5STP 09D2201

Old part no. TV 907-860-22

Phase Control Thyristor

Properties

- High operational capability
- Possibility of serial and parallel connection

Applications

- Controlled rectifiers
- AC drives

Key Parameters

V_{DRM}, V_{RRM}	=	2 200	V
I_{TAVm}	=	863	A
I_{TSM}	=	12 000	A
V_{TO}	=	0.976	V
r_T	=	0.414	mΩ

Types

	V_{RRM}, V_{DRM}
5STP 09D2201	**2 200 V**
Conditions:	*T_j = -40 ÷ 125 °C, half sine waveform, f = 50 Hz*

Mechanical Data

F_m	**Mounting force**	10 ± 2	kN
m	**Weight**	0.26	kg
D_S	**Surface creepage distance**	25	mm
D_a	**Air strike distance**	14	mm

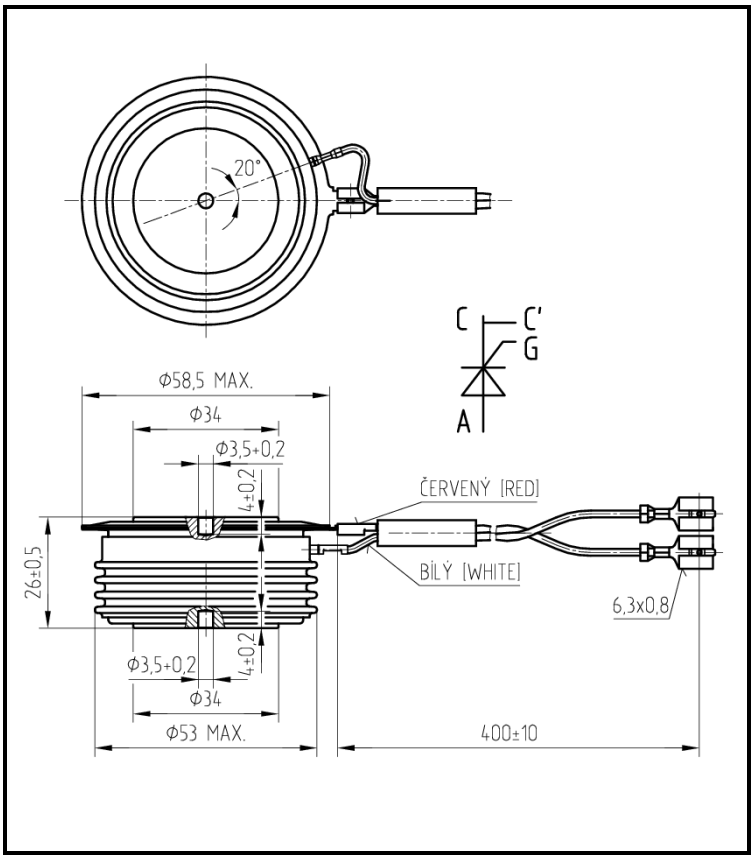

Fig. 1 Case

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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*		**2 200**	**V**
I_{TRMS}	**RMS on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**1 356**	**A**
I_{TAVm}	**Average on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**863**	**A**
I_{TSM}	**Peak non-repetitive surge** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**12 000** **12 800**	**A**
I^2t	**Limiting load integral** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**720 000** **680 000**	**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} = 1 500 A				1.600	V
V_{T0} r_T	**Threshold voltage** **Slope resistance** I_{T1} = 1 089 A, I_{T2} = 3 266 A				0.976 0.414	V mΩ
I_{DM}	**Peak off-state current** $V_D = V_{DRM}$				70	mA
I_{RM}	**Peak reverse current** $V_R = V_{RRM}$				70	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 = 1500 A, di_T/dt = 12.5 A/µs, V_D = 2/3 V_{DRM}, dv_D/dt = 50 V/µs			200		µs
Q_{rr}	**Recovery charge** the same conditions as at t_q			1 600		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*	32.0	K/kW
	anode side cooling	52.0	
	cathode side cooling	83.0	
R_{thch}	**Thermal resistance case to heatsink** *double side cooling*	10.0	K/kW
	single side cooling	20.0	

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 = 10 ± 2 kN, Double side cooled

Correction for periodic waveforms

180°	**sine:**	**add 2.3 K/kW**
180°	**rectangular:**	**add 3.1 K/kW**
120°	**rectangular:**	**add 5.2 K/kW**
60°	**rectangular:**	**add 8.7 K/kW**

i	1	2	3	4	5
τ_i (s)	0.4857	0.2162	0.0762	0.0043	0.0006
R_i(K/ W)	13.07	8.03	8.20	2.57	0.13

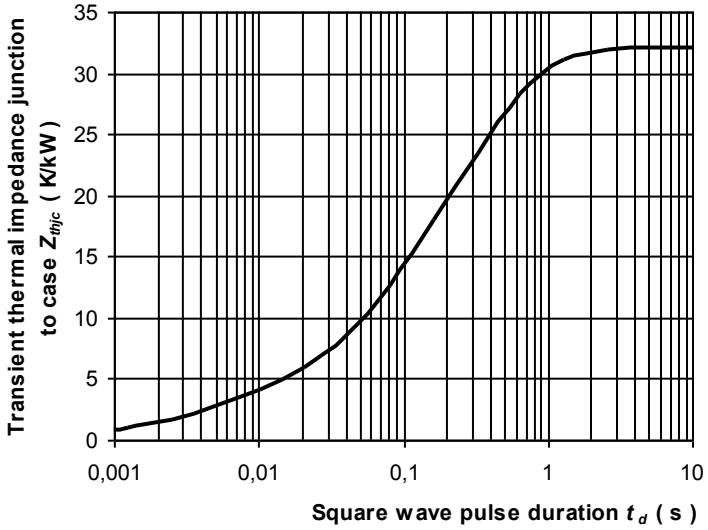

Fig. 2 Dependence transient thermal impedance junction to case on square pulse

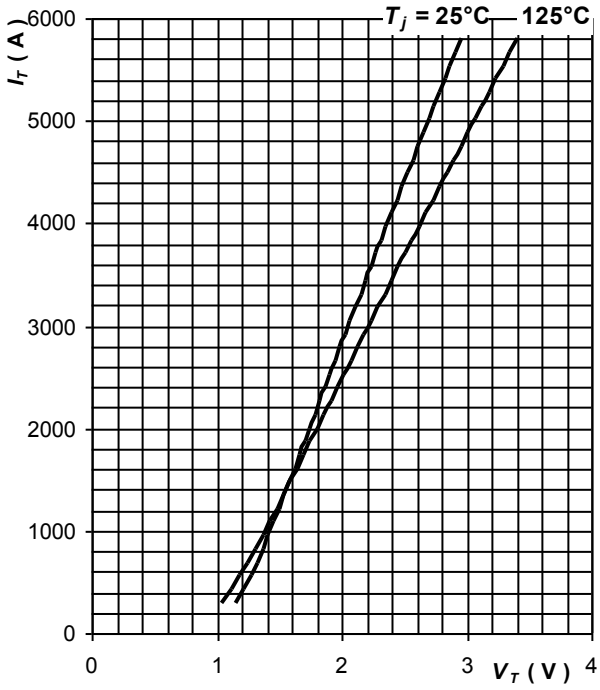

Fig. 3 Maximum on-state characteristics

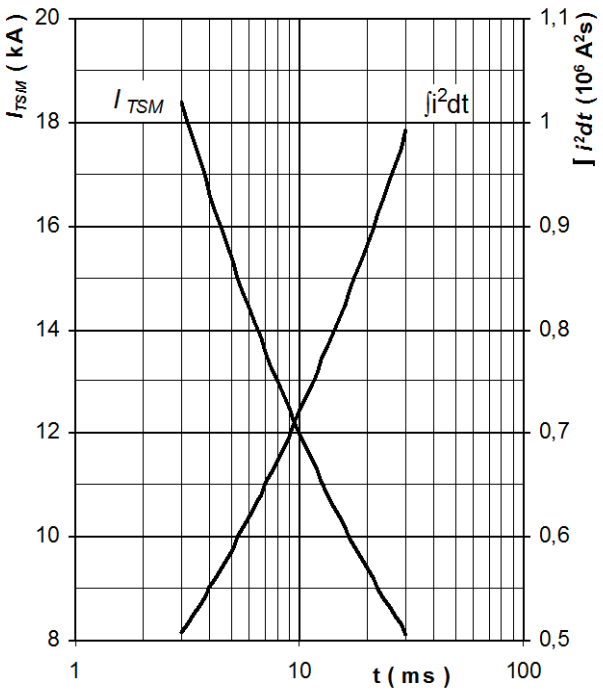

Fig. 4 Surge on-state current vs. pulse length, half sine wave, single pulse, V_R = 0 V, T_j = T_{jmax}

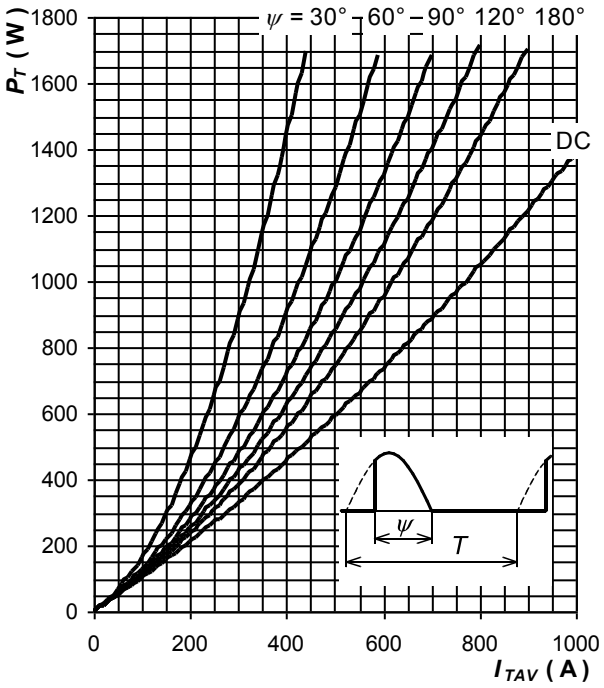

Fig. 5 On-state power loss vs. average on-state current, sine waveform, f = 50 Hz, T = 1/f

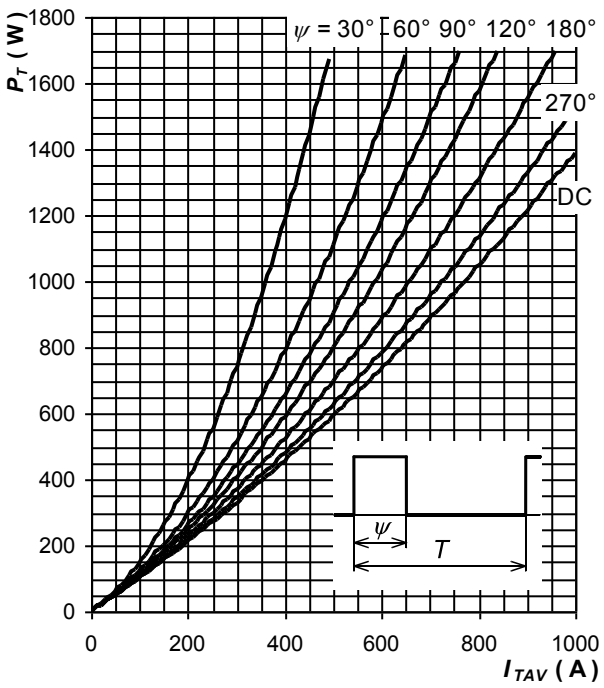

Fig. 6 On-state power loss vs. average on-state current, square waveform, f = 50 Hz, T = 1/f

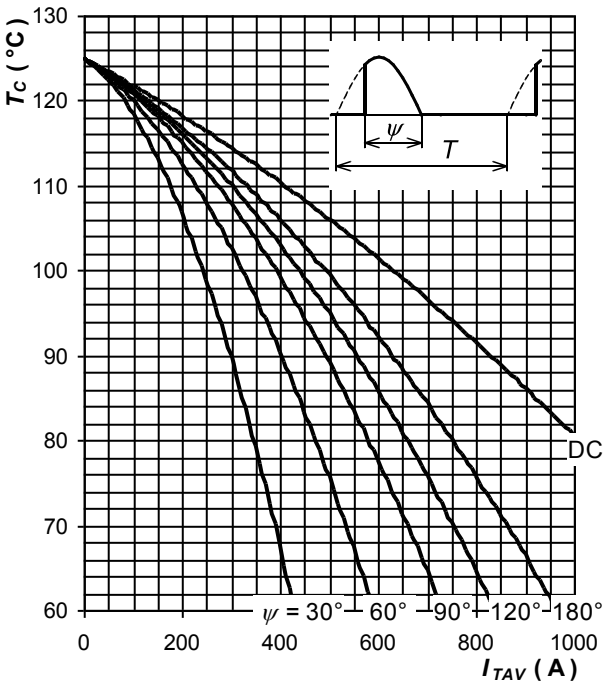

Fig. 7 Max. case temperature vs. aver. on-state current, sine waveform, f = 50 Hz, T = 1/f

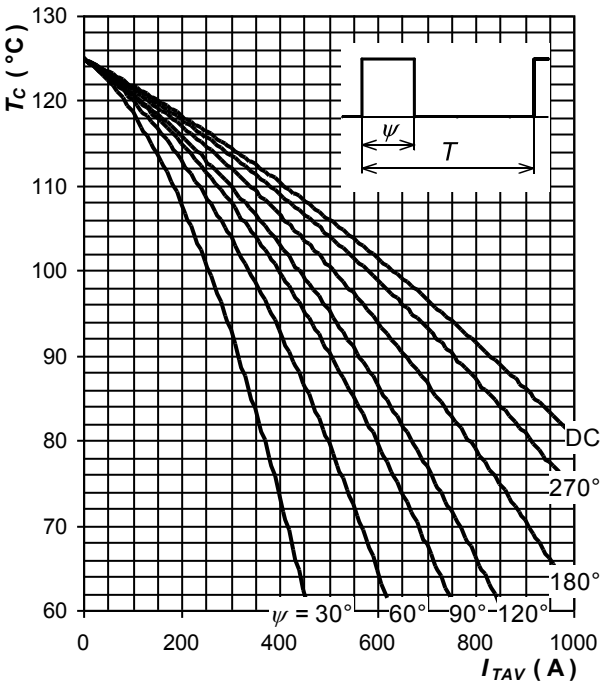

Fig. 8 Max. case temperature vs. aver. on-state current, square waveform, f = 50 Hz, T = 1/f

Notes: