



PROTON – ELECTROTEX RUSSIA

Pressure contact
Low switching losses
Low reverse recovery charge
High power cycling capability
Distributed amplified gate for high di_T/dt

Fast Inverter Stud Thyristor Type TFI175-200-14

Mean on-state current			I _{TAV}		200 A	
Repetitive peak off-state voltage			V _{DRM}		1000...1400 V	
Repetitive peak reverse voltage			V _{RRM}			
Turn-off time			t _q		20.0, 25.0, 32.0, 40.0 μs	
V _{DRM} , V _{RRM} , V	1000	1100	1200	1300	1400	
Voltage code	10	11	12	13	14	
T _{ij} , °C	−60...+125					

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{TAV}	Maximum allowable mean on-state current	A	200 247 365	$T_c=95\text{ }^{\circ}\text{C}$; $T_c=85\text{ }^{\circ}\text{C}$; $T_c=55\text{ }^{\circ}\text{C}$; 180° half-sine wave; 50 Hz	
I_{TRMS}	RMS on-state current	A	314	$T_c=95\text{ }^{\circ}\text{C}$; 180° half-sine wave; 50 Hz	
I_{TSM}	Surge on-state current	kA	6.5 7.5	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{S}$; $di_G/dt=1\text{ A}/\mu\text{S}$
			7.0 8.0	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{S}$; $di_G/dt=1\text{ A}/\mu\text{S}$
I^2t	Safety factor	$\text{A}^2\text{s}\cdot 10^3$	210 280	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=10\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{S}$; $di_G/dt=1\text{ A}/\mu\text{S}$
			200 260	$T_j=T_{j\text{ max}}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; $t_p=8.3\text{ ms}$; single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{S}$; $di_G/dt=1\text{ A}/\mu\text{S}$
BLOCKING					
V_{DRM}, V_{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	1000...1400	$T_{j\text{ min}} < T_j < T_{j\text{ max}}$; 180° half-sine wave; 50 Hz; Gate open	
V_{DSM}, V_{RSM}	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	1100...1500	$T_{j\text{ min}} < T_j < T_{j\text{ max}}$; 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	

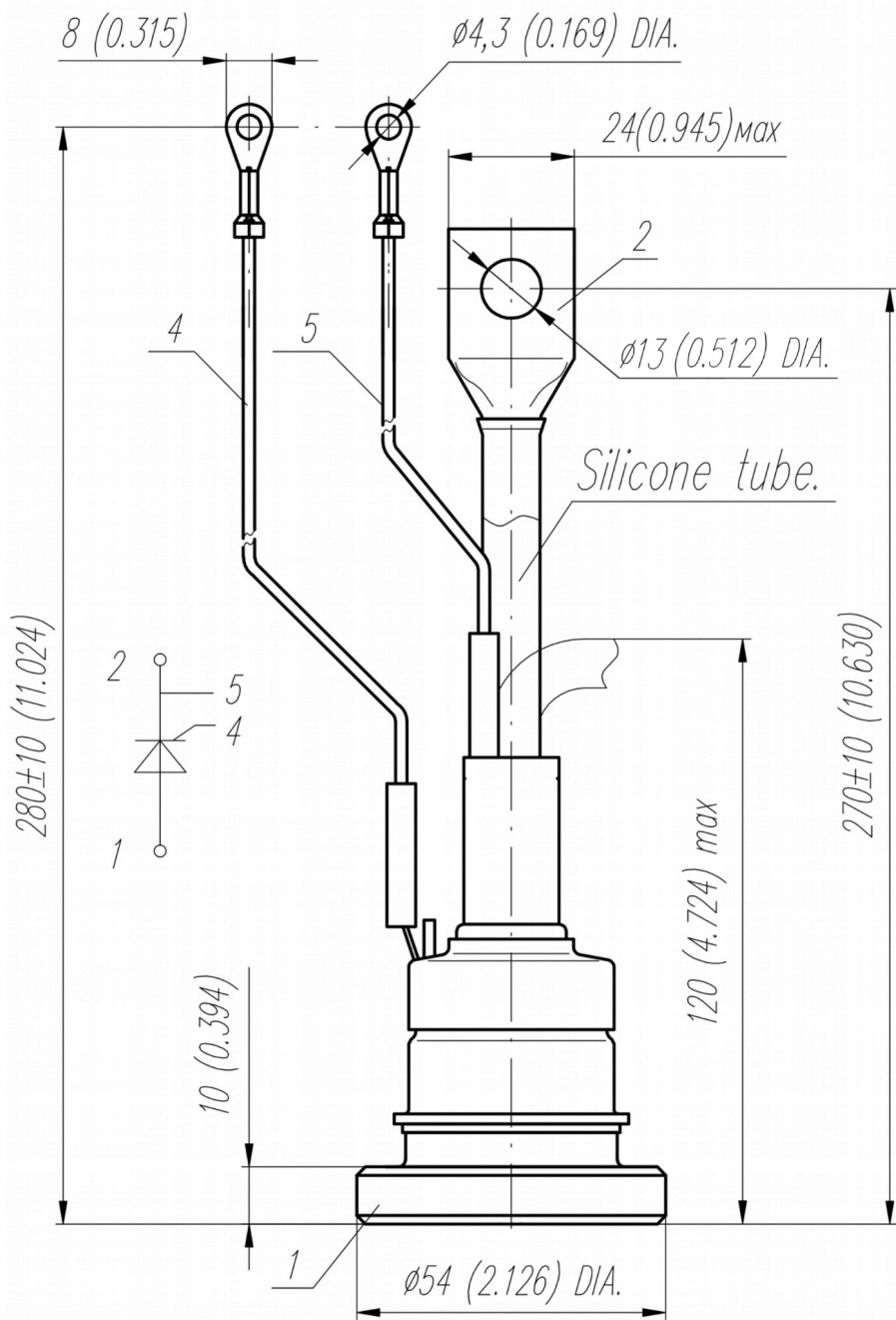
TRIGGERING				
I_{FGM}	Peak forward gate current	A	6	$T_j = T_{j\max}$
V_{RGM}	Peak reverse gate voltage	V	5	
P_G	Gate power dissipation	W	3	$T_j = T_{j\max}$ for DC gate current
SWITCHING				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive (f=1 Hz)	A/ μ s	1600	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; $I_{TM} = 400$ A; Gate pulse: $I_G = 2$ A; $V_G = 20$ V; $t_{GP} = 50$ μ s; $di_G/dt = 2$ 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	kN	1.5...2.5	
a	Acceleration	m/s ²	100	

