



CSG 30J2500

Gate turn-off Thyristor

Features

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

Key Parameters

V_{DRM}	2500 V
I_{TGQM}	3000 A
I_{TSM}	30 kA
V_{T0}	1.5 V
r_{T}	0.33 mW
V_{DClink}	1400 V

Blocking

V_{DRM}	Repetitive peak off-state voltage	2500 V	$V_{\text{GR}} \geq 2V$
V_{RRM}	Repetitive peak reverse voltage	17 V	
I_{DRM}	Repetitive peak off-state current	$\leq 100 \text{ mA}$	$V_{\text{D}} = V_{\text{DRM}} \quad V_{\text{GR}} \geq 2V$
I_{RRM}	Repetitive peak reverse current	$\leq 50 \text{ mA}$	$V_{\text{R}} = V_{\text{RRM}} \quad R_{\text{GK}} = \infty$
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	$\geq$	33	mm
D_{a}	Air strike distance	$\geq$	15	mm



GTO CHARACTERISTICS

On-state

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

Gate

V_{GT}	Gate trigger voltage	1.2 V	$V_D = 24\text{ V}$	$T_j = 25^\circ\text{C}$
I_{GT}	Gate trigger current	4 A	$R_A = 0.1\text{ W}$	
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 I _{GM} = 30 A, di _G dt = 20 A/μs
		1000 A/μs	f = 1Hz	
t _d	Delay time	2.5 μs	V _D = 0.5 V _{DRM} T _j = 125 °C I _T = 3000 A di/dt = 300 A/μs I _{GM} = 30 A di _G /dt = 20 A/μs C _S = 5 μF R _S = 5 Ω	
t _r	Rise time	5 μs		
t _{on(min)}	Min. on-time	100 μs		
E _{on}	Turn-on energy per pulse	2 Ws		

Turn-off switching

I_{TGQM}	Max controllable turn-off current	3000 A	$V_{DM} = V_{DRM} \quad di_{GQ}/dt = 40\text{ A}/\mu\text{s}$ $C_S = 5\text{ }\mu\text{F} \quad L_S \leq 0.3\text{ }\mu\text{H}$
t_s	Storage time	25 μs	$V_D = \frac{1}{2} V_{DRM} \quad V_{DM} = V_{DRM}$ $T_j = 125^\circ\text{C} \quad di_{GQ}/dt = 40\text{ A}/\mu\text{s}$ $I_{TGQ} = I_{TGQM}$ $C_S = 5\text{ }\mu\text{F} \quad R_S = 5\text{ W}$ $L_S \leq 0.3\text{ }\mu\text{H}$
t_f	Fall time	3 μs	
$t_{off(min)}$	Min. off-time	100 μs	
E_{off}	Turn-off energy per pulse	4.7 Ws	
I_{GQM}	Peak turn-off gate current	1000 A	



GTO CHARACTERISTICS

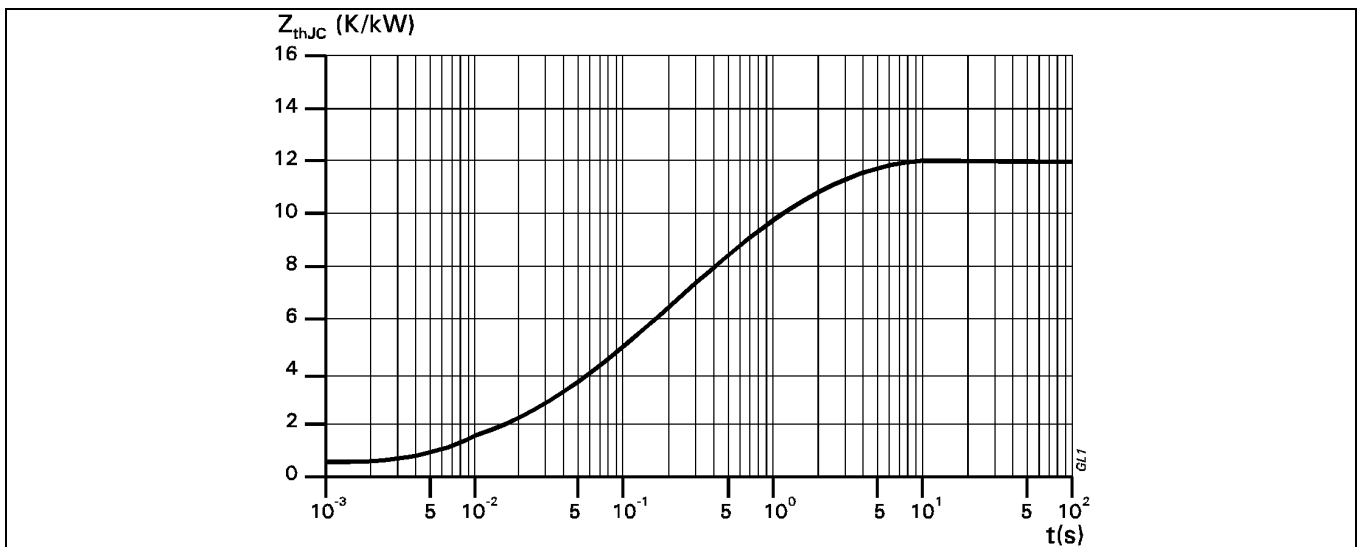
Thermal

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:

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

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





GTO CHARACTERISTICS

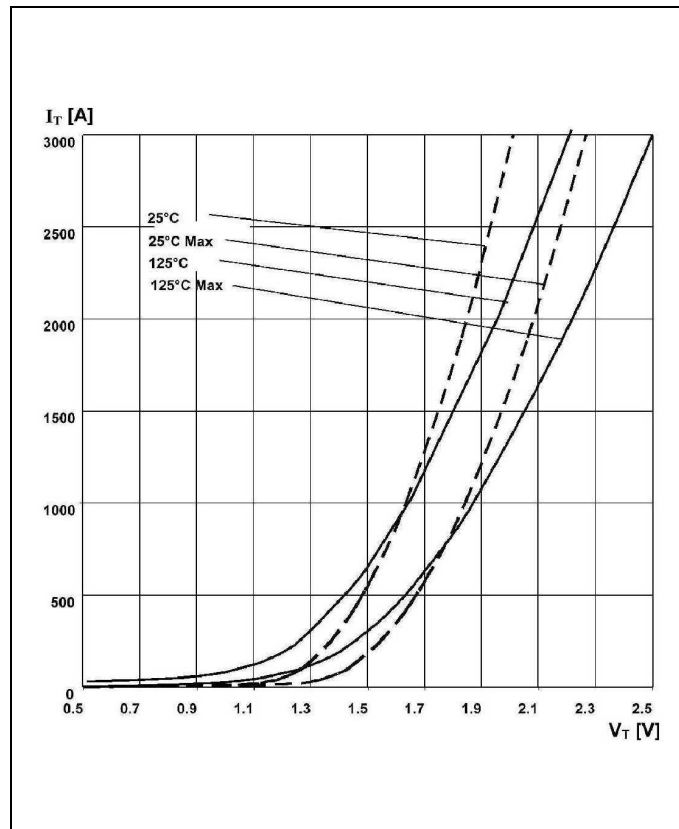


Fig. 1 On-state characteristics

GTO CHARACTERISTICS

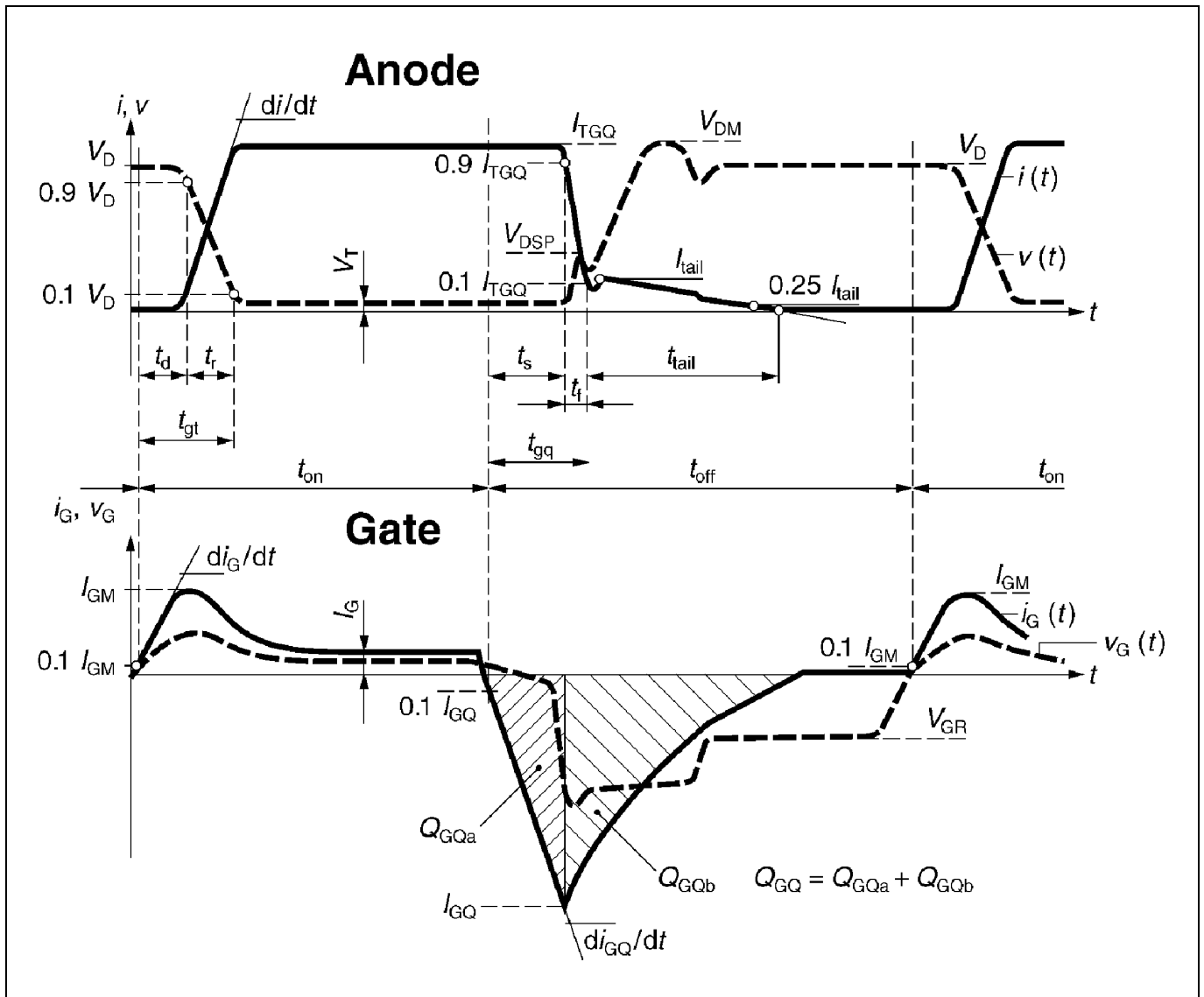


Fig. 2 General current and voltage waveforms with GTO-specific symbols

OUTLINE AND DIMENSION

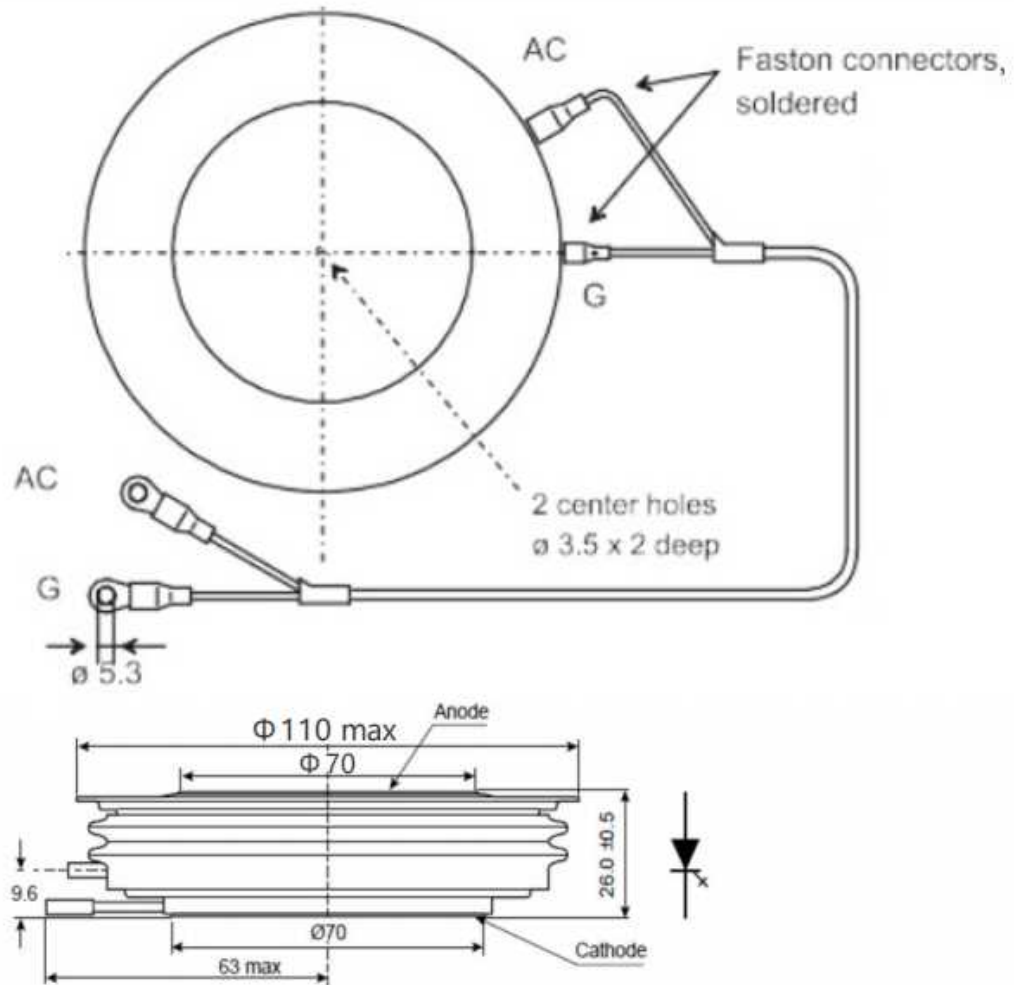


Fig. 3 Outline drawing. All dimensions are in millimeters and represent nominal val unless stated otherwise.

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 : $V_{GR} = 10 \dots 15$ V.