V_{RSM}	=	6500 V
$I_{F(AV)M}$	=	5850 A
$I_{F(RMS)}$	=	9200 A
I_{FSM}	=	$110 \cdot 10^3$ A
V_{F0}	=	0.84 V
r_F	=	0.098 mΩ

Rectifier Diode
5SDD 57N6500

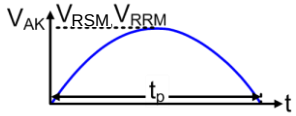
Doc. No. 5SYA 1191-02 Mar. 22

- **High forward and surge current rating**
- **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…160 °C, Note 1	6500	V
Max non-repetitive peak reverse voltage	V_{RSM}	f = 5 Hz, t_p = 10 ms, T_{vj} = 0…160 °C, Note 1	6500	V



Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse leakage current	I_{RRM}	V_{RRM}, T_{vj} = 0…160 °C			400	mA

Note 1: Voltage derating factor of 0.11% per °C is applicable for Tvj below 0 °C.

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/s^2
Acceleration	a	Device clamped			100	m/s^2

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Weight	m				2.9	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			5850	A
RMS on-state current	$I_{F(RMS)}$				9200	A
Peak non-repetitive surge current	I_{FSM}	t_p = 10 ms, T_{vj} = 160 °C, sine half wave, V_R = 0 V, after surge			$110 \cdot 10^3$	A
Limiting load integral	I^2t				$60.5 \cdot 10^6$	A^2s

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V_F	I_F = 5000 A, T_{vj} = 160 °C		1.28	1.33	V
Threshold voltage	V_{F0}	I_F = 2500...8000 A, T_{vj} = 160 °C		0.79	0.84	V
Slope resistance	r_F			0.097	0.098	mΩ

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} = 160 °C		15000	20000	µAs
Reverse recovery current	I_{RM}			360	450	A

Thermal

Maximum rated values [1)]

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	T_{vj}		0		160	°C
Storage temperature range	T_{stg}		-40		150	°C

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	$R_{th(j-c)}$	Double-side cooled F_m = 81... 108 kN			4.7	K/kW
	$R_{th(j-c)A}$	Anode-side cooled F_m = 81... 108 kN			8.5	K/kW
	$R_{th(j-c)C}$	Cathode-side cooled F_m = 81... 108 kN			10.5	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

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)	3.186	0.806	0.530	0.178
τ_i(s)	0.9464	0.1102	0.0149	0.0027

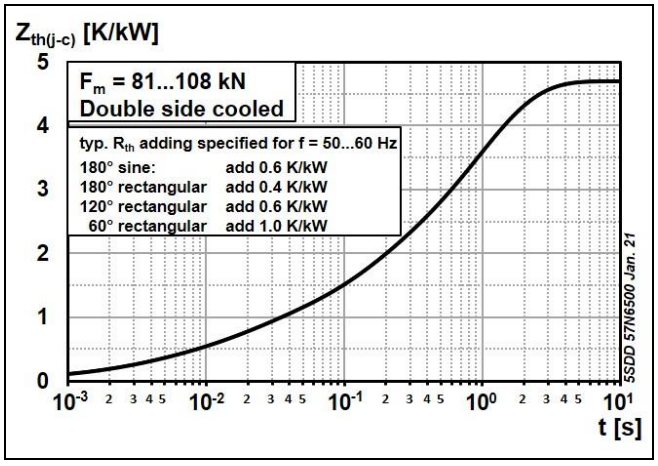


Fig. 1 Transient thermal impedance (junction-to-case) vs. time

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 = 1500 - 80000 A

A_{25}	B_{25}	C_{25}	D_{25}
$142.30 \cdot 10^{-3}$	$42.56 \cdot 10^{-6}$	$113.7 \cdot 10^{-3}$	$-1.337 \cdot 10^{-3}$