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V _{TM}	Peak on-state voltage, max	V	1.96	T _j =25 °C; I _{TM} =628 A	
V _{T(TO)}	On-state threshold voltage, max	V	1.158	T _j =T _{j max} ;	
r _T	On-state slope resistance, max	mΩ	1.227	0.5 π I _{TAV} < I _T < 1.5 π I _{TAV}	
I _H	Holding current, max	mA	500	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 ¹⁾ , 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	0.45	T _j =T _{j max} ; V _D =0.67·V _{DRM} ;	
I _{GD}	Gate non-trigger direct current, min	mA	40.00	Direct gate current	
SWITCHING					
t _{gd}	Delay time, max	μs	0.75	T _j =25 °C; V _D =600 V; I _{TM} =I _{TAV} ; di/dt=200 A/μs;	
t _{gt}	Turn-on time ²⁾ , max	μs	1.60, 2.00, 2.50, 3.20	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	20.0, 25.0, 32.0, 40.0	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}	
Q _{rr}	Recovered charge, max	μC	150	T _j =T _{j max} ; I _{TM} = I _{TAV} ;	
t _{rr}	Reverse recovery time, max	μs	3.2	di _R /dt=-50 A/μs;	
I _{rr}	Reverse recovery current, max	A	94	V _R =100 V	

THERMAL				
R_{thjc}	Thermal resistance, junction to case, max	$^{\circ}\text{C}/\text{W}$	0.085	Direct current
MECHANICAL				
m	Weight, max	g	520	
D_s	Surface creepage distance	mm (inch)	12.4 (4.882)	
D_a	Air strike distance	mm (inch)	12.4 (4.882)	

PART NUMBERING GUIDE								NOTES										
TFI	371	200	14	A2	H3	K4	N	1) Critical rate of rise of off-state voltage										
1	2	3	4	5	6	7	8	Symbol of Group	P2	K2	E2	A2	T1	P1	M1			
								$(dv_D/dt)_{crit_r}$ V/ μ s	200	320	500	1000	1600	2000	2500			
1. Fast Inverter Thyristor								2) Turn-on time										
2. Design version								Symbol of group	T4	P4	M4	K4						
3. Mean on-state current, A								t_{gt_r} μ s	1.60	2.00	2.50	3.20						
4. Voltage code								3) Turn-off time ($dv_D/dt=50$ V/ μ s)										
5. Critical rate of rise of off-state voltage								Symbol of group	P3	M3	K3	H3						
6. Group of turn-off time ($dv_D/dt=50$ V/ μ s)								t_{qf} μ s	20.0	25.0	32.0	40.0						
7. Group of turn-on time																		
8. Ambient conditions: N – normal; T – tropica																		



Polarity	Example of code designation	Reference designation	Colors		
			Anode	Cathode	Gate
Anode to stud	TFI175-200-14		-	Red tube	White

All dimensions in millimeters (inches)