ABB 5STP06T1600 Control Thyristor datasheet

Properties

High operational capability

Possibility of serial and parallel connection

5STP 06T1600

Old part no. T 906C-640-16

Phase Control Thyristor

Properties

- High operational capability
- Possibility of serial and parallel connection

Applications

- Controlled rectifiers
- AC drives

Key Parameters

V_{DRM}, V_{RRM}	=	1 600	V
I_{TAVm}	=	641	A
I_{TSM}	=	9 900	A
V_{TO}	=	0.990	V
r_T	=	0.503	mΩ

Types

	V_{RRM}, V_{DRM}
5STP 06T1600	**1 600 V**
Conditions:	*T_j = -40 ÷ 125 °C, half sine waveform, f = 50 Hz*

Mechanical Data

F_m	**Mounting force**	9 ± 3	kN
m	**Weight**	0.11	kg
D_S	**Surface creepage distance**	12.2	mm
D_a	**Air strike distance**	5.5	mm

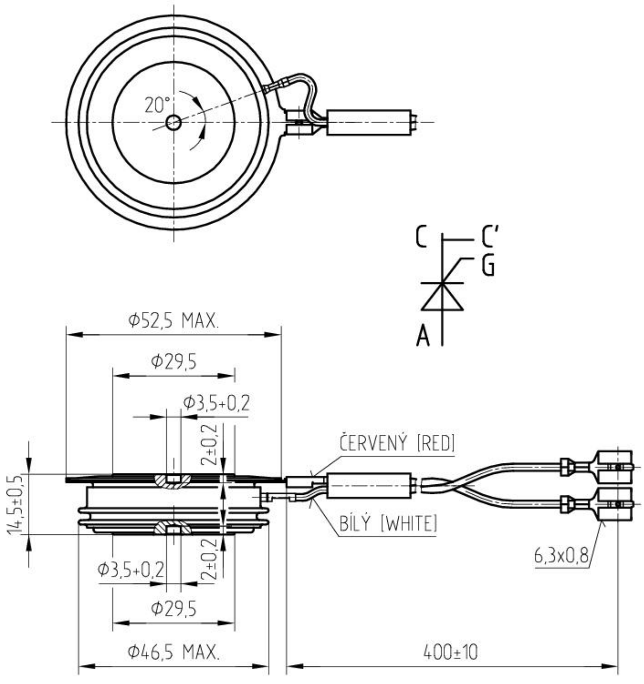

Fig. 1 Case

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Maximum Ratings			**Maximum Limits**	**Unit**
V_{RRM} V_{DRM}	**Repetitive peak reverse and off-state voltage** *T_j = -40 ÷ 125 °C*		**1 600**	**V**
I_{TRMS}	**RMS on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**1 007**	**A**
I_{TAVm}	**Average on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**641**	**A**
I_{TSM}	**Peak non-repetitive surge** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**9 900** **10 600**	**A**
I_{TSM}	**Peak non-repetitive surge** *half sine pulse, V_R = 0.7 V_{RRM}*	*t_p = 10 ms* *t_p = 8.3 ms*	**7 900** **8 500**	**A**
I^2t	**Limiting load integral** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**490 000** **470 000**	**A^2s**
I^2t	**Limiting load integral** *half sine pulse, V_R = 0.7 V_{RRM}*	*t_p = 10 ms* *t_p = 8.3 ms*	**314 000** **300 000**	**A^2s**
$(di_T/dt)_{cr}$	**Critical rate of rise of on-state current** *I_T = I_{TAVm}, half sine waveform, f = 50 Hz,* *V_D = 2/3 V_{DRM}, t_r = 0.3 µs, I_{GT} = 2 A*		**200**	**A/µs**
$(dv_D/dt)_{cr}$	**Critical rate of rise of off-state voltage** *V_D = 2/3 V_{DRM}*		**1 000**	**V/µs**
P_{GAVm}	**Maximum average gate power losses**		**3**	**W**
I_{FGM}	**Peak gate current**		**10**	**A**
V_{FGM}	**Peak gate voltage**		**12**	**V**
V_{RGM}	**Reverse peak gate voltage**		**10**	**V**
T_{jmin} - T_{jmax}	**Operating temperature range**		**-40 ÷ 125**	**°C**
T_{stgmin} - T_{stgmax}	**Storage temperature range**		**-40 ÷ 125**	**°C**

Unless otherwise specified T_j = 125 °C

Characteristics			***Value***			***Unit***
			min.	***typ.***	***max.***	
V_{TM}	**Maximum peak on-state voltage** *I_{TM} = 1 000 A*				**1.500**	**V**
V_{T0} r_T	**Threshold voltage** **Slope resistance** *I_{T1} = 800 A, I_{T2} = 2 399 A*				**0.990** **0.503**	**V** **mΩ**
I_{DM}	**Peak off-state current** *$V_D = V_{DRM}$*				**30**	**mA**
I_{RM}	**Peak reverse current** *$V_R = V_{RRM}$*				**30**	**mA**
t_{gd}	**Delay time** *T_j = 25 °C, V_D = 0.4 V_{DRM}, $I_{TM} = I_{TAVm}$,* *t_r = 0.3 µs, I_{GT} = 2 A*				**2**	**µs**
t_q	**Turn-off time** *I_T = 640 A, di_T/dt = 12.5 A/µs,* *V_D = 2/3 V_{DRM}, dv_D/dt = 50 V/µs*			**150**		**µs**
Q_{rr}	**Recovery charge** *the same conditions as at t_q*			**1 000**		**µC**
I_H	**Holding current**	*T_j = 25 °C* *T_j = 125 °C*		**150** **80**		**mA**
I_L	**Latching current**	*T_j = 25 °C* *T_j = 125 °C*		**500** **350**		**mA**
V_{GT}	**Gate trigger voltage** *V_D = 12V, I_T = 4 A*	*T_j = - 40 °C* *T_j = 25 °C* *T_j = 125 °C*	 **0.25**		**4** **3** **2**	**V**
I_{GT}	**Gate trigger current** *V_D = 12V, I_T = 4 A*	*T_j = - 40 °C* *T_j = 25 °C* *T_j = 125 °C*	 **10**		**500** **250** **150**	**mA**

Unless otherwise specified T_j = 125 °C

Thermal Parameters		**Value**	**Unit**
R_{thjc}	**Thermal resistance junction to case** *double side cooling*	**44.0**	**K/kW**
	anode side cooling	**70.0**	
	cathode side cooling	**118.0**	
R_{thch}	**Thermal resistance case to heatsink** *double side cooling*	**12.0**	**K/kW**
	single side cooling	**24.0**	

Transient Thermal Impedance

Analytical function for transient thermal impedance

$$Z_{thjc} = \sum_{i=1}^{5} R_i (1 - \exp(-t / \tau_i))$$

Conditions:
F_m = 9 ± 3 kN, Double side cooled

Correction for periodic waveforms

180°	**sine:**	**add**	**4.0 K/kW**
180°	**rectangular:**	**add**	**6.0 K/kW**
120°	**rectangular:**	**add**	**9.0 K/kW**
60°	**rectangular:**	**add**	**15.5 K/kW**

i	1	2	3	4	5
R_i(K/kW)	28.28	10.76	1.26	3.47	0.16
τ_i(s)	0.2340	0.0859	0.0157	0.0037	0.0007

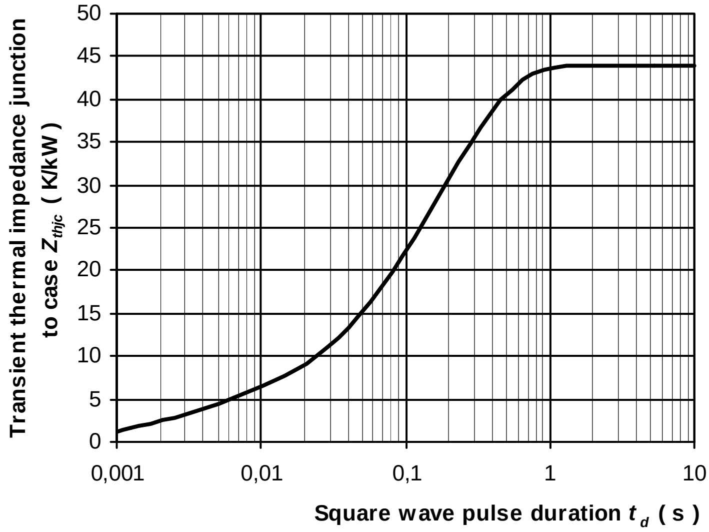

Fig. 2 Dependence transient thermal impedance junction to case on square pulse

Maximum On-state Characteristics

Analytical function for on-state characteristics:

$$v = A + B \cdot i + C \cdot \sqrt{i} + D \cdot \ln(i + 1)$$

T_j (°C)	*A*	*B*	*C*	*D*
25	**6.739E-1**	**3.730E-4**	**-2.519E-3**	**7.669E-2**
125	**5.754E-1**	**5.005E-4**	**-4.021E-3**	**7.925E-2**

Conditions:
F_m = 9 ± 3 kN,
half sine pulse 8.3/10 ms

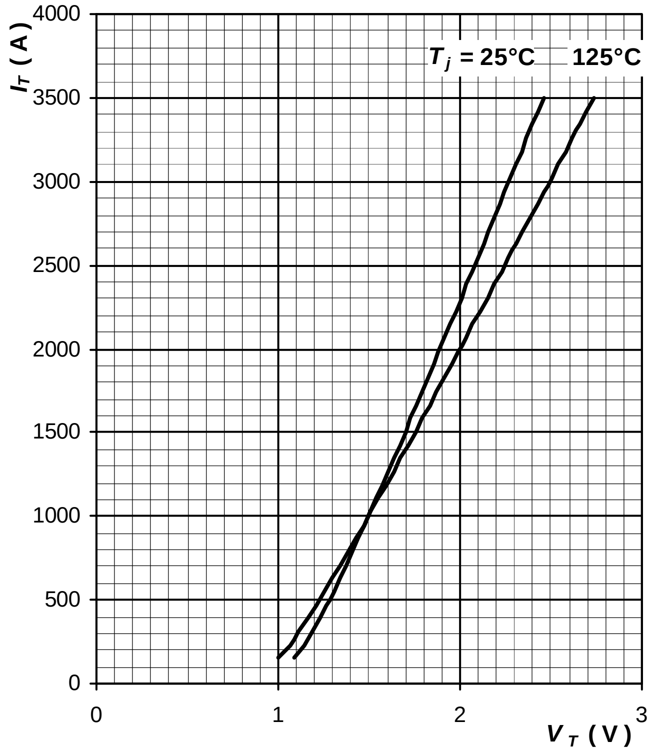

Fig. 3 Maximum on-state characteristics

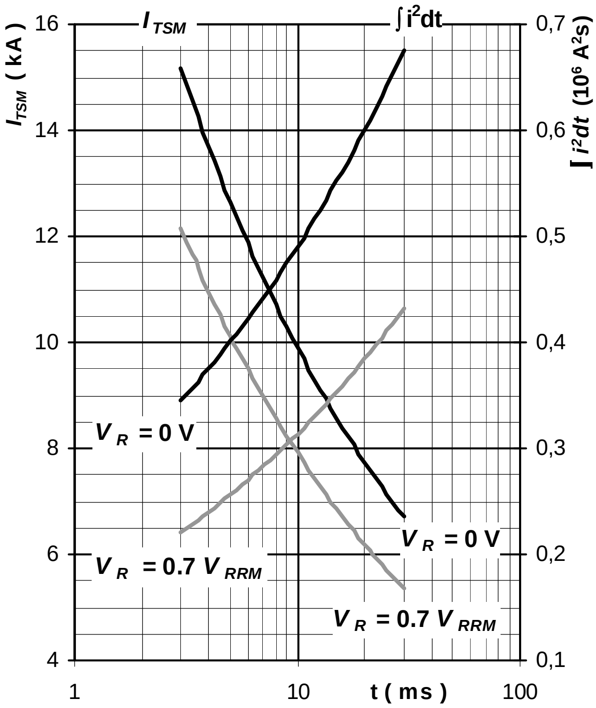

Fig. 4 Surge on-state current vs. pulse length, half sine wave, single pulse, $T_j = T_{jmax}$

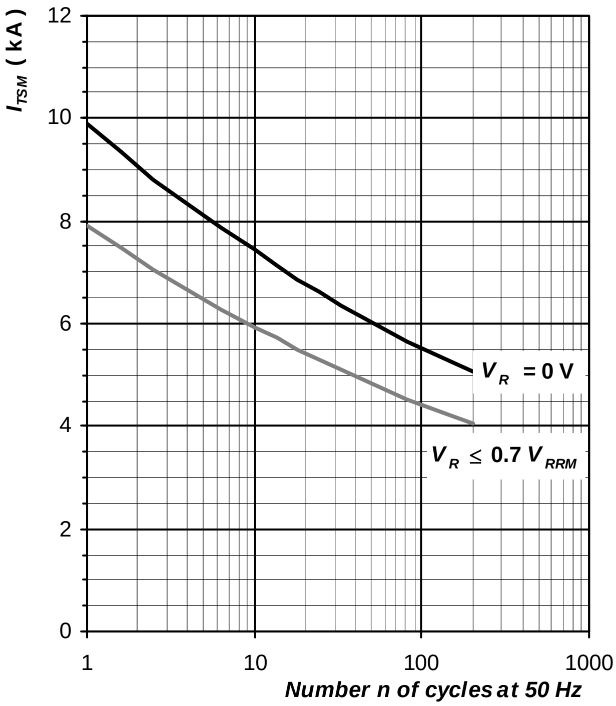

Fig. 5 Surge forward current vs. number of pulses. Half sine wave, $T_j = T_{jmax}$