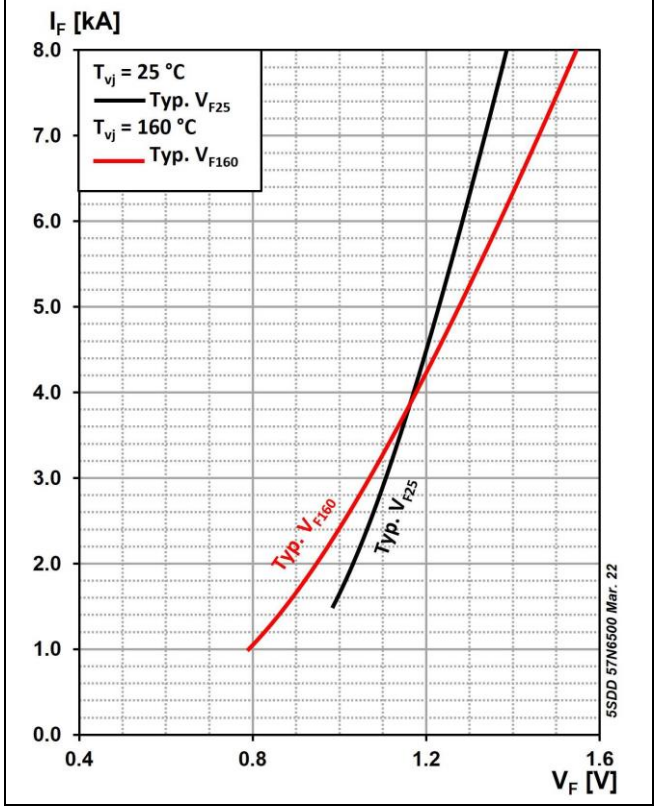


Fig. 2 Typical On-state voltage characteristics

Max. on-state characteristic model:

$$V_{F160} = A_{Tvj} + B_{Tvj} \cdot I_F + C_{Tvj} \cdot \ln(I_F + 1) + D_{Tvj} \cdot \sqrt{I_F}$$

Valid for I_F = 1000 - 80000 A

A_{160}	B_{160}	C_{160}	D_{160}
$-13.99 \cdot 10^{-3}$	$63.51 \cdot 10^{-6}$	$98.64 \cdot 10^{-3}$	$1.928 \cdot 10^{-3}$

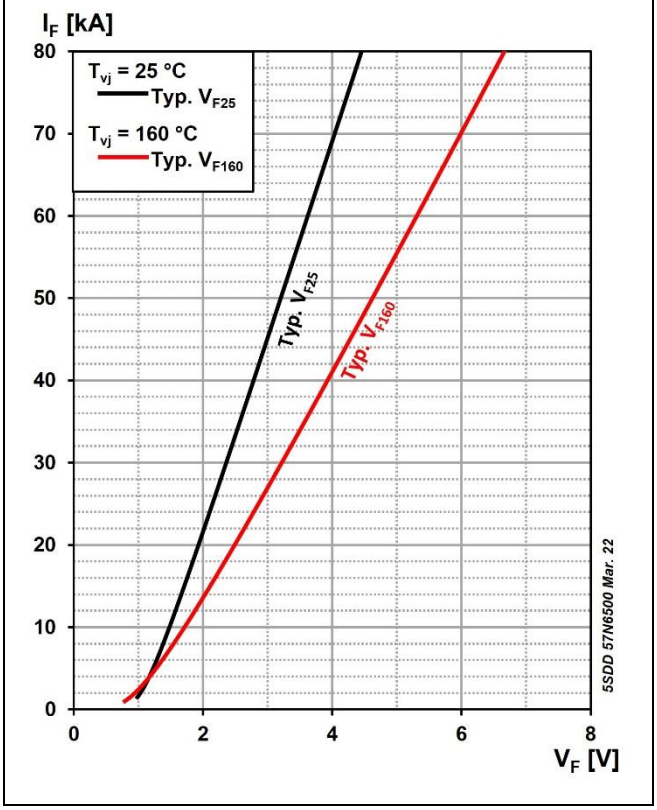


Fig. 3 Typical On-state voltage characteristics

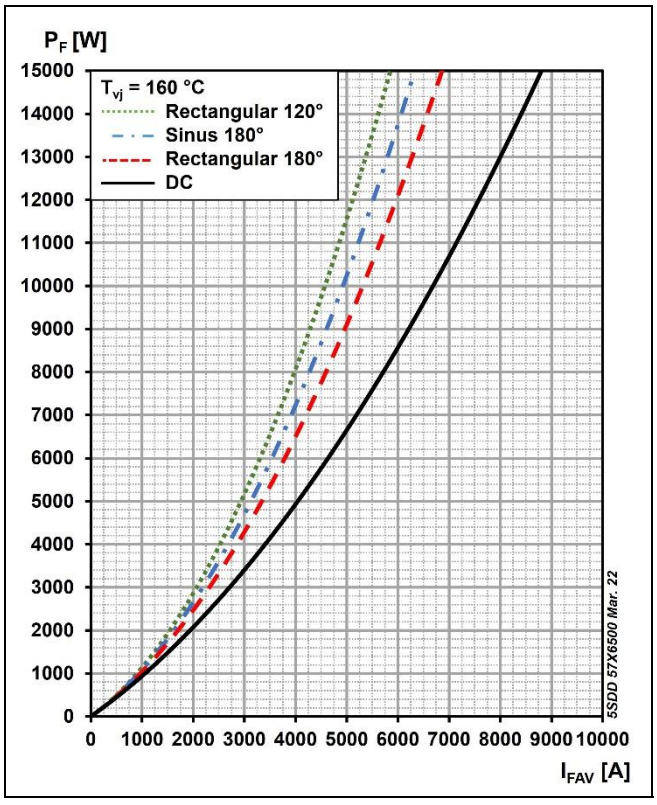


Fig. 4 On-state power dissipation vs. mean on-state current

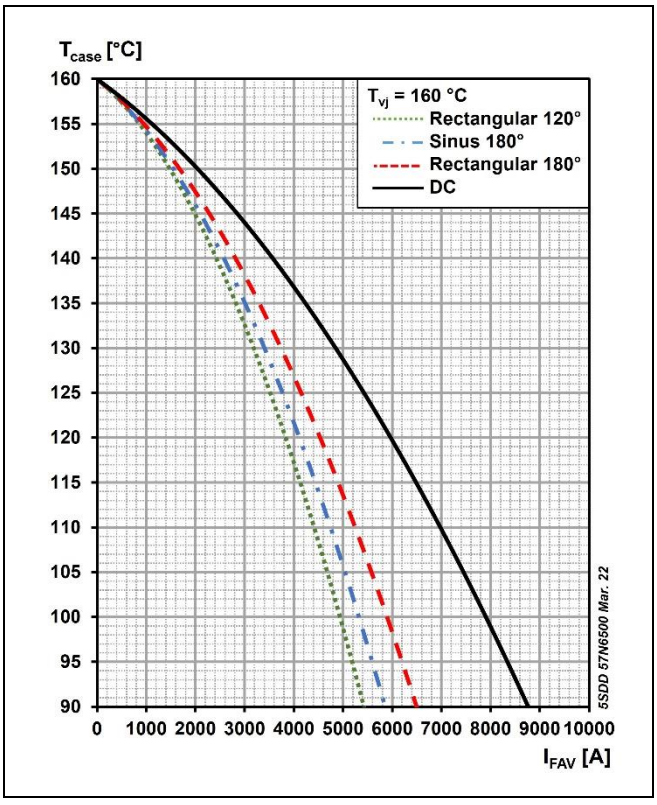


Fig. 5 Max. permissible case temperature vs. mean on-state current

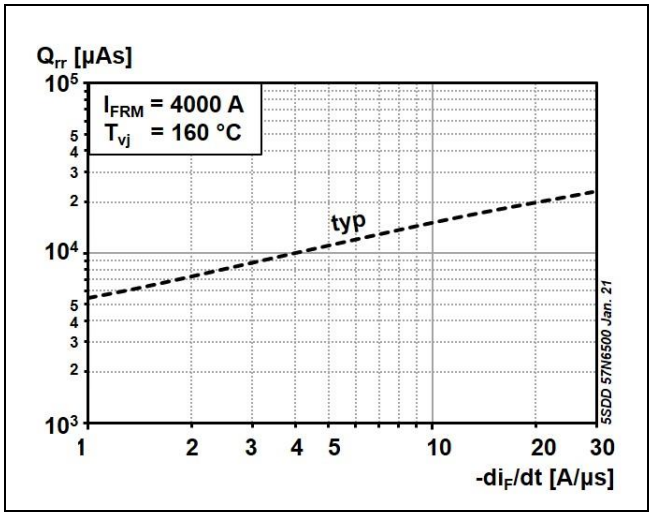


Fig. 6 Typical reverse recovery charge vs. decay rate of on-state current

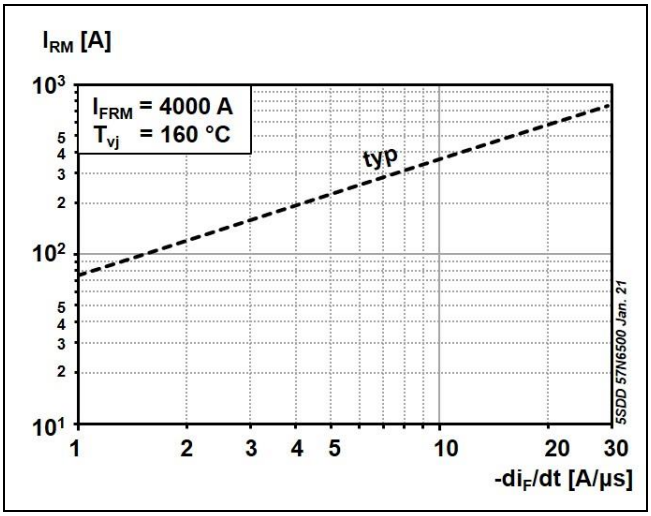


Fig. 7 Typical peak reverse recovery current vs. decay rate of on-state current

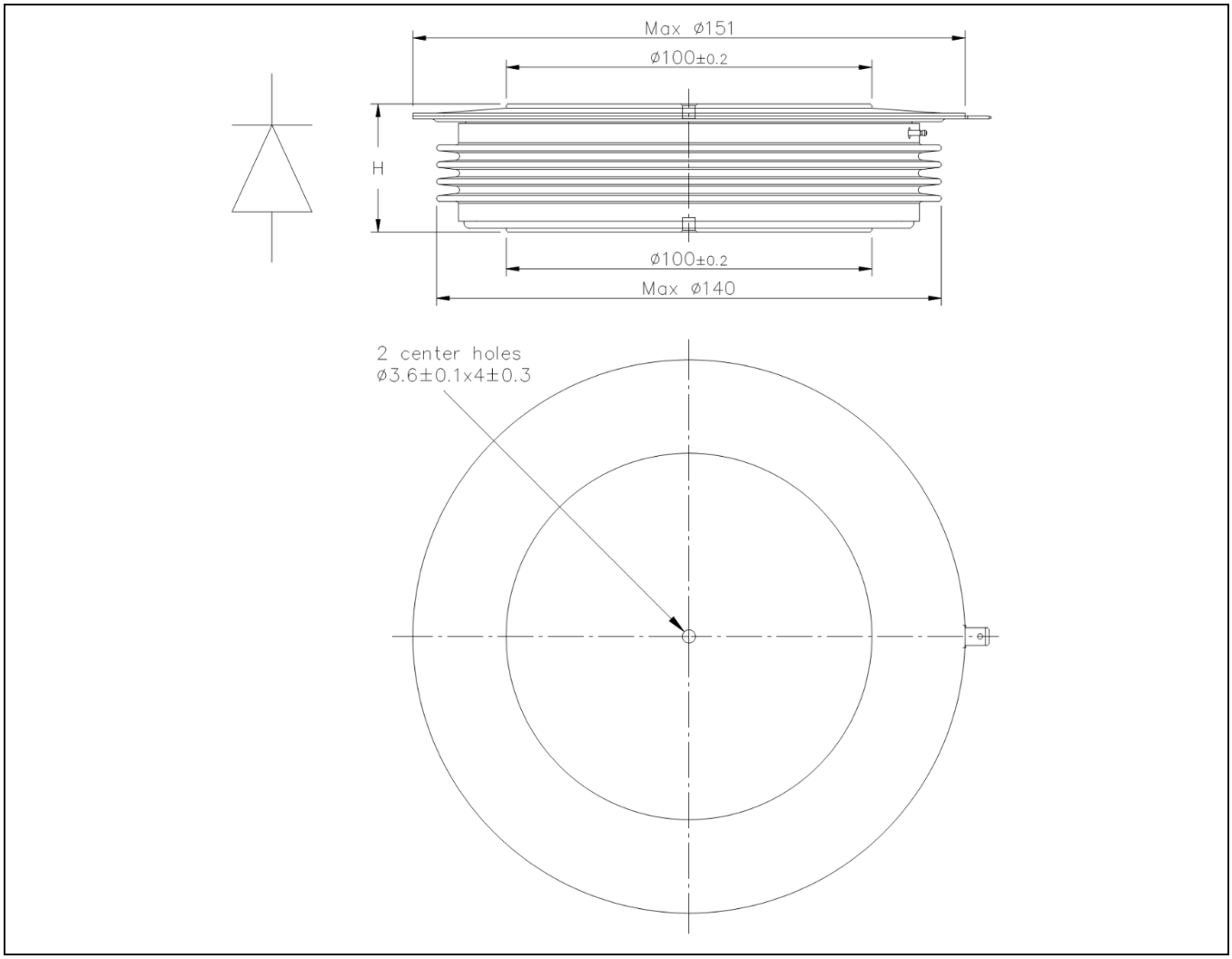


Fig. 8 Device Outline Drawing

Related documents:

5SYA 2020	Design of RC-Snubbers for Phase Control Applications
5SYA 2029	High Power Rectifier Diodes
5SYA 2036	Recommendations regarding mechanical clamping of Press Pack High Power Semiconductors
5SYA 2048	Field Measurements on High Power Press-Pack Semiconductors
5SYA 2051	Voltage Ratings of High Power Semiconductors
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