V_{DSM}	=	1800 V
I_{TAVM}	=	1660 A
I_{TRMS}	=	2610 A
I_{TSM}	=	21000 A
V_{T0}	=	0.83 V
r_T	=	0.230 mW

Phase Control Thyristor

5STP 18F1800

Doc. No. 5SYA1028-04 Aug.00

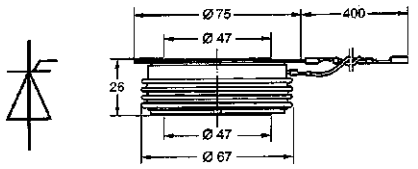
- **Patented free-floating silicon technology**
- **Low on-state and switching losses**
- **Designed for traction, energy and industrial applications**
- **Optimum power handling capability**

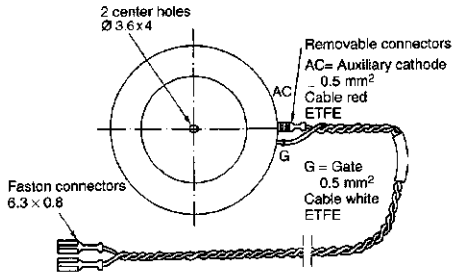
Blocking

Part Number	**5STP 18F1800**	**5STP 18F1600**	**5STP 18F1200**	Conditions	
V_{DRM} V_{RRM}	1800 V	1600 V	1200 V	f = 50 Hz, t_p = 10ms	
V_{RSM1}	2000 V	1800 V	1400 V	t_p = 5 ms, single pulse	
I_{DRM}	≤ 200 mA			V_{DRM}	T_j = 125°C
I_{RRM}	≤ 200 mA			V_{RRM}	
dV/dt_{crit}	1000 V/µs			@ Exp. to 0.67xV_{DRM}	

Mechanical data

F_M	Mounting force	nom.	22	kN
		min.	14	kN
		max.	24	kN
a	Acceleration			
	Device unclamped		50	m/s^2
	Device clamped		100	m/s^2
m	Weight		0.6	kg
D_S	Surface creepage distance		25	mm
D_a	Air strike distance		14	mm





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On-state

I_{TAVM}	Max. average on-state current	1660 A	Half sine wave, T_C = 70°C	
I_{TRMS}	Max. RMS on-state current	2610 A		
I_{TSM}	Max. peak non-repetitive surge current	21000 A	tp = 10 ms	T_j = 125°C
		22000 A	tp = 8.3 ms	After surge:
I^2t	Limiting load integral	2205 kA^2s	tp = 10 ms	$V_D = V_R$ = 0V
		2008 kA^2s	tp = 8.3 ms	
V_T	On-state voltage	1.30 V	I_T = 2000 A	
V_{T0}	Threshold voltage	0.83 V	I_T = 1000 - 3000 A	T_j = 125°C
r_T	Slope resistance	0.230 mΩ		
I_H	Holding current	20-70 mA	T_j = 25°C	
		15-60 mA	T_j = 125°C	
I_L	Latching current	100-500 mA	T_j = 25°C	
		50-200 mA	T_j = 125°C	

Switching

di/dt_{crit}	Critical rate of rise of on-state current		150 A/µs	Cont.	$V_D \le 0.67 \cdot V_{DRM}$ T_j = 125°C
			300 A/µs	60 sec.	I_{TRM} = 2000 A f = 50 Hz
					I_{FG} = 2.0 A t_r = 0.5 µs
t_d	Delay time		≤ 3.0 µs	$V_D = 0.4 \cdot V_{DRM}$	I_{FG} = 2.0 A t_r = 0.5 µs
t_q	Turn-off time		≤ 400 µs	$V_D \le 0.67 \cdot V_{DRM}$	I_{TRM} = 2000 A T_j = 125°C
				dv_D/dt = 20V/µs	V_R > 200 V
Q_{rr}	Recovery charge	min	2500 µAs		di_T/dt = -20 A/µs
		max	4500 µAs		

Triggering

V_{GT}	Gate trigger voltage	2.6 V	T_j = 25°C
I_{GT}	Gate trigger current	400 mA	T_j = 25°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	

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Thermal

$T_{j\,max}$	Max. junction temperature	125°C	
$T_{j\,stg}$	Storage temperature range	-40...150°C	
R_{thJC}	Thermal resistance junction to case	33 K/kW	Anode side cooled
		35 K/kW	Cathode side cooled
		17 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	8 K/kW	Single side cooled
		4 K/kW	Double side cooled

