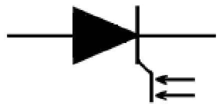
High-end Power Semiconductor Manufacturer

TL183-2000

Light Triggered Thyristor

- V_{DRM} = **6000 – 6400V**
- V_{RRM} = **6000 – 6400V**
- $I_{T(AV)}$ = **1685 A** (T_C = 85 °C)
- $I_{T(AV)}$ = **2115 A** (T_C = 70 °C)
- I_{TSM} = **40 kA** (T_j = 120 °C)
- P_{LM} = **40 mW**



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

MAXIMUM RATED VALUES

Parameters and conditions	Symbol	Values	Units
Repetitive peak off-state voltage	V_{DRM}	6000, 6200, 6400	V
Repetitive peak reverse voltages	V_{RRM}	6000, 6200, 6400	
Repetitive peak off-state current / Repetitive peak reverse current T_j=120 °C, V_D / V_R = V_{DRM} / V_{RRM}	I_{DRM} / I_{RRM}	max.250	mA
Maximum average on-state current f = 50 Hz, double side cooling T_C=85 °C T_C=70 °C	$I_{T(AV)}$	1685 2115	A
RMS on-state current, f=50 Hz, T_C=70 °C	I_{TRMS}	3320	
Surge current, V_R=0 V, T_j = 120 °C, t_p=10 ms	I_{TSM}	40	kA
Safety current, T_j=120 °C, t_p=10 ms	I^2t	8000	kA^2s
Critical rate of rise of on-state current, V=0.67V_{DRM}, I_T=4000 A, P_{LM}=40 mW, t_L=10 µs, t_{rise}=0.5 µs, f=50 Hz, T_j=120 °C	$(di_T/dt)_{crit}$	300	A/µs
Critical rate of rise of off-state voltage, V_D = 0.67V_{DRM}, T_j = 120 °C	$(dV_D/dt)_{crit}$	1000, 1600, 2000	V/µs
Minimum gate trigger light power, T_j = 25 °C, V_D = 12 V	P_{LM}	max. 40	mW
Operating temperature	T_j	-40… +120	˚C
Storage temperature	T_{stg}	-40… +50	

ELECTRICAL CHARACTERICTICS			
Maximum peak on-state voltage, I_T = 6280 A, T_j = 25 °C	V_{TM}	max. 2.65	V
On-state threshold voltage, T_j = 120 °C, I_T = 3000 - 9500 A	$V_{(TO)}$	max. 1.2	
On-state slope resistance, T_j = 120 °C, I_T = 3000 - 9500 A	r_T	max. 0.35	mΩ
Gate controlled delay time, V = 1000 V , I_T = 2000 A, P_{LM} = 40 mW, t_L = 10 µs, t_{rise} = 0.5 µs, T_j = 25 °C	t_d	max. 5.0	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_j = 120 °C	t_q	typ. 630	
Recovery charge, di_T/dt = - 5 A/µs, T_j = 120 °C, I_T = 2000 A, V_R ≥ 100 V	Q_{rr}	max. 5000	µAs
Holding current, V_D =12 V, T_j = 25 °C	I_H	100	mA
Latching current, V_D = 12 V, T_j = 25 °C, P_{LM} = 40 mW, t_L = 10 µs, t_{rise} = 0.5 µs	I_L	1000	
THERMAL PARAMETERS			
Thermal resistance junction to case, sin 180°: double side cooled DC: double side cooled DC: anode side cooled DC: cathode side cooled	R_{thjc} R_{thjc} R_{thjc-A} R_{thjc-K}	0.0078 0.0072 0.0112 0.0201	°C/W
Thermal resistance case to heatsink, double side cooled single side cooled	R_{thch}	0.002 0.004	
MECHANICAL PARAMETERS			
Weight	w	typ. 2.0	kg
Clamping force	F	60 - 80	kN
Vibration resistance	a	50	m/s^2
Creepage distance	D_s	36	mm
Air strice distance	D_a	23	mm

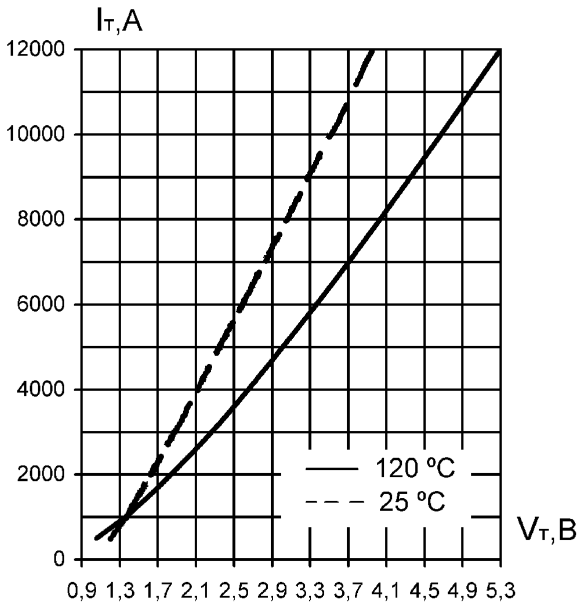


Fig. 1. Limiting on-state characteristic iT = f(vT)

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 = 500 – 12000 A

	Tj = 120 ºC	Tj = 25 ºC
A	0.427	0.583
B	0.0002137	0.0002311
C	0.012	0.087
D	0.02	-0.001815

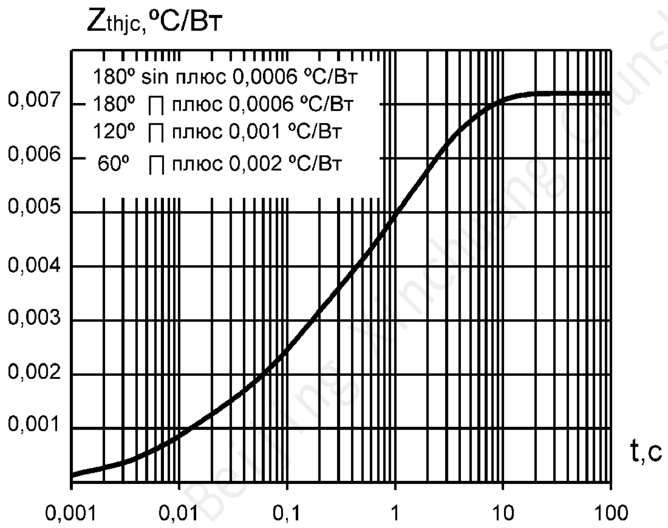


Fig. 2. Transient thermal impedance Z_{thJC} =f(t) for DC

Analytical elements of transient thermal impedance, junction to case

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

i	1	2	3	4	5
Ri, ºC/Вт	0,00027	0,0008	0,0018	0,0023	0,00203
τi,c	0,0041	0,013	0,11	0,86	3,56

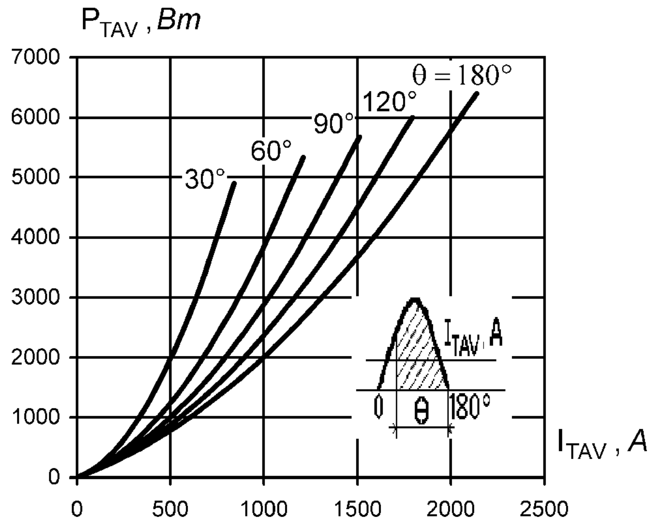


Fig. 3. On-state power loss vs. On-state current (sine)

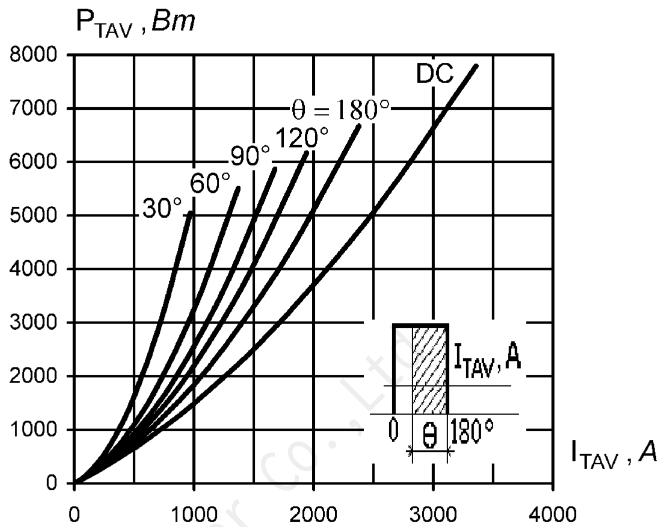


Fig. 4. On-state power loss vs. on-state current (rectangular)

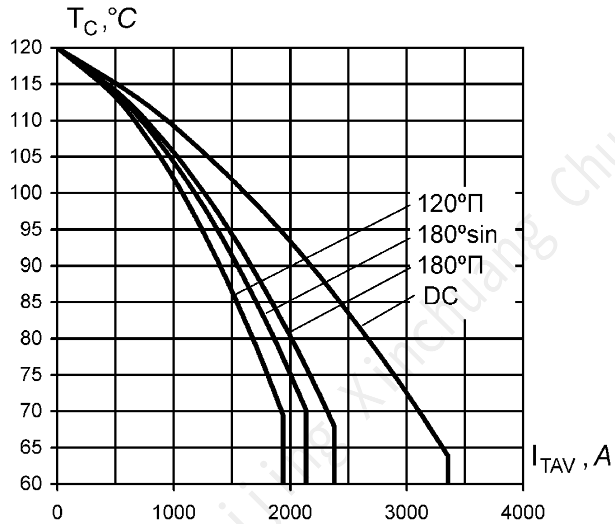


Fig. 5. Maximum allowable case temperature during various angles of conductance and various forms of current

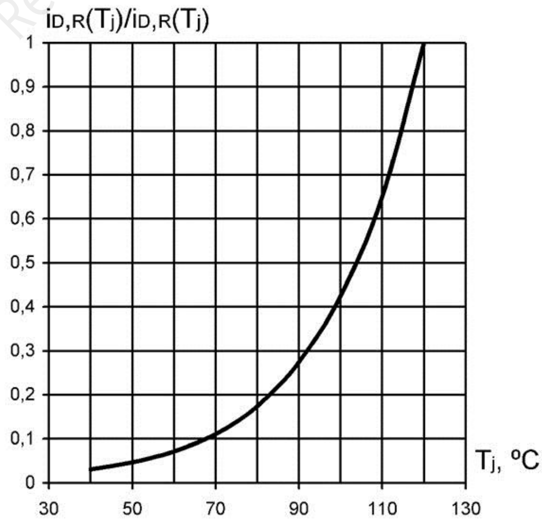


Fig. 6. Repetitive peak off-state current and repetitive peak reverse current vs. junction temperature (U_D=U_{DRM} U_R=U_{RRM})

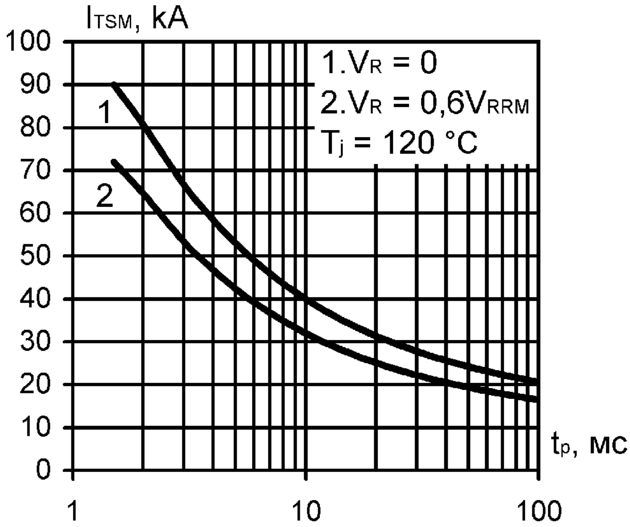


Fig. 7. Surge on-state current vs. pulse length (half-sine)

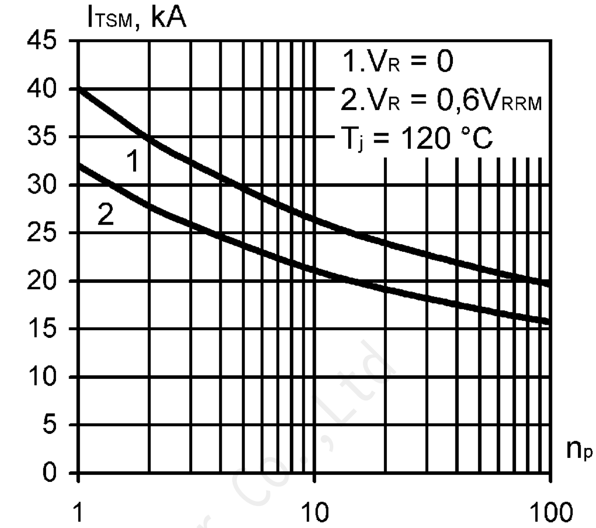


Fig. 8. Surge on-state current vs. number of pulses of sine form (10 ms, 50 Hz)

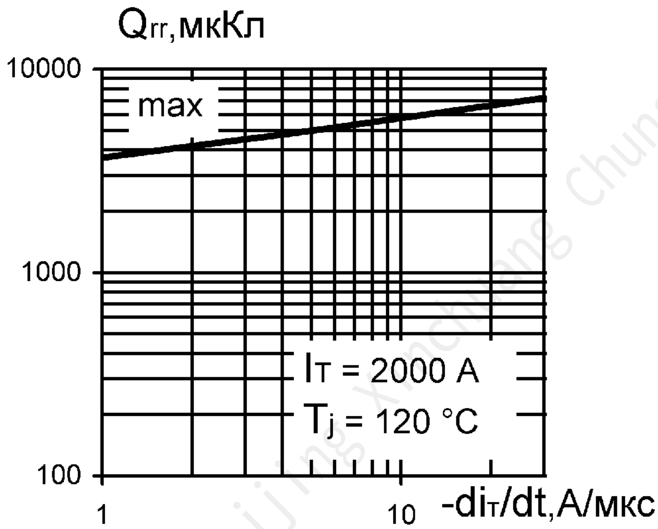


Fig. 9. Recovery charge vs. decay rate of on-state current

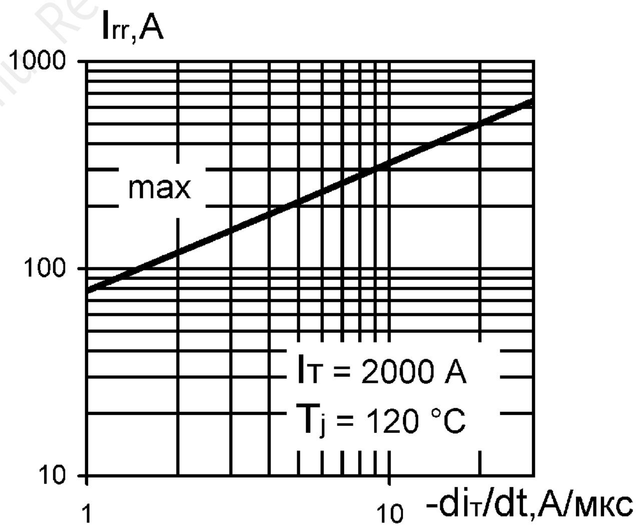
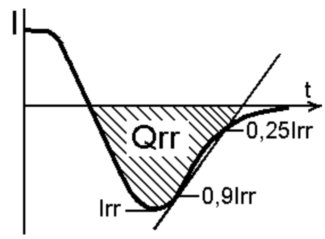


Fig. 10. Peak reverse recovery current vs. decay rate of on-state current



TL183-2000---PACKAGE DETAILS

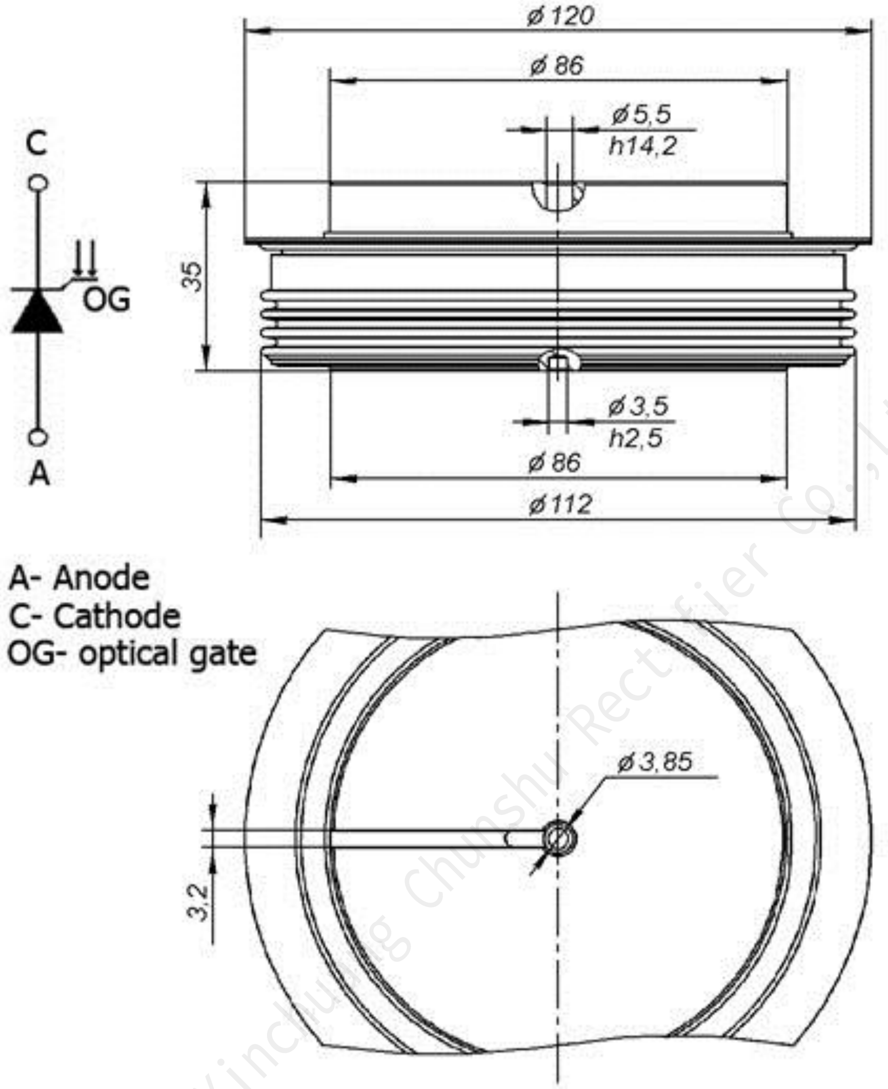


Fig. 11. Device Outline Drawing
(dimensions in mm)