V_{RSM}	=	5000	V
$I_{F(AV)M}$	=	3810	A
$I_{F(RMS)}$	=	5990	A
I_{FSM}	=	45×10^3	A
V_{F0}	=	0.903	V
r_F	=	0.136	mW

Rectifier Diode

5SDD 38H5000

Doc. No. 5SYA1177-00 Feb. 06

- **Optimum power handling capability**
- **Very low on-state losses**

Blocking

Maximum rated values *[Note 1]*

Parameter	Symbol	Conditions	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	f = 50 Hz, t_p = 10ms, T_j = -40...160°C	5000	V
Non-repetitive peak reverse voltage	V_{RSM}	f = 50 Hz, t_p = 10ms, T_j = -40...160°C	5000	V

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Max. (reverse) leakage current	I_{RRM}	V_{RRM}, Tj = 160°C			110	mA

Derating factor of 0.13% per °C is applicable for T_j below 0 °C.

Mechanical data

Maximum rated values *[Note 1]*

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	F_M		45	50	55	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			0.9		kg
Housing thickness	H	F_M = 50 kN, T_a = 25 °C	25.5		26.5	mm
Surface creepage distance	D_S		40			mm
Air strike distance	D_a		20			mm

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

On-state

Maximum rated values *Note 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			3810	A
Max. RMS on-state current	$I_{F(RMS)}$				5990	A
Max. peak non-repetitive surge current	I_{FSM}	t_p = 10 ms, T_j = 160°C, V_R = 0 V			$45×10^3$	A
Limiting load integral	I^2t				$9.6×10^6$	A^2s
Max. peak non-repetitive surge current	I_{FSM}	t_p = 8.3 ms, T_j = 160°C, V_R = 0 V			$48×10^3$	A
Limiting load integral	I^2t				$10.1×10^6$	A^2s

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V_F	I_F = 4000 A, T_j = 160°C			1.43	V
Threshold voltage	$V_{(T0)}$	T_j = 160°C I_T = 6000...18000 A			0.903	V
Slope resistance	r_T				0.136	mΩ

Switching

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Recovery charge	Q_{rr}	di_F/dt = -30 A/µs, V_R = 100 V I_{FRM} = 2000 A, T_j = 160°C		9000		µAs

Thermal

Maximum rated values [Note 1]

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

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	$R_{th(j-c)}$	Double-side cooled F_m = 45...55 kN			8	K/kW
	$R_{th(j-c)A}$	Anode-side cooled F_m = 45...55 kN			14.5	K/kW
	$R_{th(j-c)C}$	Cathode-side cooled F_m = 45...55 kN			18.0	K/kW
Thermal resistance case to heatsink	$R_{th(c-h)}$	Double-side cooled F_m = 45...55 kN			2.5	K/kW
	$R_{th(c-h)}$	Single-side cooled F_m = 45...55 kN			5.0	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)	4.533	2.255	0.868	0.345
τ_i(s)	0.4406	0.1045	0.0092	0.0022