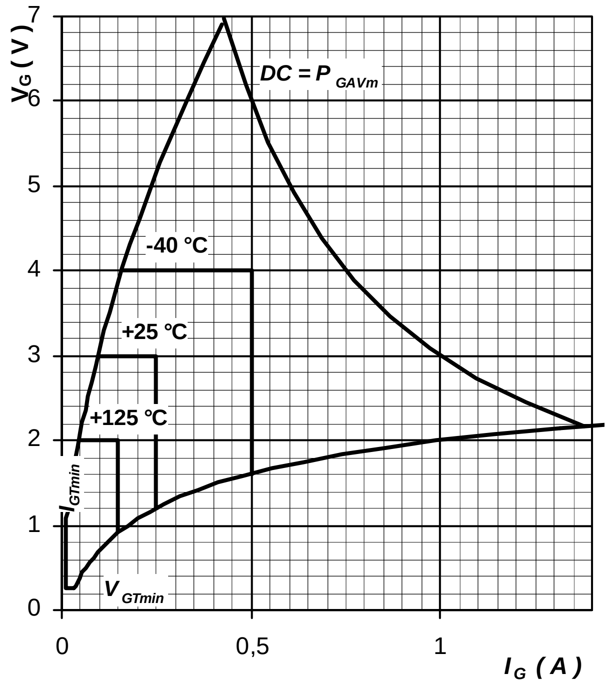

Fig. 6 Gate trigger characteristics – switching

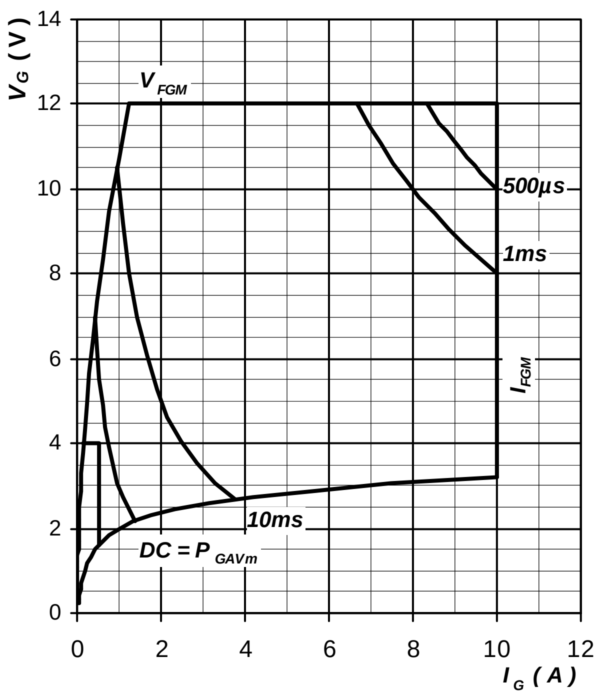

Fig. 7 Gate trigger characteristics – max. peak gate power loss (single pulses)

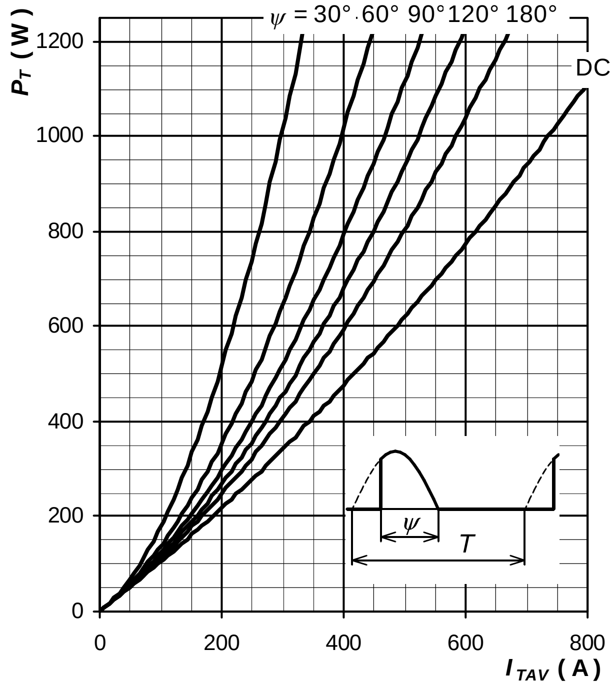

Fig. 8 On-state power loss vs. average on-state current, sine waveform, f = 50/60 Hz, T = 1/f

