

V_{DSM}	=	6500 V
I_{TAVM}	=	350 A
I_{TRMS}	=	550 A
I_{TSM}	=	4500 A
V_{T0}	=	1.20 V
r_T	=	2.300 mW

Phase Control Thyristor

5STP 03X6500

Doc. No. 5SYA1003-04 Aug.00

- Patented free-floating silicon technology
- Low on-state and switching losses
- Designed for traction, energy and industrial applications
- Optimum power handling capability

Blocking

Part Number	5STP 03X6500	5STP 03X6200	5STP 03X5800	Conditions	
V _{DSM} V _{RSM}	6500 V	6200 V	5800 V	f = 5 Hz, t _p = 10ms	
V _{DRM} V _{RRM}	5600 V	5300 V	4900 V	f = 50 Hz, t _p = 10ms	
V _{RSM1}	7000 V	6700 V	6300 V	t _p = 5 ms, single pulse	
I _{DSM}	≤ 150 mA			V _{DSM}	T _j = 125°C
I _{RSM}	≤ 150 mA			V _{RSM}	
dV/dt _{crit}	1000 V/μs @ Exp. to 0.67xV _{DRM}				

V_{DRM}/V_{RRM} are equal to V_{DSM}/V_{RSM} values up to $T_j = 110^\circ\text{C}$

Mechanical data

F_M	Mounting force	nom.	10 kN
		min.	8 kN
		max.	12 kN
a	Acceleration		
	Device unclamped		50 m/s^2
	Device clamped		100 m/s^2
m	Weight		0.4 kg
D_S	Surface creepage distance		38 mm
D_a	Air strike distance		21 mm

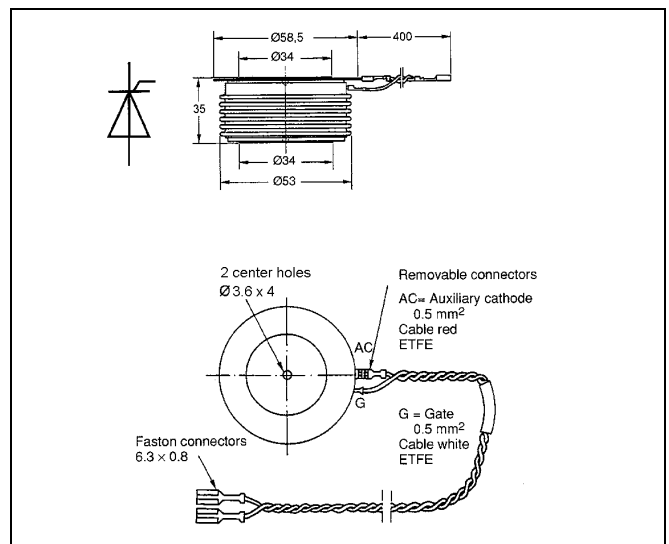


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On-state

I _{TAVM}	Max. average on-state current	350 A	Half sine wave, T _C = 70°C	
I _{TRMS}	Max. RMS on-state current	550 A		
I _{TSM}	Max. peak non-repetitive surge current	4500 A	tp = 10 ms	T _j = 125°C
		4850 A	tp = 8.3 ms	After surge:
I ² t	Limiting load integral	101 kA ² s	tp = 10 ms	V _D = V _R = 0V
		98 kA ² s	tp = 8.3 ms	
V _T	On-state voltage	3.50 V	I _T = 1000 A	T _j = 125°C
V _{T0}	Threshold voltage	1.20 V	I _T = 300 - 900 A	
r _T	Slope resistance	2.300 mΩ		
I _H	Holding current	30-80 mA	T _j = 25°C	
		15-60 mA	T _j = 125°C	
I _L	Latching current	80-500 mA	T _j = 25°C	
		50-200 mA	T _j = 125°C	

Switching

di/dt_{crit}	Critical rate of rise of on-state current	100 $\text{A}/\mu\text{s}$	Cont.	$V_D \leq 0.67 \cdot V_{DRM} \quad T_j = 125^\circ\text{C}$ $I_{TRM} = 1000 \text{ A} \quad f = 50 \text{ Hz}$ $I_{FG} = 2.0 \text{ A} \quad t_r = 0.5 \mu\text{s}$
		200 $\text{A}/\mu\text{s}$	60 sec.	
t_d	Delay time	$\leq 3.0 \mu\text{s}$	$V_D = 0.4 \cdot V_{DRM}$	$I_{FG} = 2.0 \text{ A} \quad t_r = 0.5 \mu\text{s}$
t_q	Turn-off time	$\leq 700 \mu\text{s}$	$V_D \leq 0.67 \cdot V_{DRM}$ $dv_D/dt = 20\text{V}/\mu\text{s}$	$I_{TRM} = 1000 \text{ A} \quad T_j = 125^\circ\text{C}$ $V_R > 200 \text{ V}$
Q_{rr}	Recovery charge	min		$di_T/dt = -1 \text{ A}/\mu\text{s}$
		max		

Triggering

V_{GT}	Gate trigger voltage	2.6 V	$T_j = 25^\circ\text{C}$
I_{GT}	Gate trigger current	400 mA	$T_j = 25^\circ\text{C}$
V_{GD}	Gate non-trigger voltage	0.3 V	$V_D = 0.4 \cdot V_{DRM}$
I_{GD}	Gate non-trigger current	10 mA	$V_D = 0.4 \cdot V_{DRM}$
V_{FGM}	Peak forward gate voltage	12 V	
I_{FGM}	Peak forward gate current	10 A	
V_{RGM}	Peak reverse gate voltage	10 V	
P_G	Maximum gate power loss	3 W	

Thermal

$T_{j\max}$	Max. junction temperature	125°C	
$T_{j\text{stg}}$	Storage temperature range	-40...150°C	
R_{thJC}	Thermal resistance junction to case	85 K/kW	Anode side cooled
		95 K/kW	Cathode side cooled
		45 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	15 K/kW	Single side cooled
		7.5 K/kW	Double side cooled

Analytical function for transient thermal impedance:

$$Z_{\text{thJC}}(t) = \sum_{i=1}^n R_i(1 - e^{-t/\tau_i})$$

i	1	2	3	4
R_i (K/kW)	26.07	12.16	3.37	3.1
τ_i (s)	0.6439	0.0812	0.0161	0.0075

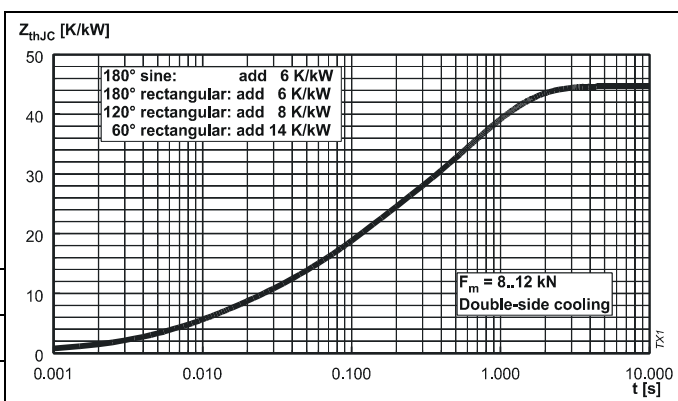


Fig. 1 Transient thermal impedance junction to case.

