



**Fast Thyristor
Type TFI443-400-22**

Low switching losses
Low reverse recovery charge
Distributed amplified gate for high di_T/dt

Mean on-state current	I_{TAV}	400 A
Repetitive peak off-state voltage	V_{DRM}	2000 ÷ 2200 V
Repetitive peak reverse voltage	V_{RRM}	
Turn-off time	t_q	25.0, 32.0, 40.0, 50.0 μs
V_{DRM}, V_{RRM}, V	2000	2200
Voltage code	20	22
$T_j, ^\circ C$	- 60 ÷ 125	

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions
ON-STATE				
I_{TAV}	Mean on-state current	A	400 630	$T_c = 90^\circ C$; Double side cooled; $T_c = 55^\circ C$; Double side cooled; 180° half-sine wave; 50 Hz
I_{TRMS}	RMS on-state current	A	628	$T_c = 90^\circ C$; Double side cooled; 180° half-sine wave; 50 Hz
I_{TSM}	Surge on-state current	kA	8.5 10.0	$T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; $t_p = 10$ ms; single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = I_{FGM}$; $V_G = 20$ V; $t_{GP} = 50 \mu s$; $di_G/dt = 1$ A/ μs
			9.0 10.5	$T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; $t_p = 8.3$ ms; single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = I_{FGM}$; $V_G = 20$ V; $t_{GP} = 50 \mu s$; $di_G/dt = 1$ A/ μs
I^2t	Safety factor	$A^2s \cdot 10^3$	360 500	$T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; $t_p = 10$ ms; single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = I_{FGM}$; $V_G = 20$ V; $t_{GP} = 50 \mu s$; $di_G/dt = 1$ A/ μs
			330 450	$T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; $t_p = 8.3$ ms; single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = I_{FGM}$; $V_G = 20$ V; $t_{GP} = 50 \mu s$; $di_G/dt = 1$ A/ μs
BLOCKING				
V_{DRM}, V_{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	2000÷2200	$T_{jmin} < T_j < T_{jmax}$; 180° half-sine wave; 50 Hz; Gate open
V_{DSM}, V_{RSM}	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	2100÷2300	$T_{jmin} < T_j < T_{jmax}$; 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}	$T_j = T_{jmax}$; Gate open

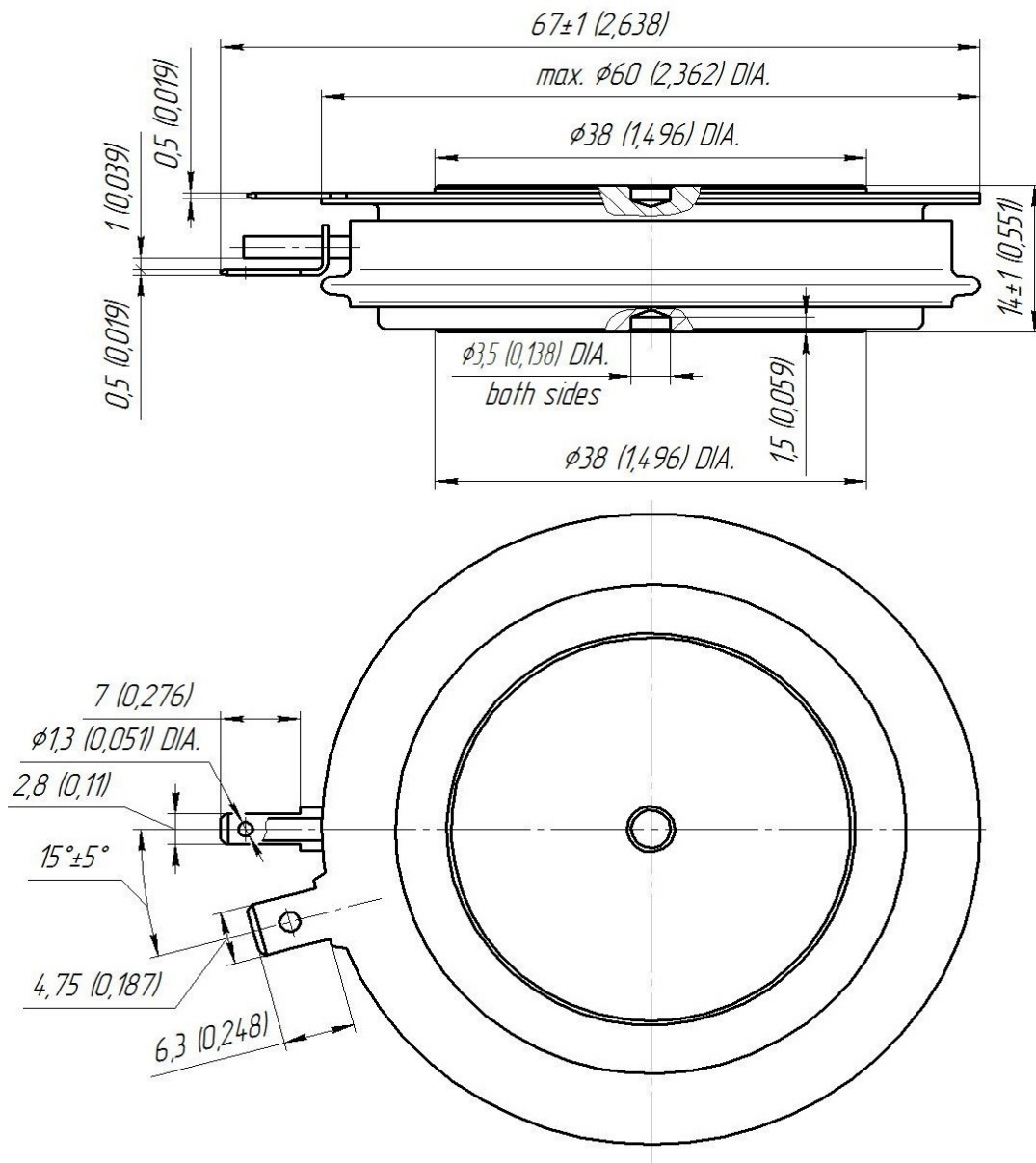
TRIGGERING				
I_{FGM}	Peak forward gate current	A	8	$T_j = T_{j\max}$
V_{RGM}	Peak reverse gate voltage	V	5	
P_G	Gate power dissipation	W	8	$T_j = T_{j\max}$ for DC gate current
SWITCHING				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive (f=1 Hz)	A/ μ s	2000	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; $I_{TM} = 2 I_{TAV}$; 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	14.0 ÷ 16.0	
a	Acceleration	m/s ²	50	Device clamped

CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
ON-STATE					
V_{TM}	Peak on-state voltage, max	V	2.85	$T_j = 25$ $^{\circ}$ C; $I_{TM} = 1256$ A	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.50	$T_j = T_{j\max}$;	
r_T	On-state slope resistance, max	m Ω	1.400	$0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$	
I_H	Holding current, max	mA	500	$T_j = 25$ $^{\circ}$ C; $V_D = 12$ V; Gate open	
BLOCKING					
I_{DRM}, I_{RRM}	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	100	$T_j = T_{j\max}$; $V_D = V_{DRM}$; $V_R = V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage ¹⁾ , min	V/ μ s	200, 320, 500, 1000	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; Gate open	
TRIGGERING					
V_{GT}	Gate trigger direct voltage, max	V	4.00	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ C $T_j = T_{j\max}$	V _D =12 V; I _D =3 A; Direct gate current
			2.50		
			2.00		
I_{GT}	Gate trigger direct current, max	mA	500	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ C $T_j = T_{j\max}$	
			300		
			200		
V_{GD}	Gate non-trigger direct voltage, min	V	0.25	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$;	
I_{GD}	Gate non-trigger direct current, min	mA	10.00	Direct gate current	
SWITCHING					
t_{gd}	Delay time, max	μ s	0.84	$T_j = 25$ $^{\circ}$ C; $V_D = 1000$ V; $I_{TM} = I_{TAV}$; $di/dt = 200$ A/ μ s;	
t_{gt}	Turn-on time ²⁾	μ s	2.00, 2.50, 3.20, 4.00	Gate pulse: $I_G = 2$ A; $V_G = 20$ V; $t_{GP} = 50$ μ s; $di_G/dt = 2$ A/ μ s	
t_q	Turn-off time ³⁾ max	μ s	25.0, 32.0, 40.0, 50.0	$dv_D/dt = 50$ V/ μ s;	
			32.0, 40.0, 50.0, 63.0	$dv_D/dt = 200$ V/ μ s;	
Q_{rr}	Total recovered charge, max	μ C	300	$T_j = T_{j\max}$; $I_{TM} = I_{TAV}$;	
t_{rr}	Reverse recovery time, typ	μ s	5.0	$di_R/dt = -50$ A/ μ s;	
I_{rrM}	Peak reverse recovery current, max	A	145	$V_R = 100$ V	

THERMAL					
R_{thjc}	Thermal resistance, junction to case, max	°C/W	0.0300	Direct current	Double side cooled
R_{thjc-A}			0.0660		Anode side cooled
R_{thjc-K}			0.0540		Cathode side cooled
R_{thck}	Thermal resistance, case to heatsink, max	°C/W	0.0060	Direct current	
MECHANICAL					
w	Weight, max	g	180		
D_s	Surface creepage distance	mm (inch)	7.86 (0.309)		
D_a	Air strike distance	mm (inch)	6.10 (0.240)		

PART NUMBERING GUIDE									NOTES					
TFI	443	400	22	A2	M3	P4	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	
1. TFI — fast inverter thyristor									$(dv_D/dt)_{crit}$, V/ μ s	200	320	500	1000	
2. Design version									2) Turn-on time					
3. Mean on-state current, A									Symbol of group	P4	M4	K4	H4	
4. Voltage code									t_{gt} , μ s	2.00	2.50	3.20	4.00	
5. Critical rate of rise of off-state voltage									3) Turn-off time ($dv_D/dt=50$ V/ μ s)					
6. Group of turn-off time ($dv_D/dt=50$ V/ μ s)									Symbol of group	M3	K3	H3	E3	
7. Group of turn-on time									t_{qf} , μ s	25.0	32.0	40.0	50.0	
8. Ambient conditions: N – normal; T – tropical														



All dimensions in millimeters (inches)

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