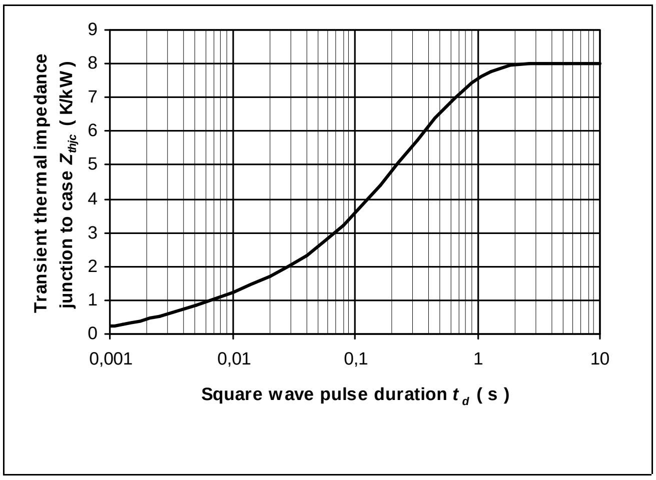

Fig. 1 Transient thermal impedance junction-to-case

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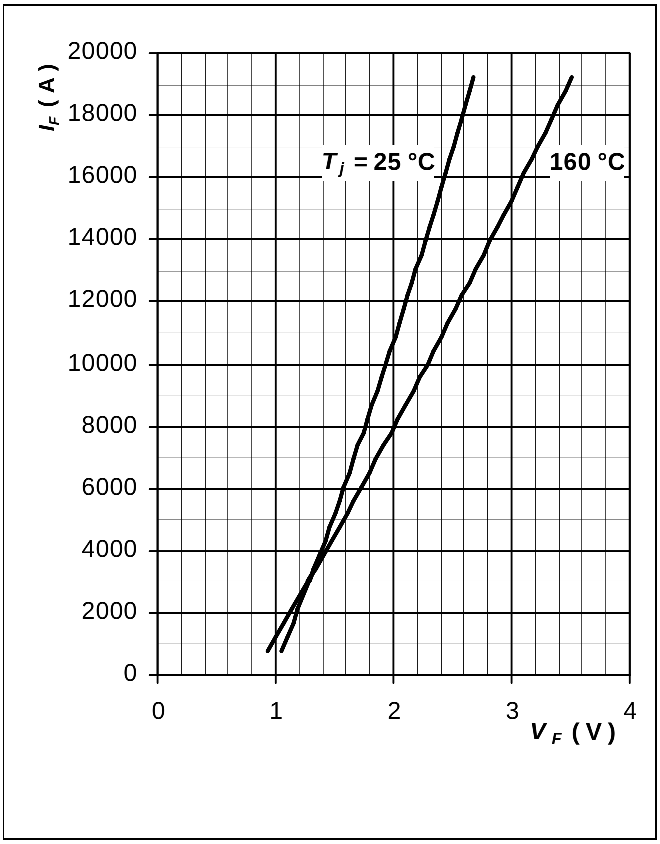

Fig. 2 Max. on-state characteristics

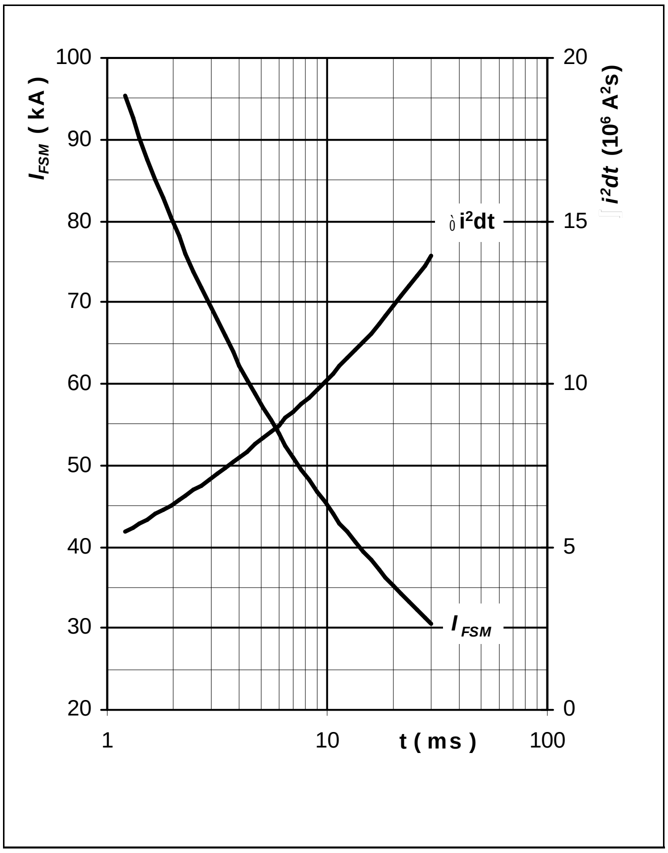

Fig. 3 Surge forward current vs. pulse length, half sine wave, single pulse, V_R = 0 V

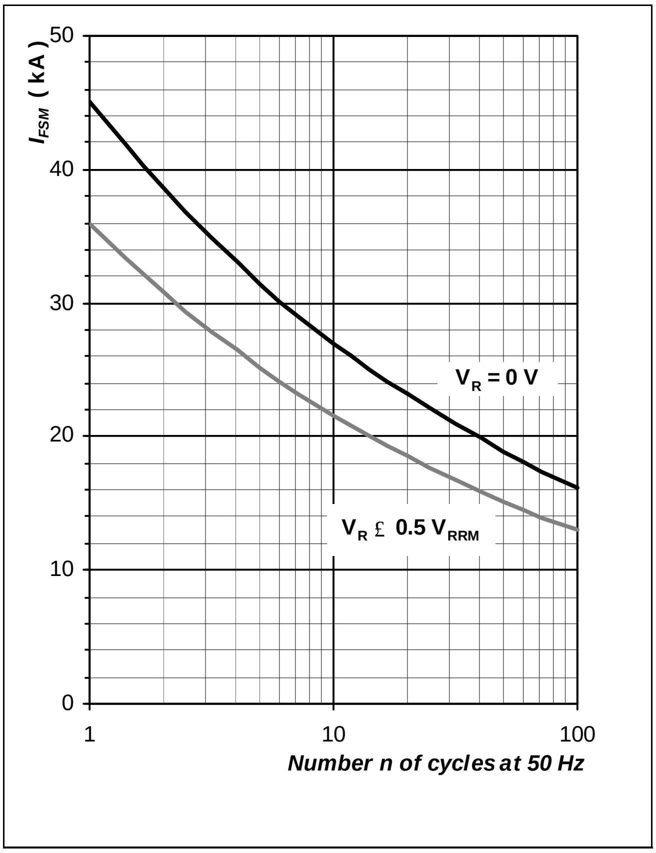

Fig. 4 Surge forward current vs. number of pulses, half sine wave, V_R = 0 V

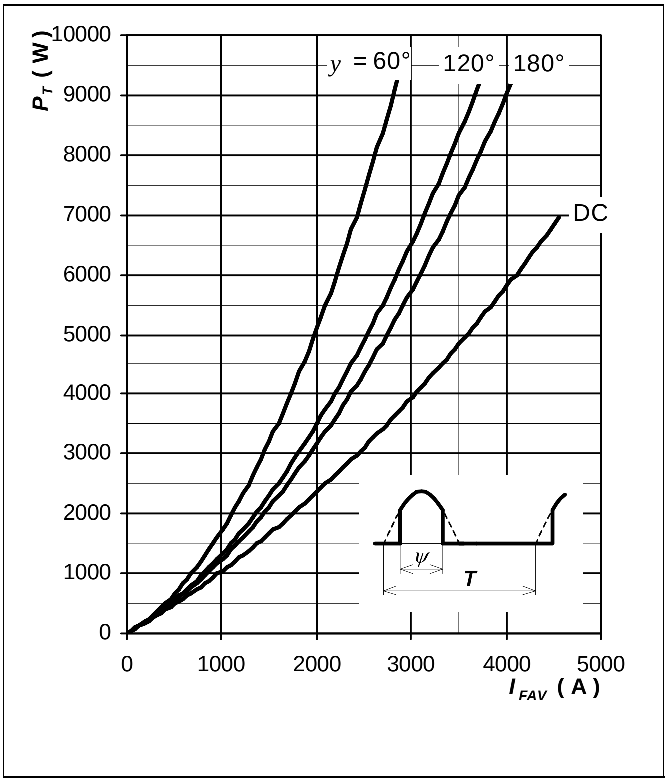

Fig. 5 Forward power loss vs. average forward current, sine waveform, f = 50 Hz

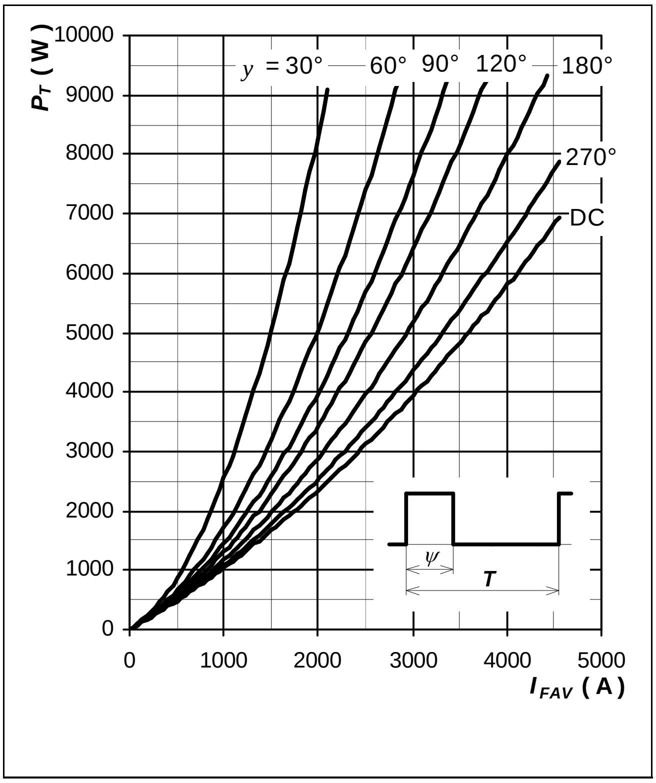

