AS ENERGI

Thyristor
AGA 600-45-D-02

Key Parameters

V_{DRM}	=	4500	V
I_{TGQM}	=	600	A
I_{TSM}	=	3×10^3	A
V_{T0}	=	1.9	V
r_T	=	3.5	mΩ
V_{Dclink}	=	1400	V

Features

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

Blocking

Symbols and parameters			Value			Unit
			min	typ	max	
V_{DRM}	Repetitive peak off-state voltage	$V_{GR} \geq 2$ V			4500	V
V_{RRM}	Repetitive peak reverse voltage				17	V
$V_{DC\text{-}link}$	Permanent DC voltage for 100 FIT failure rate	Ambient cosmic radiation at sea level in open air.			2800	V
I_{DRM}	Repetitive peak off-state current	$V_D = V_{DRM}$, $V_{GR} \geq 2$ V			20	mA
I_{RRM}	Repetitive peak reverse current	$V_R = V_{RRM}$, $R_{GK} = \infty$ Ω			50	mA

Mechanical data

Symbols and parameters			Value			Unit
			min	typ	max	
F_m	Mounting force		10	11	12	kN
D_p	Pole-piece diameter	± 0.1 mm		34		mm
H	Housing thickness			26		mm
m	Weight				0.25	kg
D_s	Surface creepage distance	Anode to Gate	30			mm
D_a	Air strike distance	Anode to Gate	20.5			mm

GTO Data

Symbols and parameters			Value			Unit
			min	typ	max	
$I_{T(AV)M}$	Max. average on-state current	Half sine wave, T_C = 85 °C			210	A
$I_{T(RMS)}$	Max. RMS on-state current				330	A
I_{TSM}	Max. peak non-repetitive surge current	t_p = 8.3 ms, T_{vj} = 125°C, sine wave After Surge: $V_D = V_R$ = 0 V			3.1×10^3	A
I^2t	Limiting load integral				40×10^3	A^2s
I_{TSM}	Max. peak non-repetitive surge current	t_p = 10 ms, Tvj = 125°C, sine wave After Surge: $V_D = V_R$ = 0 V			3×10^3	A
I^2t	Limiting load integral				45×10^3	A^2s
I_{TSM}	Max. peak non-repetitive surge current	t_p = 1 ms, Tvj = 125°C, sine wave After Surge: $V_D = V_R$ = 0 V			6×10^3	A
I^2t	Limiting load integral				18×10^3	A^2s
V_T	On-state voltage	I_T = 600 A, T_{vj} = 125°C			4	V
$V_{(T0)}$	Threshold voltage	T_{vj} = 125°C I_T = 200...600 A			1.9	V
r_T	Slope resistance				3.5	mΩ
I_H	Holding current	T_{vj} = 25°C			20	A

Turn-on switching

Symbols and parameters				Value			Unit
				min	typ	max	
di_T/dt_{cr}	Critical rate of rise of on state current	T_{vj} = 125°C, I_T = 600 A, I_{GM} = 20 A, di_G/dt = 20 A/µs	f = 200 Hz			400	A/µs
di_T/dt_{cr}	Critical rate of rise of on state current		f = 1 Hz			600	A/µs
t_{on}	Min. on-time			80			µs
t_d	Turn-on delay time	V_D = 0.5 V_{DRM}, T_{vj}=125 °C I_T = 600 A, di/dt = 20 A/µs, I_{GM} = 20 A, di_G/dt = 20 A/µs, C_S = 1 µF, R_S = 10 Ω				1.5	µs
t_r	Rise time					3	µs
E_{on}	Turn-on energy per pulse					0.8	J

Turn-off switching

Symbols and parameters			Value			Unit
			min	typ	max	
I_{TGQM} V_{DSP}	Max. controllable turn-off current Spike Voltage	$V_{DM} \leq V_{DRM}$, $V_D = 0.5\ V_{DRM}$ $di_{GQ}/dt = 20\ A/\mu s$, $C_S = 1\ \mu F$, $L_S \leq 0.15\ \mu H$, RCD Snubber			600 ≤650	A
t_{off}	Min. off-time		80			µs
t_S	Storage time	$V_D = 0.5\ V_{DRM}$, $T_{vj} = 125\ °C$ $V_{DM} \leq V_{DRM}$, $di_{GQ}/dt = 20\ A/\mu s$, $I_{TGQ} = I_{TGQM}$, $R_S = 10\ \Omega$, $C_S = 1\ \mu F$, $L_S = 0.15\ \mu H$ RCD Snubber			15	µs
t_f	Fall time				5	µs
E_{off}	Turn-on energy per pulse				1.9	J
I_{GQM}	Peak turn-off gate current				300	A

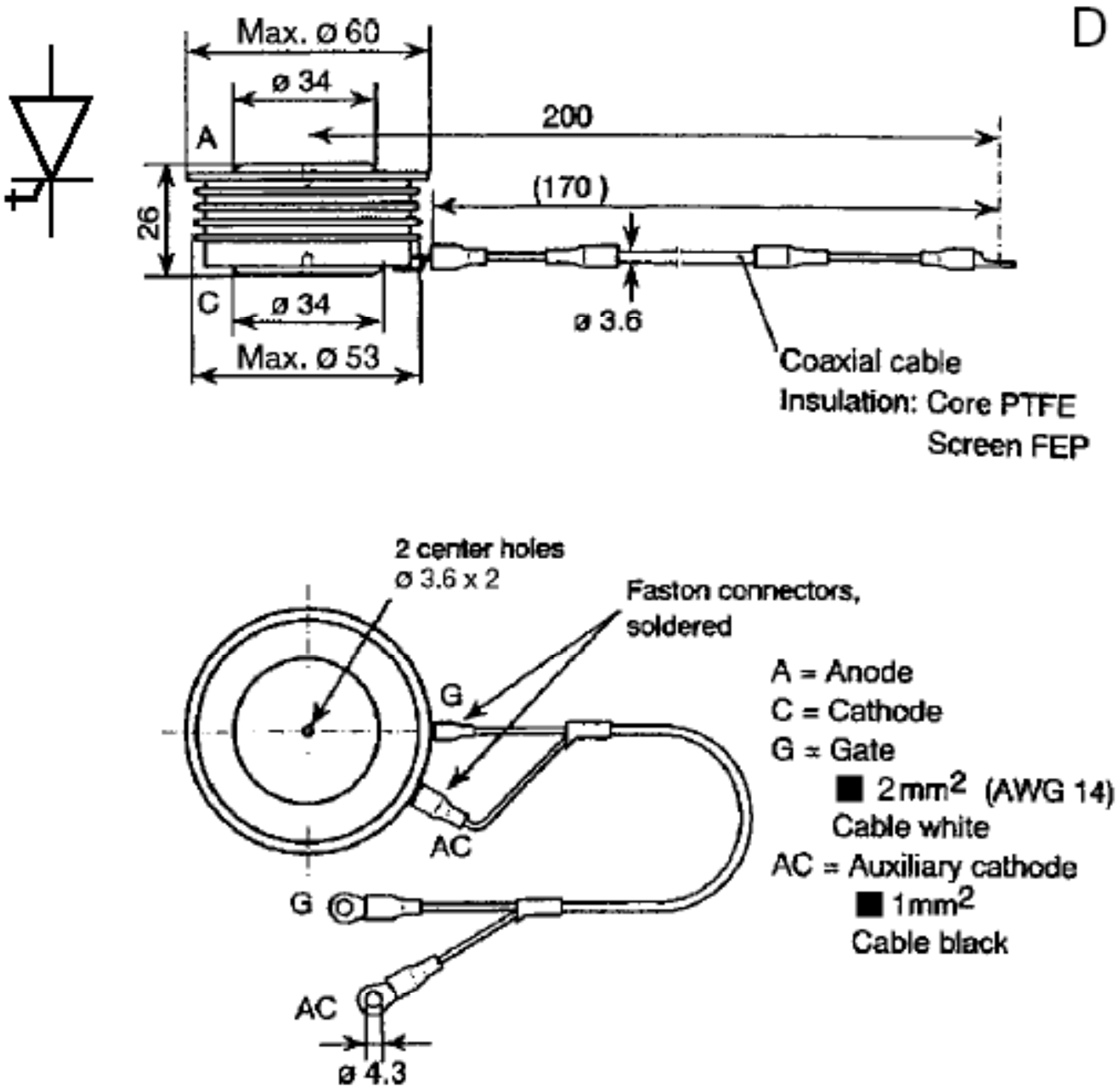
Gate

Symbols and parameters			Value			Unit
			min	typ	max	
V_{GRM}	Repetitive peak reverse voltage				17	V
I_{GRM}	Repetitive peak reverse current	$V_{GR} = V_{GRM}$			20	mA
V_{GT}	Gate trigger voltage	$T_{vj} = 25°C$, $V_D = 24\ V$, $R_A = 0.1\ \Omega$		1		V
I_{GT}	Gate trigger current			2		A

Thermal

Symbols and parameters			Value	Unit
T_{vj}	Junction operating temperature		0 ... 125	°C
T_{stg}	Storage temperature range		0 ... 125	°C
$R_{th(j-c)}$	Thermal resistance junction to case	Double side cooled	50	K/kW
$R_{th(j-c)A}$		Anode side cooled	85	K/kW
$R_{th(j-c)C}$		Cathode side cooled	122	K/kW
$R_{th(c-h)}$	Thermal resistance case to heatsink (Double side cooled)	Single side cooled	16	K/kW
$R_{th(c-h)}$		Double side cooled	8	K/kW

DIMENSIONS


D
Max. ø 60
ø 34
A
200
(170)
26
C
ø 34
Max. Ø 53
ø 3.6
Coaxial cable
Insulation: Core PTFE
Screen FEP
2 center holes
ø 3.6 x 2
Faston connectors,
soldered
G
AC
G
AC
ø 4.3
A = Anode
C = Cathode
G = Gate
■ 2mm² (AWG 14)
Cable white
AC = Auxiliary cathode
■ 1mm²
Cable black

Analytical function for transient thermal impedance:

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

i	1	2	3	4
R_i(K/kW)	15.000	5.200	7.500	0.100
τ_i(s)	0.4610	0.0950	0.0120	0.0010

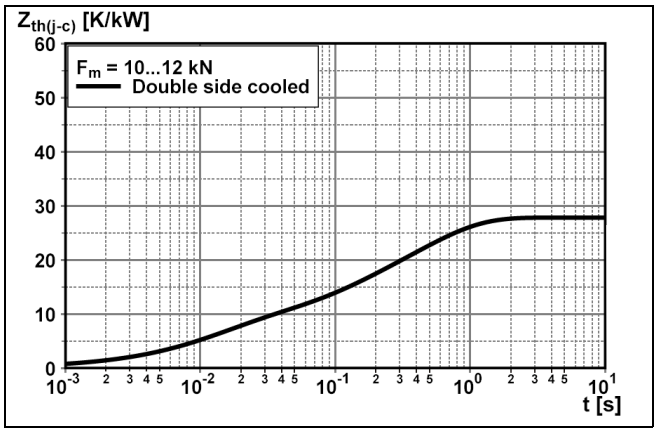


Fig. 1 Transient thermal impedance, junction to case.

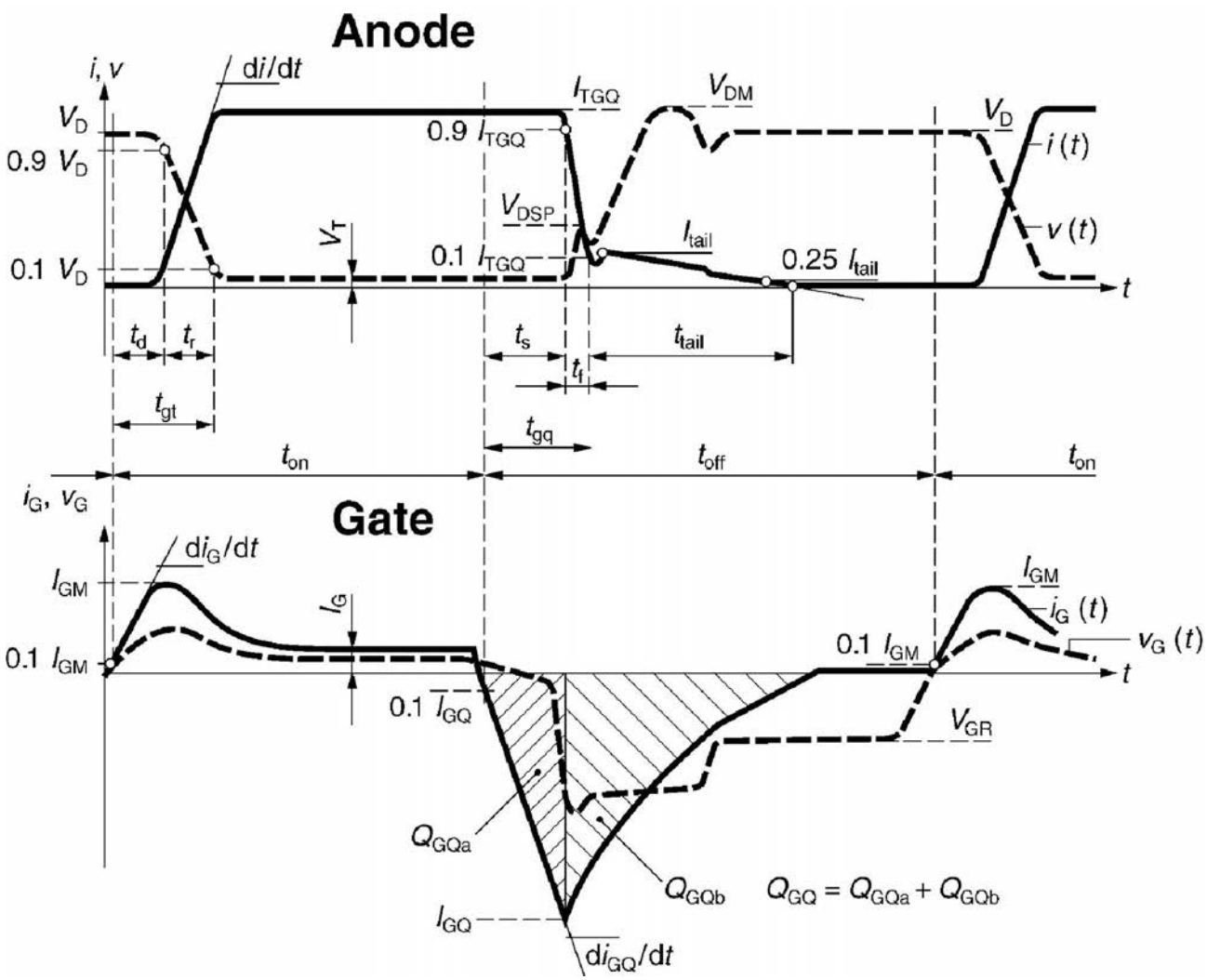


Fig. 2 General current and voltage waveforms with GTO-specific symbols.