5STP 12F4201

Old part no. TV 918-1200-42

Phase Control Thyristor

Properties

- High operational capability
- Possibility of serial and parallel connection

Applications

- Controlled rectifiers
- AC drives

Key Parameters

V_{DRM}, V_{RRM}	=	4 200	V
I_{TAVm}	=	1 247	A
I_{TSM}	=	15 000	A
V_{TO}	=	1.252	V
r_T	=	0.421	mΩ

Types

	V_{RRM}, V_{DRM}
5STP 12F4201	**4 200 V**
Conditions:	*T_j = -40 ÷ 125 °C, half sine waveform, f = 50 Hz, note 1*

Mechanical Data

F_m	**Mounting force**	22 ± 2	kN
m	**Weight**	0.48	kg
D_S	**Surface creepage distance**	25	mm
D_a	**Air strike distance**	13	mm

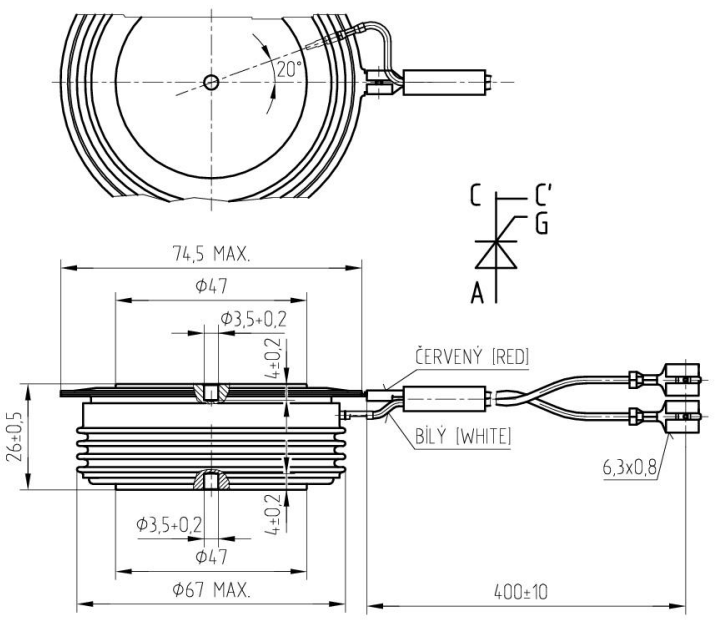

Fig. 1 Case

ABB s.r.o.
Novodvorska 1768/138a, 142 21 Praha 4, Czech Republic
tel.: +420 261 306 250, http://www.abb.com/semiconductors

Maximum Ratings			*Maximum Limits*	*Unit*
V_{RRM} V_{DRM}	**Repetitive peak reverse and off-state voltage** *T_j = -40 ÷ 125 °C, note 1*		**4 200**	**V**
V_{RSM} V_{DSM}	**Non-repetitive peak reverse and off-state voltage** *T_j = 25 ÷ 125 °C*		**4 300**	**V**
I_{TRMS}	**RMS on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**1 959**	**A**
I_{TAVm}	**Average on-state current** *T_c = 70 °C, half sine waveform, f = 50 Hz*		**1 247**	**A**
I_{TSM}	**Peak non-repetitive surge** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**15 000** **16 000**	**A**
I^2t	**Limiting load integral** *half sine pulse, V_R = 0 V*	*t_p = 10 ms* *t_p = 8.3 ms*	**1 125 000** **1 060 000**	**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*		**150**	**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
Note 1: De-rating factor of 0.13% V_{RRM} or V_{DRM} per °C is applicable for T_j below 25 °C

Characteristics			*Value*			*Unit*
			min.	*typ.*	*max.*	
V_{TM}	**Maximum peak on-state voltage** I_{TM} = 2 000 A				2.100	V
V_{T0} r_T	**Threshold voltage** **Slope resistance** I_{T1} = 1 885 A, I_{T2} = 5 655 A				1.252 0.421	V mΩ
I_{DM}	**Peak off-state current** $V_D = V_{DRM}$				150	mA
I_{RM}	**Peak reverse current** $V_R = V_{RRM}$				150	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				3	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			600		µs
Q_{rr}	**Recovery charge** the same conditions as at t_q			2 500		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 = 12 V, 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 = 12 V, I_T = 4 A	T_j = - 40 °C T_j = 25 °C T_j = 125 °C	 10		500 300 200	mA

Unless otherwise specified T_j = 125 °C

Thermal Parameters		*Value*	*Unit*
R_{thjc}	**Thermal resistance junction to case** *double side cooling*	16.0	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)	0.4653	0.1533	0.0375	0.0034
R_i(K/kW)	5.50	7.24	2.00	1.34

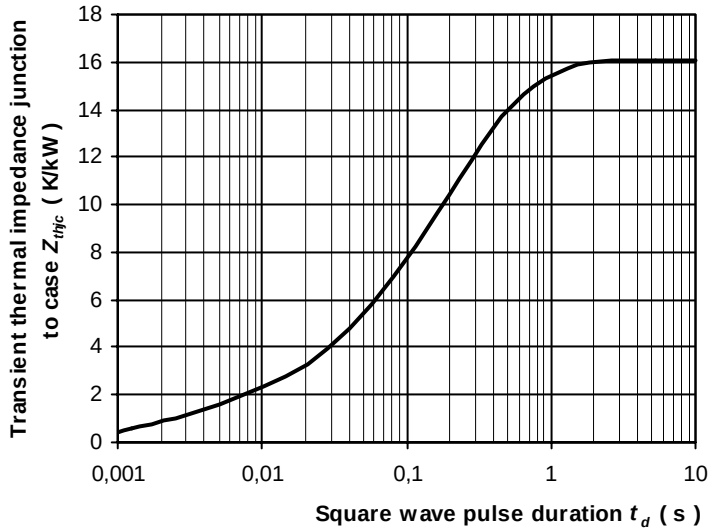

Fig. 2 Dependence transient thermal impedance junction to case on square pulse

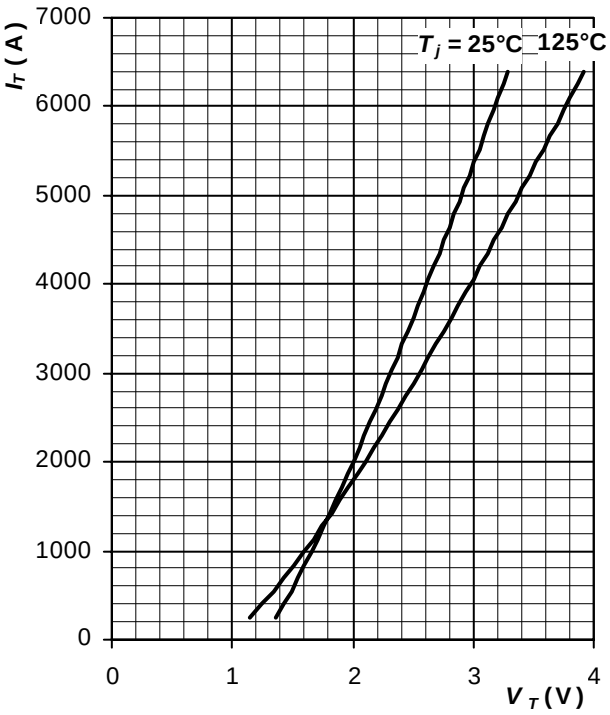

Fig. 3 Maximum on-state characteristics

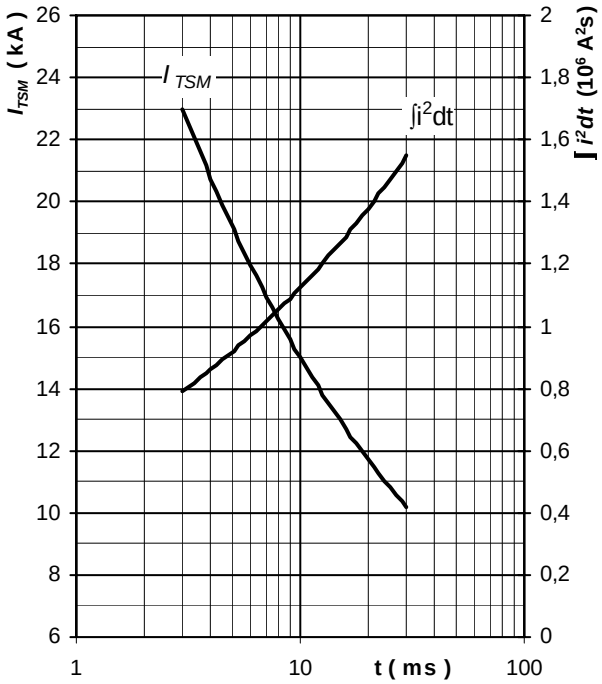

Fig. 4 Surge on-state current vs. pulse length, half sine wave, single pulse, V_R = 0 V, T_j = T_{jmax}

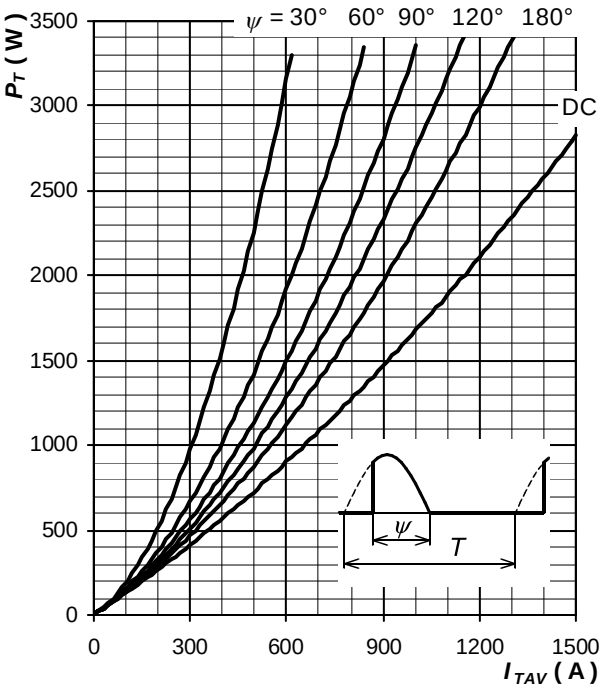

Fig. 5 On-state power loss vs. average on-state current, sine waveform, f = 50 Hz, T = 1/f

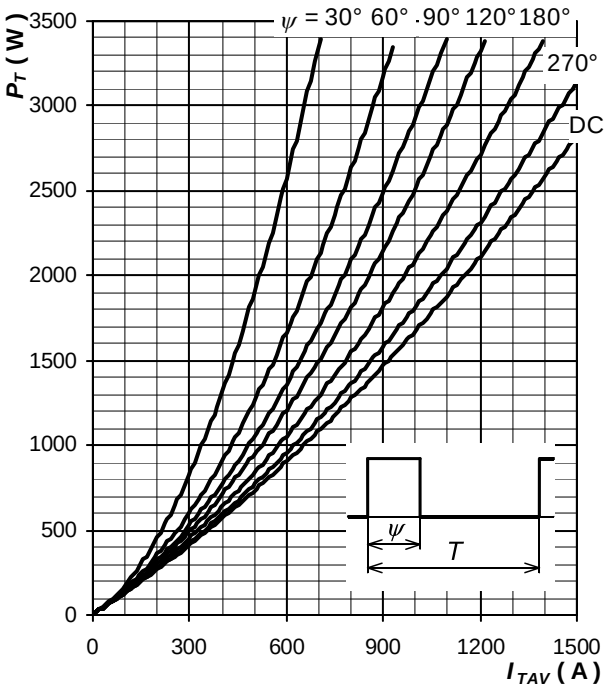

Fig. 6 On-state power loss vs. average on-state current, square waveform, f = 50 Hz, T = 1/f

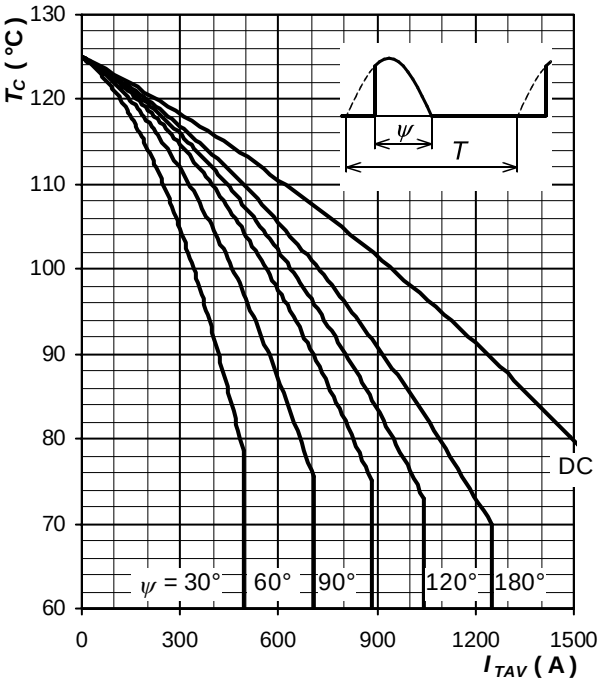

Fig. 7 Max. case temperature vs. aver. on-state current, sine waveform, f = 50 Hz, T = 1/f

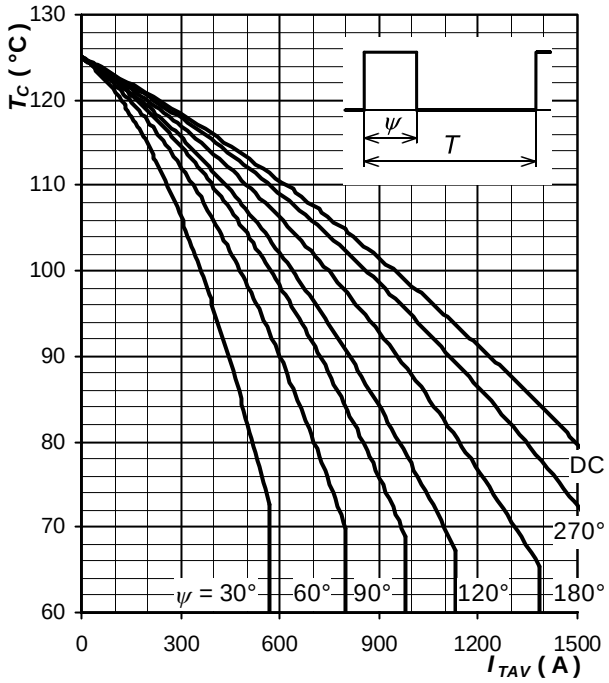

Fig. 8 Max. case temperature vs. aver. on-state current, square waveform, f = 50 Hz, T = 1/f

Notes: