

# EVLYS LTD. - POWER SEMICONDUCTORS DEVICES - Wholesale and Retail.

## Fast Stud Thyristor Type FST24-160-14

Low switching losses, High power cycling capability  
Distributed amplified gate for high  $di_T/dt$

Mean on-state current	$I_{TAV}$		160 A				
Repetitive peak off-state voltage	$V_{DRM}$		800...1400 V				
Repetitive peak reverse voltage	$V_{RRM}$						
Turn-off time	$t_q$		20.0, 25.0, 32.0, 40.0 $\mu s$				
$V_{DRM}, V_{RRM}, V$	800	900	1000	1100	1200	1300	1400
Voltage code	8	9	10	11	12	13	14
$T_j, ^\circ C$	-60...+125						

### MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions
<b>ON-STATE</b>				
$I_{TAV}$	Maximum allowable mean on-state current	A	156 160 233	$T_c=85^\circ C$ ; $T_c=83^\circ C$ ; $T_c=55^\circ C$ ; 180° half-sine wave; 50 Hz
$I_{TRMS}$	RMS on-state current	A	251	$T_c=83^\circ C$ ; 180° half-sine wave; 50 Hz
$I_{TSM}$	Surge on-state current	kA	5.5 6.5	$T_j=T_{j\max}$ $T_j=25^\circ C$ 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/ $\mu s$
			6.0 7.0	$T_j=T_{j\max}$ $T_j=25^\circ C$ 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	$A^2s \cdot 10^3$	150 210	$T_j=T_{j\max}$ $T_j=25^\circ C$ 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/ $\mu s$
			140 200	$T_j=T_{j\max}$ $T_j=25^\circ C$ 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/ $\mu s$
<b>BLOCKING</b>				
$V_{DRM}, V_{RRM}$	Repetitive peak off-state and Repetitive peak reverse voltages	V	800...1400	$T_{j\min} < T_j < T_{j\max}$ ; 180° half-sine wave; 50 Hz; Gate open
$V_{DSM}, V_{RSM}$	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	900...1500	$T_{j\min} < T_j < T_{j\max}$ ; 180° half-sine wave; single pulse; Gate open
$V_D, V_R$	Direct off-state and Direct reverse voltages	V	$0.6 \cdot V_{DRM}$ $0.6 \cdot V_{RRM}$	$T_j=T_{j\max}$ ; Gate open

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<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	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; $I_{TM} = 320$ A; Gate pulse: $I_G = 2$ A; $V_G = 20$ V; $t_{GP} = 50$ $\mu$ s; $di_G/dt = 2$ A/ $\mu$ s
<b>THERMAL</b>				
$T_{stg}$	Storage temperature	$^{\circ}$ C	-60...+50	
$T_j$	Operating junction temperature	$^{\circ}$ C	-60...+125	
<b>MECHANICAL</b>				
M	Tightening torque	Nm	20...30	
a	Acceleration	m/s <sup>2</sup>	100	

## CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
<b>ON-STATE</b>					
$V_{TM}$	Peak on-state voltage, max	V	1.85	$T_j = 25$ $^{\circ}$ C; $I_{TM} = 502$ A	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.123	$T_j = T_{j\max}$ ;	
$r_T$	On-state slope resistance, max	m $\Omega$	1.524	$0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$	
$I_H$	Holding current, max	mA	250	$T_j = 25$ $^{\circ}$ 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, 1600, 2000, 2500	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; Gate open	
<b>TRIGGERING</b>					
$V_{GT}$	Gate trigger direct voltage, max	V	3.00 2.50 1.50	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ 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	400 250 150	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ C $T_j = T_{j\max}$	
$V_{GD}$	Gate non-trigger direct voltage, min	V	0.70	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ;	
$I_{GD}$	Gate non-trigger direct current, min	mA	55.00	Direct gate current	
<b>SWITCHING</b>					
$t_{gd}$	Delay time, max	$\mu$ s	0.70	$T_j = 25$ $^{\circ}$ C; $V_D = 600$ V; $I_{TM} = I_{TAV}$ ; $di/dt = 200$ A/ $\mu$ s;	
$t_{gt}$	Turn-on time <sup>2)</sup> , max	$\mu$ s	1.60, 2.00, 2.50, 3.20	Gate pulse: $I_G = 2$ A; $V_G = 20$ V; $t_{GP} = 50$ $\mu$ s; $di_G/dt = 2$ A/ $\mu$ s	
$t_q$	Turn-off time <sup>3)</sup> , max	$\mu$ s	20.0, 25.0, 32.0, 40.0	$dv_D/dt = 50$ V/ $\mu$ s; $T_j = T_{j\max}$ ; $I_{TM} = I_{TAV}$ ; $di_R/dt = -10$ A/ $\mu$ s; $V_R = 100$ V; $V_D = 0.67 V_{DRM}$	
<b>THERMAL</b>					
$R_{thjc}$	Thermal resistance, junction to case, max	$^{\circ}$ C/W	0.150	Direct current	
<b>MECHANICAL</b>					
m	Weight, max	g	260		
$D_s$	Surface creepage distance	mm (inch)	12.4 (4.882)		

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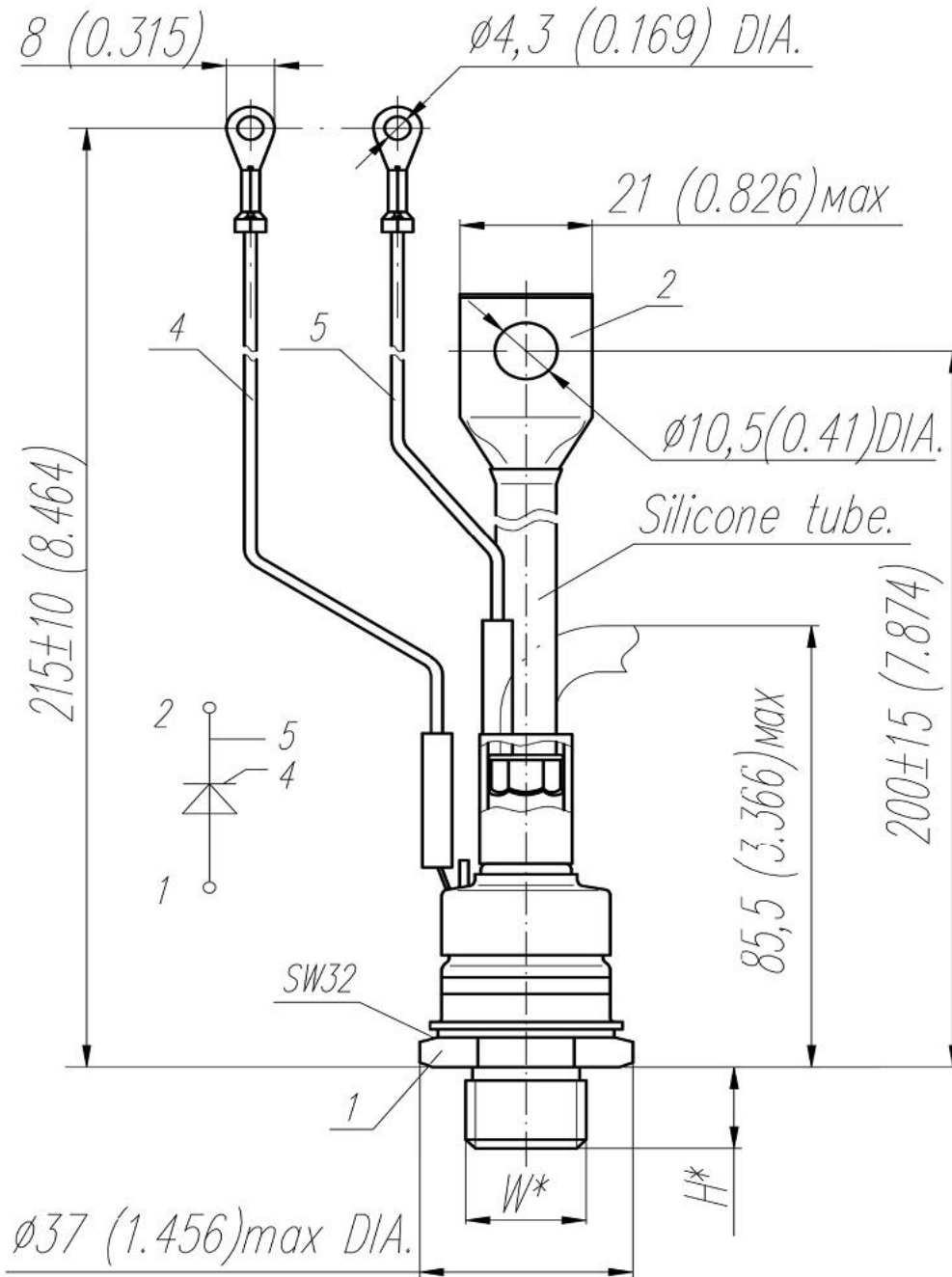
D <sub>a</sub>	Air strike distance	mm (inch)	12.4 (4.882)	
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PART NUMBERING GUIDE							NOTES																					
FST	24	160	14	7	4	3	1) Critical rate of rise of off-state voltage <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Symbol of Group</th> <th style="text-align: center;">4</th> <th style="text-align: center;">5</th> <th style="text-align: center;">6</th> <th style="text-align: center;">7</th> <th style="text-align: center;">8</th> <th style="text-align: center;">8,5</th> <th style="text-align: center;">9</th> </tr> <tr> <td style="text-align: left;">(dv<sub>0</sub>/dt)<sub>crit</sub>, V/μs</td> <td style="text-align: center;">200</td> <td style="text-align: center;">320</td> <td style="text-align: center;">500</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">1600</td> <td style="text-align: center;">2000</td> <td style="text-align: center;">2500</td> </tr> </table>						Symbol of Group	4	5	6	7	8	8,5	9	(dv <sub>0</sub> /dt) <sub>crit</sub> , V/μs	200	320	500	1000	1600	2000	2500
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1	2	3	4	5	6	7	2) Turn-on time <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Symbol of group</th> <th style="text-align: center;">6</th> <th style="text-align: center;">5</th> <th style="text-align: center;">4</th> <th style="text-align: center;">3</th> </tr> <tr> <td style="text-align: left;">t<sub>gt</sub>, μs</td> <td style="text-align: center;">1.60</td> <td style="text-align: center;">2.00</td> <td style="text-align: center;">2.50</td> <td style="text-align: center;">3.20</td> </tr> </table>						Symbol of group	6	5	4	3	t <sub>gt</sub> , μs	1.60	2.00	2.50	3.20						
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1. FST — Fast Stud Thyristor 2. Element Diameter 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							3) Turn-off time (dv <sub>D</sub> /dt=50 V/μs) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Symbol of group</th> <th style="text-align: center;">6</th> <th style="text-align: center;">5</th> <th style="text-align: center;">4</th> <th style="text-align: center;">3</th> </tr> <tr> <td style="text-align: left;">t<sub>q</sub>, μs</td> <td style="text-align: center;">20.0</td> <td style="text-align: center;">25.0</td> <td style="text-align: center;">32.0</td> <td style="text-align: center;">40.0</td> </tr> </table>						Symbol of group	6	5	4	3	t <sub>q</sub> , μs	20.0	25.0	32.0	40.0						
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## OVERALL DIMENSIONS

Package type: **T.SA1**



Type of screw	W	H
Metric Screw Type A	M16x1,5 – 8g	13
Metric Screw Type B (upon request)	M20x1,5 – 8g	15

Polarity	Example of code designation	Reference designation	Colors		
			Anode	Cathode	Gate
Anode to stud	FST 24		-	Red tube	White

All dimensions in millimeters (inches)