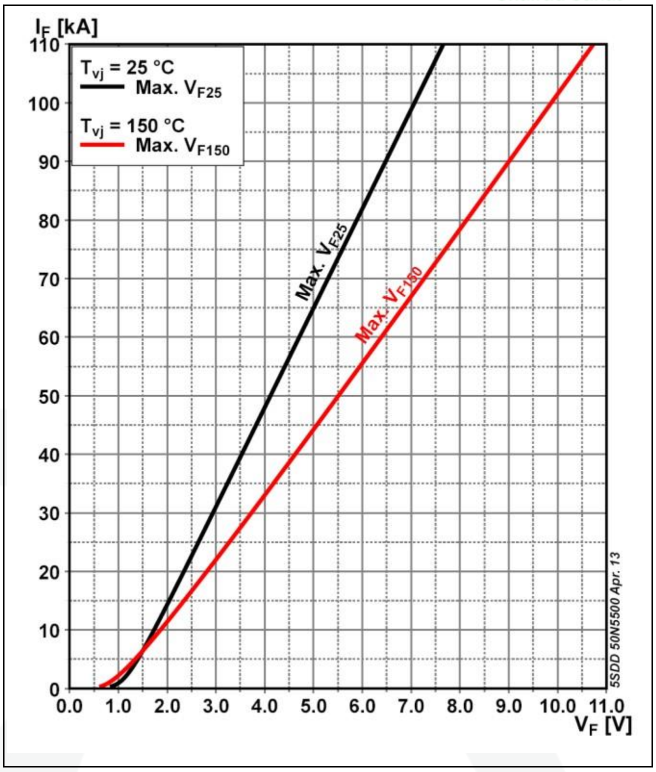


Fig. 3 On-state voltage characteristics

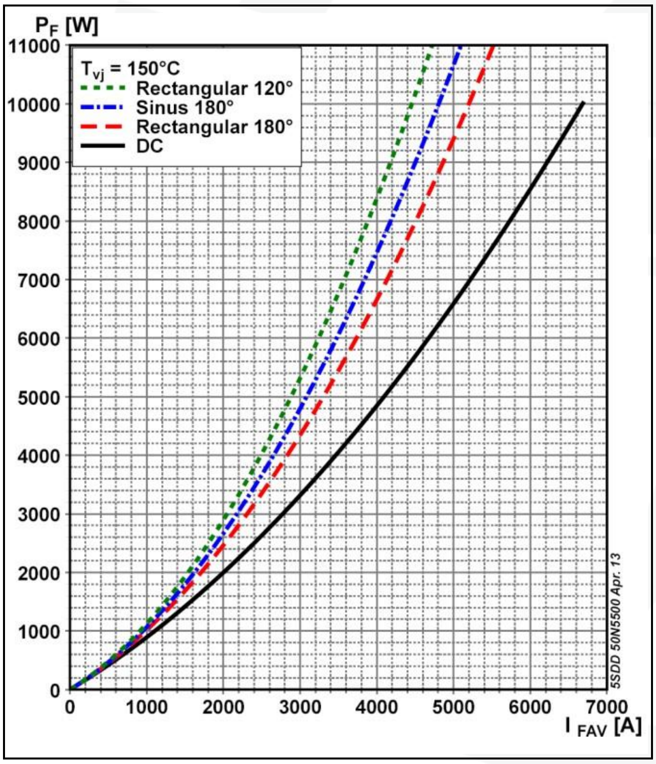


Fig. 4 On-state power dissipation vs. mean on-state on-state current

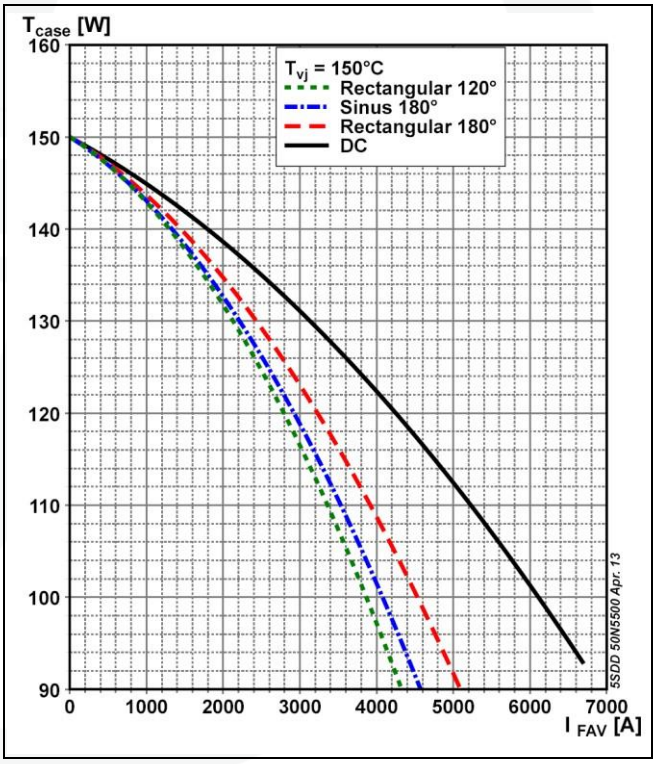


Fig. 5 Max. permissible case temperature vs. mean current

No.21,7th alley, Nilofar.
St ,Khorramshahe Ave
1533877411,Tehran-IRAN

www.shairad-sanat.com
Email: info@shairad-sanat

Tel: + 98 21 88505119
fax: + 98 21 88505102

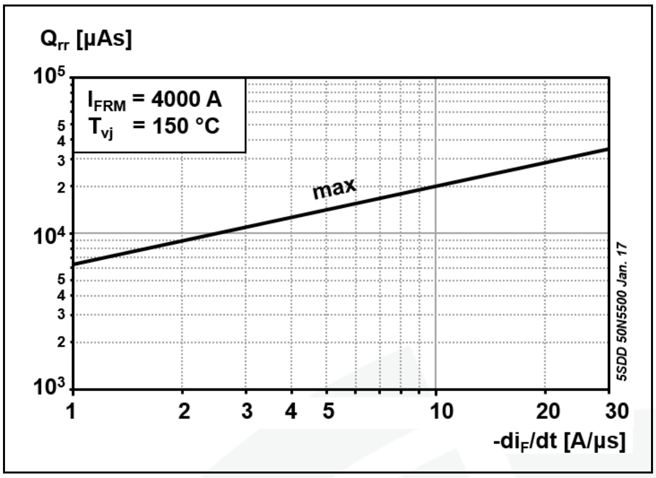


Fig. 6 Reverse recovery charge vs. decay rate of on-state current

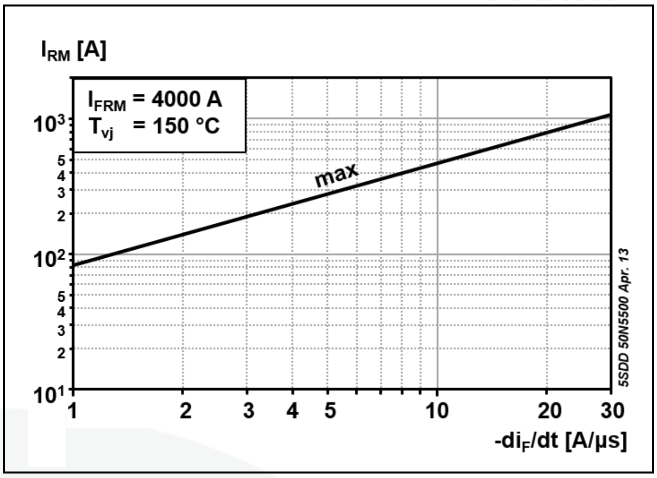


