



PROTON-ELECTROTEX RUSSIA

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

Phase Control Thyristor Chip Type TR34-250-44

Maximum allowable mean on-state current ¹⁾	I_{TAV}	250 A		
Repetitive peak off-state voltage	V_{DRM}	3800...4400 V		
Repetitive peak reverse voltage	V_{RRM}			
Turn-off time	t_q	500, 630, 800 μ s		
V_{DRM}, V_{RRM}, V	3800	4000	4200	4400
Voltage code	38	40	42	44
$T_j, ^\circ\text{C}$	-60...+125			

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I _{TAV}	Maximum allowable mean on-state current ¹⁾	A	250 293	T _c =93 °C; Double side cooled; T _c =85 °C; Double side cooled; 180° half-sine wave; 50 Hz	
I _{TRMS}	RMS on-state current ¹⁾	A	392	T _c =93 °C; Double side cooled; 180° half-sine wave; 50 Hz	
I _{TSM}	Surge on-state current ¹⁾	kA	3.5 4.0	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _D =V _R =0 V; Gate pulse: I _G =2 A; t _{GP} =50 μs; di _G /dt≥1 A/μs
			3.5 4.0	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =8.3 ms; single pulse; V _D =V _R =0 V; Gate pulse: I _G =2 A; t _{GP} =50 μs; di _G /dt≥1 A/μs
I ² t	Safety factor ¹⁾	A ² s·10 ³	60 80	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =10 ms; single pulse; V _D =V _R =0 V; Gate pulse: I _G =2 A; t _{GP} =50 μs; di _G /dt≥1 A/μs
			50 60	T _j =T _{j max} T _j =25 °C	180° half-sine wave; t _p =8.3 ms; single pulse; V _D =V _R =0 V; Gate pulse: I _G =2 A; t _{GP} =50 μs; di _G /dt≥1 A/μs
BLOCKING					
V _{DRM} , V _{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	3800...4400	T _{j min} < T _j <T _{j 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	3900...4500	T _{j min} < T _j <T _{j max} ; 180° half-sine wave; single pulse; Gate open	
V _D , V _R	Direct off-state and Direct reverse voltages	V	0.6·V _{DRM} 0.6·V _{RRM}	T _j =T _{j max} ; Gate open	

