POLOVODIČE
akciová společnost

TI 918L-600-25

Integrated Gate-Commutaded Thyristor

Properties

- Full reverse voltage
- Low on-state losses
- Snubberless
- Suitable for inverters, drives and traction applications
- High reliability

Key Parameters

V_{DRM}, V_{RRM}	=	2 500	V
I_{TGQM}	=	600	A
I_{TAVm}	=	630	A
I_{TSM}	=	10 000	A
V_{TO}	=	1.495	V
r_T	=	1.37	mΩ

Types

	V_{DRM}, V_{RRM}
TI 918L-600-30	**3 000 V**
TI 918L-600-25	**2 500 V**
TI 918L-600-20	**2 000 V**

Mechanical Data (see Fig. 6)

F_m	**Mounting force**	10 ± 2	kN
m	**Weight**	0.890	kg
D_S	**Surface creepage distance**	25	mm
D_a	**Air strike distance**	12	mm
D_p	**Pole-piece diameter**	47	mm
l	**Lenght**	230	mm
h	**Height**	57	mm
w	**Width**	112	mm

Fig. 1 Case

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Maximum Ratings			*Maximum Limits*	*Unit*
V_{DRM} V_{RRM}	**Repetitive peak off-state and peak reverse voltage** *T_j = -40 ÷ 115 ℃, Gate unit energized*	**TI 918L-600-30** **TI 918L-600-25** **TI 918L-600-20**	**3 000** **2 500** **2 000**	**V**
V_{Dclink}	***Permanent DC voltage for λ = 100 FIT failure rate*** *Gate unit energized*	**TI 918L-600-30** **TI 918L-600-25** **TI 918L-600-20**	**1 800** **1 500** **1 200**	**V**
I_{TRMS}	**RMS on-state current** *T_c = 70 ℃, half sine waveform, f = 50 Hz*		**990**	**A**
I_{TAVm}	**Average on-state current** *T_c = 70 ℃, half sine waveform, f = 50 Hz*		**630**	**A**
I_{TSM}	**Peak non-repetitive surge** *half sine pulse, t_p = 10 ms, V_R = 0 V*		**10 000**	**A**
I^2t	**Limiting load integral** *half sine pulse, t_p = 10 ms, V_R = 0 V*		**500 000**	**A^2s**
T_{jmin} - T_{jmax}	**Junction operating temperature range**		**-40 ÷ 115**	**℃**
T_{stgmin} - T_{stgmax}	**Storage temperature range**		**-40 ÷ 80**	**℃**

Unless otherwise specified T_j = 115 ℃

Characteristics		*Value*			*Unit*
		min.	*typ.*	*max.*	
V_{TM}	**Maximum peak on-state voltage** I_{TM} = 600 A, CS - ON			**2.31**	**V**
V_{T0} r_T	**Threshold voltage** **Slope resistance** I_{T1} = 333 A, I_{T2} = 1000 A			**1.495** **1.37**	**V** **mΩ**
I_{DM}	**Peak off-state current** $V_D = V_{DRM}$, Gate unit energized			**150**	**mA**
I_{RM}	**Peak reverse current** $V_R = V_{RRM}$, Gate unit energized			**150**	**mA**

Unless otherwise specified T_j = 115 ℃

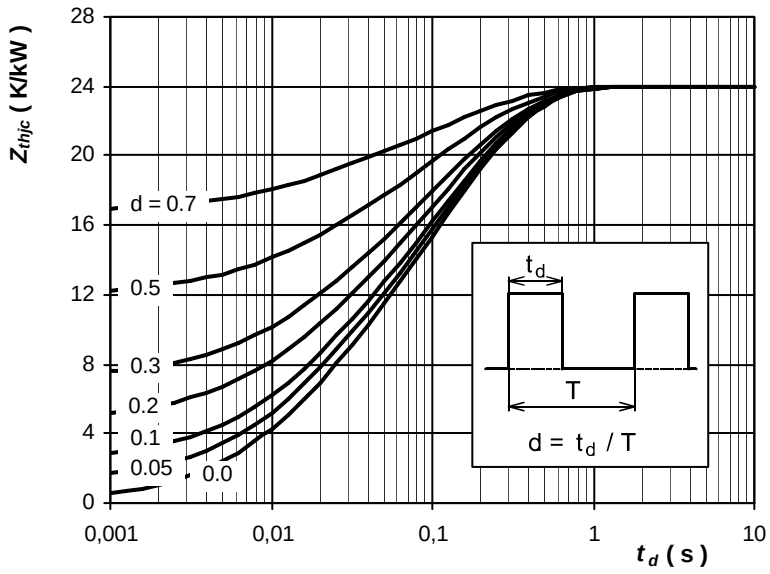
Turn-on switching

Maximum rated values		*Value*	*Unit*
$(di_T/dt)_{cr}$	**Critical rate of rise of on-state current**	**800**	**A/µs**
Conditions: T_j = 90 ℃, I_T = 600 A, f = 0÷1000 Hz			
Characteristic values		*Value*	*Unit*
I_{Tm}	**Peak on-state current**	**600**	**A**
t_{don}	**Turn-on delay time**	**≤ 2.5**	**µs**
t_r	**Rise on-time**	**≤ 0.7**	**µs**
E_{on}	**Turn-on energy per pulse**	**≤ 0.2**	**J**
Conditions: T_j = 90 ℃, L_{CL}= 0.2µH, L_i = 2µH, R_s= 12 Ω, V_{LC} = 0.6 $V_{DRM.}$ (Fig. 8)			

Turn-off switching

Maximum rated values		*Value*	*Unit*
I_{TGQM}	**Max. controllable turn-off current**	**600**	**A**
t_{doff}	**Turn-off delay time**	**≤ 3.5**	**µs**
t_f	**Fall time**	**≤ 0.5**	**µs**
E_{off}	**Turn-off energy per pulse**	**≤ 1.0**	**J**
Conditions: T_j = 90 ℃,C_{CL}= 2 µF, L_{CL}= 0.2µH, L_i = 2µH, R_s= 12 Ω, V_{LC} = 0.6 $V_{DRM.}$ (Fig. 8)			

Thermal Parameters		*Value*	*Unit*
R_{thjc}	**Thermal resistance junction to case** *double side cooling*	**24.0**	**K/kW**
R_{thch}	**Thermal resistance case to heatsink,** *double side cooling*	**6.0**	**K/kW**



Analytical function for transient thermal impedance

$$Z_{thjc} = \sum_{i=1}^{4} R_i (1 - \exp(-t / \tau_i))$$

i	R_i	τ_i
1	5,91	0,4209
2	4,09	0,2289
3	8,35	0,0749
4	5,65	0,0149

F_m = 10 ± 2 kN,
double side cooling

Fig.2 Transient thermal impedance junction to case

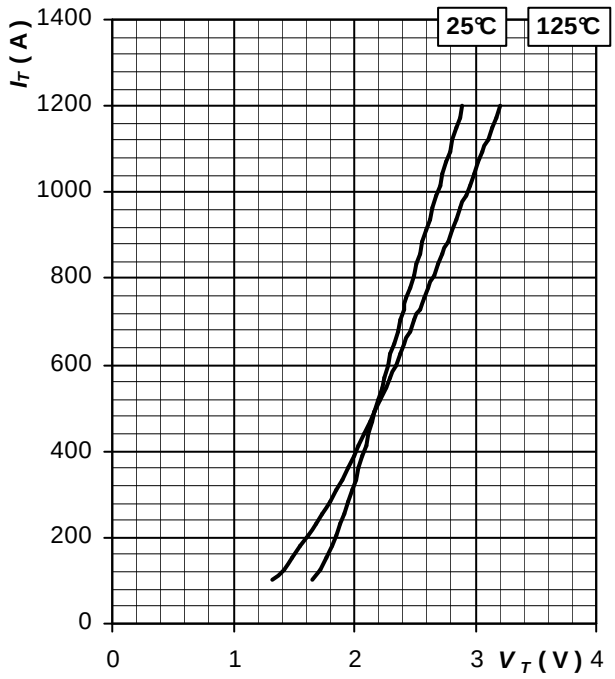


Fig.3 Maximum instaneous on-state characteristics

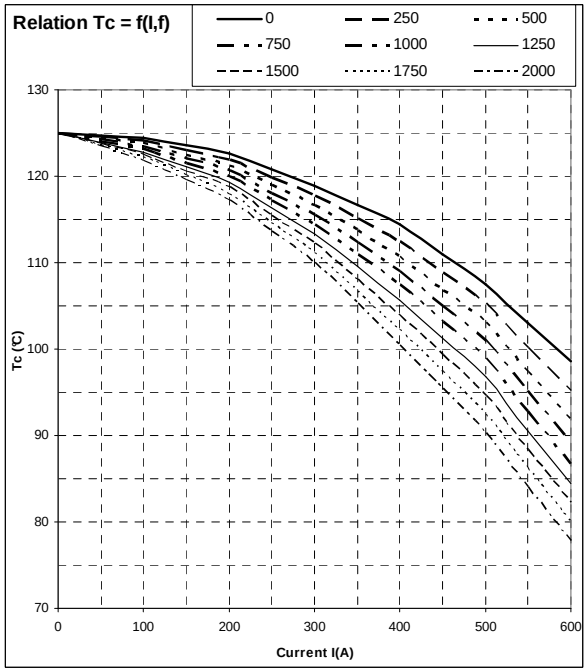


Fig.4 Maximum allowable case temperature T_c *on rectangular turn-off current and frequence. Conditions:* C_{CL}= 3 µF, L_{CL}=0.2µH, L_i =3µH, R_s= 12 Ω, V_D =1500V

Gate unit		*Value*	*Unit*
V_{GIN1}	**Gate unit voltage**	**- 20**	**V**
V_{GIN2}	**Input turn-on voltage**	**2.5**	**V**
P_{max}	**Gate unit power consuption** [1)]	**80**	**W**
$P_{on\ CS}$	**Control Signal optical input power** (B1)	**> -20**	**dBm**
$P_{off\ CS}$	**Control Signal optical noise power** (B1)	**< -45**	**dBm**
$P_{on\ SF}$	**Status Feedback optical output power**(B2)	**> -20**	**dBm**
$P_{off\ SF}$	**Status Feedback optical noise power** (B2)	**< -50**	**dBm**
t_{onmin}	**Minimal on time**	**5 ± 20%**	**µs**
t_{offmin}	**Minimal off time**	**6 ± 20%**	**µs**
t_{GLITCH}	**Pulse width threshold**	**< 0.75**	**µs**
f_{max}	**Frequency**	**2 000**	**Hz**
t_{fd}	**Delay time of on gate current**	**2.0**	**µs**
t_{rd}	**Delay time of off gate current**	**2.0**	**µs**
D_{max}	**Maximum duty**	**100**	**%**
T_{wmin} - T_{wmax}	**Operating temperature range** [2)] *(Fig. 5)*	**-20 ÷ 70**	**℃**
T_{stgmin} - T_{stgmax}	**Storage temperature range**	**-40 ÷ 80**	**℃**
X1	**Gate part power connector** *(see Fig.6)*	**BU0403 Hartman**	**-**
CS - B1	**LWL receiver for command signal**	**HFBR-2524 Agilent**	**-**
SF - B2	**LWL transmitter for status feedback**	**HFBR-1528 Agilent**	**-**

Note 1: Powered with recomended supply unit SU 918A

Note 2: Recomended temperature: ≤ 60°C

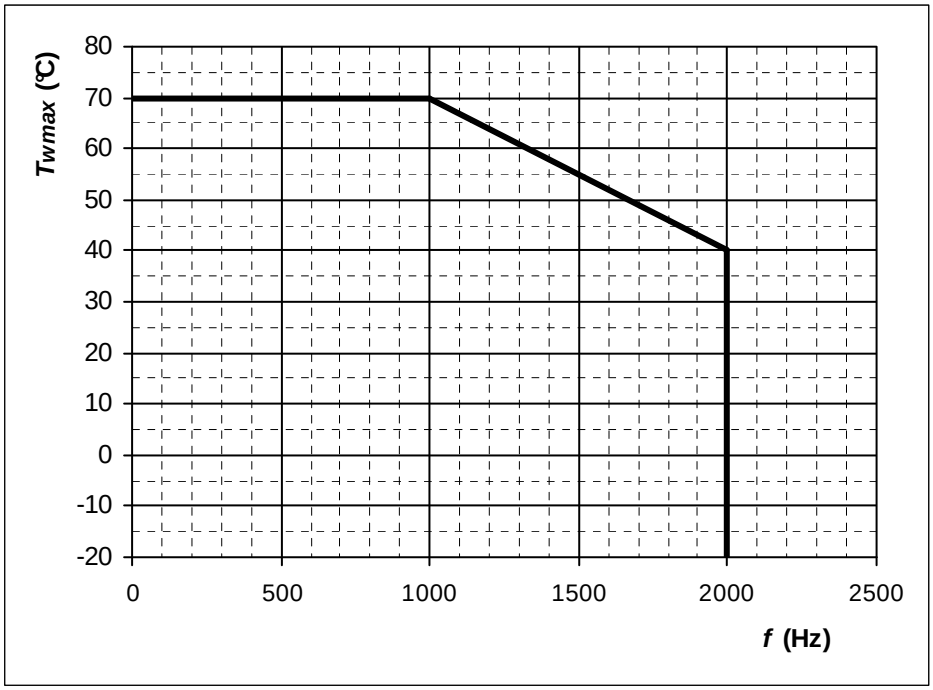


Fig. 5 Gate drive part operating temperature area

Supply unit (recomended type)		***Value***	***Unit***
Vc	**DC power supply – SU 918A** **- SU 918A-48**	**18 ÷ 36** **36 ÷ 60**	**V**
P	**Power consumption (cut-off limit)**	**90**	**W**
V_{out1}	**Output supply voltage**	**-20**	**V**
T_{wmin} - T_{wmax}	**Operating temperature range**[2)]	**-20 to +70**	**°C**
V_{is}/*1min*	**Insulation strength**	**5.0**	**[kV]**
m	**Weight**	**1 220**	**g**

Note 2: Recomended temperature: ≤ 60°C

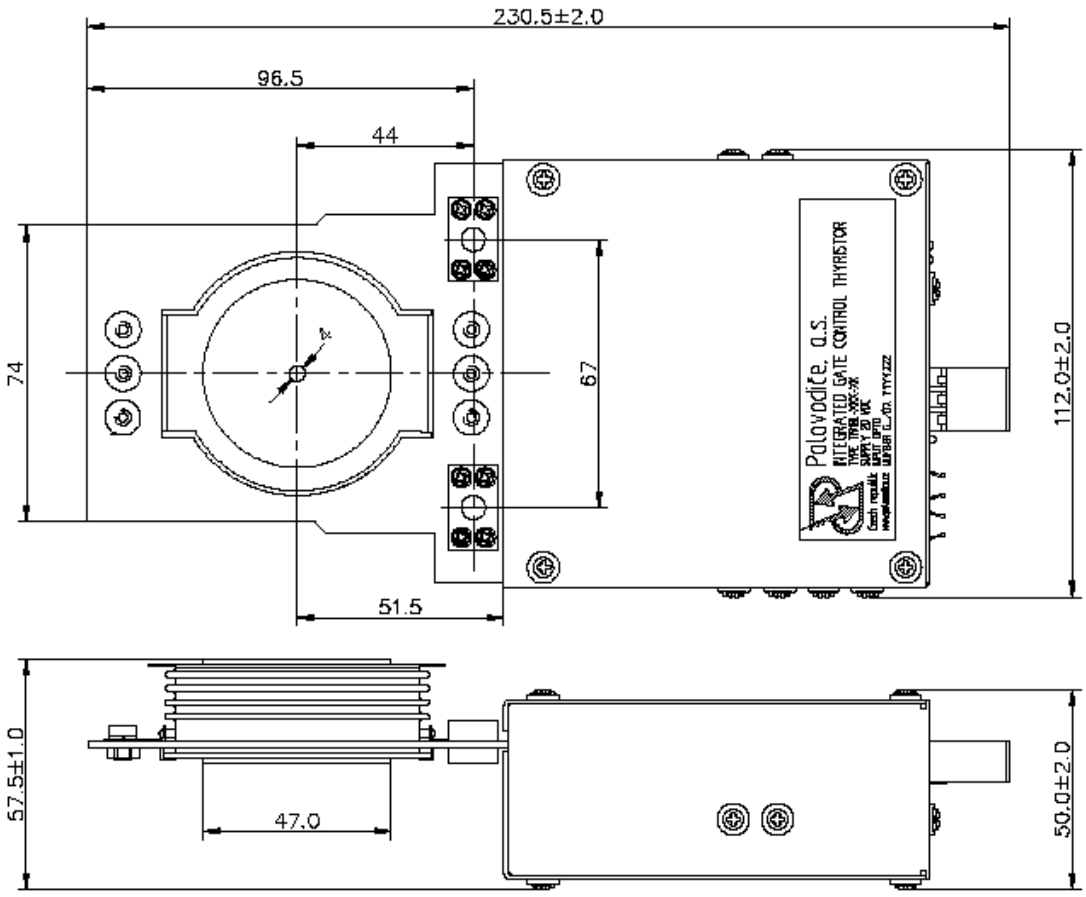


Fig. 6 Device gate part drawing

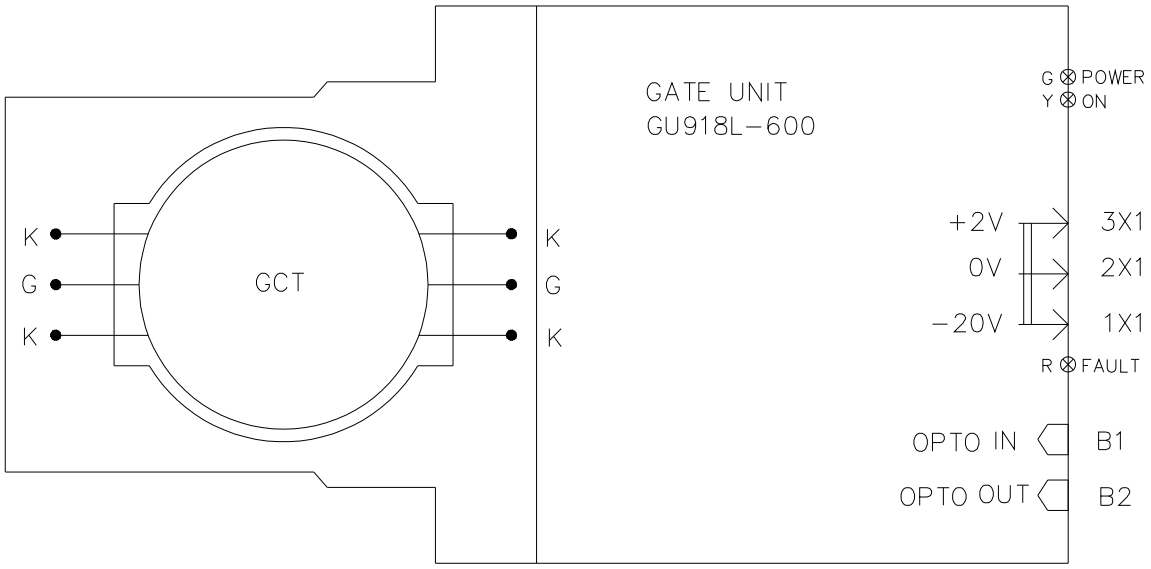


Fig. 7 Schema of input-output connection

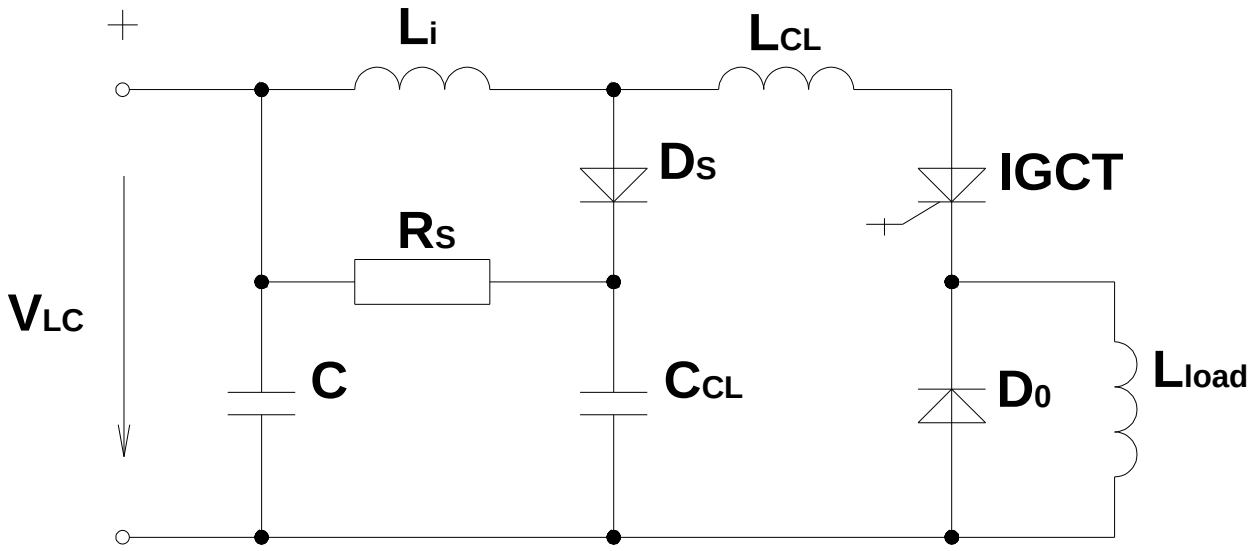


Fig.8 Test circuit.

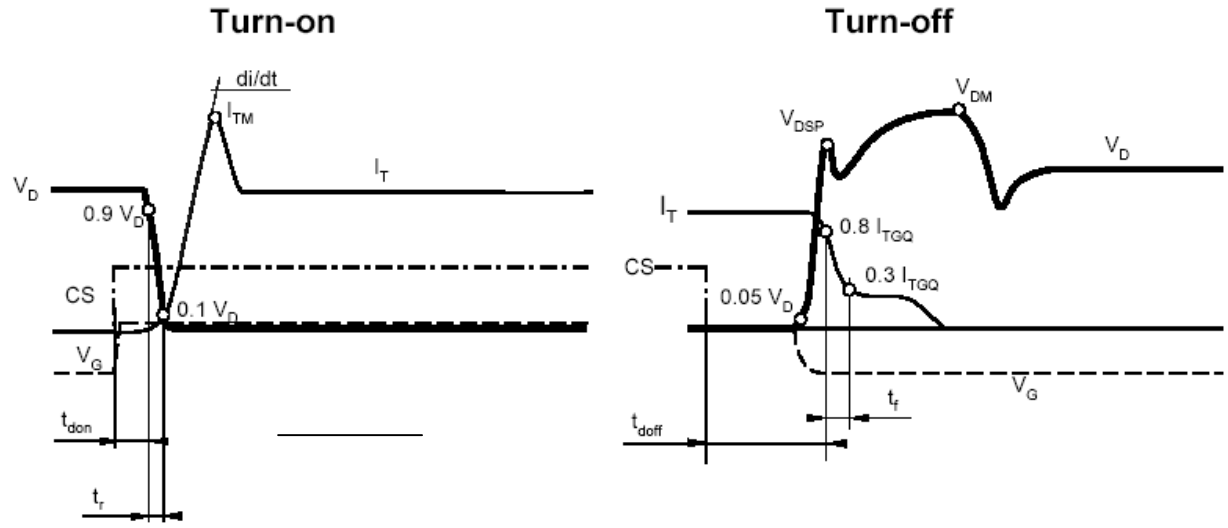


Fig. 9 Turn-on and turn-off waveform diagram