V_{DRM}	=	2500 V
I_{TGQM}	=	3000 A
I_{TSM}	=	30 kA
V_{T0}	=	1.5 V
r_T	=	0.33 mΩ
V_{DClink}	=	1400 V

Gate turn-off Thyristor

5SGA 30J2501

Doc. No. 5SYA1213-02 Jan. 05

- **Patented free-floating silicon technology**
- **Low on-state and switching losses**
- **Annular gate electrode**
- **Industry standard housing**
- **Cosmic radiation withstand rating**

Blocking

V_{DRM}	Repetitive peak off-state voltage	2500	V	$V_{GR} \geq 2V$
V_{RRM}	Repetitive peak reverse voltage	17	V	
I_{DRM}	Repetitive peak off-state current	≤ 100	mA	$V_D = V_{DRM}$ $V_{GR} \geq 2V$
I_{RRM}	Repetitive peak reverse current	≤ 50	mA	$V_R = V_{RRM}$ $R_{GK} = \infty$
V_{DClink}	Permanent DC voltage for 100 FIT failure rate	1400	V	Ambient cosmic radiation at sea level in open air.

Mechanical data (see Fig. 3)

F_m	Mounting force	min.	36	kN
		max.	44	kN
A	Acceleration:			
	Device unclamped		50	m/s^2
	Device clamped		200	m/s^2
M	Weight		1.3	kg
D_S	Surface creepage distance	≥	33	mm
D_a	Air strike distance	≥	15	mm

GTO Data

On-state

I_{TAVM}	Max. average on-state current	1300 A	Half sine wave, T_C = 85 °C	
I_{TRMS}	Max. RMS on-state current	2040 A		
I_{TSM}	Max. peak non-repetitive surge current	30 kA	t_P = 10 ms	T_j = 125°C
		51 kA	t_P = 1 ms	After surge:
I^2t	Limiting load integral	$4.5x10^6$ A^2s	t_P = 10 ms	$V_D = V_R$ = 0V
		$1.3x10^6$ A^2s	t_P = 1 ms	
V_T	On-state voltage	2.5 V	I_T = 3000 A	
V_{T0}	Threshold voltage	1.5 V	I_T = 400 - 4000 A	T_j = 125 °C
r_T	Slope resistance	0.33 mΩ		
I_H	Holding current	100 A	T_j = 25 °C	

Gate

V_{GT}	Gate trigger voltage	1.2 V	V_D = 24 V	T_j = 25 °C
I_{GT}	Gate trigger current	4 A	R_A = 0.1 W	
V_{GRM}	Repetitive peak reverse voltage	17 V		
I_{GRM}	Repetitive peak reverse current	50 mA	$V_{GR} = V_{GRM}$	

Turn-on switching

di/dt_{crit}	Max. rate of rise of on-state current	500 A/µs	f = 200Hz	I_T = 3000 A, T_j = 125 °C
		1000 A/µs	f = 1Hz	I_{GM} = 30 A, $di_G dt$ = 20 A/µs
t_d	Delay time	2.5 µs	V_D = 0.5 V_{DRM}	T_j = 125 °C
t_r	Rise time	5 µs	I_T = 3000 A	di/dt = 300 A/µs
$t_{on(min)}$	Min. on-time	100 µs	I_{GM} = 30 A	di_G/dt = 20 A/µs
E_{on}	Turn-on energy per pulse	2 Ws	C_S = 5 µF	R_S = 5 Ω

Turn-off switching

I_{TGQM}	Max controllable turn-off current	3000 A	$V_{DM} = V_{DRM}$	di_{GQ}/dt = 40 A/µs
			C_S = 5 µF	L_S ≤ 0.3 µH
t_s	Storage time	25 µs	V_D = ½ V_{DRM}	$V_{DM} = V_{DRM}$
t_f	Fall time	3 µs	T_j = 125 °C	di_{GQ}/dt = 40 A/µs
$t_{off(min)}$	Min. off-time	100 µs	$I_{TGQ} = I_{TGQM}$	
E_{off}	Turn-off energy per pulse	4.7 Ws	C_S = 5 µF	R_S = 5 W
I_{GQM}	Peak turn-off gate current	1000 A	L_S ≤ 0.3 µH	

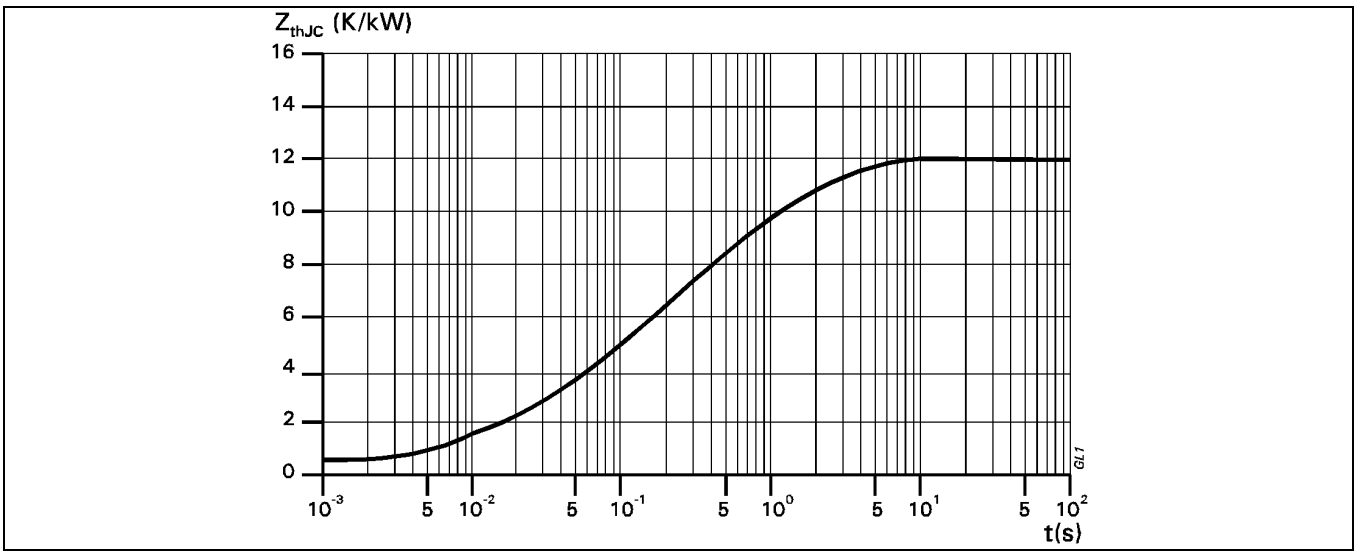
Thermal

T_j	Storage and operating junction temperature range	-40...125°C	
R_{thJC}	Thermal resistance junction to case	22 K/kW	Anode side cooled
		27 K/kW	Cathode side cooled
		12 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	6 K/kW	Single side cooled
		3 K/kW	Double side cooled

Analytical function for transient thermal impedance:

$$Z_{thJC}(t) = \sum_{i=1}^{4} R_i(1 - e^{-t/t_i})$$

i	1	2	3	4
R_i (K/kW)	5.4	4.5	1.7	0.4
τ_i (s)	1.2	0.17	0.01	0.001



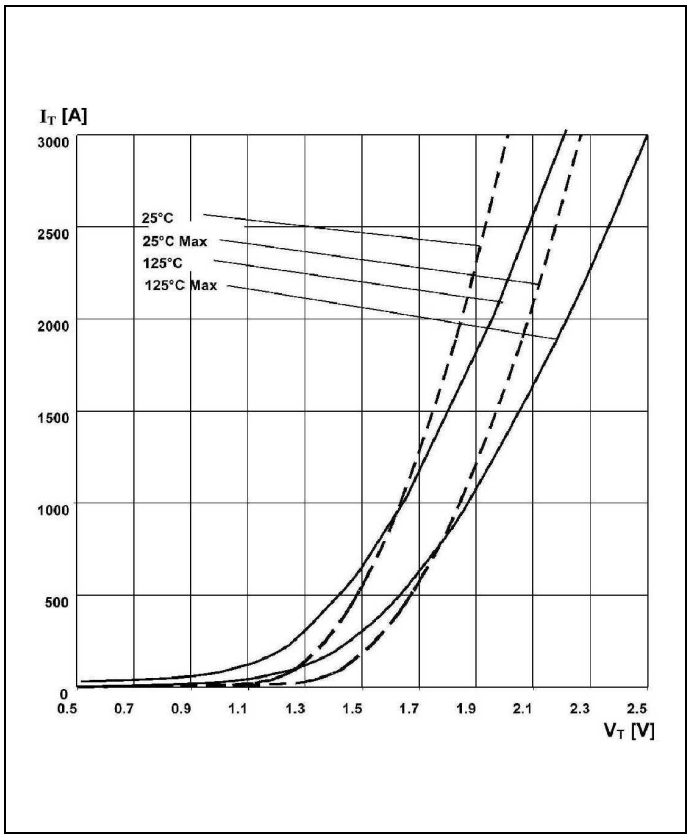


Fig. 1 On-state characteristics

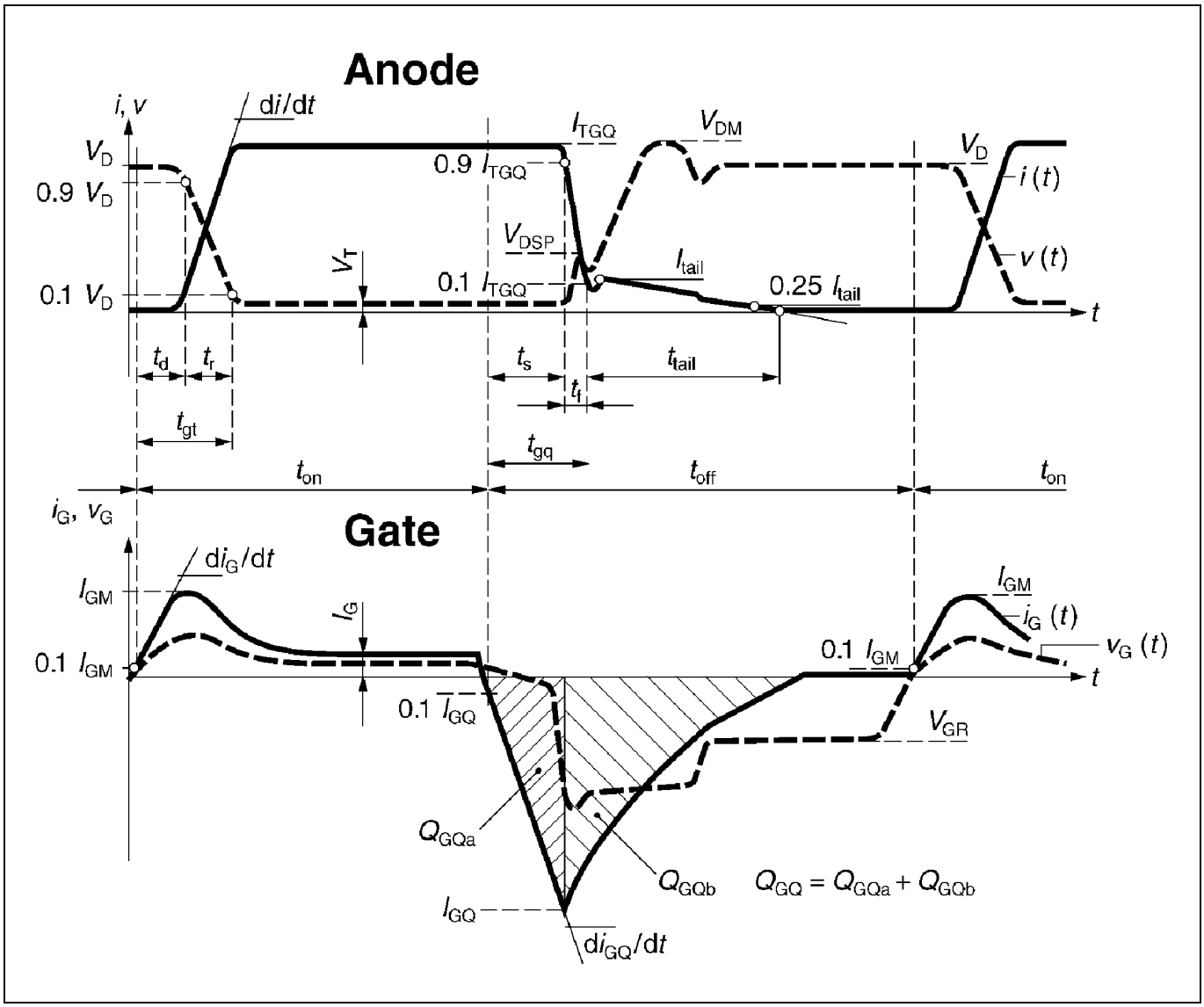


Fig. 2 General current and voltage waveforms with GTO-specific symbols

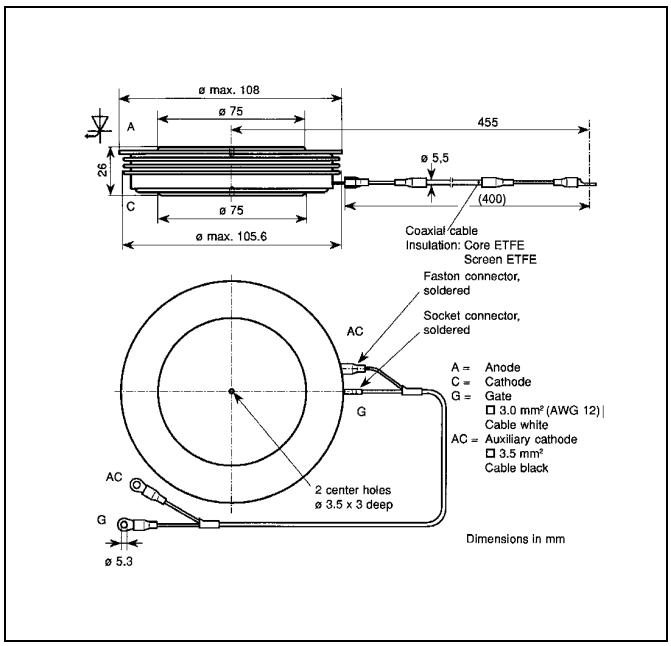


Fig. 3 Outline drawing. All dimensions are in millimeters and represent nominal values unless stated otherwise.

Reverse avalanche capability

In operation with an antiparallel freewheeling diode, the GTO reverse voltage V_R may exceed the rate value V_{RRM} due to stray inductance and diode turn-on voltage spike at high di/dt. The GTO is then driven into reverse avalanche. This condition is not dangerous for the GTO provided avalanche time and current are below 10 µs and 1000 A respectively. However, gate voltage must remain negative during this time. Recommendation : V_{GR} = 10… 15 V.

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