Fig. 6 Forward power loss vs. average forward current, square waveform, f = 50 Hz

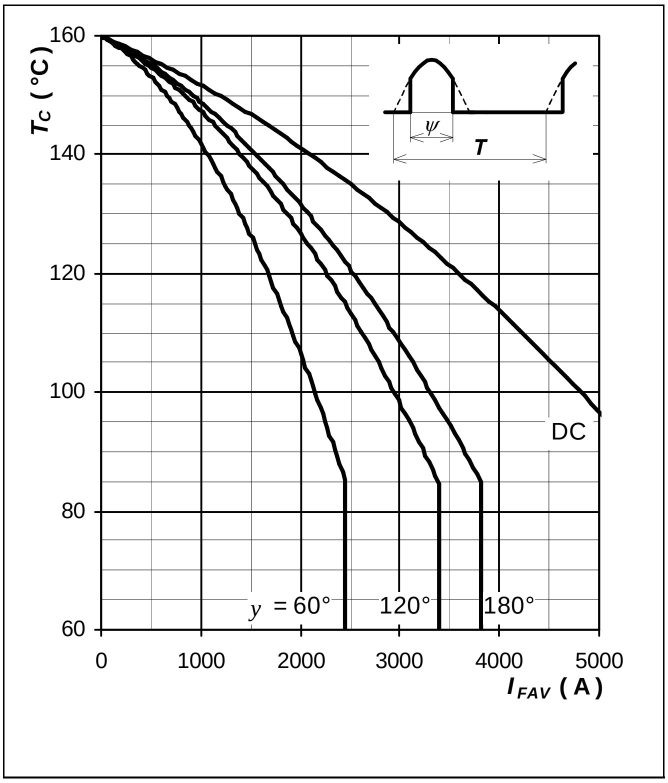

Fig. 7 Max. case temperature vs aver. forward current, sine waveform, f = 50 Hz

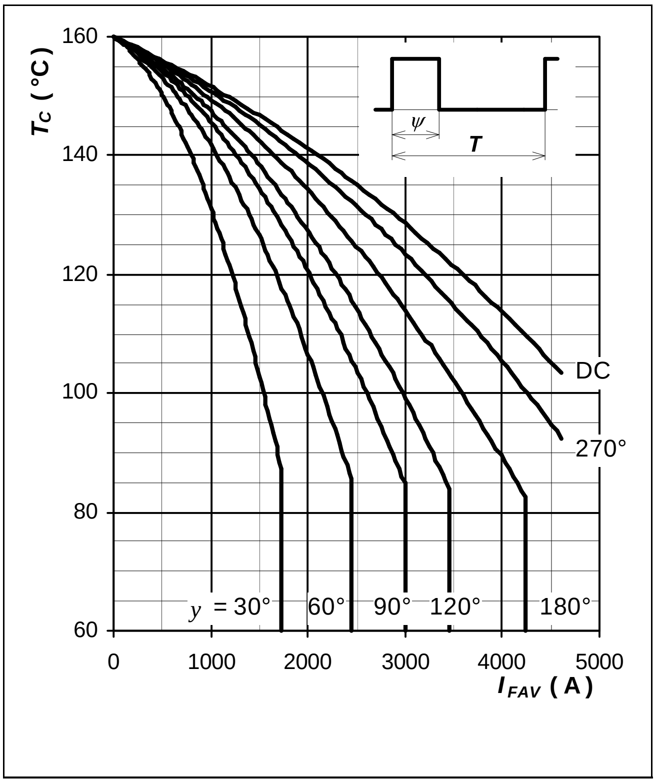

Fig. 8 Max. case temperature vs aver. forward current, square waveform, f = 50 Hz

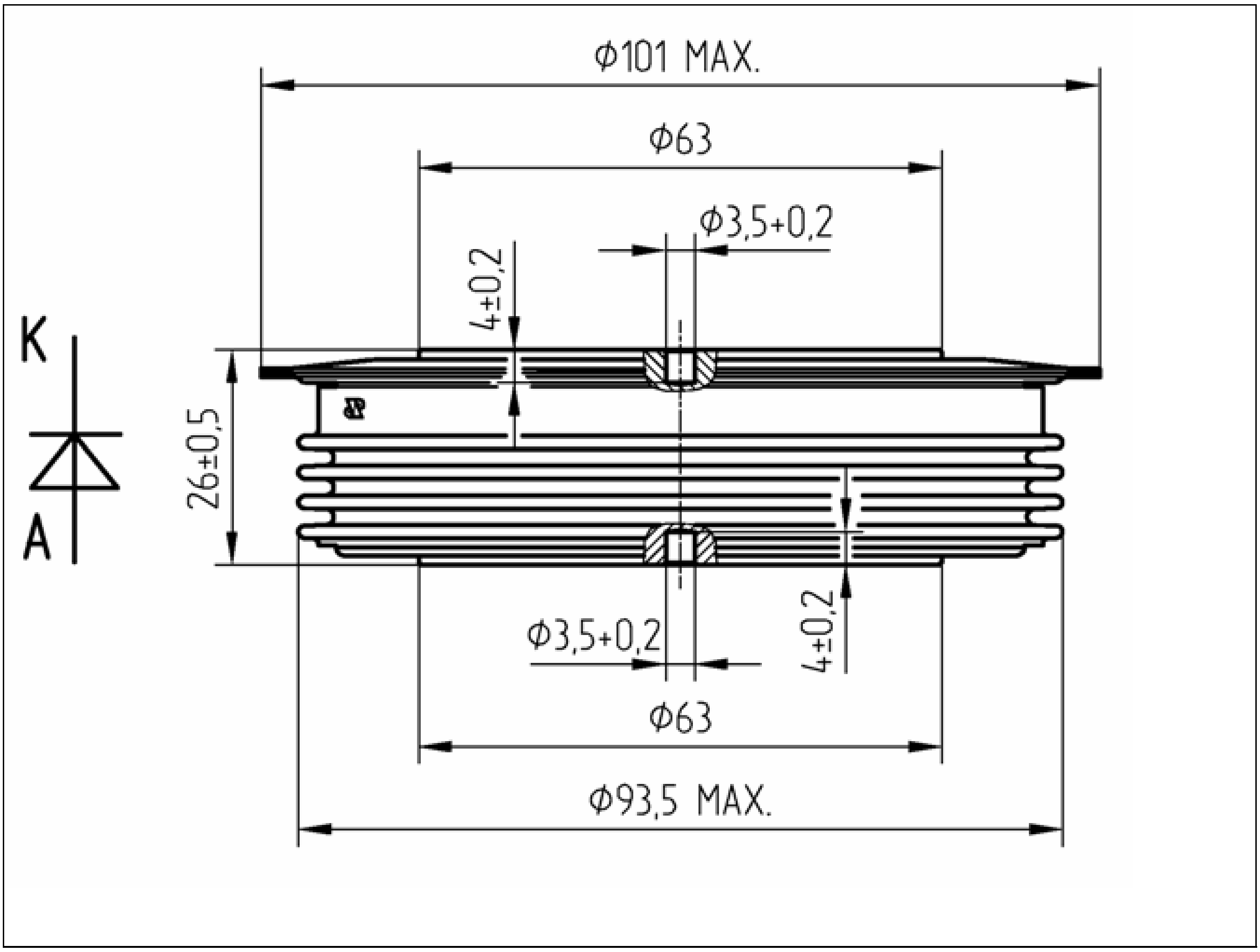

Fig. 9 Outline drawing; all dimensions are in millimeters and represent nominal values unless stated otherwise

Related documents:

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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