Analytical function for transient thermal impedance:

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

i	1	2	3	4
R_i(K/kW)	10.35	3.76	2.29	0.67
τ_i(s)	0.3723	0.0525	0.0057	0.0023

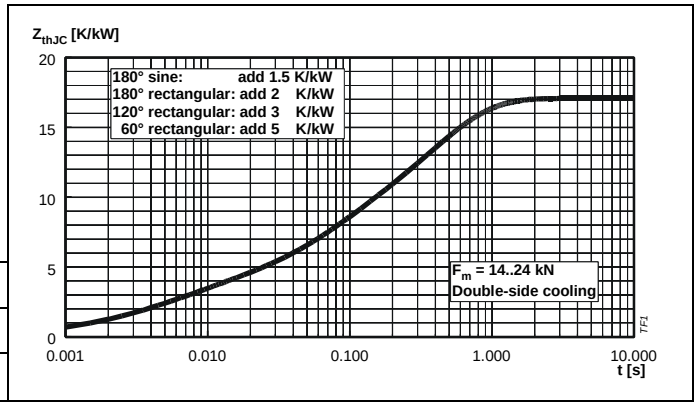

Fig. 1 Transient thermal impedance junction to case.

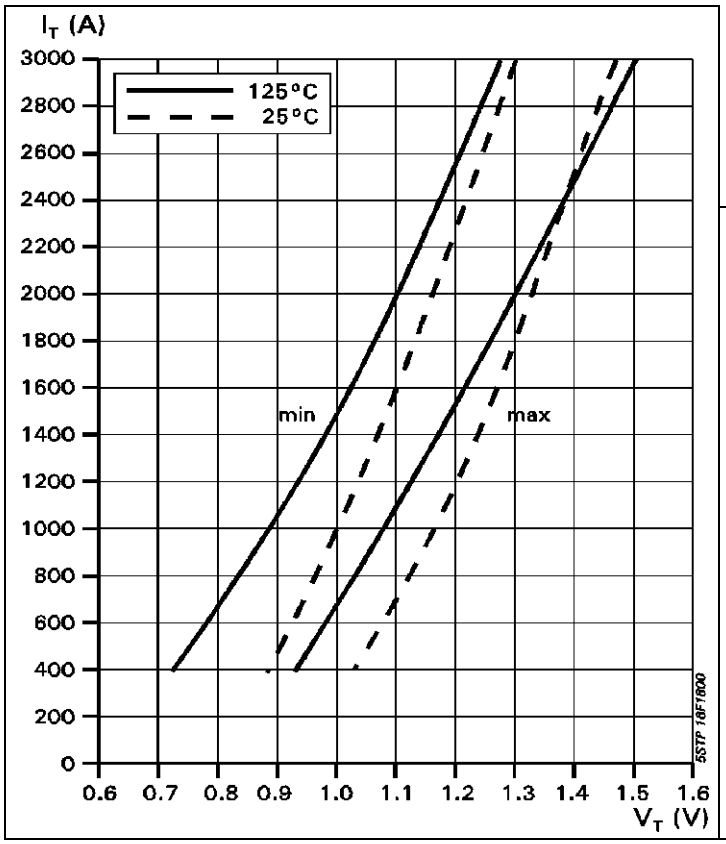

Fig 2. On-state characteristics.

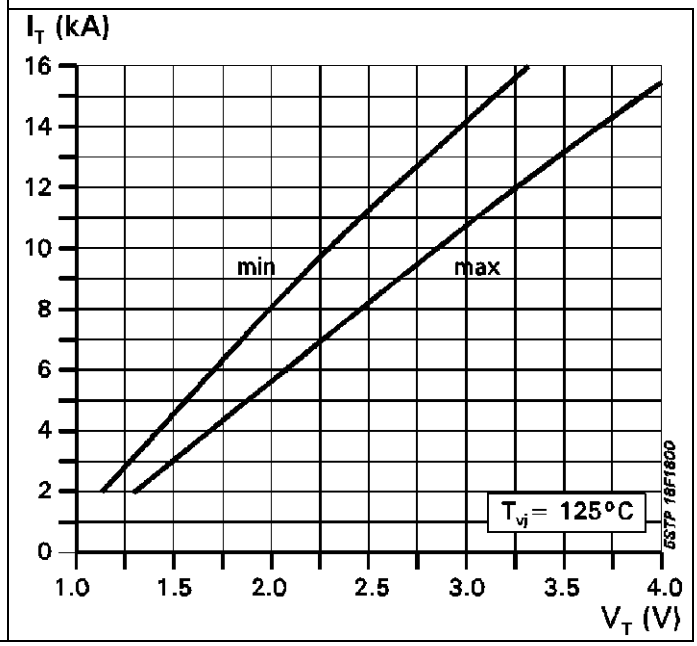

Fig. 3 On state characteristics.

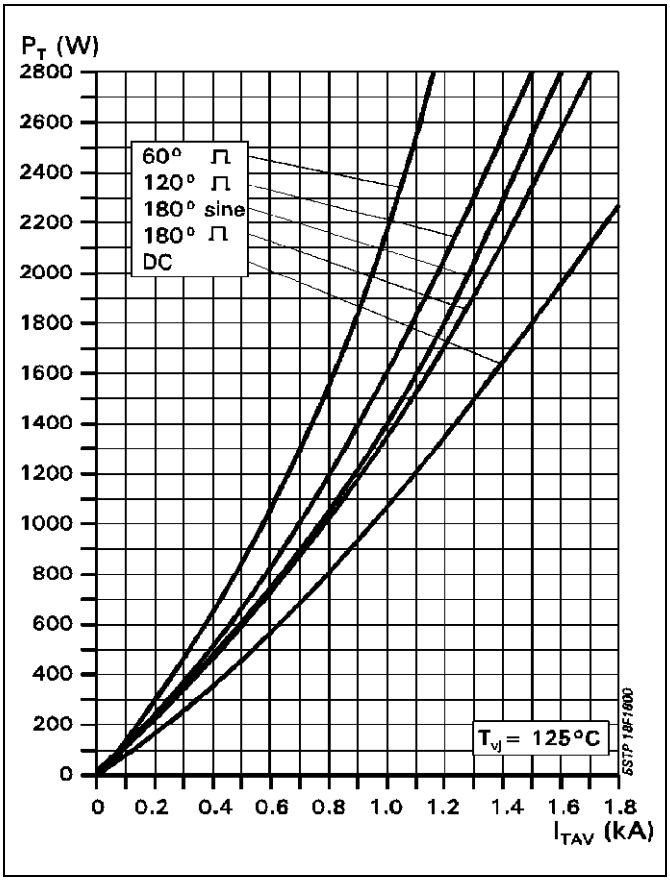

Fig. 4 On-state power dissipation vs. mean on-state current. Turn-on losses excluded.

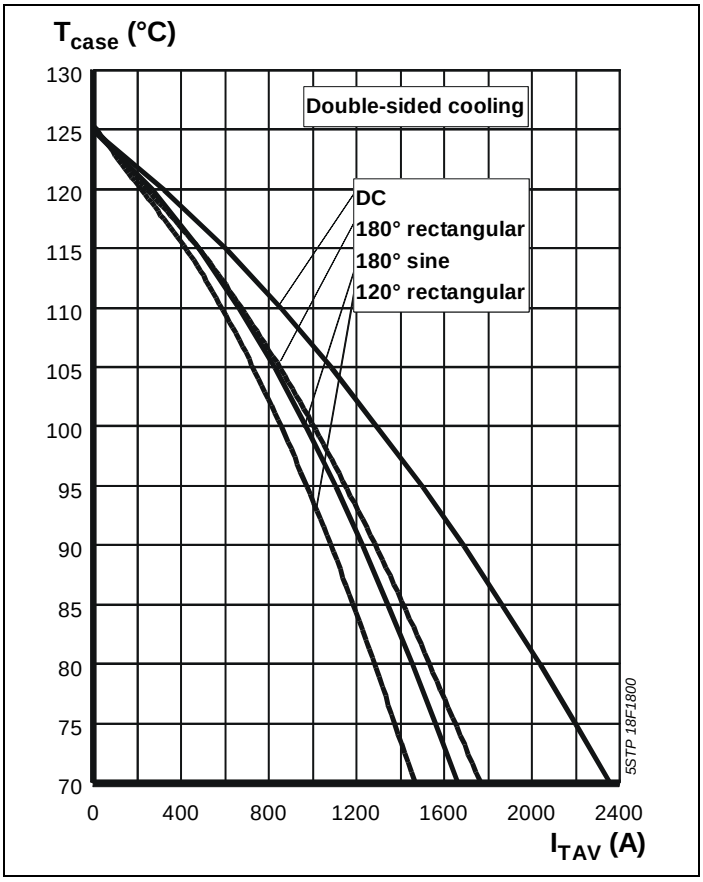

Fig. 5 Max. permissible case temperature vs. mean on-state current.