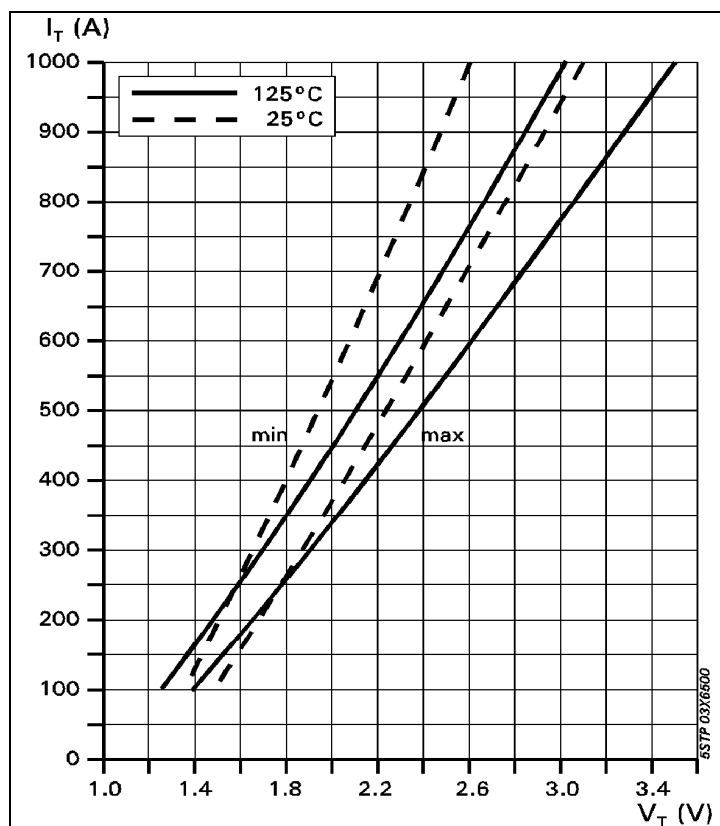


Fig. 2. On-state characteristics.

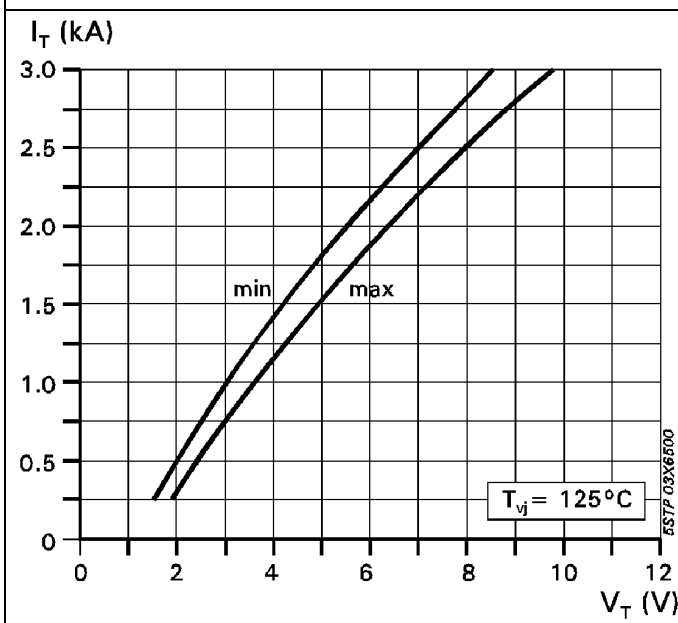


Fig. 3 On state characteristics.

