

V_{DRM}	=	5600 V
V_{DSM}	=	6500 V
$I_{T(AV)M}$	=	720 A
$I_{T(RMS)}$	=	1140 A
I_{TSM}	=	11.8×10^3 A
$V_{(T0)}$	=	1.24 V
r_T	=	1.015 m Ω

Phase Control Thyristor

5STP 08G6500

Doc. No. 5SYA1006-03 Apr. 03

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

Blocking

Maximum rated values ¹⁾

Symbol	Conditions	5STP 08G6500	5STP 08G6200	5STP 08G5800
V_{DSM}, V_{RSM}	f = 5 Hz, $t_p = 10$ ms	6500 V	6200 V	5800 V
V_{DRM}, V_{RRM}	f = 50 Hz, $t_p = 10$ ms	5600 V	5300 V	4900 V
V_{RSM}	$t_p = 5$ ms, single pulse	7000 V	6700 V	6300 V
dV/dt_{crit}	Exp. to $0.67 \times V_{DRM}$, $T_{vj} = 125^\circ\text{C}$	2000 V/ μs		

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Forward leakage current	I_{DSM}	$V_{DSM}, T_{vj} = 125^\circ\text{C}$			200	mA
Reverse leakage current	I_{RSM}	$V_{RSM}, T_{vj} = 125^\circ\text{C}$			200	mA

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

Mechanical data

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	F_M		14	22	24	kN
Acceleration	a	Device unclamped			50	m/s ²
Acceleration	a	Device clamped			100	m/s ²

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Weight	m				0.65	kg
Surface creepage distance	D_S		38			mm
Air strike distance	D_a		21			mm

1) Maximum rated values indicate limits beyond which damage to the device may occur

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On-state

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Average on-state current	$I_{T(AV)M}$	Half sine wave, $T_c = 70^\circ\text{C}$			720	A
RMS on-state current	$I_{T(RMS)}$				1140	A
Peak non-repetitive surge current	I_{TSM}	$t_p = 10\text{ ms}$, $T_{vj} = 125^\circ\text{C}$, $V_D = V_R = 0\text{ V}$			11.8×10^3	A
Limiting load integral	I^2t				703×10^3	A^2s
Peak non-repetitive surge current	I_{TSM}	$t_p = 8.3\text{ ms}$, $T_{vj} = 125^\circ\text{C}$, $V_D = V_R = 0\text{ V}$			12.76×10^3	A
Limiting load integral	I^2t				676×10^3	A^2s

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V_T	$I_T = 1000\text{ A}$, $T_{vj} = 125^\circ\text{C}$			2.25	V
Threshold voltage	$V_{(T0)}$	$I_T = 500\text{ A} - 1800\text{ A}$, $T_{vj} = 125^\circ\text{C}$			1.24	V
Slope resistance	r_T				1.015	$\text{m}\Omega$
Holding current	I_H	$T_{vj} = 25^\circ\text{C}$			90	mA
		$T_{vj} = 125^\circ\text{C}$			60	mA
Latching current	I_L	$T_{vj} = 25^\circ\text{C}$			500	mA
		$T_{vj} = 125^\circ\text{C}$			200	mA

Switching

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Critical rate of rise of on-state current	di/dt_{crit}	$T_{vj} = 125^\circ\text{C}$, $I_{TRM} = 1300\text{ A}$, Cont. $f = 50\text{ Hz}$			50	$\text{A}/\mu\text{s}$
Critical rate of rise of on-state current	di/dt_{crit}	$V_D \leq 0.67 V_{DRM}$, $I_{FG} = 2\text{ A}$, $t_r = 0.5\ \mu\text{s}$ Cont. $f = 1\text{ Hz}$			1000	$\text{A}/\mu\text{s}$
Circuit-commutated turn-off time	t_q	$T_{vj} = 125^\circ\text{C}$, $I_{TRM} = 2000\text{ A}$, $V_R = 200\text{ V}$, $di_T/dt = -1\text{ A}/\mu\text{s}$, $V_D \leq 0.67 \cdot V_{DRM}$, $dv_D/dt = 20\text{ V}/\mu\text{s}$,	700			μs

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Recovery charge	Q_{rr}	$T_{vj} = 125^\circ\text{C}$, $I_{TRM} = 2000\text{ A}$, $V_R = 200\text{ V}$, $di_T/dt = -1\text{ A}/\mu\text{s}$	1600		2700	μAs
Gate turn-on delay time	t_{gd}	$V_D = 0.4 \cdot V_{DRM}$, $I_{FG} = 2\text{ A}$, $t_r = 0.5\ \mu\text{s}$, $T_{vj} = 25^\circ\text{C}$			3	μs

Triggering

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Peak forward gate voltage	V _{FGM}				12	V
Peak forward gate current	I _{FGM}				10	A
Peak reverse gate voltage	V _{RGM}				10	V
Average gate power loss	P _{G(AV)}		see Fig. 9			

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Gate-trigger voltage	V _{GT}	T _{vj} = 25 °C			2.6	V
Gate-trigger current	I _{GT}	T _{vj} = 25 °C			400	mA
Gate non-trigger voltage	V _{GD}	V _D = 0.4 x V _{DRM} , T _{vjmax} = 125 °C	0.3			V
Gate non-trigger current	I _{GD}	V _D = 0.4 x V _{DRM} , T _{vjmax} = 125 °C	10			mA

Thermal

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	T _{vj}				125	°C
Storage temperature range	T _{stg}		-40		140	°C

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	R _{th(j-c)}	Double-side cooled			22	K/kW
	R _{th(j-c)A}	Anode-side cooled			43	K/kW
	R _{th(j-c)C}	Cathode-side cooled			45	K/kW
Thermal resistance case to heatsink	R _{th(c-h)}	Double-side cooled			4	K/kW
	R _{th(c-h)}	Single-side cooled			8	K/kW

Analytical function for transient thermal impedance:

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

i	1	2	3	4
R _i (K/kW)	14.267	4.550	1.985	1.202
τ _i (s)	0.6894	0.0872	0.0217	0.0043

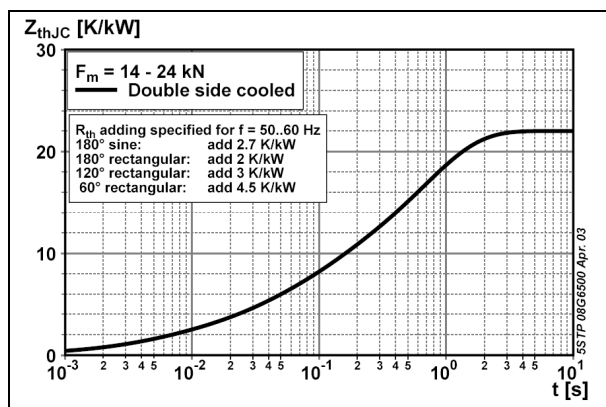


Fig. 1 Transient thermal impedance junction-to case.