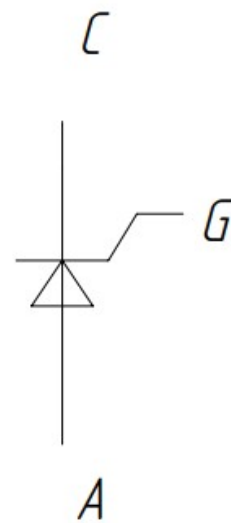
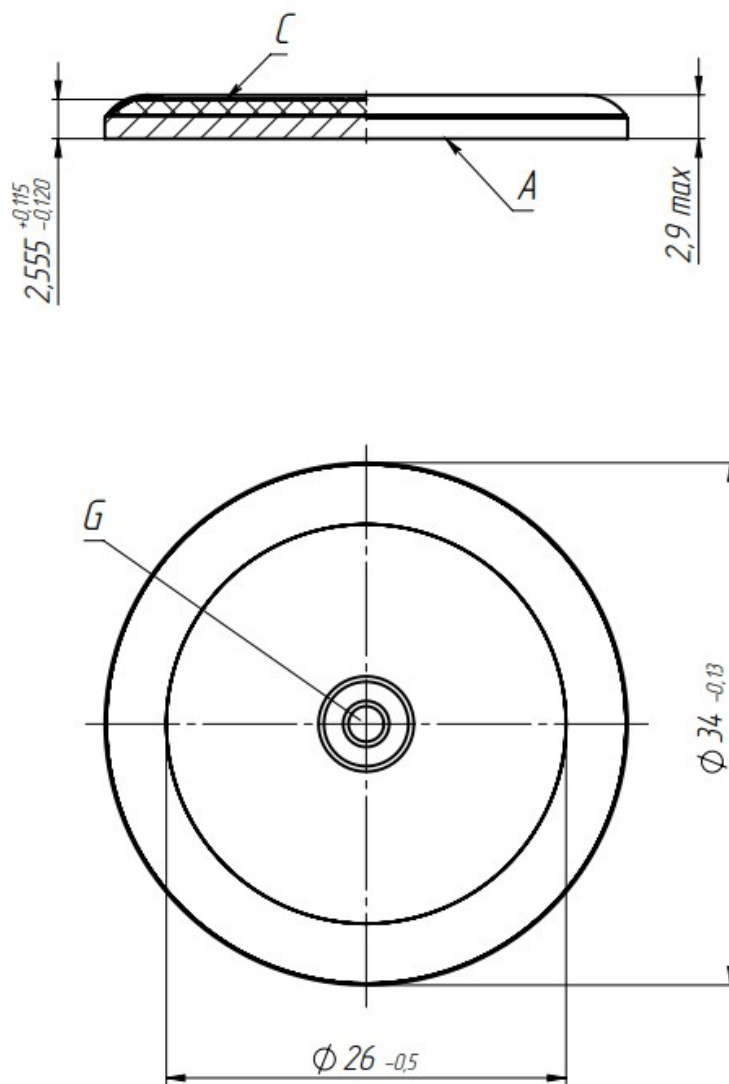
TRIGGERING				
I_{FGM}	Peak forward gate current	A	6	$T_j = T_{j\max}$
V_{RGM}	Peak reverse gate voltage	V	5	
P_G	Gate power dissipation	W	3	$T_j = T_{j\max}$ for DC gate current
SWITCHING				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive ($f=1$ Hz)	A/ μ s	400	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; $I_{TM} = 500$ A; Gate pulse: $I_G = 2$ A; $t_{GP} = 50$ μ s; $di_G/dt \geq 2$ A/ μ s
THERMAL				
T_{stg}	Storage temperature	$^{\circ}$ C	-60...+50	
T_j	Operating junction temperature	$^{\circ}$ C	-60...+125	
MECHANICAL				
F	Mounting force ¹⁾	kN	9.0...11.0	
F_{cg}	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	2.60	T _j =25 °C; I _{TM} =785 A	
V _{T(TO)}	On-state threshold voltage, max	V	1.572	T _j =T _{j max} ;	
r _T	On-state slope resistance ¹⁾ , max	mΩ	2.562	0.5 π I _{TAV} < I _T < 1.5 π I _{TAV}	
I _L	Latching current, max	mA	700	T _j =25 °C; V _D =12 V; Gate pulse: I _G =2 A; t _{GP} =50 μs; di _G /dt≥1 A/μs	
I _H	Holding current, max	mA	300	T _j =25 °C; V _D =12 V; Gate open	
BLOCKING					
I _{DRM} , I _{RRM}	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	70	T _j =T _{j 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	200, 320, 500, 1000, 1600, 2000, 2500	T _j =T _{j max} ; V _D =0.67·V _{DRM} ; Gate open	
TRIGGERING					
V _{GT}	Gate trigger direct voltage, max	V	3.00 2.50 1.50	T _j = T _{j min} T _j =25 °C T _j = T _{j max}	V _D =12 V; I _D =3 A; Direct gate current
I _{GT}	Gate trigger direct current, max	mA	400 250 150	T _j = T _{j min} T _j = 25 °C T _j = T _{j max}	
V _{GD}	Gate non-trigger direct voltage, min	V	0.55	T _j =T _{j max} ; V _D =0.67·V _{DRM} ;	
I _{GD}	Gate non-trigger direct current, min	mA	35.00	Direct gate current	
SWITCHING					
t _{gd}	Delay time, max	μs	3.10	T _j =25 °C; V _D =1500 V; I _{TM} =I _{TAV} ; di/dt=200 A/μs;	
t _{gt}	Turn-on time, max	μs	25.0	Gate pulse: I _G =2 A; V _G =20 V; t _{GP} =50 μs; di _G /dt=2 A/μs	
t _q	Turn-off time ³⁾ , max	μs	500, 630, 800	dv _D /dt=50 V/μs; T _j =T _{j max} ; I _{TM} = I _{TAV} ; di _R /dt=-10 A/μs; V _R =100V; V _D =0.67·V _{DRM}	

THERMAL																					
R _{thjc}	Thermal resistance, junction to case ¹⁾ , max	°C/W	0.0400	Direct current	Double side cooled																
R _{thjc-A}			0.0880		Anode side cooled																
R _{thjc-K}			0.0720		Cathode side cooled																
MECHANICAL																					
m	Weight, max	g	17.20																		
PART NUMBERING GUIDE			NOTES																		
TR	34	250	44	A2	B2																
1	2	3	4	5	6																
1. Phase Control Thyristor Chip			¹⁾ Depending on the specifications of the housing used. The specified values are relevant when using the Proton-Electrotex T.B3 housing.																		
2. Maximum diameter, mm																					
3. Mean on-state current, A			²⁾ Critical rate of rise of off-state voltage																		
4. Voltage code																					
5. Critical rate of rise of off-state voltage, V/μs			³⁾ Turn-off time (dv _D /dt=50 V/μs)																		
6. Turn-off time (dv _D /dt=50 V/μs)																					
			<table><tr><td>Symbol of Group</td><td>P2</td><td>K2</td><td>E2</td><td>A2</td><td>T1</td><td>P1</td><td>M1</td></tr><tr><td>(dv_D/dt)_{crit}, V/μs</td><td>200</td><td>320</td><td>500</td><td>1000</td><td>1600</td><td>2000</td><td>2500</td></tr></table>			Symbol of Group	P2	K2	E2	A2	T1	P1	M1	(dv _D /dt) _{crit} , V/μs	200	320	500	1000	1600	2000	2500
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(dv _D /dt) _{crit} , V/μs	200	320	500	1000	1600	2000	2500														
			<table><tr><td>Symbol of Group</td><td>E2</td><td>C2</td><td>B2</td></tr><tr><td>t_q, μs</td><td>500</td><td>630</td><td>800</td></tr></table>			Symbol of Group	E2	C2	B2	t _q , μs	500	630	800								
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OVERALL DIMENSIONS



**Dimensions for reference.*

All dimensions in millimeters