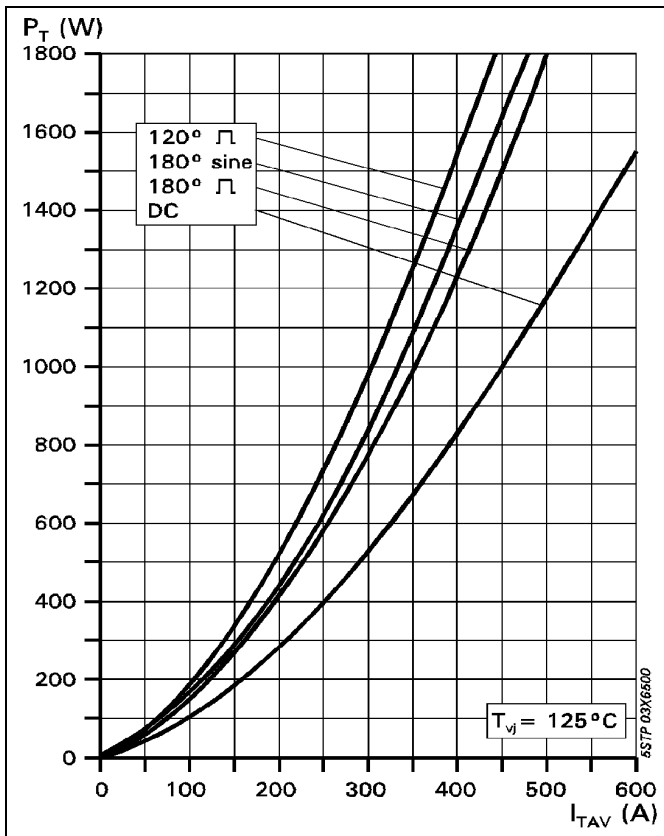


Fig. 4 On-state power dissipation vs. mean on-state current. Turn-on losses excluded.

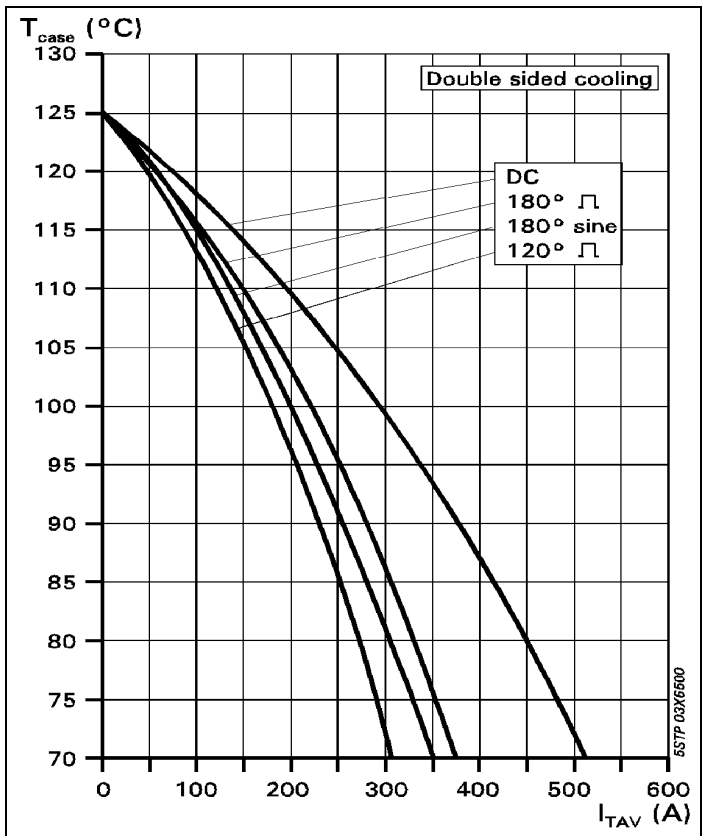


Fig. 5 Max. permissible case temperature vs. mean on-state current.

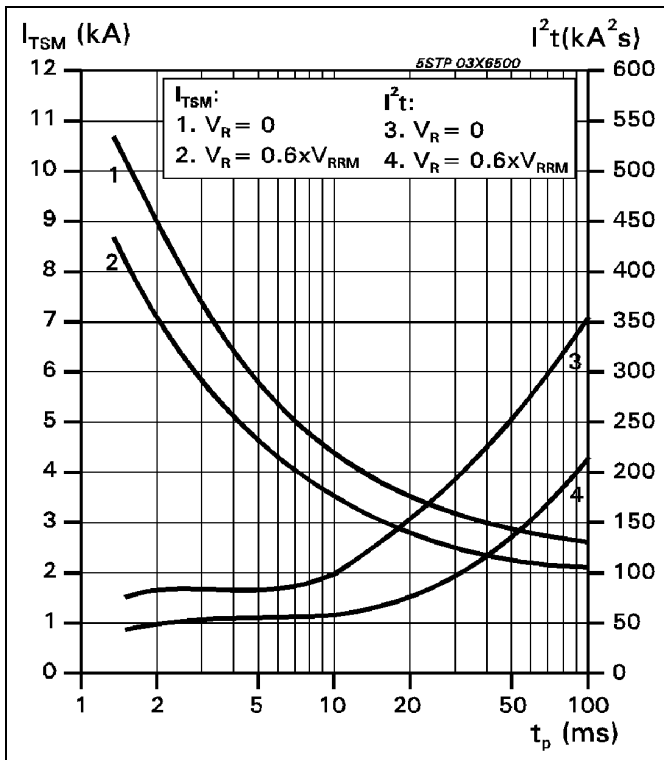


Fig. 6 Surge on-state current vs. pulse length. Half-sine wave.

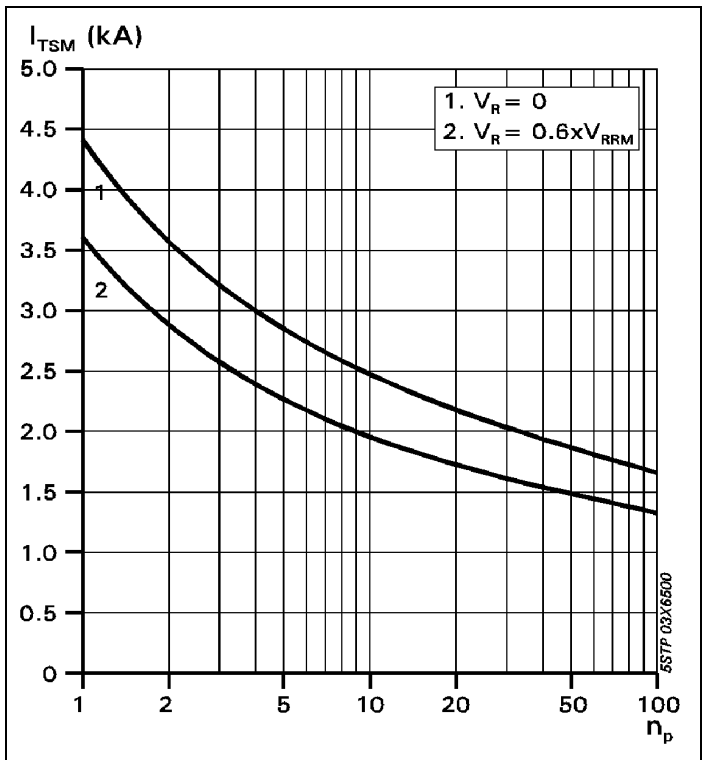


Fig. 7 Surge on-state current vs. number of pulses. Half-sine wave, 10 ms, 50Hz.

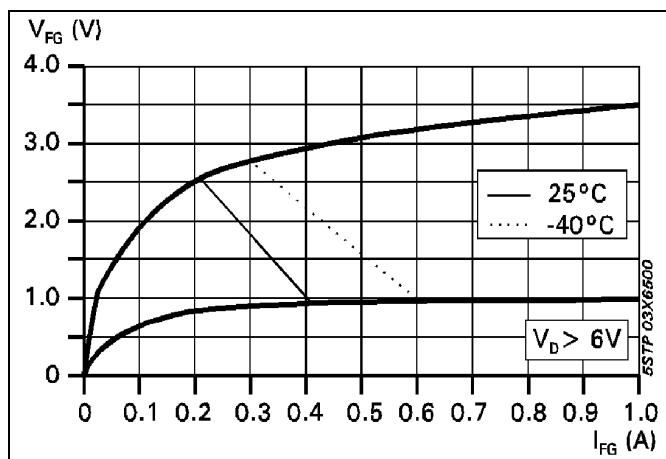


Fig. 8 Gate trigger characteristics.

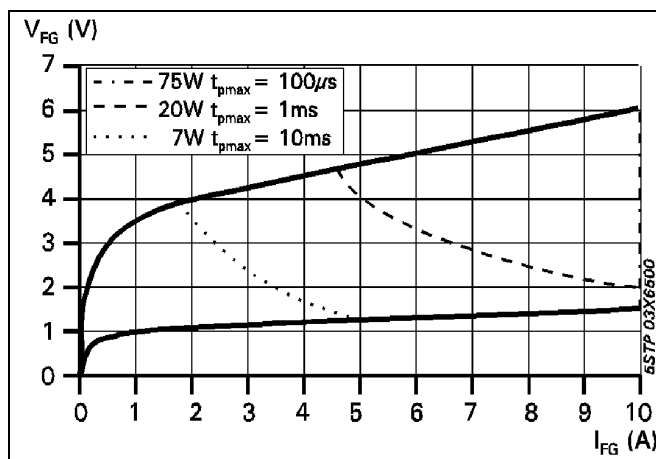


Fig. 9 Max. peak gate power loss.

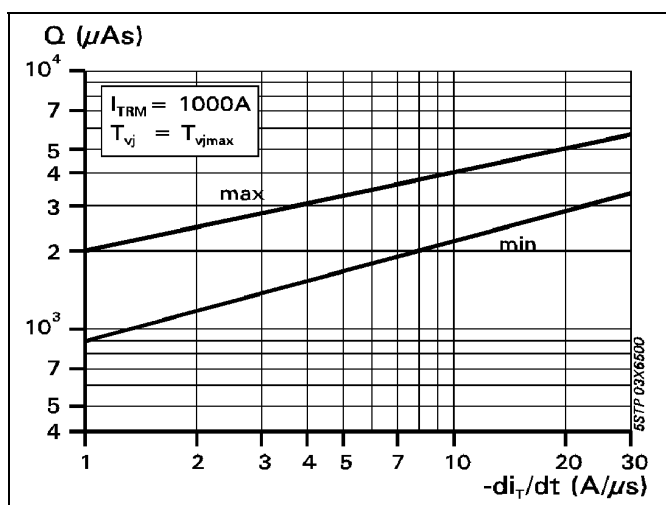


Fig. 10 Recovery charge vs. decay rate of on-state current.

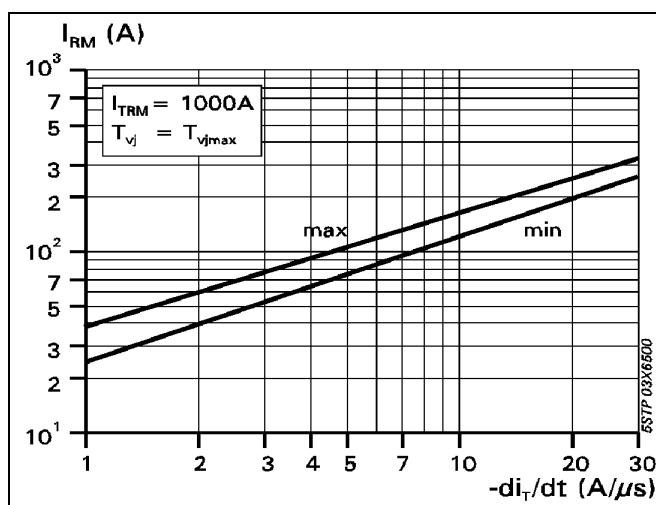


Fig. 11 Peak reverse recovery current vs. decay rate of on-state current.

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