



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

## Fast Thyristor Type TFIS123-200-14

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	$t_q$		6.30, 8.00, 10.0, 12.5 $\mu s$		
$V_{DRM}, V_{RRM}, V$	1000	1100	1200	1300	1400
Voltage code	10	11	12	13	14
$T_j, ^\circ C$	- 40 ÷ 125				

### MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
<b>ON-STATE</b>					
$I_{TAV}$	Mean on-state current	A	200 280	$T_c = 83^\circ C$ ; Double side cooled; $T_c = 55^\circ C$ ; Double side cooled; 180° half-sine wave; 50 Hz	
$I_{TRMS}$	RMS on-state current	A	314	$T_c = 83^\circ C$ ; Double side cooled; 180° half-sine wave; 50 Hz	
$I_{TSM}$	Surge on-state current	kA	3.5 4.0	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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/ $\mu s$
			3.5 4.0	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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/ $\mu s$
$I^2t$	Safety factor	$A^2s \cdot 10^3$	60 80	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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/ $\mu s$
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<b>BLOCKING</b>					
$V_{DRM}, V_{RRM}$	Repetitive peak off-state and Repetitive peak reverse voltages	V	1000 ÷ 1400	$T_{jmin} < T_j < T_{jmax}$ ; 180° half-sine wave; 50 Hz; Gate open	
$V_{DSM}, V_{RSM}$	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	1100 ÷ 1500	$T_{jmin} < T_j < T_{jmax}$ ; 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	

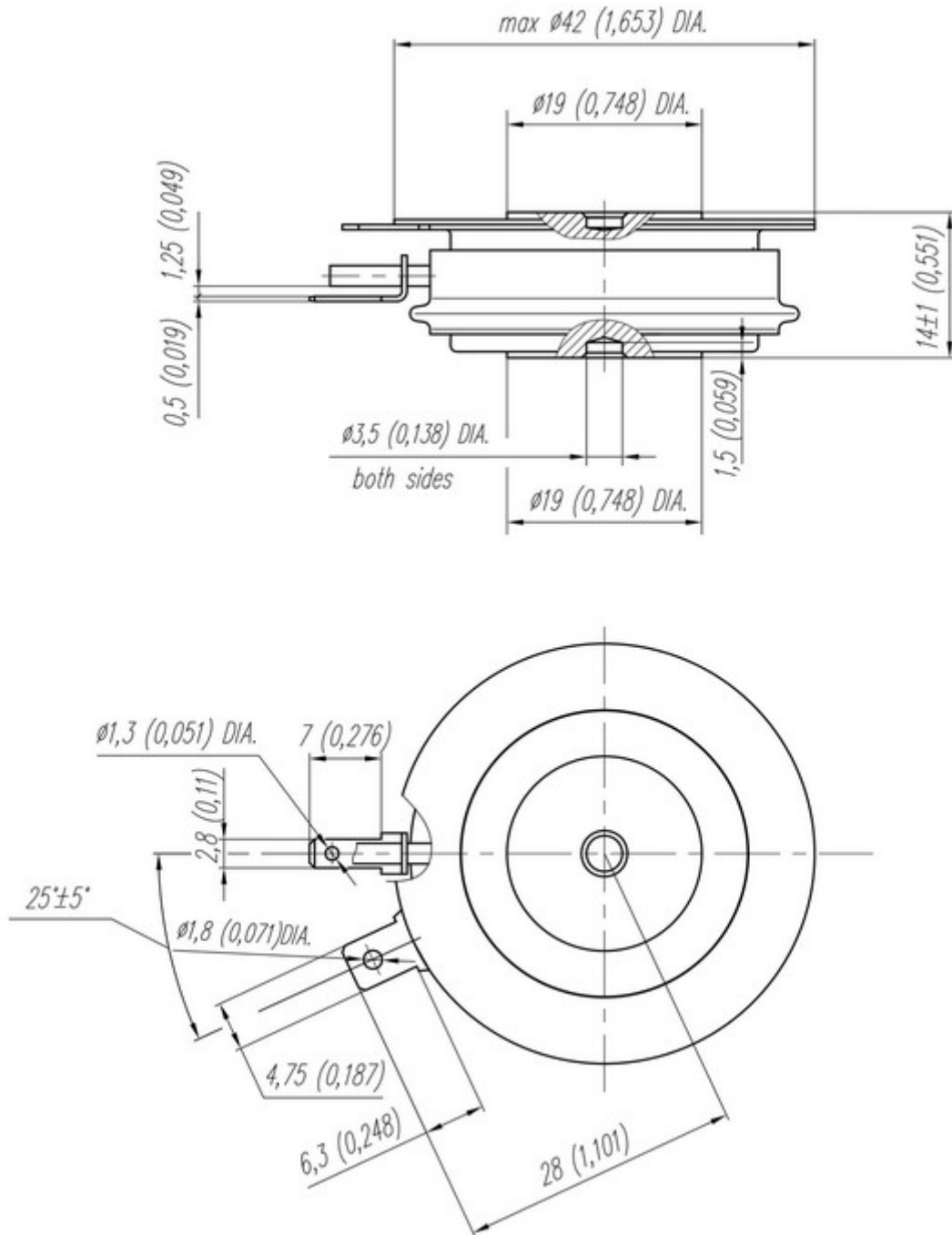
<b>TRIGGERING</b>				
$I_{FGM}$	Peak forward gate current	A	5	$T_j = T_{j\max}$
$V_{RGM}$	Peak reverse gate voltage	V	5	
$P_G$	Gate power dissipation	W	3	$T_j = T_{j\max}$ for DC gate current
<b>SWITCHING</b>				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive (f=1 Hz)	A/ $\mu$ s	1000	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; $I_{TM} = 2 I_{TAV}$ ; Gate pulse: $I_G = I_{FGM}$ ; $V_G = 20$ V; $t_{GP} = 50$ $\mu$ s; $di_G/dt = 2$ A/ $\mu$ s
<b>THERMAL</b>				
$T_{stg}$	Storage temperature	$^{\circ}$ C	-60 $\div$ 50	
$T_j$	Operating junction temperature	$^{\circ}$ C	-60 $\div$ 125	
<b>MECHANICAL</b>				
F	Mounting force	kN	5.0 $\div$ 7.0	
a	Acceleration	m/s <sup>2</sup>	50	Device clamped

## CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
<b>ON-STATE</b>					
$V_{TM}$	Peak on-state voltage, max	V	3.30	$T_j = 25$ $^{\circ}$ C; $I_{TM} = 628$ A	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.40	$T_j = T_{j\max}$ ;	
$r_T$	On-state slope resistance, max	m $\Omega$	3.20	$0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$	
$I_H$	Holding current, max	mA	200	$T_j = 25$ $^{\circ}$ C; $V_D = 12$ V; Gate open	
<b>BLOCKING</b>					
$I_{DRM}, I_{RRM}$	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	50	$T_j = T_{j\max}$ ; $V_D = V_{DRM}$ ; $V_R = V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage <sup>1)</sup> , min	V/ $\mu$ s	200, 320, 500, 1000	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; Gate open	
<b>TRIGGERING</b>					
$V_{GT}$	Gate trigger direct voltage, max	V	4.00 2.50 2.00	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ C $T_j = T_{j\max}$	$V_D = 12$ V; $I_D = 3$ A; Direct gate current
$I_{GT}$	Gate trigger direct current, max	mA	500 300 200	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ C $T_j = T_{j\max}$	
$V_{GD}$	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	
<b>SWITCHING</b>					
$t_{gd}$	Delay time, max	$\mu$ s	0.58	$T_j = 25$ $^{\circ}$ C; $V_D = 600$ V; $I_{TM} = I_{TAV}$ ; $di/dt = 200$ A/ $\mu$ s;	
$t_{gt}$	Turn-on time <sup>2)</sup>	$\mu$ s	1.25, 1.60, 2.00, 2.50	Gate pulse: $I_G = I_{FGM}$ ; $V_G = 20$ V; $t_{GP} = 50$ $\mu$ s; $di_G/dt = 2$ A/ $\mu$ s	
$t_q$	Turn-off time <sup>3)</sup> , max	$\mu$ s	6.30, 8.00, 10.0, 12.5 8.00, 10.0, 12.5, 16.0	$dv_D/dt = 50$ V/ $\mu$ s; $dv_D/dt = 200$ V/ $\mu$ s;	$T_j = T_{j\max}$ ; $I_{TM} = I_{TAV}$ ; $di_R/dt = -10$ A/ $\mu$ s; $V_R = 100$ V; $V_D = 0.67 V_{DRM}$
$Q_{rr}$	Total recovered charge, max	$\mu$ C	80.0	$T_j = T_{j\max}$ ; $I_{TM} = 200$ A;	
$t_{rr}$	Reverse recovery time, typ	$\mu$ s	2.1	$di_R/dt = -50$ A/ $\mu$ s;	
$I_{rrM}$	Peak reverse recovery current, max	A	75	$V_R = 100$ V	

THERMAL					
R <sub>thjc</sub>	Thermal resistance, junction to case, max	°C/W	0.0700	Direct current	Double side cooled
R <sub>thjc-A</sub>			0.1570		Anode side cooled
R <sub>thjc-K</sub>			0.1260		Cathode side cooled
R <sub>thck</sub>	Thermal resistance, case to heatsink, max	°C/W	0.0100	Direct current	
MECHANICAL					
w	Weight, max	g	55		
D <sub>s</sub>	Surface creepage distance	mm (inch)	7.94 (0.313)		
D <sub>a</sub>	Air strike distance	mm (inch)	5.00 (0.197)		

PART NUMBERING GUIDE								NOTES														
TFIS	123	200	14	A2	C4	X4	N	<sup>1)</sup> Critical rate of rise of off-state voltage <table border="1"> <tr> <td>Symbol of group</td> <td>P2</td> <td>K2</td> <td>E2</td> <td>A2</td> </tr> <tr> <td>(dv<sub>D</sub>/dt)<sub>crit</sub>, V/μs</td> <td>200</td> <td>320</td> <td>500</td> <td>1000</td> </tr> </table>					Symbol of group	P2	K2	E2	A2	(dv <sub>D</sub> /dt) <sub>crit</sub> , V/μs	200	320	500	1000
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1. TFIS — fast high frequency inverter thyristor. Design version 3. Mean on-state current, A 4. Voltage code 5. Critical rate of rise of off-state voltage 6. Group of turn-off time (dv <sub>D</sub> /dt=50 V/μs) 7. Group of turn-on time 8. Ambient conditions: N – normal; T – tropical								<sup>3)</sup> Turn-off time (dv <sub>D</sub> /dt=50 V/μs) <table border="1"> <tr> <td>Symbol of group</td> <td>C4</td> <td>B4</td> <td>A4</td> <td>X3</td> </tr> <tr> <td>t<sub>qr</sub>, μs</td> <td>6.30</td> <td>8.00</td> <td>10.0</td> <td>12.5</td> </tr> </table>					Symbol of group	C4	B4	A4	X3	t <sub>qr</sub> , μs	6.30	8.00	10.0	12.5
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All dimensions in millimeters (inches)

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