V_{RSM}	=	2800	V
$I_{F(AV)M}$	=	5380	A
$I_{F(RMS)}$	=	8450	A
I_{FSM}	=	65×10^3	A
V_{F0}	=	0.77	V
r_F	=	0.082	mW

Rectifier Diode
5SDD 51L2800

Doc. No. 5SYA1103-01 Feb. 05

- **Patented free-floating silicon technology**
- **Very low on-state losses**
- **High average and surge current.**

Blocking

Maximum rated values [1)]

Parameter	Symbol	Conditions	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	f = 50 Hz, t_p = 10ms, T_j = 175°C	2000	V
Non-repetitive peak reverse voltage	V_{RSM}	f = 5 Hz, t_p = 10ms, T_j = 175°C	2800	V
Non-repetitive peak reverse voltage	V_{RSM}	f = 50 Hz, $t_p \leq$ 5ms, T_j = ...175°C	3000	V

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Max. (reverse) leakage current	I_{RRM}	V_{RRM}, Tj = 175°C			400	mA

T_{vj} = -40°C reduces V_{RSM} and V_{RRM} by 5%.

Mechanical data

Maximum rated values [1)]

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	F_M		63	70	77	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				1.45	kg
Housing thickness	H	F_M = 70 kN, T_a = 25 °C	25.7		26.3	mm
Surface creepage distance	D_S		35			mm
Air strike distance	D_a		14			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
Max. average on-state current	$I_{F(AV)M}$	50 Hz, Half sine wave, T_C = 85 °C			5380	A
Max. RMS on-state current	$I_{F(RMS)}$				8450	A
Max. peak non-repetitive surge current	I_{FSM}	t_p = 10 ms, T_j = 175°C, V_R = 0 V			65×10^3	A
Limiting load integral	I^2t				21.13×10^6	A^2s
Max. peak non-repetitive surge current	I_{FSM}	t_p = 8.3 ms, T_j = 175°C, V_R = 0 V			70×10^3	A
Limiting load integral	I^2t				20.34×10^6	A^2s

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V_F	I_F = 5000 A, T_j = 175°C		1.18		V
Threshold voltage	$V_{(T0)}$	T_j = 175°C I_T = 2500...7500 A			0.77	V
Slope resistance	r_T				0.082	mΩ

Switching

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Recovery charge	Q_{rr}	di_F/dt = -10 A/µs, V_R = 200 V I_{FRM} = 4000 A, T_j = 175°C			7000	µAs

Thermal

Maximum rated values [1)]

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	T_{vj}				175	°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 = 63...77 kN			8	K/kW
	$R_{th(j-c)A}$	Anode-side cooled F_m = 63...77 kN			16	K/kW
	$R_{th(j-c)C}$	Cathode-side cooled F_m = 63...77 kN			16	K/kW
Thermal resistance case to heatsink	$R_{th(c-h)}$	Double-side cooled F_m = 63...77 kN			3	K/kW
	$R_{th(c-h)}$	Single-side cooled F_m = 63...77 kN			6	K/kW

Analytical function for transient thermal impedance:

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

i	1	2	3	4
$R_{th\,i}$(K/kW)	5.364	1.586	0.638	0.412
τ_i(s)	0.5339	0.0684	0.0067	0.0013

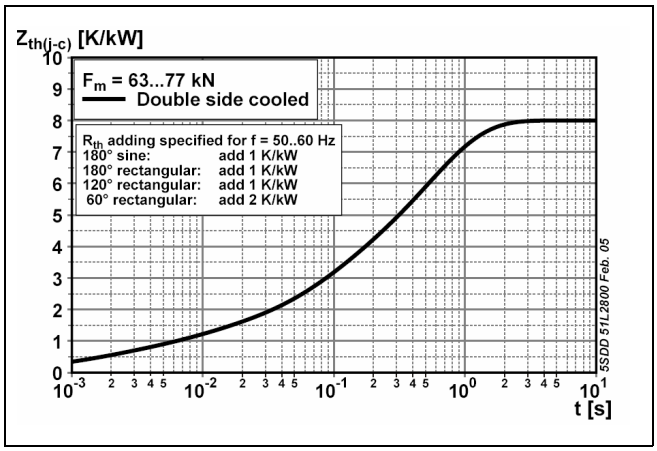

Fig. 1 Transient thermal impedance junction-to-case.

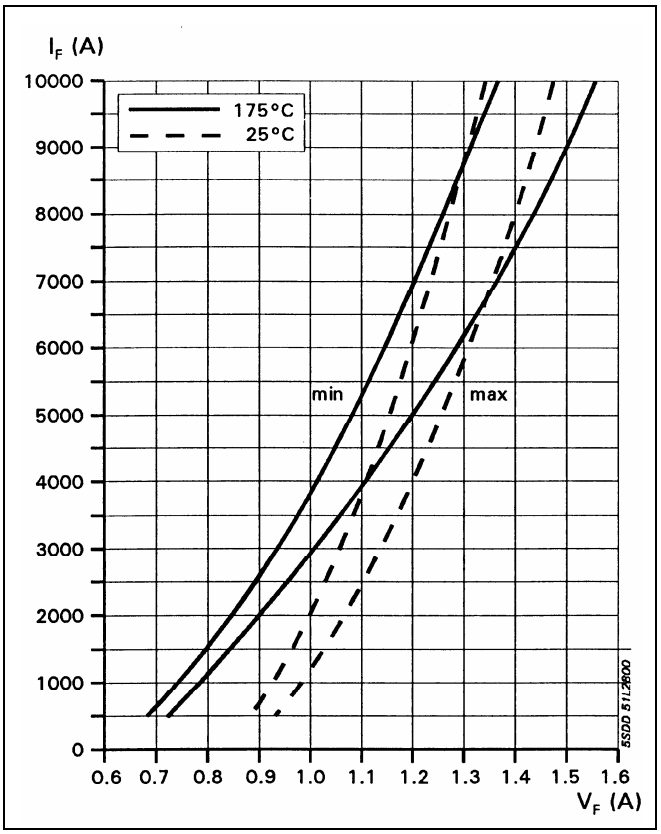

Fig. 2 On-state characteristics.

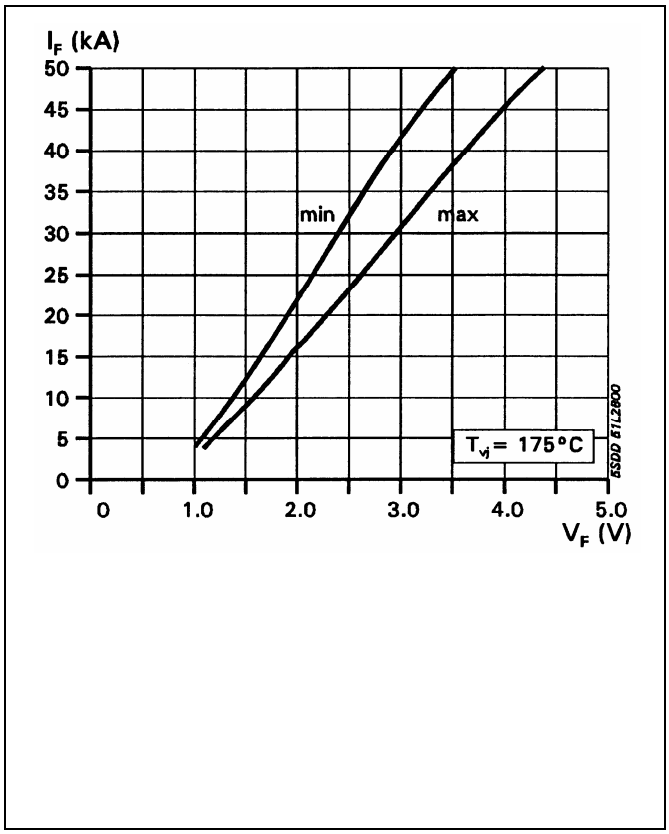

Fig. 3 On-state characteristics.

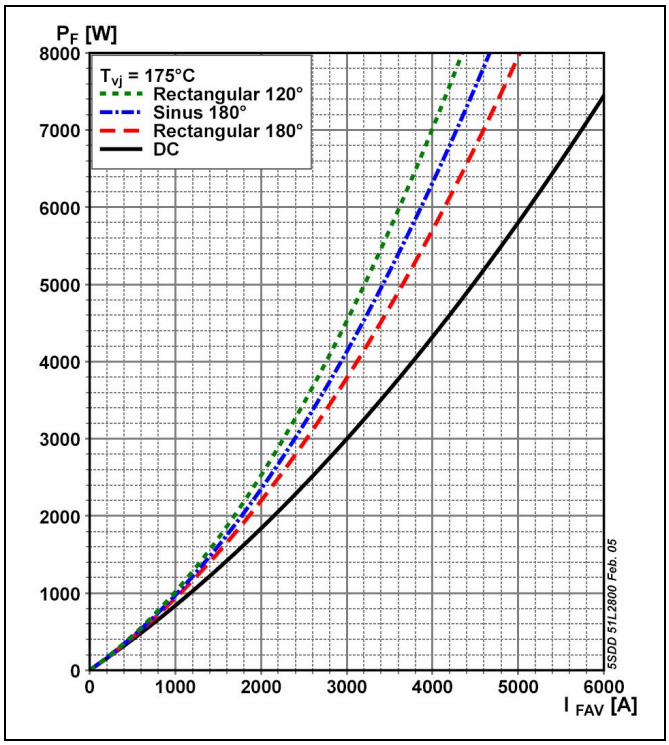

Fig. 4 On-state power losses vs average on-state current.

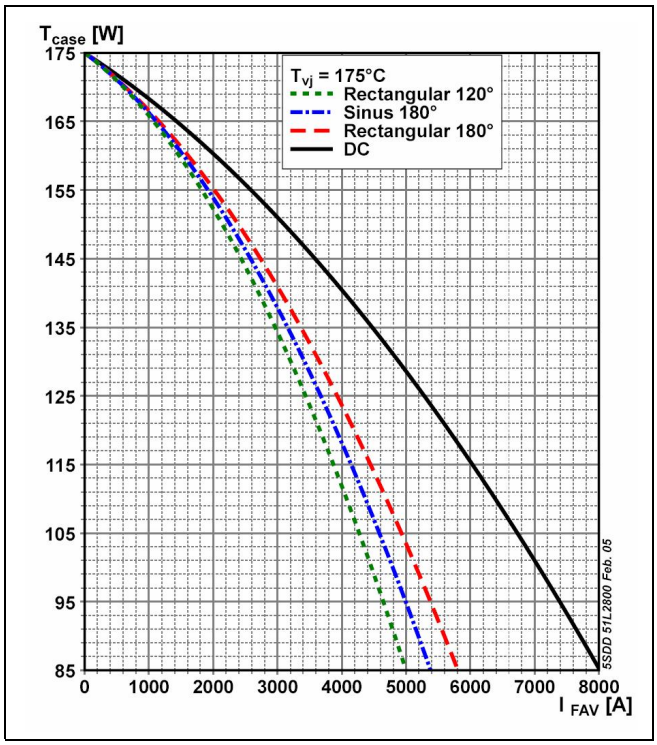

Fig. 5 Max. permissible case temperature vs average on-state current.

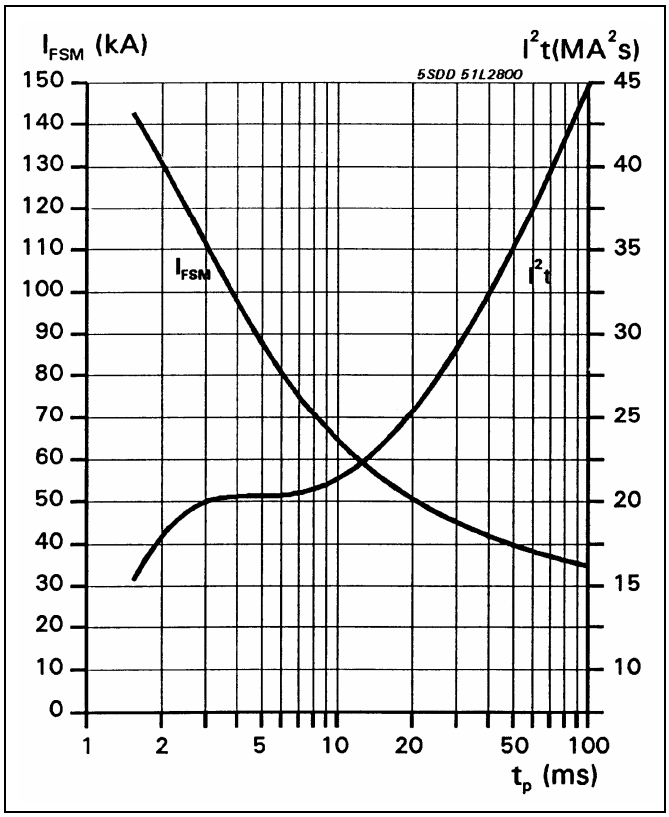

Fig. 6 Surge on-state current vs. pulse length. Half-sine wave.

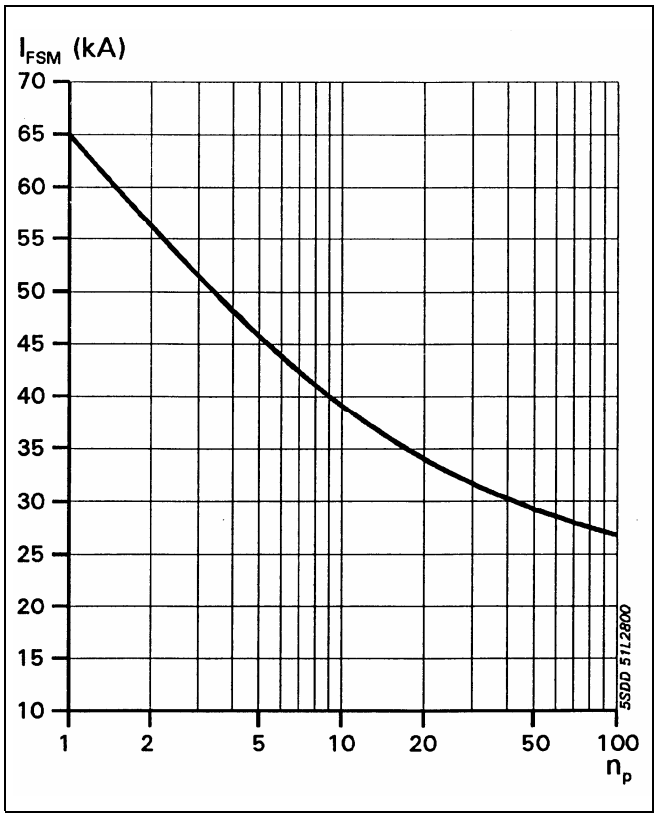

Fig. 7 Surge on-state current vs. number of pulses. Half-sine wave, 10 ms, 50Hz.

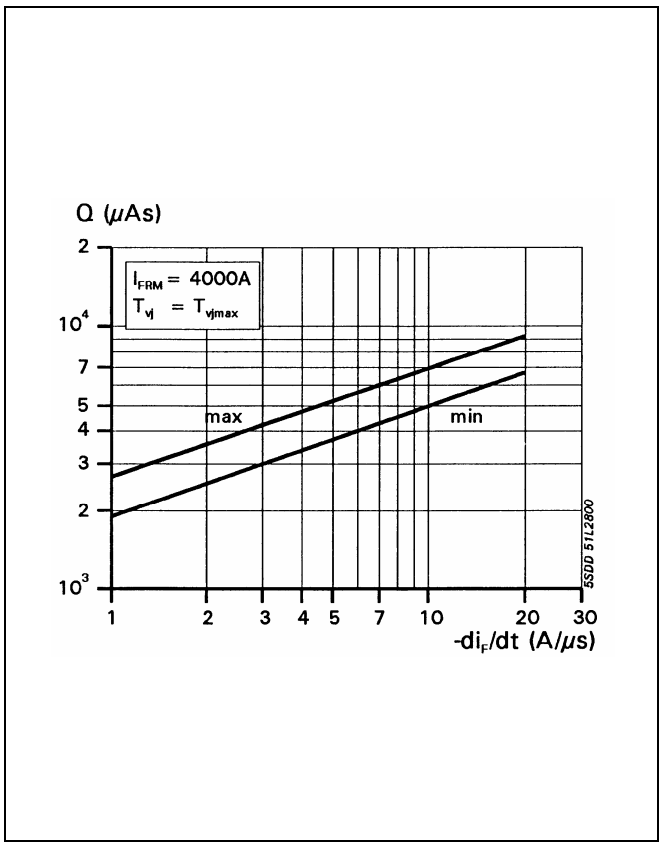

Fig. 8 Recovery charge vs. decay rate of on-state current.

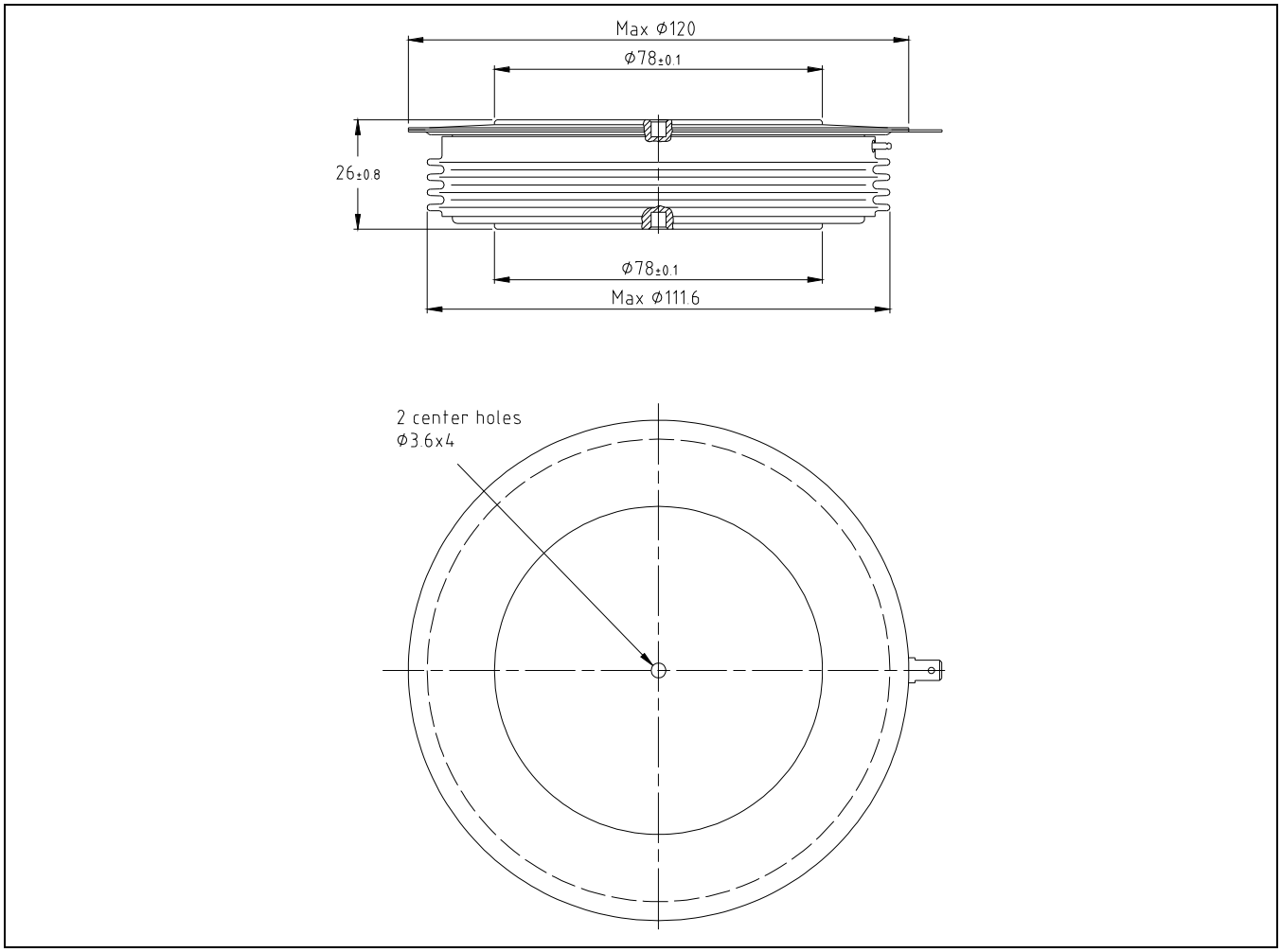

Fig. 9 Outline drawing. All dimensions are in millimeters and represent nominal values unless stated otherwise.

Related application notes:

Doc. Nr	Titel
5SYA 2020	Design of RC-Snubbers for Phase Control Applications
5SYA 2029	Designing Large Rectifiers with High Power Diodes
5SYA 2036	Recommendations regarding mechanical clamping of Press Pack High Power Semiconductors

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