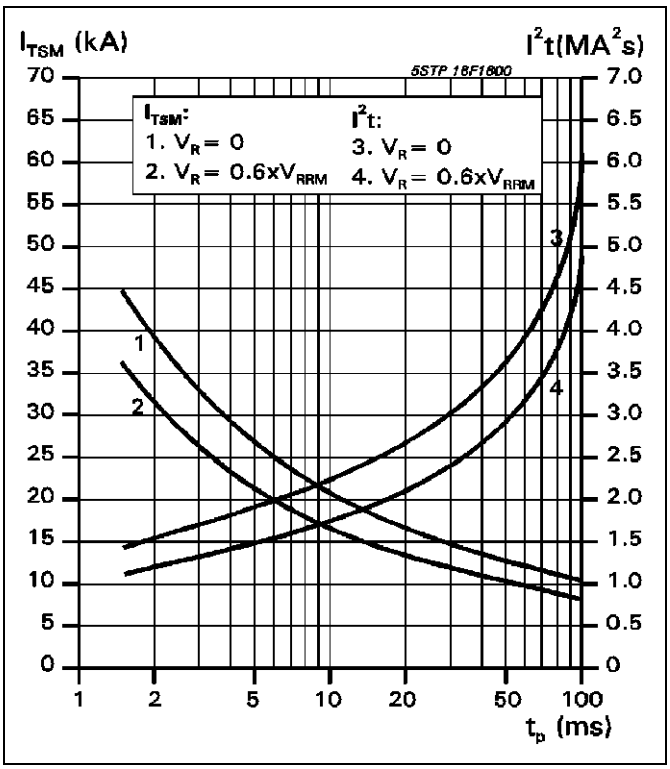

Fig. 6 Surge on-state current vs. pulse length. Half-sine wave.

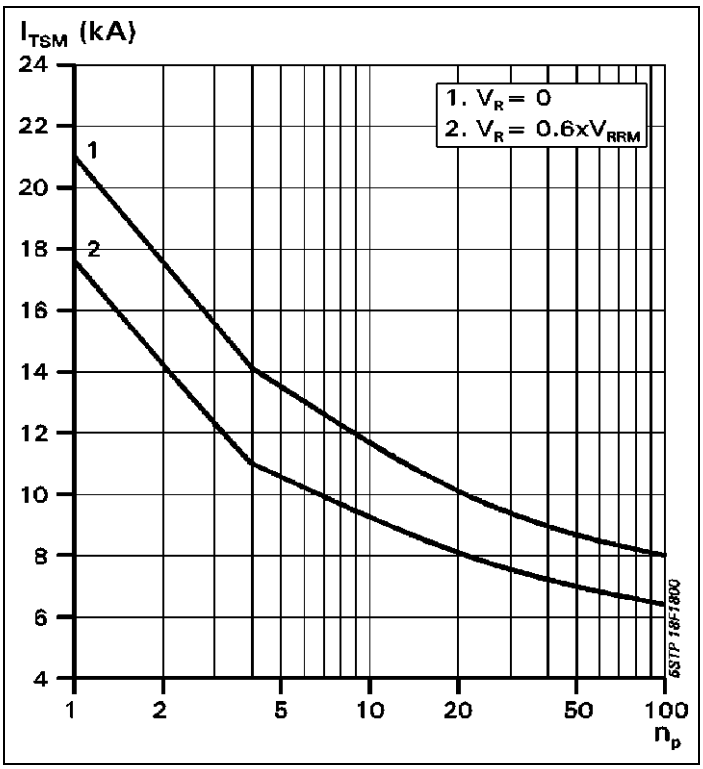

Fig. 7 Surge on-state current vs. number of pulses. Half-sine wave, 10 ms, 50Hz.

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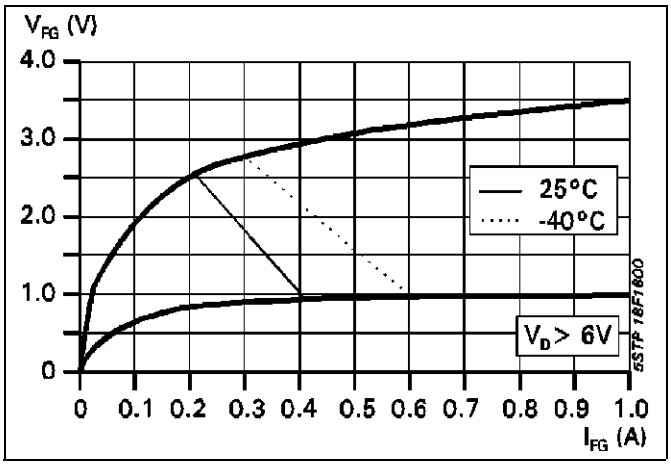

Fig. 8 Gate trigger characteristics.

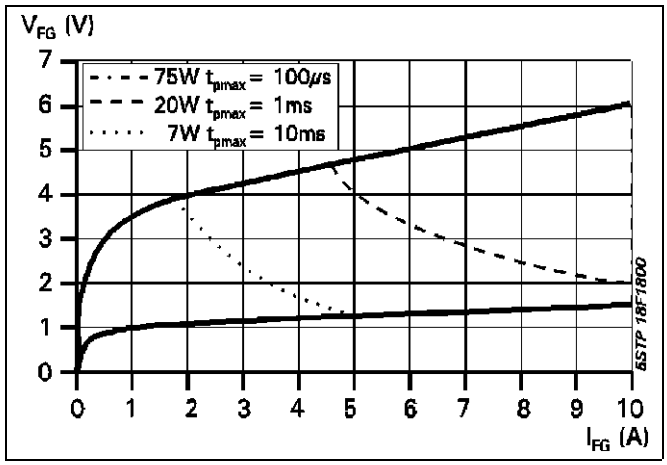

Fig. 9 Max. peak gate power loss.

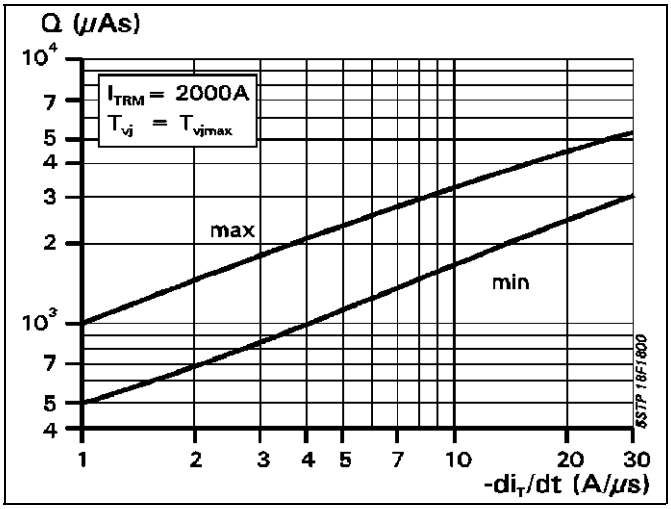

Fig. 10 Recovery charge vs. decay rate of on-state current.

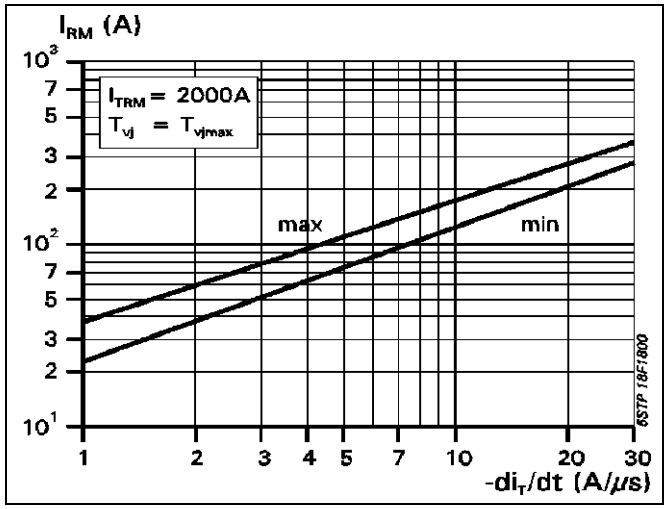

Fig. 11 Peak reverse recovery current vs. decay rate of on-state current.

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