

$V_{DSM}$	=	2800 V
$I_{TAVM}$	=	620 A
$I_{TRMS}$	=	970 A
$I_{TSM}$	=	8000 A
$V_{T0}$	=	0.92 V
$r_T$	=	0.78 m $\Omega$

# Phase Control Thyristor

## 5STP 06D2800

Doc. No. 5SYA1020-04 Jan. 02

- 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 <sup>1)</sup>

Symbol	Conditions	5STP 06D2800	5STP 06D2600	5STP 06D2200
$V_{DRM}, V_{RRM}$	f = 50 Hz, $t_p = 10ms$	2800 V	2600 V	2200 V
$V_{RSM1}$	$t_p = 5ms$ , single pulse	3000 V	2800 V	2400 V
$dV/dt_{crit}$	Exp. to $0.67 \times V_{DRM}$ , $T_j = 125^\circ C$	1000 V/ $\mu s$		

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Forward leakage current	$I_{DRM}$	$V_{DRM}$ , $T_j = 125^\circ C$			100	mA
Reverse leakage current	$I_{RRM}$	$V_{RRM}$ , $T_j = 125^\circ C$			100	mA

### Mechanical data

Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	$F_M$		8	10	12	kN
Acceleration	a	Device unclamped			50	m/s <sup>2</sup>
Acceleration	a	Device clamped			100	m/s <sup>2</sup>

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Weight	m			0.3		kg
Surface creepage distance	$D_s$		25			mm
Air strike distance	$D_a$		14			mm

<sup>1)</sup> Maximum Ratings are those values beyond which damage to the device may occur

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## On-state

### Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Max. average on-state current	$I_{TAVM}$	Half sine wave, $T_c = 70^\circ\text{C}$			620	A
RMS on-state current	$I_{TRMS}$				970	A
Max. peak non-repetitive surge current	$I_{TSM}$	$t_p = 10\text{ ms}$ , $T_j = 125^\circ\text{C}$ , $V_D = V_R = 0\text{ V}$			8000	A
Limiting load integral	$I^2t$				320	$\text{kA}^2\text{s}$
Max. peak non-repetitive surge current	$I_{TSM}$	$t_p = 8.3\text{ ms}$ , $T_j = 125^\circ\text{C}$ , $V_D = V_R = 0\text{ V}$			8500	A
Limiting load integral	$I^2t$				300	$\text{kA}^2\text{s}$

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	$V_T$	$I_T = 1000\text{ A}$ , $T_j = 125^\circ\text{C}$			1.7	V
Threshold voltage	$V_{T0}$	$I_T = 333\text{ A} - 1000\text{ A}$ , $T_j = 125^\circ\text{C}$			0.92	V
Slope resistance	$r_T$	$T_j = 125^\circ\text{C}$			0.78	$\text{m}\Omega$
Holding current	$I_H$	$T_j = 25^\circ\text{C}$			70	mA
		$T_j = 125^\circ\text{C}$			50	mA
Latching current	$I_L$	$T_j = 25^\circ\text{C}$			500	mA
		$T_j = 125^\circ\text{C}$			200	mA

## Switching

### Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Critical rate of rise of on-state current	$di/dt_{crit}$	$T_j = 125^\circ\text{C}$ , $I_{TRM} = 1500\text{ A}$ , $V_D \leq 0.67 \cdot V_{DRM}$ , $I_{FG} = 2\text{ A}$ , $t_r = 0.5\ \mu\text{s}$			150	$\text{A}/\mu\text{s}$
Critical rate of rise of on-state current	$di/dt_{crit}$		Cont. $f = 50\text{ Hz}$			1000
Circuit-commutated turn-off time	$t_q$	$T_j = 125^\circ\text{C}$ , $I_{TRM} = 1500\text{ A}$ , $V_R = 200\text{ V}$ , $di_T/dt = -20\text{ A}/\mu\text{s}$ , $V_D \leq 0.67 \cdot V_{DRM}$ , $dv_D/dt = 20\text{ V}/\mu\text{s}$ ,	400			$\mu\text{s}$

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Recovery charge	$Q_{rr}$	$T_j = 125^\circ\text{C}$ , $I_{TRM} = 1500\text{ A}$ , $V_R = 200\text{ V}$ , $di_T/dt = -20\text{ A}/\mu\text{s}$	1500		3200	$\mu\text{As}$
Delay time	$t_d$	$V_D = 0.4 \cdot V_{DRM}$ , $I_{FG} = 2\text{ A}$ , $t_r = 0.5\ \mu\text{s}$			3	$\mu\text{s}$

## Triggering

Maximum rated values <sup>1)</sup>

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
Gate power loss	$P_G$	For DC gate current			3	W
Average gate power loss	$P_{GAV}$		see Fig. 9			

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Gate trigger voltage	$V_{GT}$	$T_j = 25^\circ\text{C}$			2.6	V
Gate trigger current	$I_{GT}$	$T_j = 25^\circ\text{C}$			400	mA
Gate non-trigger voltage	$V_{GD}$	$V_D = 0.4 \times V_{DRM}, T_{vjmax} = 125^\circ\text{C}$	0.3			V
Gate non-trigger current	$I_{GD}$	$V_D = 0.4 \times V_{DRM}, T_{vjmax} = 125^\circ\text{C}$	10			mA

## Thermal

Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	$T_j$				125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$		-40		140	$^\circ\text{C}$

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	$R_{th(j-c)}$	Double side cooled			36	K/kW
	$R_{th(j-c)A}$	Anode side cooled			70	K/kW
	$R_{th(j-c)C}$	Cathode side cooled			74	K/kW
Thermal resistance case to heatsink	$R_{th(c-h)}$	Double side cooled			7.5	K/kW
	$R_{th(c-h)}$	Single side cooled			15	K/kW

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)	19.18	9.82	5.45	1.44
$\tau_i$ (s)	0.3862	0.0561	0.0058	0.0024

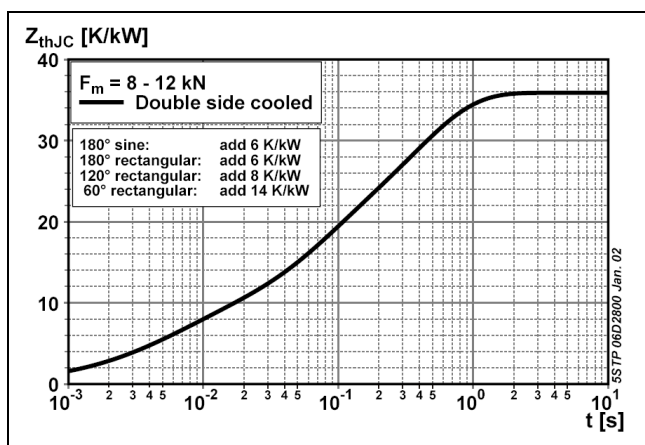


Fig. 1 Transient thermal impedance junction-to case.

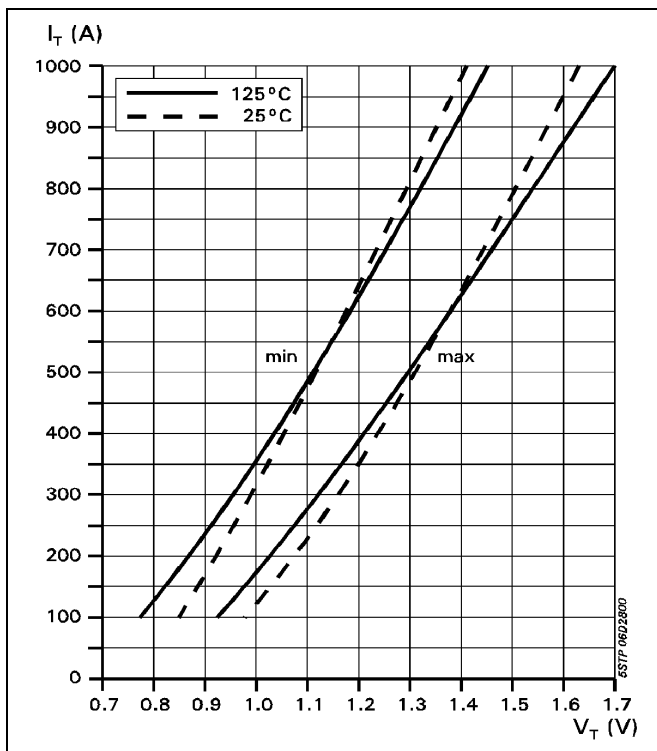


Fig. 2 On-state characteristics.

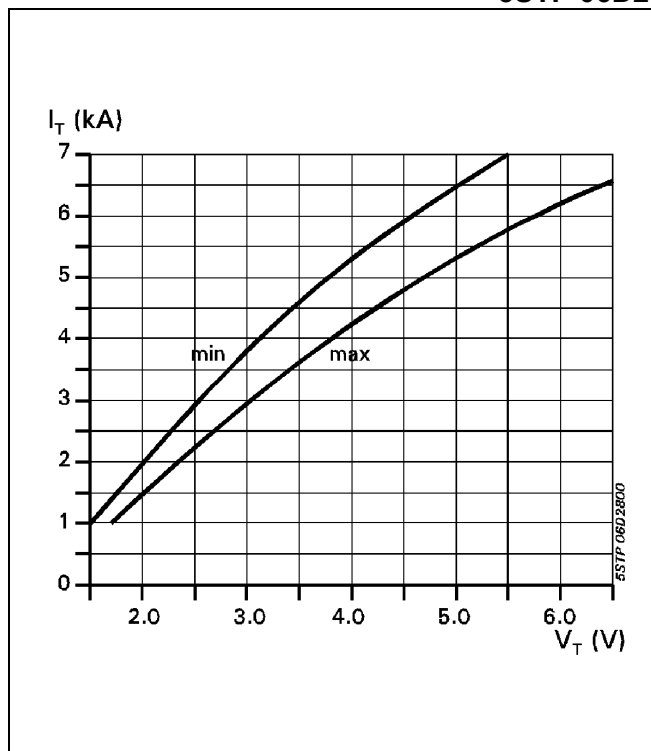


Fig. 3 On-state characteristics.  
T<sub>j</sub>=125°C, 10ms half sine

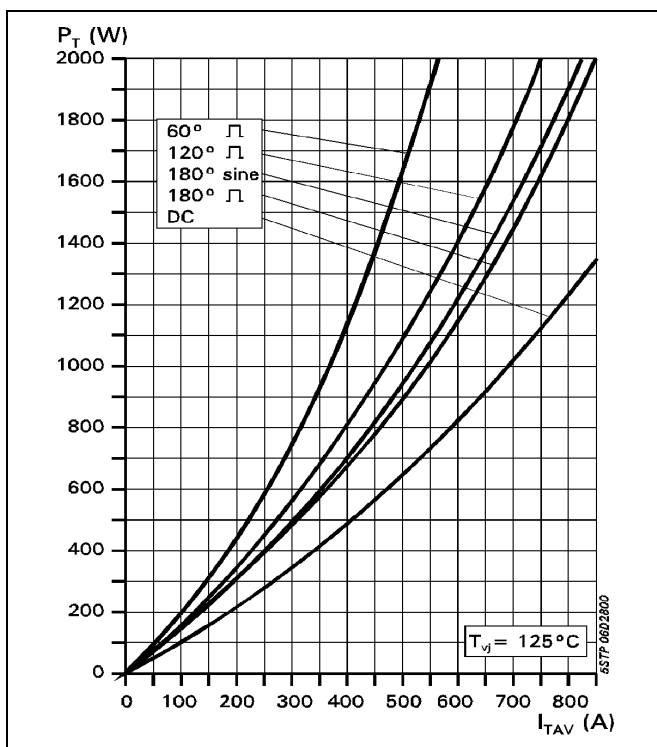


Fig. 4 On-state power dissipation vs. mean on-state current. Turn - on losses excluded.

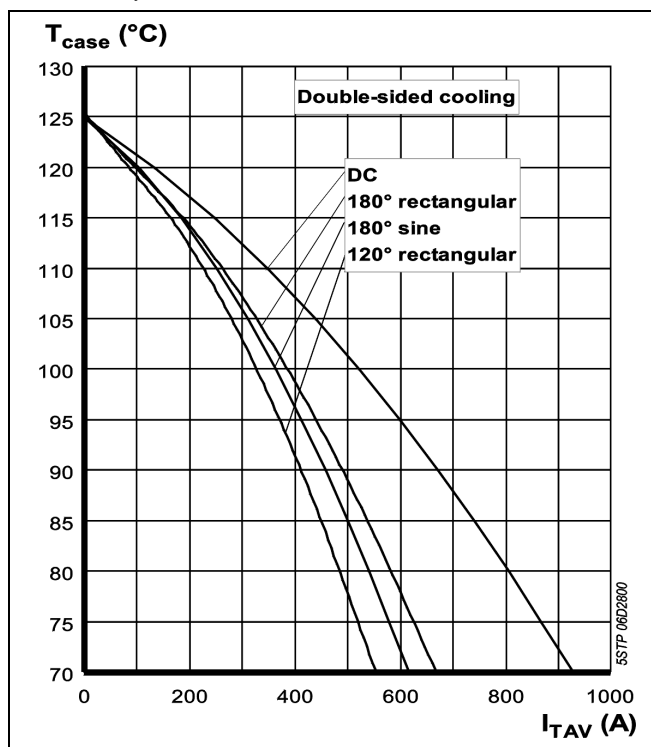
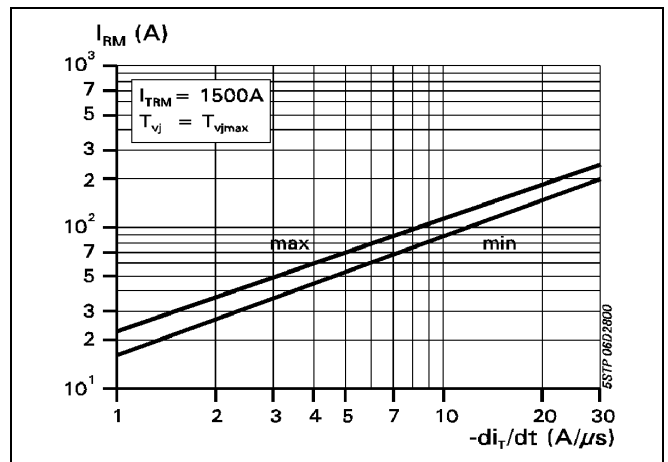
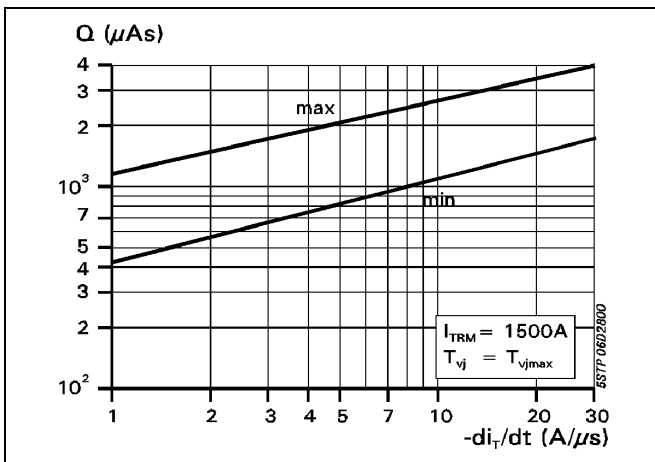
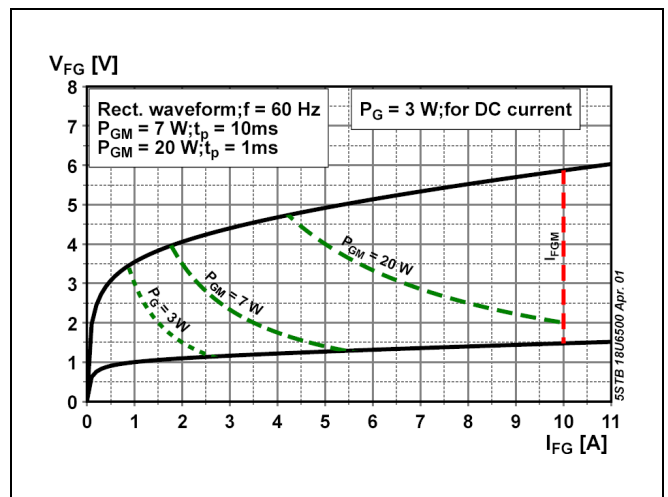
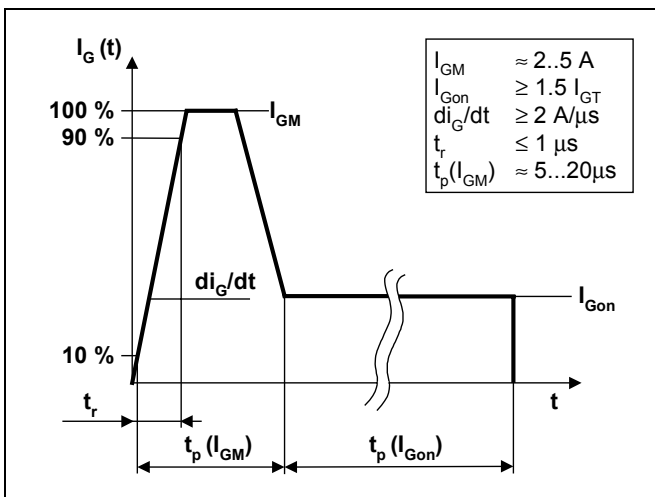
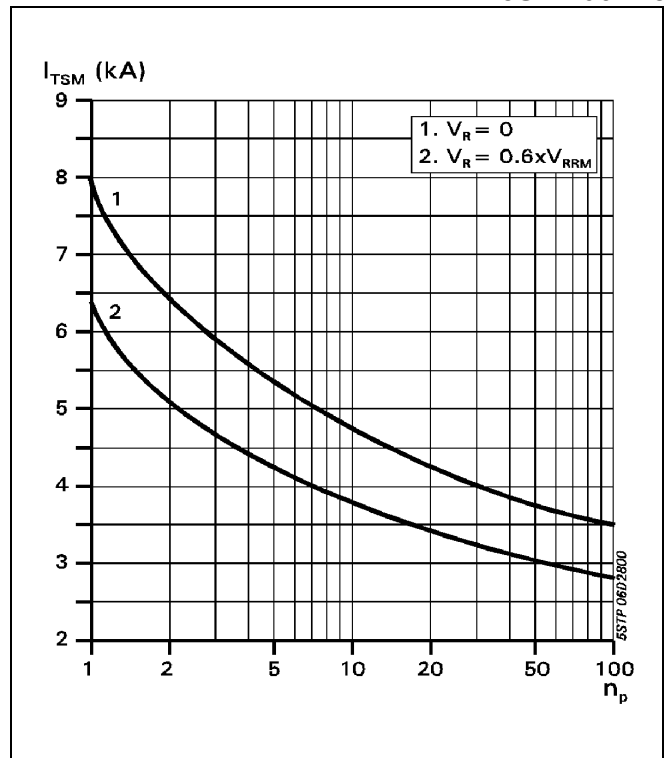
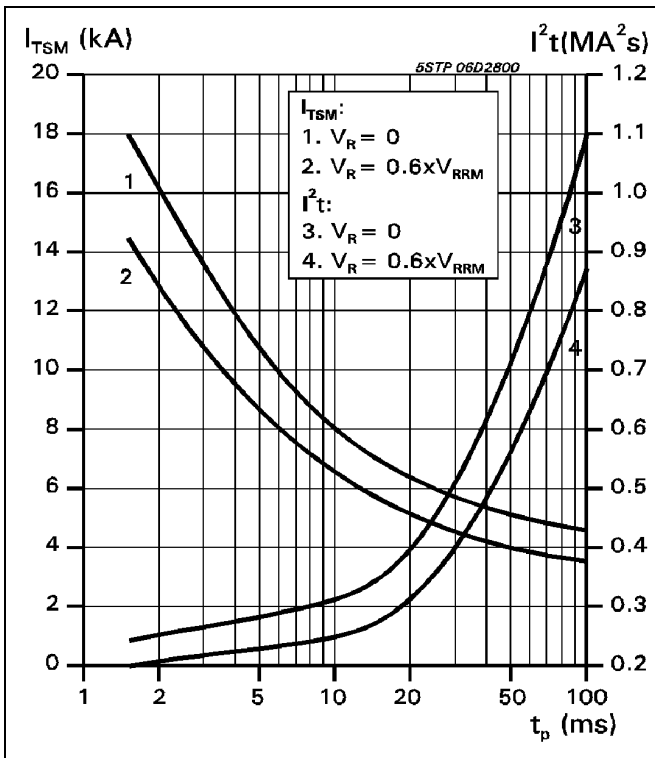


Fig. 5 Max. permissible case temperature vs. mean on-state current.



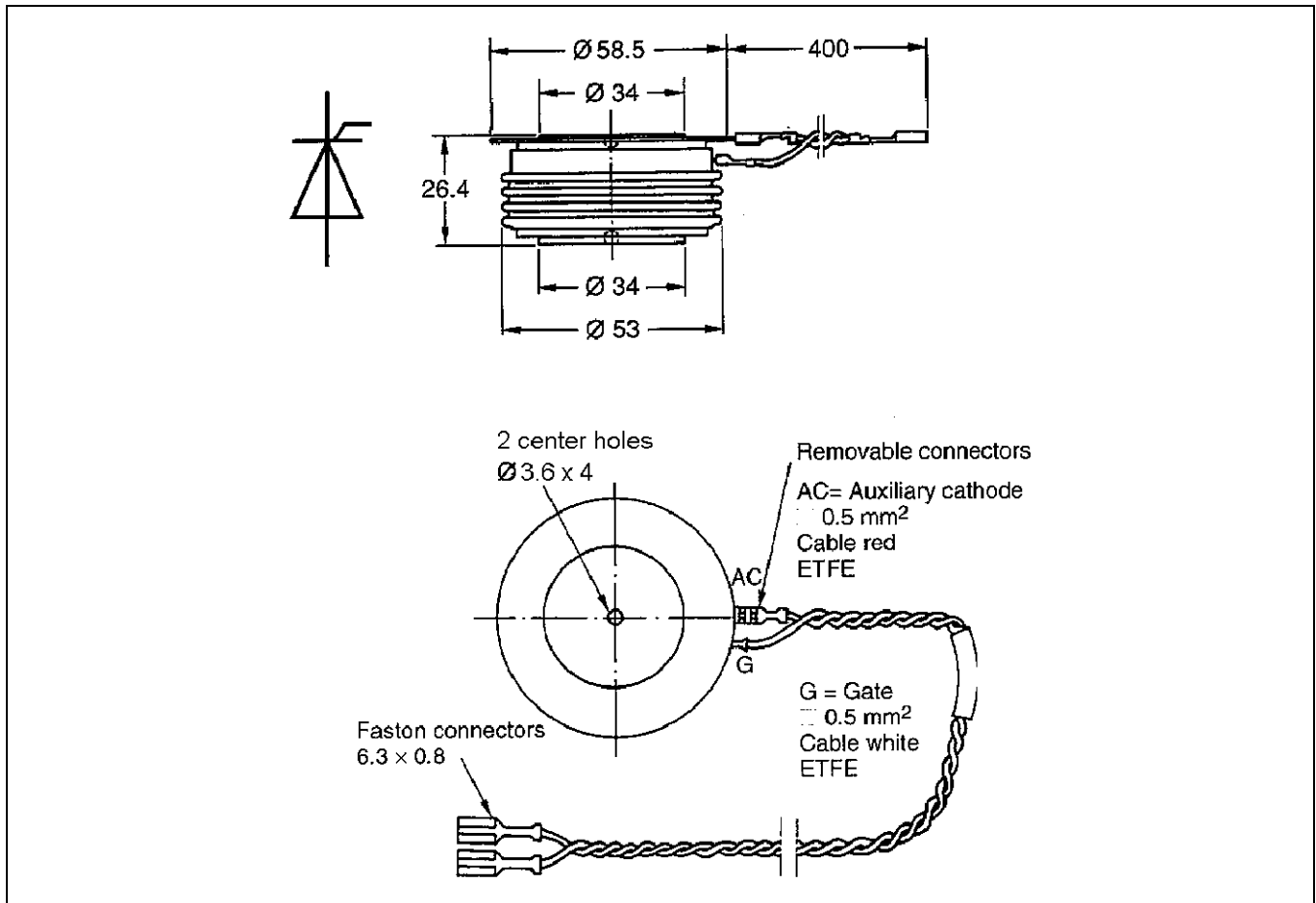


Fig. 12 Device Outline Drawing.

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