Fig. 7 Peak reverse recovery current vs. decay rate of on-state current

No.21,7th alley, Nilofar.
St ,Khorramshahe Ave
1533877411,Tehran-IRAN

www.shairad-sanat.com
Email: info@shairad-sanat

Tel: + 98 21 88505119
fax: + 98 21 88505102

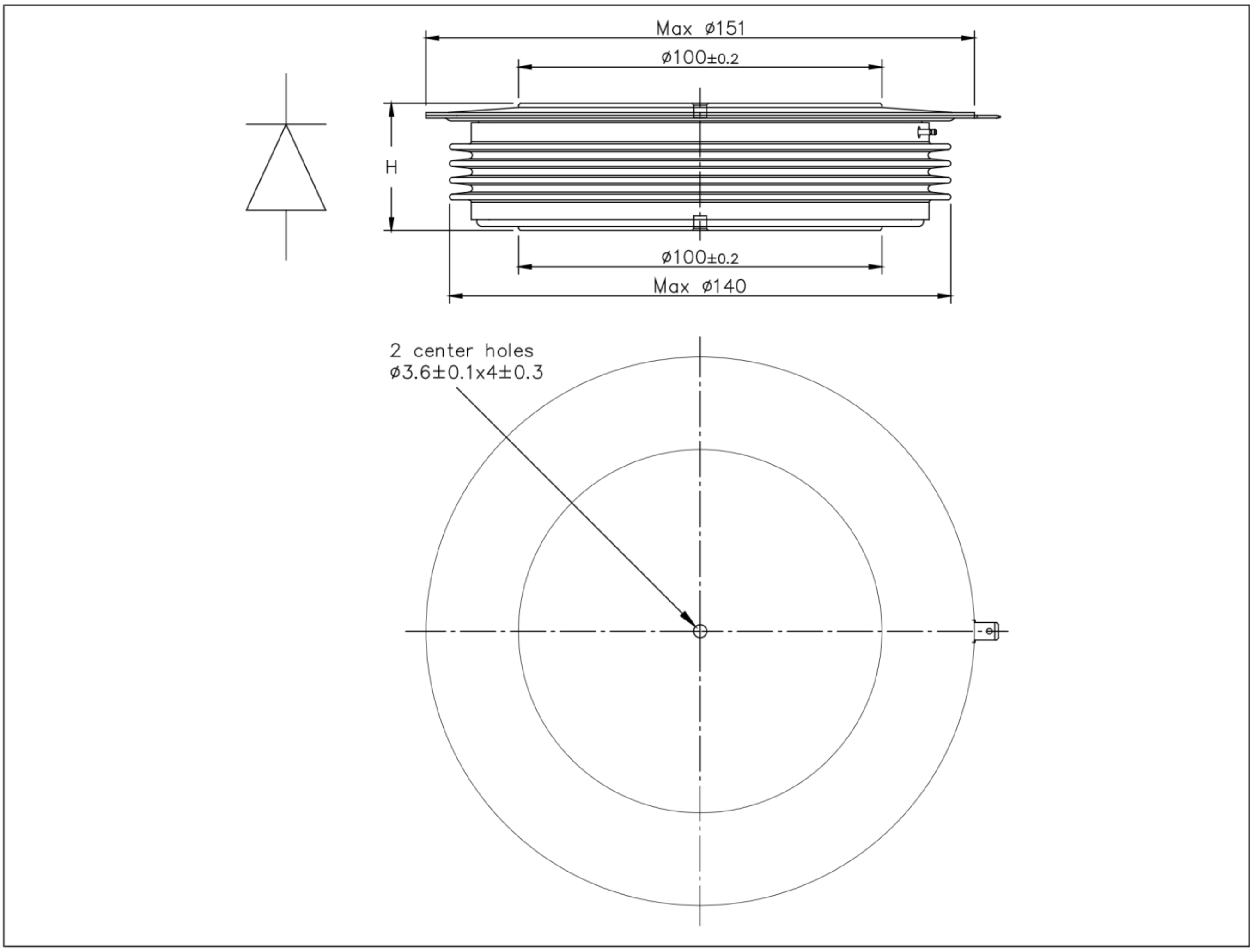


Fig. 8 Device Outline Drawing