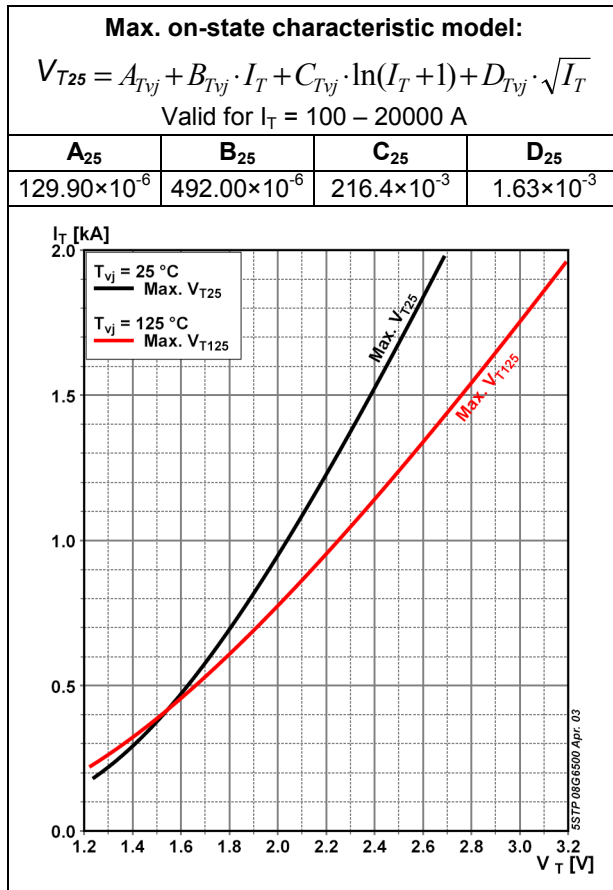


Fig. 2 Max. on-state voltage characteristics

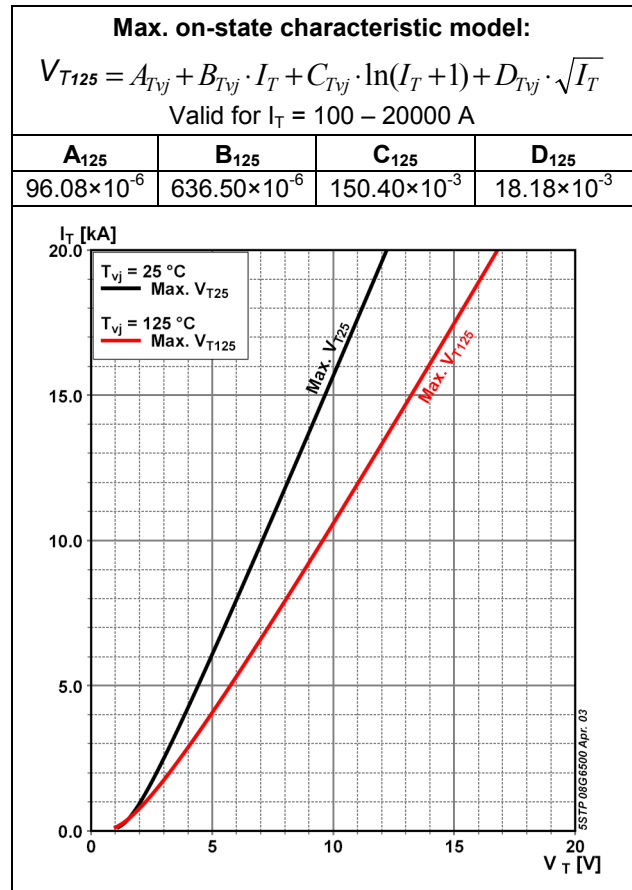


Fig. 3 Max. on-state voltage characteristics

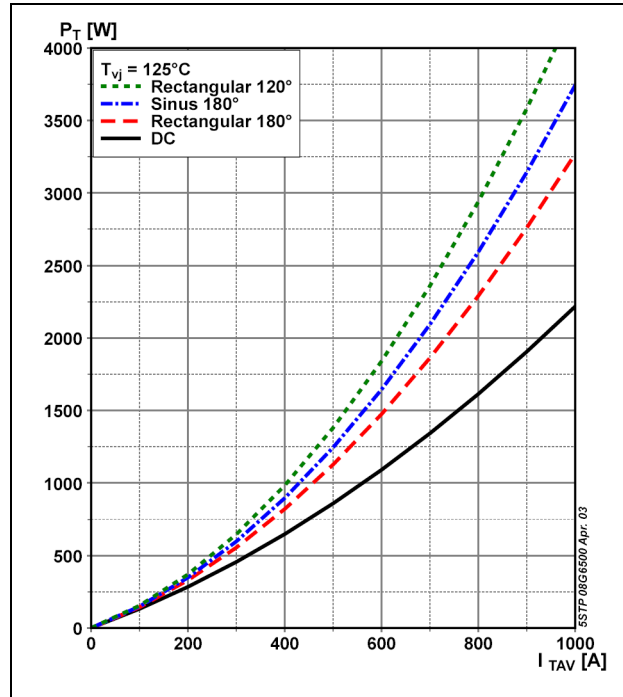


Fig. 4 On-state power dissipation vs. mean on-state current. Turn - on losses excluded.

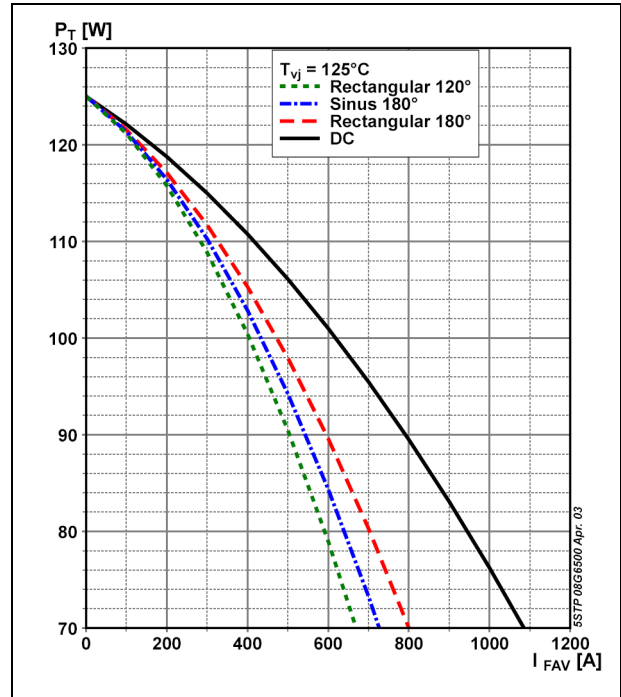


Fig. 5 Max. permissible case temperature vs. mean on-state current.

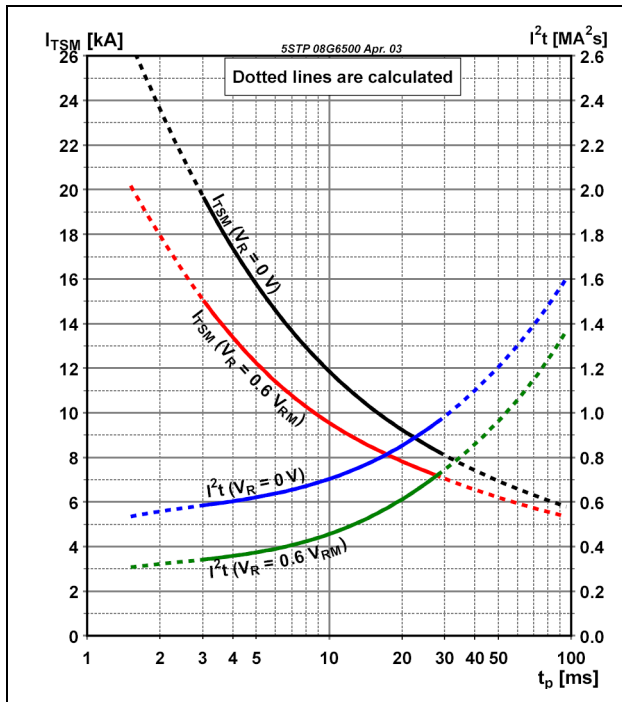


Fig. 6 Surge on-state current vs. pulse length. Half-sine wave.

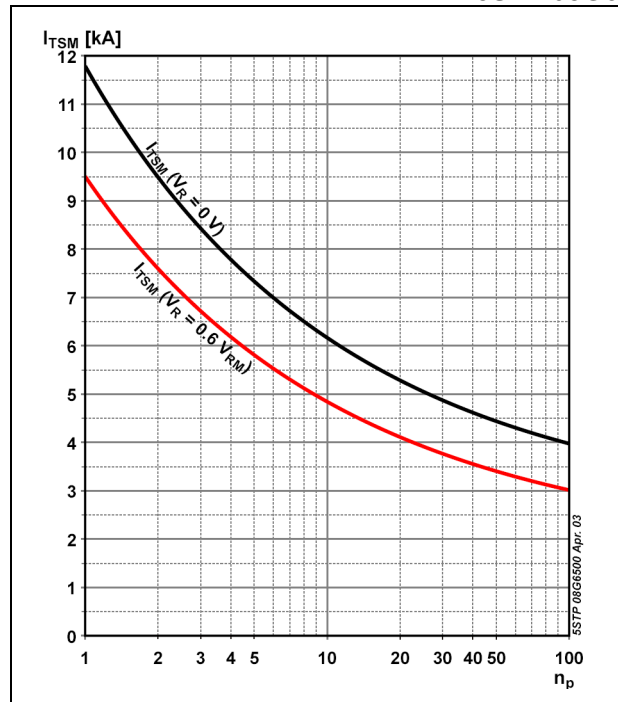


Fig. 7 Surge on-state current vs. number of pulses. Half-sine wave, 10 ms, 50Hz.

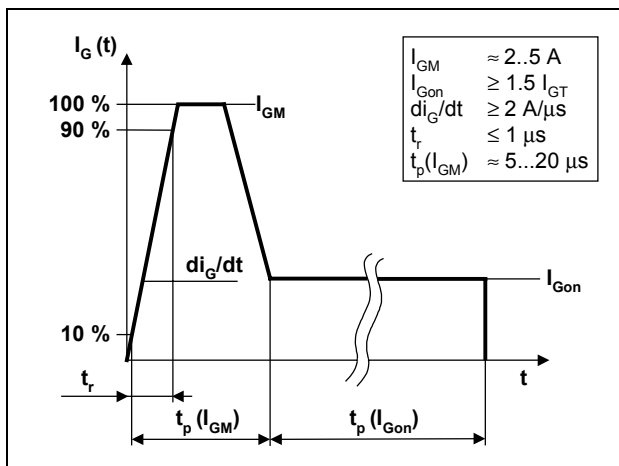


Fig. 8 Recommended gate current waveform.

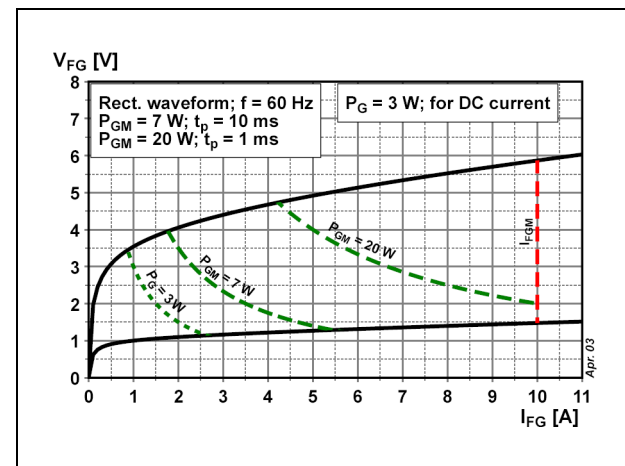


Fig. 9 Max. peak gate power loss.

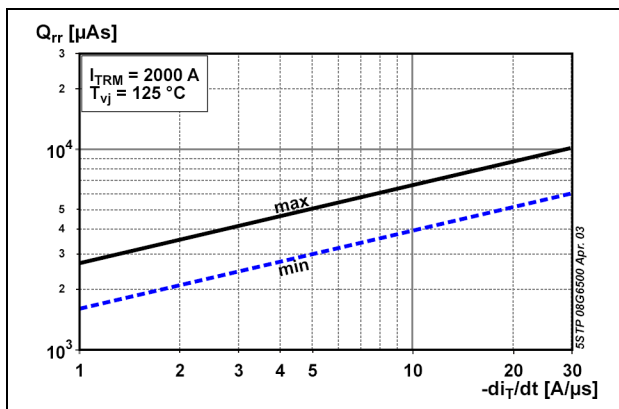


Fig. 10 Recovery charge vs. decay rate of on-state current.

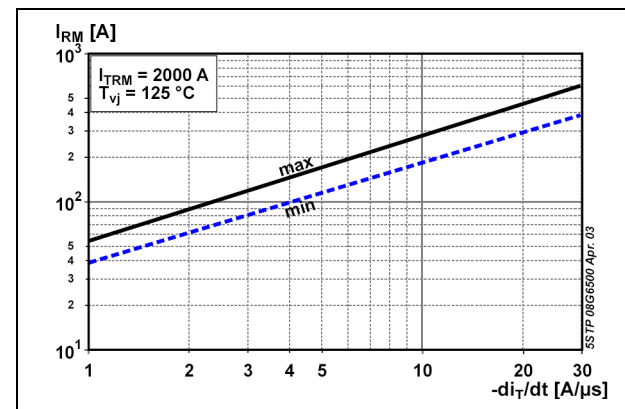


Fig. 11 Peak reverse recovery current vs. decay rate of on-state current.

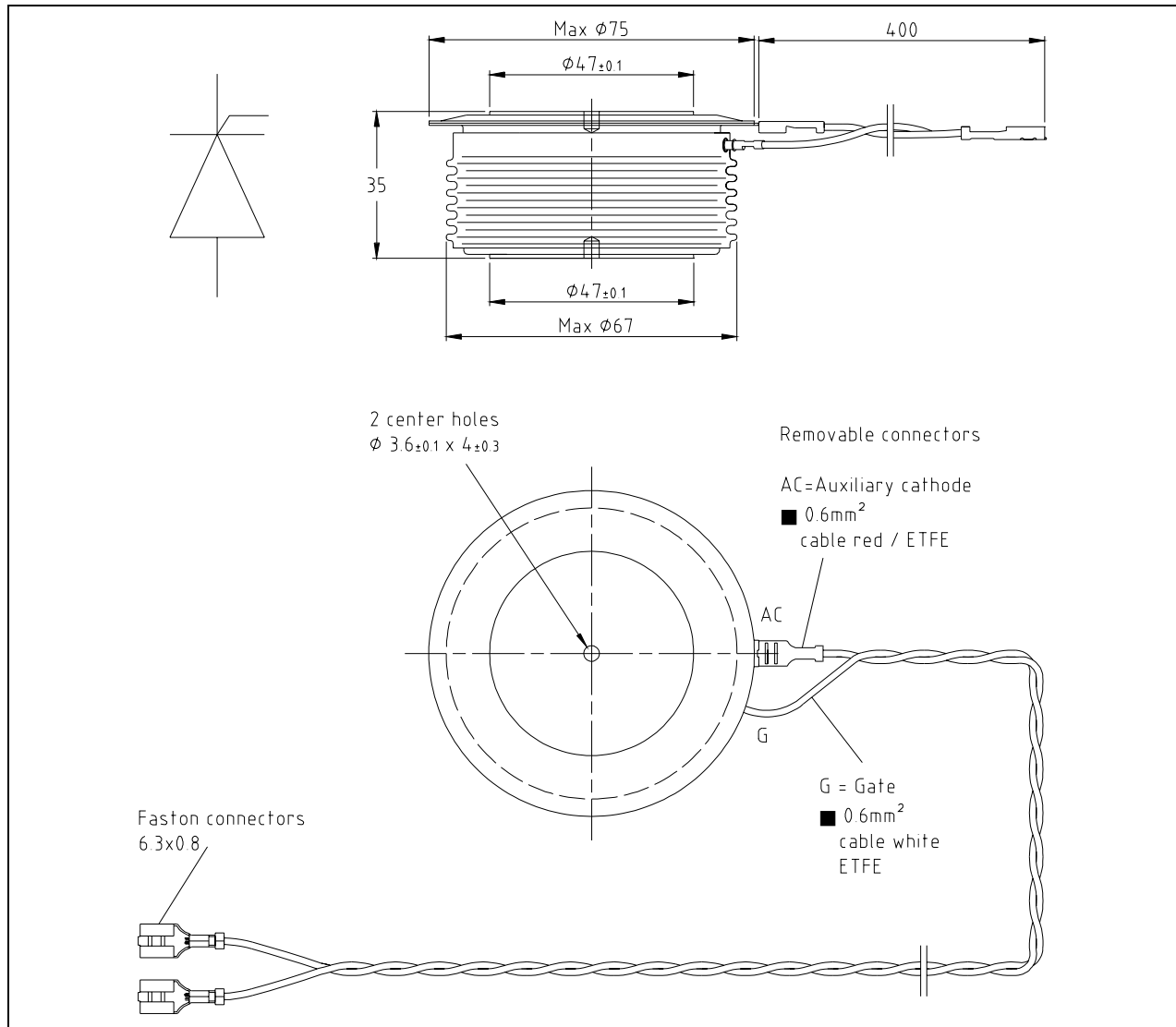


Fig. 12 Device Outline Drawing.

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Doc. No. 5SYA1006-03 Apr. 03

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