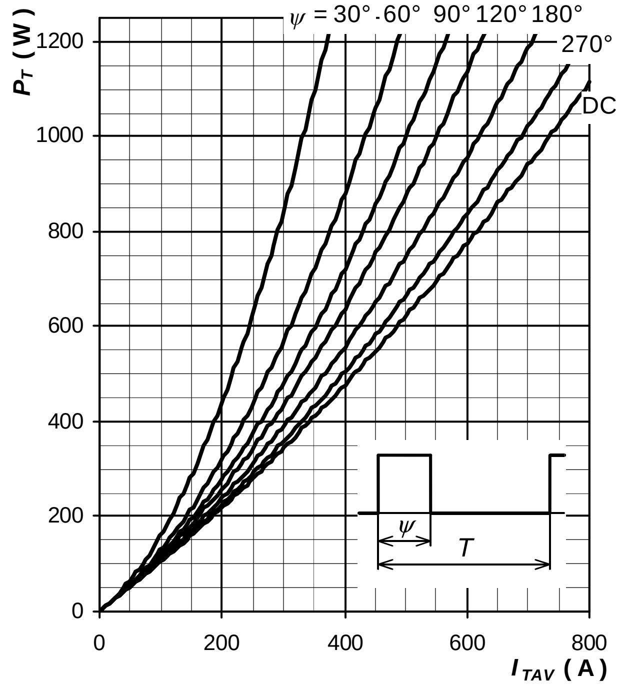

Fig. 9 On-state power loss vs. average on-state current, square waveform, f = 50/60 Hz, T = 1/f

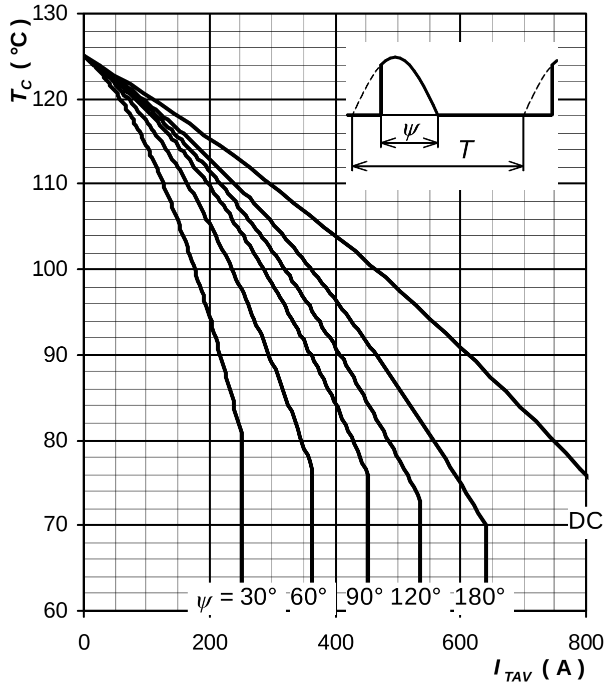

Fig. 10 Max. case temperature vs. aver. on-state current, sine waveform, f = 50/60 Hz, T = 1/f

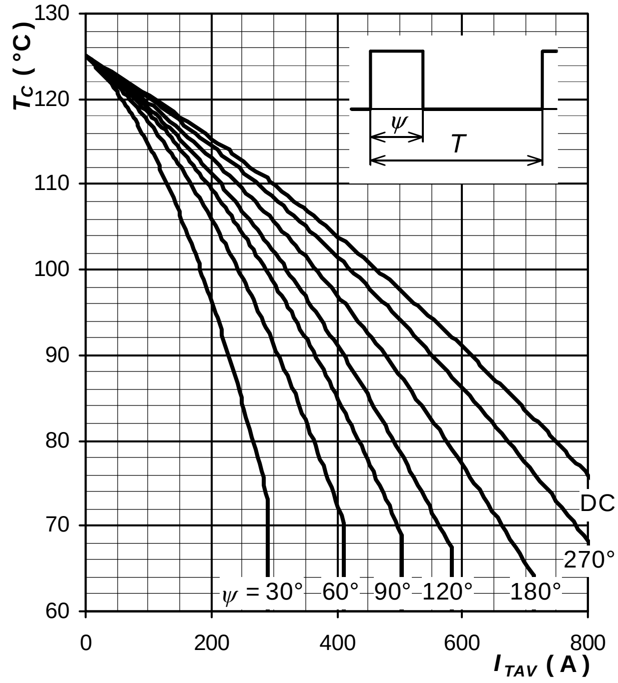

Fig. 11 Max. case temperature vs. aver. on-state current, square waveform, f = 50/60 Hz, T = 1/f

Notes: