



PROTON-ELECTROTEX RUSSIA

High power cycling capability
Low on-state and switching losses
Designed for traction and industrial applications

Phase Control Thyristor Chip Type TG70-1000-65

Maximum allowable mean on-state current ¹⁾					I _{TAV}		1000 A					
Repetitive peak off-state voltage					V _{DRM}		4600...6500 V					
Repetitive peak reverse voltage					V _{RRM}							
Turn-off time					t _q		800 μs					
V _{DRM} , V _{RRM} , V	4600	4800	5000	5200	5400	5600	5800	6000	6200	6400	6500	
Voltage code	46	48	50	52	54	56	58	60	62	64	65	
T _j , °C	-60...+125											

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{TAV}	Maximum allowable mean on-state current ¹⁾	A	1000 1381 1670	$T_c=101\text{ }^{\circ}\text{C}$, Double side cooled $T_c=85\text{ }^{\circ}\text{C}$, Double side cooled $T_c=70\text{ }^{\circ}\text{C}$, Double side cooled 180° half-sine wave; 50 Hz	
I_{TRMS}	RMS on-state current ¹⁾	A	1570	$T_c=101\text{ }^{\circ}\text{C}$, Double side cooled 180° half-sine wave; 50 Hz	
I_{TSM}	Surge on-state current ¹⁾	kA	18.0 21.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
			19.0 22.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
I^2t	Safety factor ¹⁾	$\text{A}^2\text{s}\cdot 10^3$	1600 2200	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
			1400 2000	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
BLOCKING					
V_{DRM}, V_{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	4600...6500	$T_{j\text{ min}} < T_j < T_{j\text{ max}}$; 180° half-sine wave; 50 Hz; Gate open	
V_{DSM}, V_{RSM}	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	4700...6600	$T_{j\text{ min}} < T_j < T_{j\text{ max}}$; 180° half-sine wave; single pulse; Gate open	
V_D, V_R	Direct off-state and Direct reverse voltages	V	$0.6\cdot V_{DRM}$ $0.6\cdot V_{RRM}$	$T_j=T_{j\text{ max}}$; Gate open	

TRIGGERING					
I _{FGM}	Peak forward gate current	A	8	T _j =T _{j max}	
V _{RGM}	Peak reverse gate voltage	V	5		
P _G	Gate power dissipation	W	5	T _j =T _{j max} for DC gate current	
SWITCHING					
(di _T /dt) _{crit}	Critical rate of rise of on-state current non-repetitive (f=1 Hz)	A/μs	630	T _j =T _{j max} ; V _D =0.67·V _{DRM} ; I _{TM} =2 I _{TAV} ; Gate pulse: I _G =2 A; t _{GP} =50 μs; di _G /dt≥2 A/μs	
THERMAL					
T _{stg}	Storage temperature	°C	−60...+50		
T _j	Operating junction temperature	°C	−60...+125		
MECHANICAL					
F	Mounting force ¹⁾	kN	33.0...40.0		
F _{cq}	Force on control gate	N	7.8		

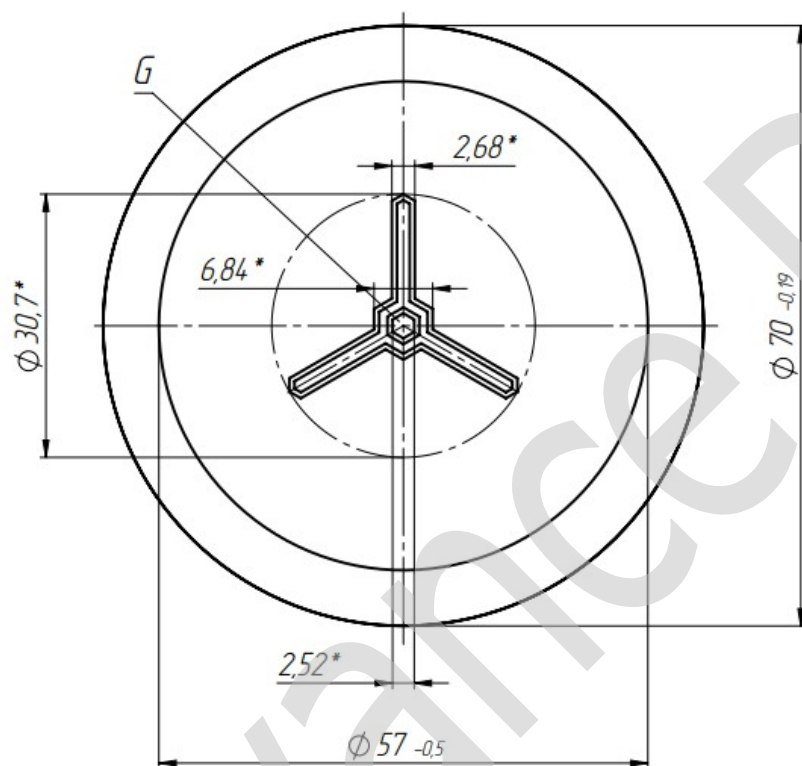
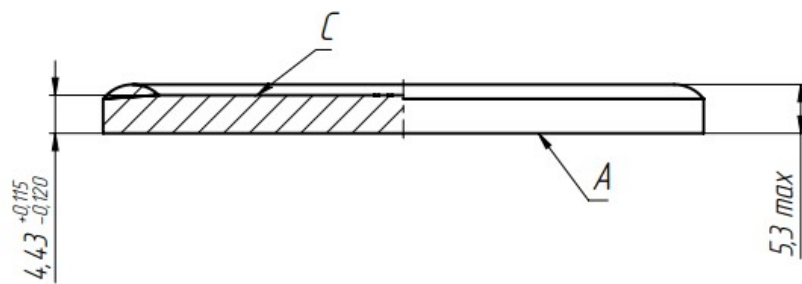
CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V_{TM}	Peak on-state voltage ¹⁾ , max	V	3.15	$T_j=25\text{ }^{\circ}\text{C}$; $I_{TM}=5000\text{ A}$	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.00	$T_j=T_{j\text{ max}}$;	
r_T	On-state slope resistance ¹⁾ , max	mΩ	0.560	$0.5\pi I_{TAV} < I_T < 1.5\pi I_{TAV}$	
I_L	Latching current, max	mA	1500	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=12\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$	
I_H	Holding current, max	mA	300	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=12\text{ V}$; Gate open	
BLOCKING					
I_{DRM}, I_{RRM}	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	300	$T_j=T_{j\text{ max}}$; $V_D=V_{DRM}$; $V_R=V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage ²⁾ , min	V/ μs	1000	$T_j=T_{j\text{ max}}$; $V_D=0.67\cdot V_{DRM}$; Gate open	
TRIGGERING					
V_{GT}	Gate trigger direct voltage, max	V	5.00 3.00 2.00	$T_j= T_{j\text{ min}}$ $T_j=25\text{ }^{\circ}\text{C}$ $T_j= T_{j\text{ max}}$	$V_D=12\text{ V}$; $I_D=3\text{ A}$; Direct gate current
I_{GT}	Gate trigger direct current, max	mA	500 300 200	$T_j= T_{j\text{ min}}$ $T_j= 25\text{ }^{\circ}\text{C}$ $T_j= T_{j\text{ max}}$	
V_{GD}	Gate non-trigger direct voltage, min	V	0.35	$T_j=T_{j\text{ max}}$; $V_D=0.67\cdot V_{DRM}$; Direct gate current	
I_{GD}	Gate non-trigger direct current, min	mA	15.00		
SWITCHING					
t_{gd}	Delay time	μs	4.00	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=1500\text{ V}$; $I_{TM}=I_{TAV}$; $di/dt=200\text{ A}/\mu\text{s}$; Gate pulse: $I_G=2\text{ A}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt=2\text{ A}/\mu\text{s}$	
t_q	Turn-off time ³⁾ , max	μs	800	$dv_D/dt=50\text{ V}/\mu\text{s}$; $T_j=T_{j\text{ max}}$; $I_{TM}=I_{TAV}$; $di_R/dt=-10\text{ A}/\mu\text{s}$; $V_R=100\text{ V}$; $V_D=0.67\text{ }V_{DRM}$;	

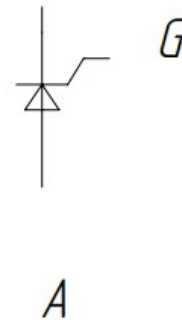
THERMAL					
R _{thjc}	Thermal resistance, junction to case ¹⁾ , max	°C/W	0.0100	Direct current	Double side cooled
R _{thjc-A}			0.0220		Anode side cooled
R _{thjc-K}			0.0180		Cathode side cooled
MECHANICAL					
m	Weight, max	g	184		

PART NUMBERING GUIDE						NOTES	
TG	70	1000	65	A2	B2	¹⁾ Depending on the specifications of the housing used. The specified values are relevant when using the Proton-Electrotex T.E3 housing. ²⁾ Critical rate of rise of off-state voltage	
1	2	3	4	5	6		
1. Phase Control Thyristor Chip with a distributed gate 2. Maximum diameter, mm 3. Mean on-state current, A 4. Voltage code 5. Critical rate of rise of off-state voltage, V/μs 6. Turn-off time (dv _D /dt=50 V/μs)						³⁾ Turn-off time (dv _D /dt=50 V/μs)	
						Symbol of Group	A2
						(dv _D /dt) _{crit} , V/μs	1000
						Symbol of Group	B2
						t _q , μs	800

OVERALL DIMENSIONS



**Dimensions for reference.*



All dimensions in millimeters

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