ABB 5STP20T1600 Control Thyristor datasheet

http://www.manuallib.com/abb/5stp20t1600-control-thyristor-datasheet.html

Properties

- High operational capability
- Possibility of serial and parallel connection

5STP 20T1600

Old part no. T 918C-2010-16

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}	=	1 956	A
I_{TSM}	=	27 300	A
V_{TO}	=	0.948	V
r_T	=	0.152	mΩ

Types

	V_{RRM}, V_{DRM}
5STP 20T1600	**1 600 V**
Conditions:	*T_j = -40 ÷ 125 °C, half sine waveform, f = 50 Hz*

Mechanical Data

F_m	**Mounting force**	22 ± 2	kN
m	**Weight**	0.40	kg
D_S	**Surface creepage distance**	18	mm
D_a	**Air strike distance**	9	mm

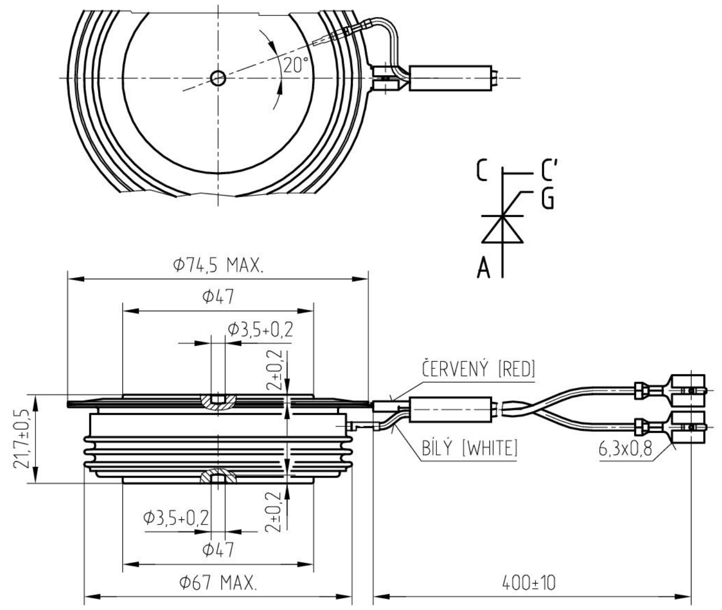

Fig. 1 Case

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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*		**3 073**	**A**
I_{TAVm}	**Average on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**1 956**	**A**
I_{TSM}	**Peak non-repetitive surge** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**27 300** **29 200**	**A**
I^2t	**Limiting load integral** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**3 730 000** **3 540 000**	**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} = 2 000 A*				**1.250**	**V**
V_{T0} r_T	**Threshold voltage** **Slope resistance** *I_{T1} = 2 380 A, I_{T2} = 7 139 A*				**0.948** **0.152**	**V** **mΩ**
I_{DM}	**Peak off-state current** *V_D = V_{DRM}*				**80**	**mA**
I_{RM}	**Peak reverse current** *V_R = V_{RRM}*				**80**	**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 = 2 000 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*			**2 200**		**µC**
I_H	**Holding current**	*T_j = 25 °C* *T_j = 125 °C*		**170** **90**		**mA**
I_L	**Latching current**	*T_j = 25 °C* *T_j = 125 °C*		**450** **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*	**15.5**	**K/kW**
	anode side cooling	**25.0**	
	cathode side cooling	**45.0**	
R_{thch}	**Thermal resistance case to heatsink** *double side cooling*	**4.0**	**K/kW**
	single side cooling	**8.0**	

Transient Thermal Impedance

Analytical function for transient thermal impedance

$$Z_{thjc} = \sum_{i=1}^{4} R_i (1 - \exp(-t / \tau_i))$$

Conditions:
F_m = 22 ± 2 kN, Double side cooled

Correction for periodic waveforms

180°	**sine:**	**add**	**1.3 K/kW**
180°	**rectangular:**	**add**	**1.8 K/kW**
120°	**rectangular:**	**add**	**3.0 K/kW**
60°	**rectangular:**	**add**	**5.1 K/kW**

i	1	2	3	4
τ_i (s)	0.41773	0.07323	0.00752	0.00214
R_i(K/kW)	9.311	4.504	1.014	0.675

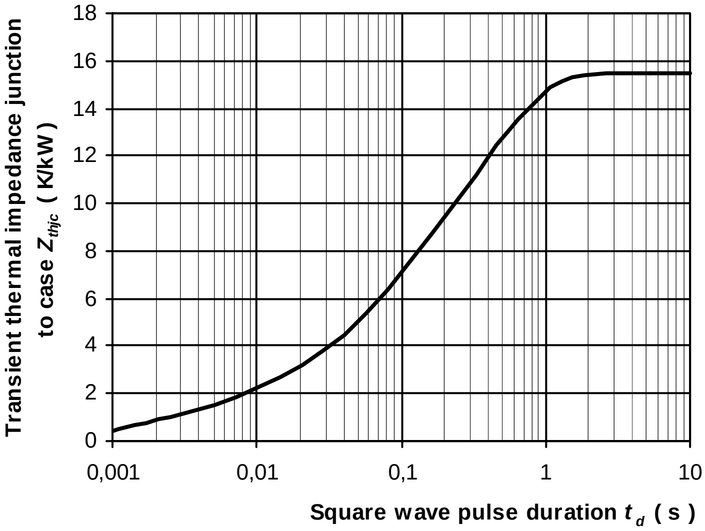

Fig. 2 Dependence transient thermal impedance junction to case on square pulse

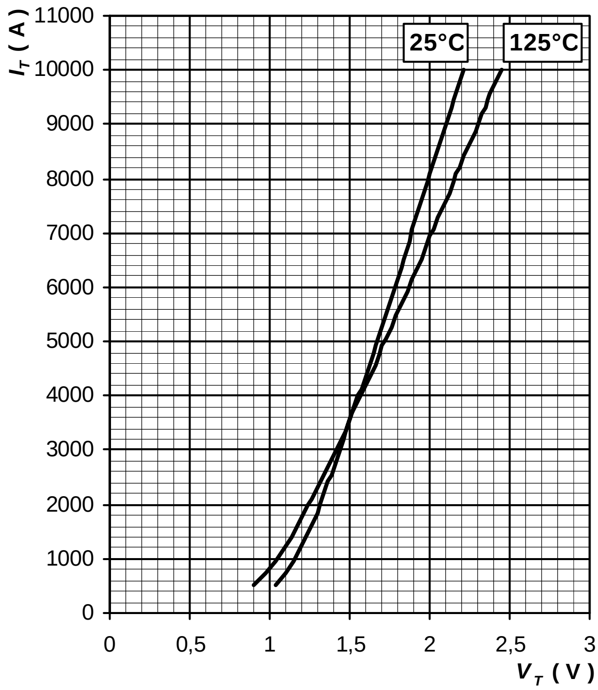

Fig. 3 Maximum on-state characteristics

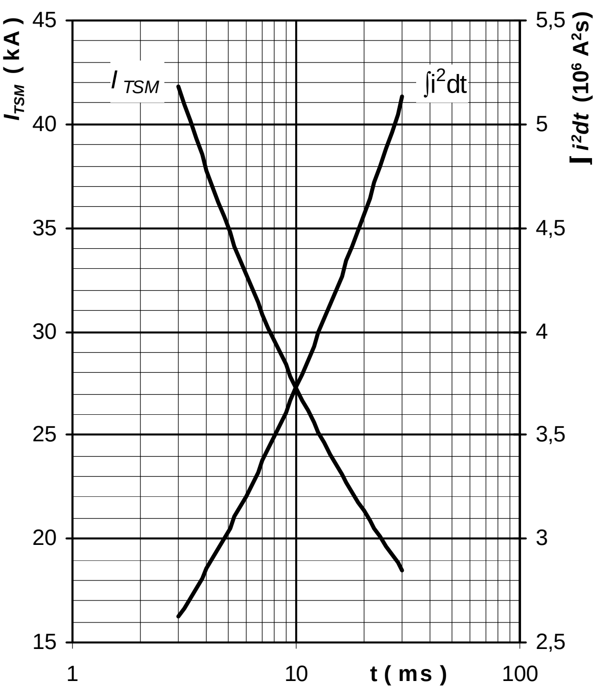

Fig. 4 Surge on-state current vs. pulse length, half sine wave, single pulse, V_R = 0 V, T_j = T_{jmax}

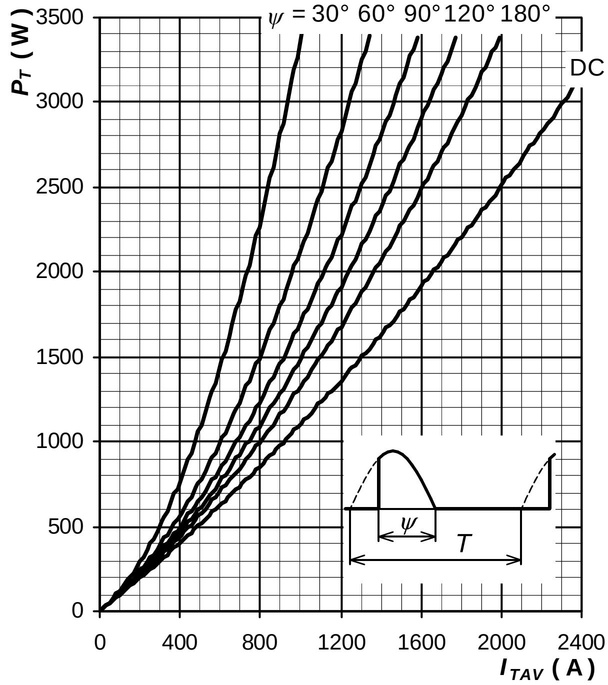

Fig. 5 On-state power loss vs. average on-state current, sine waveform, f = 50 Hz, T = 1/f

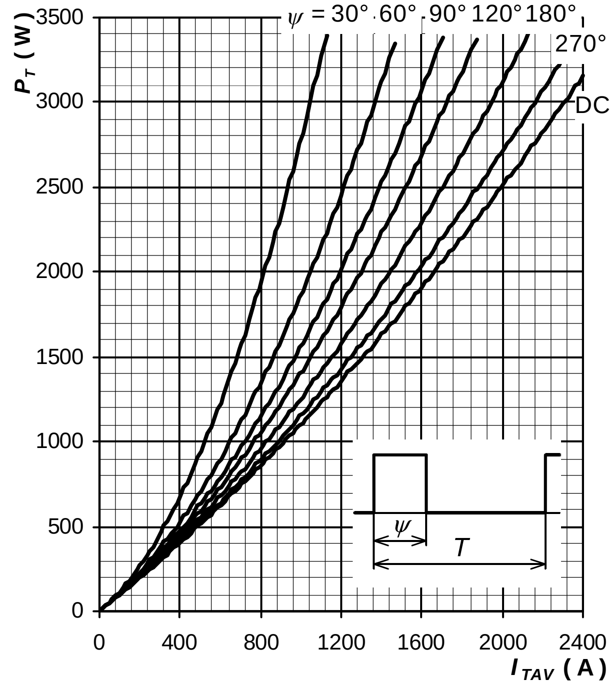

Fig. 6 On-state power loss vs. average on-state current, square waveform, f = 50 Hz, T = 1/f

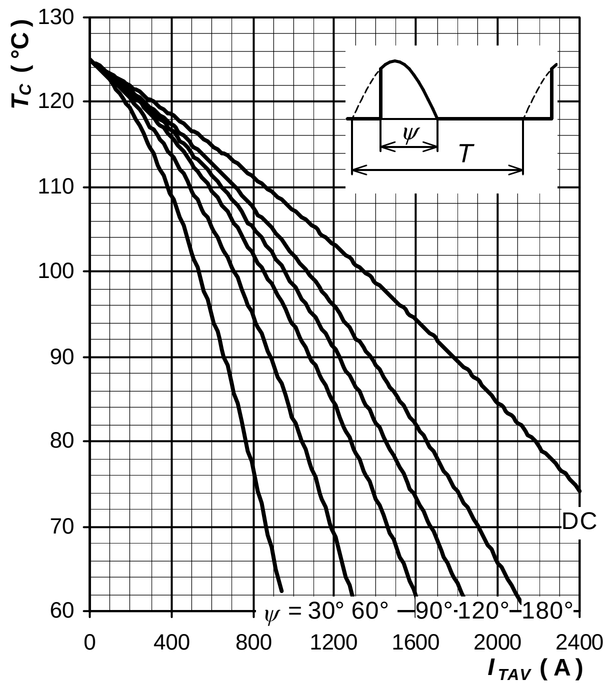

Fig. 7 Max. case temperature vs. aver. on-state current, sine waveform, f = 50 Hz, T = 1/f

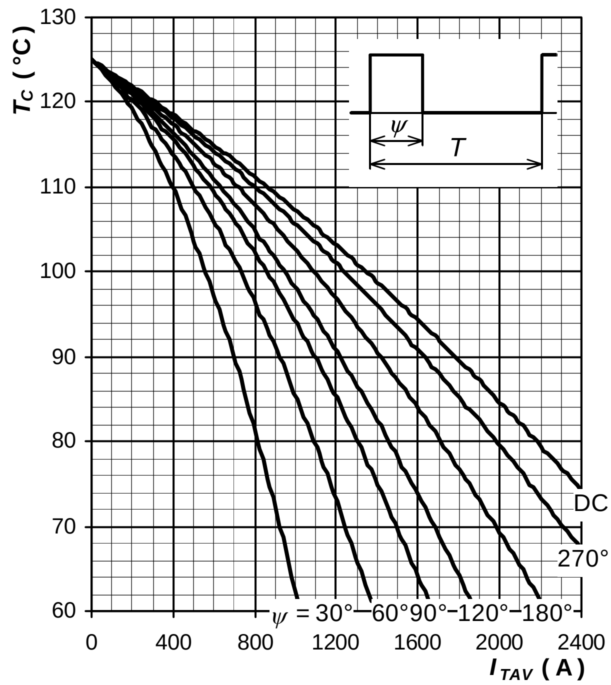

Fig. 8 Max. case temperature vs. aver. on-state current, square waveform, f = 50 Hz, T = 1/f

Notes: