

5STP 03T1200

Old part no. T 955-250-12

Phase Control Thyristor

Properties

- § High operational capability
- § Possibility of serial and parallel connection

Applications

- § Controlled rectifiers
- § AC drives

Key Parameters

V_{DRM}, V_{RRM}	= 1 200	V
I_{TAVm}	= 250	A
I_{TSM}	= 4 600	A
V_{TO}	= 0.930	V
r_T	= 0.610	mK

Types

	V_{RRM}, V_{DRM}
5STP 03T1200	1 200 V
Conditions:	$T_j = -40 \div 125 \text{ }^\circ\text{C}$, half sine waveform, $f = 50 \text{ Hz}$

Mechanical Data

M_m	Mounting torque	50 ± 5 Nm
m	Weight	0.46 kg
F_t	Tensile force of cathode lead / gate lead	100 / 5 N
D_s	Surface creepage distance	12.5 mm
D_a	Air strike distance	12.5 mm

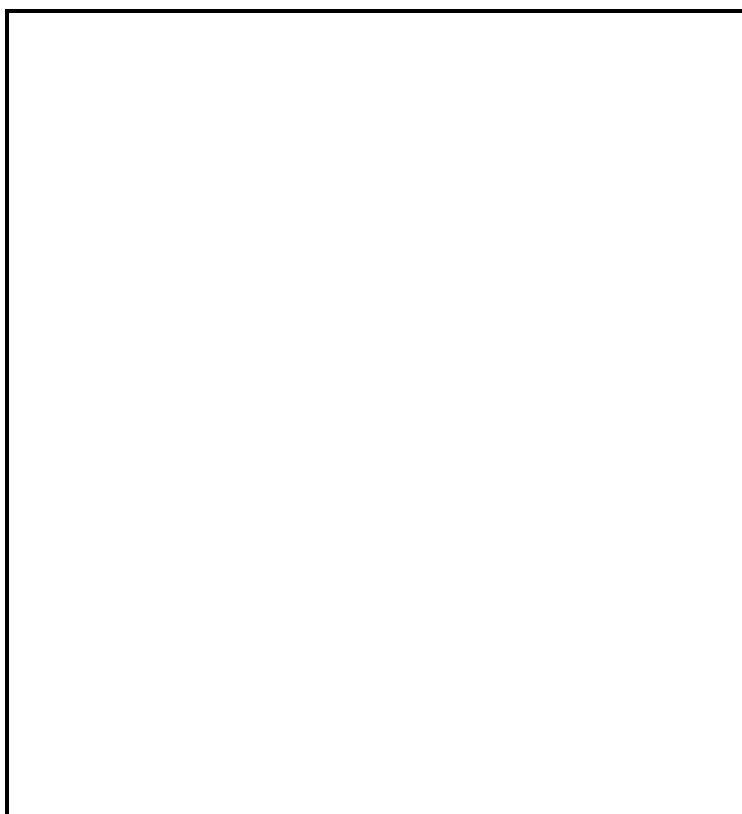


Fig. 1 Case

Maximum Ratings		Maximum Limits	Unit
V_{RRM} V_{DRM}	Repetitive peak reverse and off-state voltage $T_j = -40 \text{ (} 125 \text{)}^\circ\text{C}$	1 200	V
I_{TRMS}	RMS on-state current $T_c = 90^\circ\text{C}$, half sine waveform, $f = 50 \text{ Hz}$	393	A
I_{TAVm}	Average on-state current half sine waveform, $f = 50 \text{ Hz}$	$T_c = 70^\circ\text{C}$ 352 $T_c = 90^\circ\text{C}$ 250	A
I_{TSM}	Peak non-repetitive surge half sine pulse, $V_R = 0 \text{ V}$	$t_p = 10 \text{ ms}$ 4 600 $t_p = 8.3 \text{ ms}$ 4 900	A
I^2t	Limiting load integral half sine pulse, $V_R = 0 \text{ V}$	$t_p = 10 \text{ ms}$ 105 800 $t_p = 8.3 \text{ ms}$ 100 200	A²s
$(di_T/dt)_{cr}$	Critical rate of rise of on-state current $I_T = I_{TAVm}$, half sine waveform, $f = 50 \text{ Hz}$, $V_D = 2/3 V_{DRM}$, $t_r = 0.3 \mu\text{s}$, $I_{GT} = 2 \text{ A}$	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	5	W
I_{FGM}	Peak gate current	10	A
V_{FGM}	Peak gate voltage	12	V
V_{RGM}	Reverse peak gate voltage	3	V
$T_{jmin} - T_{jmax}$	Operating temperature range	-40 ÷ 125	°C
$T_{stgmin} - T_{stgmax}$	Storage temperature range	-40 ÷ 125	°C

Unless otherwise specified $T_j = 125^\circ\text{C}$

Characteristics		Value			Unit
		min.	typ.	max.	
V_{TM}	Maximum peak on-state voltage $I_{TM} = 785 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$			1.400	V
V_{TO}	Threshold voltage			0.930	V
r_T	Slope resistance $I_{T1} = 390 \text{ A}, I_{T2} = 1\ 180 \text{ A}$			0.610	mK
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 $T_j = 25 \text{ }^\circ\text{C}, V_D = 0.4 V_{DRM}, I_{TM} = I_{TAVm},$ $t_r = 0.3 \mu\text{s}, I_{GT} = 2 \text{ A}$		1.5		μs
t_q	Turn-off time $I_T = 100 \text{ A}, di_T/dt = 12.5 \text{ A}/\mu\text{s},$ $V_D = 2/3 V_{DRM}, dv_D/dt = 20 \text{ V}/\mu\text{s}$		200		μs
Q_{rr}	Recovery charge $I_T = 250 \text{ A}, di_T/dt = 12.5 \text{ A}/\mu\text{s}$		1 000		μC
I_H	Holding current $T_j = 25 \text{ }^\circ\text{C}$			150	mA
I_L	Latching current $T_j = 25 \text{ }^\circ\text{C}$			300	mA
V_{GT}	Gate trigger voltage $V_D = 12 \text{ V}, I_T = 4 \text{ A}$			4.5 3.0 2.3	V
			0.25		
I_{GT}	Gate trigger current $V_D = 12 \text{ V}, I_T = 4 \text{ A}$			500 300 200	mA
			5		

Unless otherwise specified $T_j = 125 \text{ }^\circ\text{C}$

Thermal Parameters		Value	Unit
R_{thjc}	Thermal resistance junction to case	100	K/kW
R_{thch}	Thermal resistance case to heatsink	30	K/kW

Transient Thermal Impedance																			
Analytical function for transient thermal impedance $Z_{thjc} = 1 + \sum_{i=1}^5 R_i (1 - \exp(-t/h_i))$																			
Conditions: $M_m = 50 \pm 5 \text{ Nm}$																			
Correction for periodic waveforms 180° sine: add 7.0 K/kW 180° rectangular: add 10.2 K/kW 120° rectangular: add 16.5 K/kW 60° rectangular: add 28.5 K/kW																			
	<table border="1"> <thead> <tr> <th>i</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>R_i (K/kW)</td> <td>45.20</td> <td>17.80</td> <td>21.10</td> <td>14.10</td> <td>1.78</td> </tr> <tr> <td>h_i (s)</td> <td>2.6500</td> <td>0.6440</td> <td>0.1060</td> <td>0.0090</td> <td>0.0008</td> </tr> </tbody> </table>	i	1	2	3	4	5	R_i (K/kW)	45.20	17.80	21.10	14.10	1.78	h_i (s)	2.6500	0.6440	0.1060	0.0090	0.0008
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	<p style="text-align: center;">Square wave pulse duration t_d (s)</p>																		
	<p>Fig. 2 Dependence transient thermal impedance junction to case on square pulse</p>																		

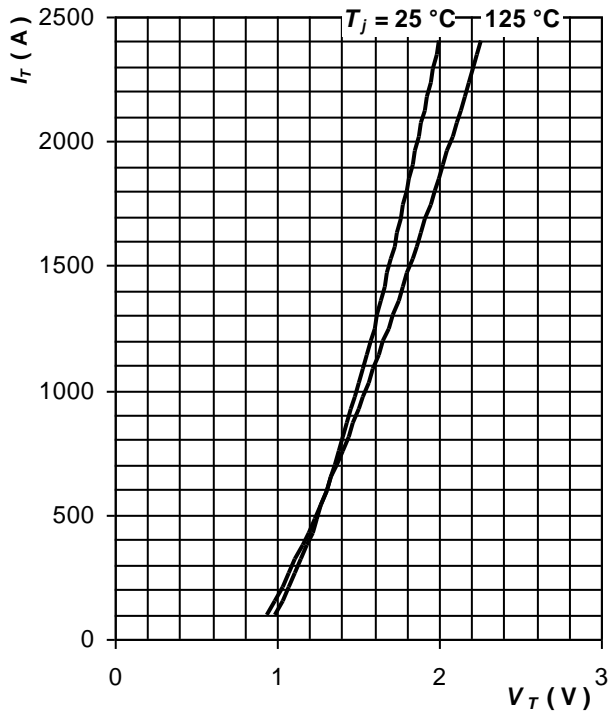


Fig. 3 Maximum on-state characteristics

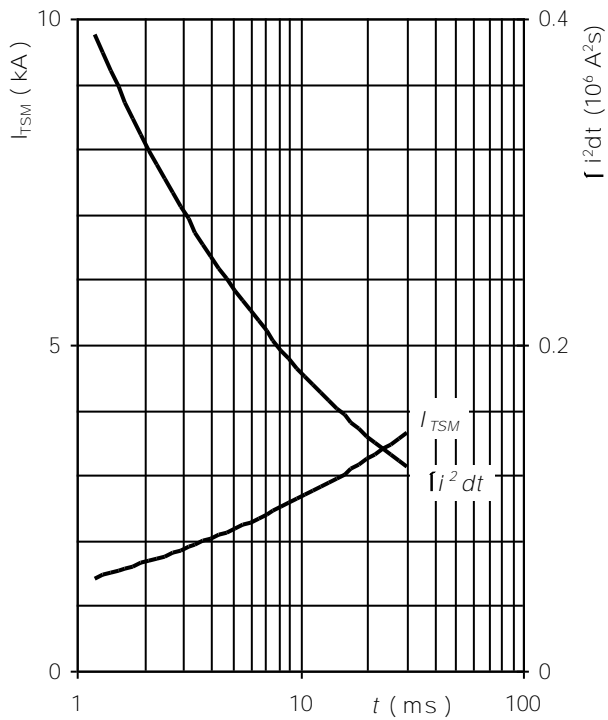


Fig. 4 Surge on-state current vs. pulse length, half sine wave, single pulse, $T_j = T_{jmax}$

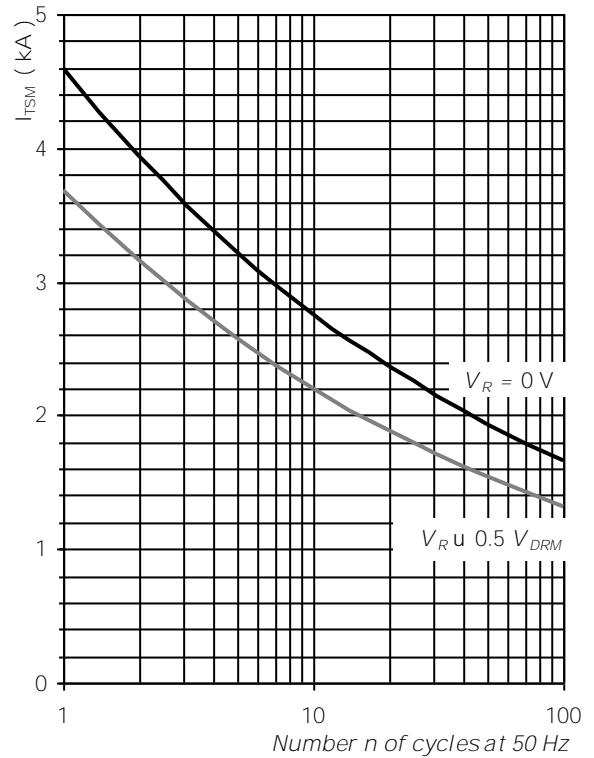


Fig. 5 Surge forward current vs. number of pulses. Half sine wave, $T_j = T_{jmax}$

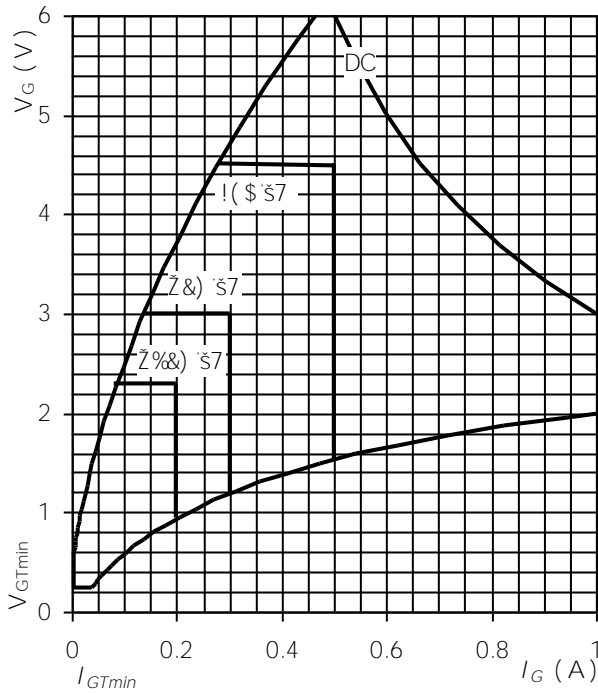


Fig. 6 Gate trigger characteristics . switching

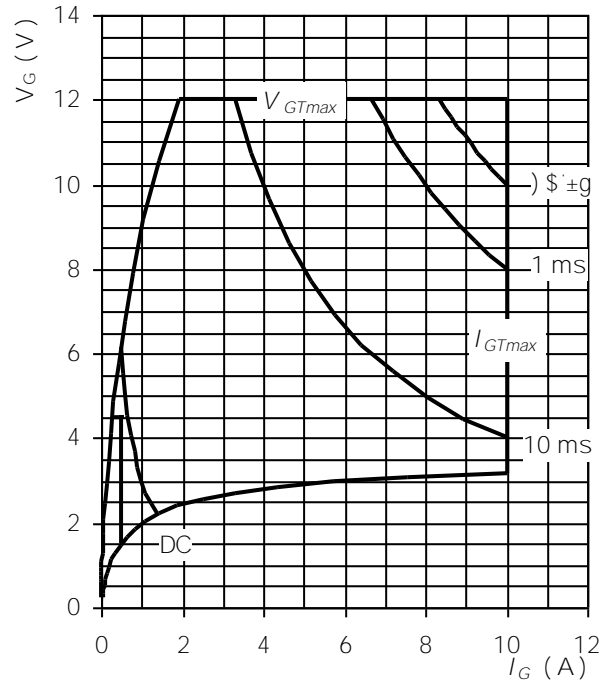


Fig. 7 Gate trigger characteristics . max. peak gate power loss (single pulses)

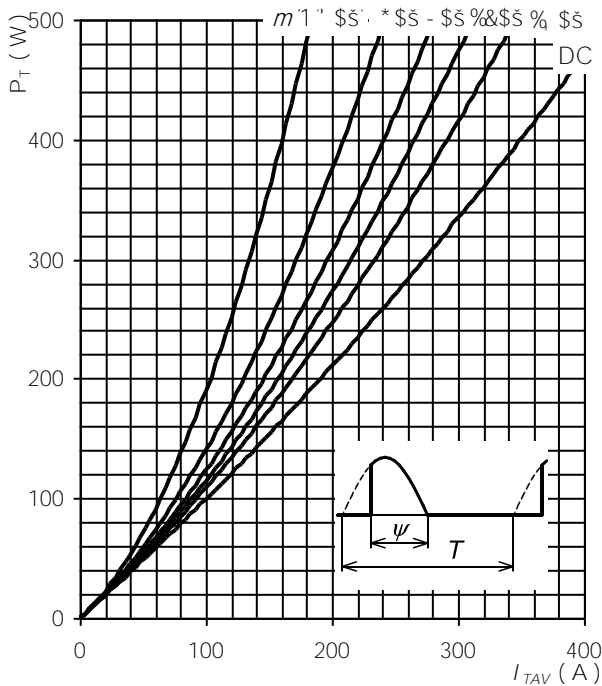


Fig. 8 On-state power loss vs. average on-state current, sine waveform, $f = 50/60$ Hz, $T = 1/f$

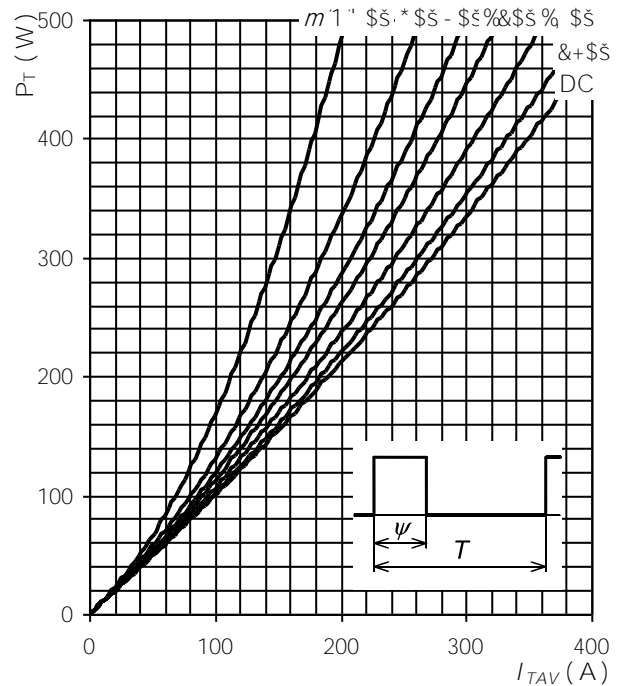


Fig. 9 On-state power loss vs. average on-state current, square waveform, $f = 50/60$ Hz, $T = 1/f$

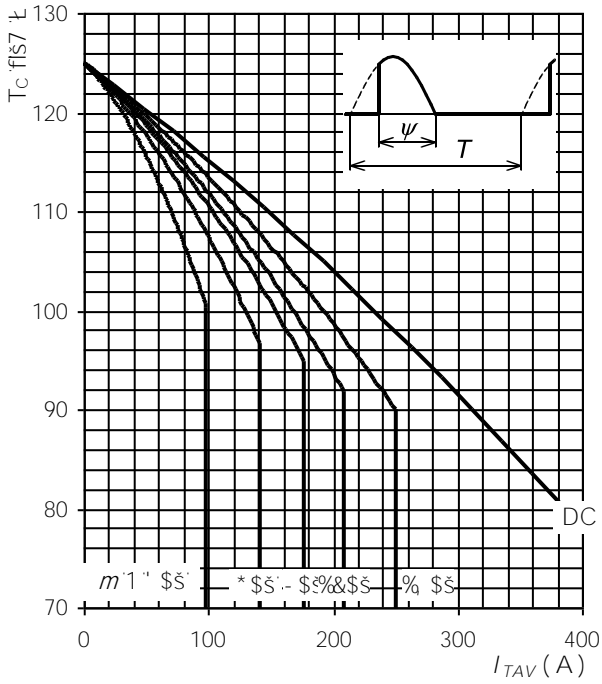


Fig. 10 Max. case temperature vs. aver. on-state current, sine waveform, $f = 50/60$ Hz, $T = 1/f$

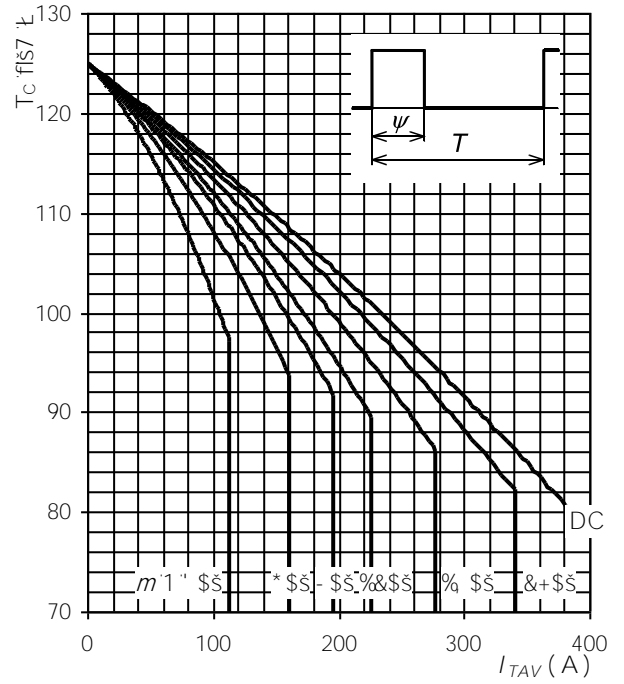


Fig. 11 Max. case temperature vs. aver. on-state current, square waveform, $f = 50/60$ Hz, $T = 1/f$

Notes: