PHASE CONTROL THYRISTOR

T273-2000

- V_{DRM}/V_{RRM} = **1800 - 2600 V**
- $I_{T(AV)}$ = **2160 A** (T_C = 85 °C)
- $I_{T(AV)}$ = **2670 A** (T_C = 70 °C)
- I_{TSM} = **42 kA** (T_{Vj} = 125 °C)

- Interdigitated amplifying gate
- Low on-state switching losses
- Acceptable for series and parallel connections (low dispersion Q_{rr}, V_{TM}, I_{DRM})

MAXIMUM RATED VALUES

Parameter and conditions	Symbol	Values			Units
		min.	typ.	max.	
Repetitive peak off-state voltage / Repetitive peak reverse voltage, T_{Vj} = - 60 °C…+ 125 °C	V_{DRM} / V_{RRM}	1800	-	2600	V
Non-repetitive peak off-state voltage/Non- repetitive peak reverse voltage, T_{Vj} = - 60 °C…+ 125 °C	V_{DSM} / V_{RSM}	1900	-	2700	
Repetitive peak off-state current/ Repetitive peak reverse current, T_{Vj} = 125 °C, V_D / V_R = V_{DRM} / V_{RRM}	I_{DRM} / I_{RRM}	-	-	180	mA
Max. average on-state current, f = 50 Hz, double side cooled T_C = 85 °C T_C = 70 °C	$I_{T(AV)}$	-	-	 2160 2670	A
RMS on-state current, f = 50 Hz, T_C = 70 °C	I_{TRMS}	-	-	4190	
Surge non-repetitive current, V_R = 0, T_{Vj} = 125 °C, t_p = 10 ms	I_{TSM}	-	-	42	kA
Safety factor	I^2t	-	-	8820	kA^2s
Critical rate of rise of on-state current, V = 0,67V_{DRM}, I_T = 4000 A, I_{FG} = 2 A, t_r = 1 µs, f = 50 Hz, T_{Vj} =125 °C	$(di_T/dt)_{crit}$	-	-	200	A/µs
Critical rate of rise of off-state voltage, V_D = 0,67V_{DRM}, T_{Vj} = 125 °C	$(dV_D/dt)_{crit}$	500	-	1600	V/µs
Gate power loss, DC	P_{GM}	-	-	4	W
Operation junction temperature range	T_{Vj}	- 60	-	+ 125	°C
Storage temperature range	T_{stg}	- 60	-	+ 125	

T273-2000

ELECTRICAL CHARACTERISTICS					
Maximum peak on-state voltage, I_T = 6280 A, T_{Vj} = 25 °C	V_{TM}	-	-	1,75	V
On-state threshold voltage, T_{Vj} = 125 °C, I_T = 3100 - 9500 A	$V_{(TO)}$	-	-	0,90	
On-state slope resistance, T_{Vj} = 125 °C, I_T = 3100 - 9500 A	r_T	-	-	0,147	mΩ
Delay time, V = 0,5V_{DRM}, I_T = 2000 A, I_{FG} = 2 A, t_r = 1 µs, T_{Vj} = 25 °C	t_d	-		3,0	µs
Circuit-commutated turn off-time, I_T = 2000 A, di_T/dt = - 5 A/µs, V_R ≥ 100 V, V_D = 0,67V_{DRM}, (dV_D/dt) = 50 V/µs, T_{Vj} = 125 °C	t_q	-	250	-	
Recovery charge, di_T/dt = - 5 A/µs, T_{Vj} = 125 °C, I_T = 2000 A, V_R ≥ 100 V	Q_{rr}	-	-	4000	µAs
Holding current, V_D =12 V, T_{Vj} = 25 °C	I_H	-	-	300	mA
Latching current, V_D = 12 V, t_P = 50 µs, T_{Vj} = 25 °C	I_L	-	-	1500	
Gate trigger voltage, V_D = 12 V, T_{Vj} = - 60 °C T_{Vj} = 25 °C T_{Vj} = 125 °C	V_{GT}	-	-	 3,5 2,5 2,0	V
Gate trigger current, V_D = 12 V, T_{Vj} = - 60 °C T_{Vj} = 25 °C T_{Vj} = 125 °C	I_{GT}	-	-	 450 250 200	mA
Gate non-trigger voltage, V_D = 0,67V_{DRM}, T_{Vj} = 125 °C	V_{GD}	0,25	-	-	V
Gate non-trigger current, V_D = 0,67V_{DRM}, T_{Vj} = 125 °C	I_{GD}	15	-	-	mA
THERMAL PARAMETERS					
Thermal resistance junction to case, double side cooled anode side cooled cathode side cooled	 $R_{th(j-c)}$ $R_{th(j-c)A}$ $R_{th(j-c)C}$	-	-	 0,0102 0,0204 0,0204	°C/W
Thermal resistance case to heatsink, double side cooled single side cooled	$R_{th(c-h)}$	-	-	 0,003 0,006	
MECHANICAL PARAMETERS					
Weight	w	-	1,2	-	kg
Mounting force	F	40	-	50	kN
Maximum acceleration (at nominal mounting force)	a	-	-	100	m/s^2
Gate-anode distance on insulator surface	D_s	-	28	-	mm
Air strike distance	D_a	-	17	-	

T273-2000

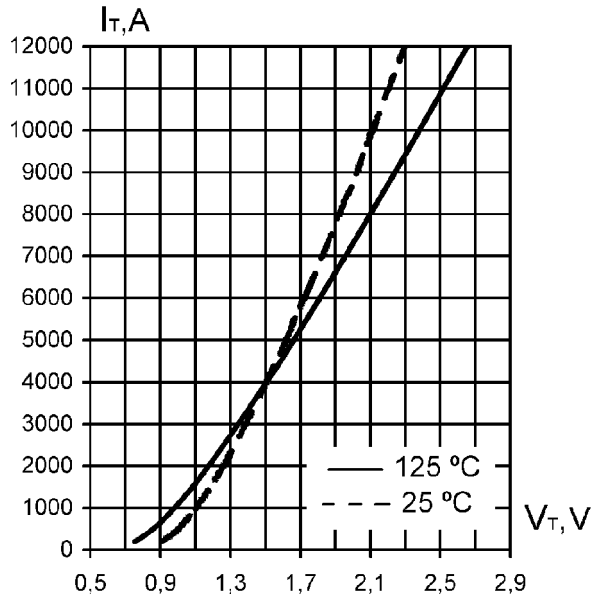


Fig. 1. Maximum on-state characteristics
(Limit device, 10 ms, half sine)

On-state characteristics model

$V_T = A + B \cdot I_T + C \cdot \ln(I_T + 1) + D \cdot \sqrt{I_T}$

Valid for I_T = 200 ÷ 12000 A

	T_{Vj} = 125 ºC	T_{Vj} = 25 ºC
A	0.482	0.676
B	0.0001122	0.0000608
C	0.035	0.026
D	0.004531	0.005896

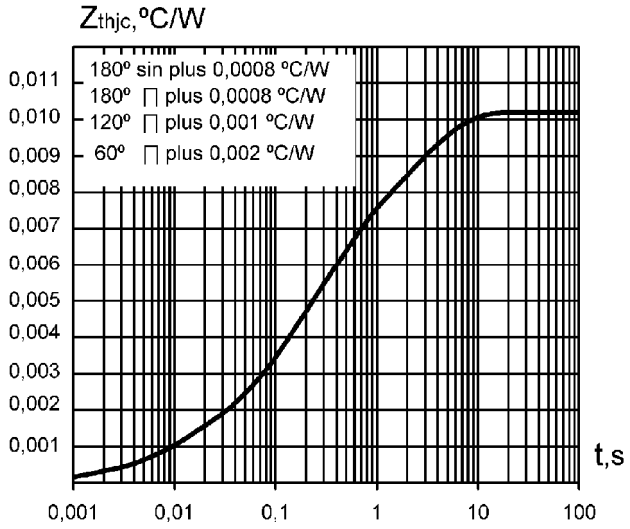


Fig. 2. Transient thermal impedance junction to case (DC)

Analytical function for transient thermal impedance

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

i	1	2	3	4	5
Ri,ºC/W	0,00037	0,0008	0,0025	0,0034	0,00313
τi,s	0,0041	0,015	0,11	0,44	3,16

T273-2000

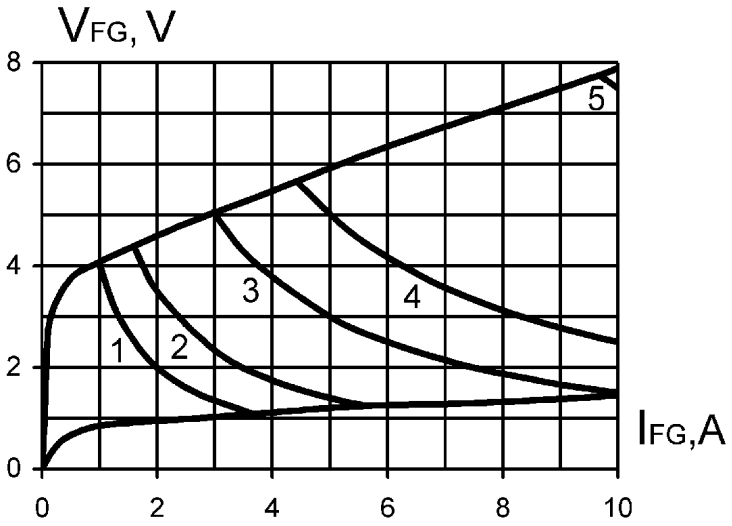


Fig. 3. Maximum peak gate power losses

Position at fig. 3	Duty cycle, $D = f \cdot t_p$	Gate pulse length, t_p, ms	Maximum gate pulse power P_{GM}, W
1	1	DC	4
2	2	10	7
3	20	1,0	15
4	40	0,5	25
5	200	0,1	75

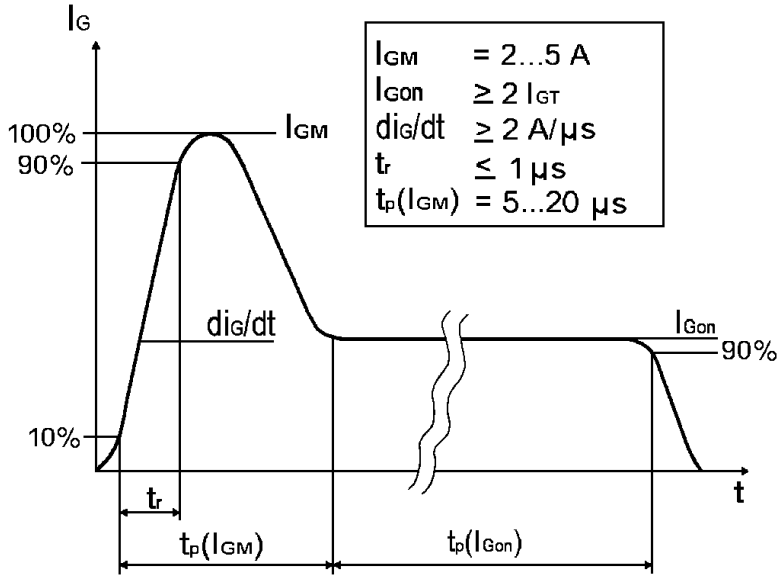


Fig. 4. Recommended gate current waveform

T273-2000

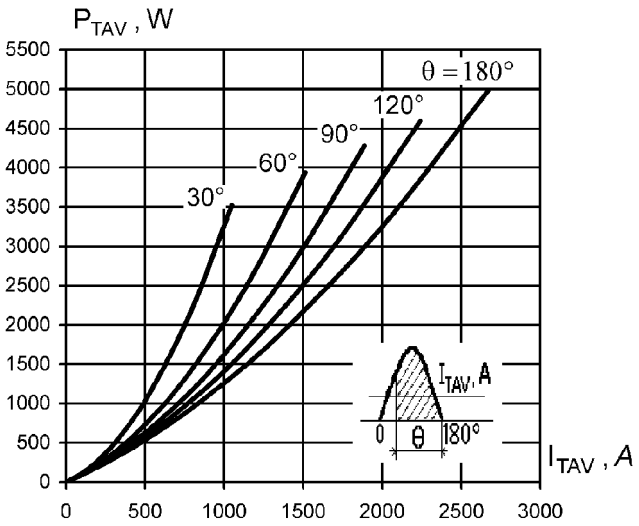


Fig. 5. On-state power loss vs. on-state current (sine)

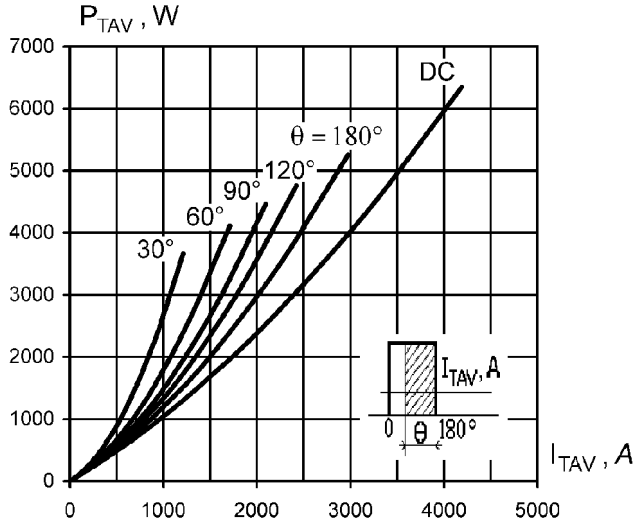


Fig. 6. On-state power loss vs. on-state current (rectangular)

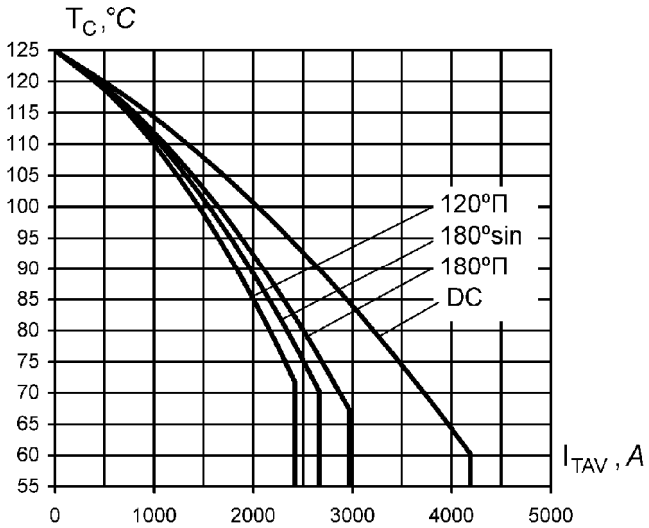


Fig. 7. Max. permissible case temperature vs. mean on-state current

T273-2000

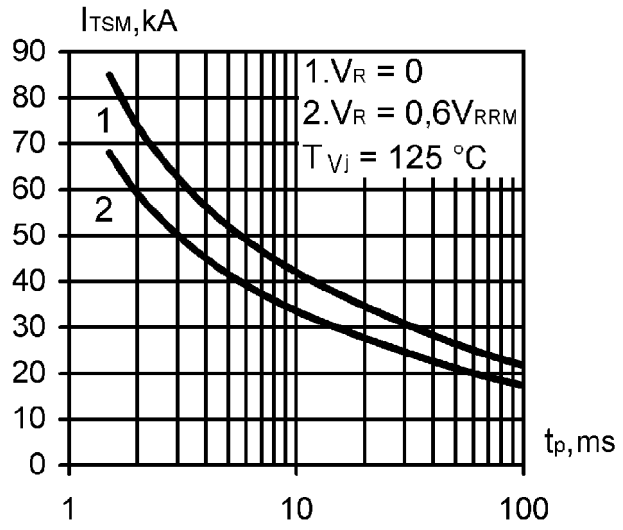


Fig. 8. Surge on-state current vs. pulse length
(half-sine)

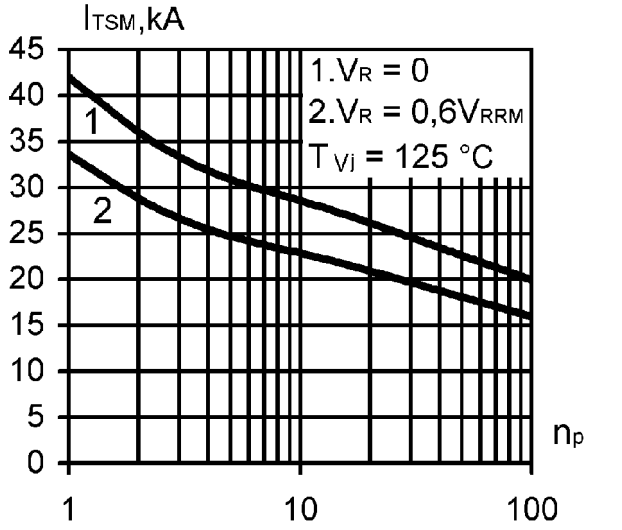


Fig. 9. Surge on-state current vs. number of pulses
(half-sine,10 ms, 50 Hz)

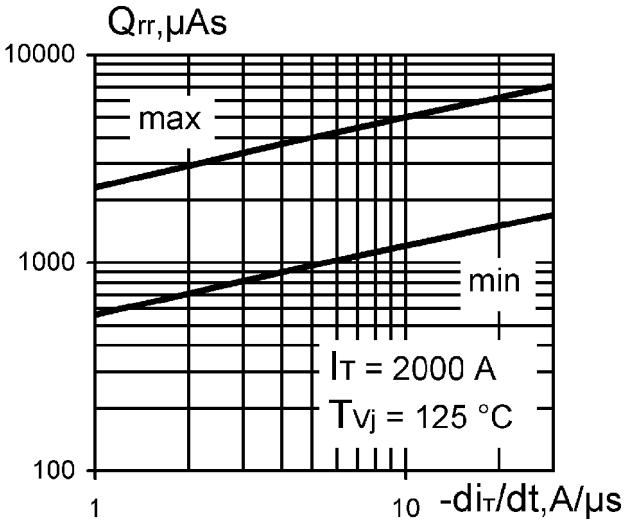


Fig. 10. Recovery charge vs. decay rate of on-state current

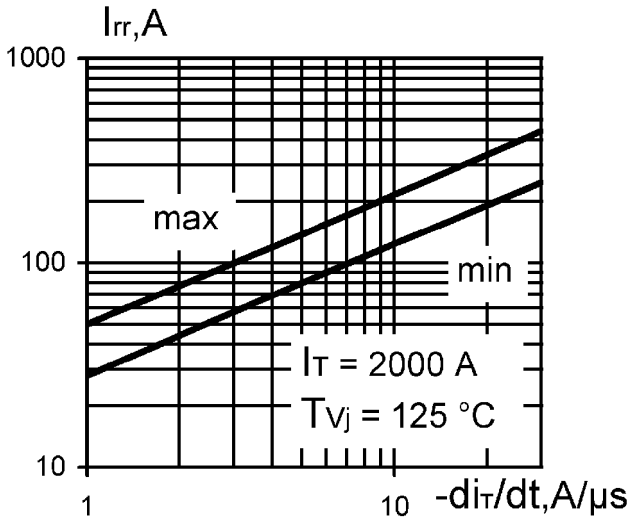
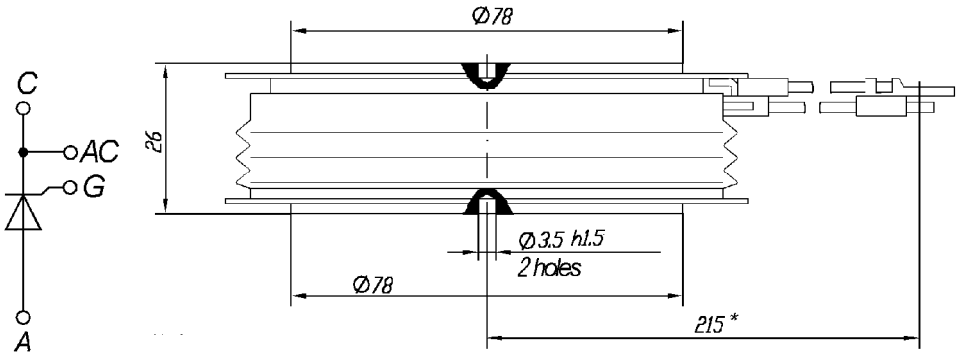
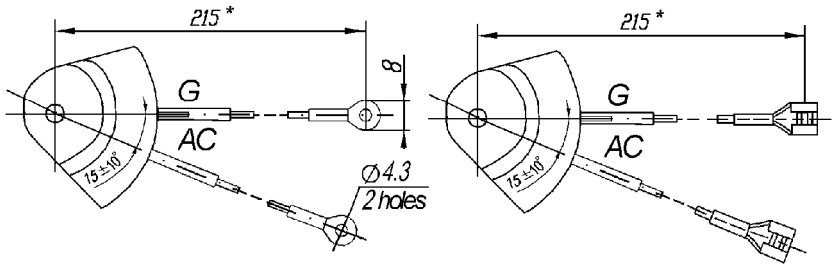


Fig. 11. Peak reverse recovery current vs. decay rate of on-state current

T273-2000



AC - Auxiliary cathode
G - Gate



***** Another length of outputs G and AC is permissible if required by clients

Fig. 12. Device outline drawing
(dimensions in mm)

JSC «ELECTROVIPRYAMITEL» reserves the right to change specification without notice.

Russia, Mordovia, Saransk,
430001, Proletarskaya str., 126
Tel: +7(8342) 47-04-30
Tel/Fax: +7 (8342) 47-15-01
E-mail: vpruvs@moris.ru, martin@moris.ru
Internet: www.elvpr.ru