

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

Fast Thyristor Type **FDT40-400-15**

Low switching losses
Distributed amplified gate for high di_T/dt

Mean on-state current		I_{TAV}		400 A			
Repetitive peak off-state voltage		V_{DRM}		1000...1500 V			
Repetitive peak reverse voltage		V_{RRM}					
Turn-off time		t_q		10.0, 12.5, 16.0, 20.0 μs			
V_{DRM}, V_{RRM}, V	1000	1100	1200	1300	1400	1500	
Voltage code	10	11	12	13	14	15	
$T_j, ^\circ C$	-60...+125						

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{TAV}	Mean on-state current	A	400 487 719	$T_c = 94^\circ C$; Double side cooled; $T_c = 85^\circ C$; 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	$T_c = 94^\circ C$; Double side cooled; 180° half-sine wave; 50 Hz	
I_{TSM}	Surge on-state current	kA	9.5 11.0	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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; $t_{GP} = 50$ μs ; $di_G/dt = 1$ A/ μs
			10.0 11.5	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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; $t_{GP} = 50$ μs ; $di_G/dt = 1$ A/ μs
I^2t	Safety factor	$A^2s \cdot 10^3$	450 600	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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; $t_{GP} = 50$ μs ; $di_G/dt = 1$ A/ μs
			410 540	$T_j = T_{jmax}$ $T_j = 25^\circ C$	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; $t_{GP} = 50$ μs ; $di_G/dt = 1$ A/ μs
BLOCKING					
V_{DRM}, V_{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	1000...1500	$T_{jmin} < T_j < T_{jmax}$; 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...1600	$T_{jmin} < T_j < T_{jmax}$; 180° half-sine wave; single pulse; Gate open	
V_D, V_R	Direct off-state and Direct reverse voltages	V	$0.6 \cdot V_{DRM}$ $0.6 \cdot V_{RRM}$	$T_j = T_{jmax}$; Gate open	

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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	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; $I_{TM} = 3700$ 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	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	1.673	$T_j = T_{j\max}$;	
r_T	On-state slope resistance, max	m Ω	0.891	$0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$	
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, 1600, 2000, 2500	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; Gate open	
TRIGGERING					
V_{GT}	Gate trigger direct voltage, max	V	3.00 2.50 1.50	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ 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	500 300 150	$T_j = T_{j\min}$ $T_j = 25$ $^{\circ}$ C $T_j = T_{j\max}$	
V_{GD}	Gate non-trigger direct voltage, min	V	0.40	$T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$;	
I_{GD}	Gate non-trigger direct current, min	mA	55.00	Direct gate current	
SWITCHING					
t_{gd}	Delay time, max	μ s	0.95	$T_j = 25$ $^{\circ}$ C; $V_D = 600$ V; $I_{TM} = I_{TAV}$; $di/dt = 200$ A/ μ s;	
t_{gt}	Turn-on time ²⁾ , max	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	10.0, 12.5, 16.0, 20.0	$dv_D/dt = 50$ V/ μ s	$T_j = T_{j\max}$; $I_{TM} = I_{TAV}$; $di_R/dt = -10$ A/ μ s; $V_R = 100$ V; $V_D = 0.67 V_{DRM}$
			12.5, 16.0, 20.0, 25.0	$dv_D/dt = 200$ V/ μ s	

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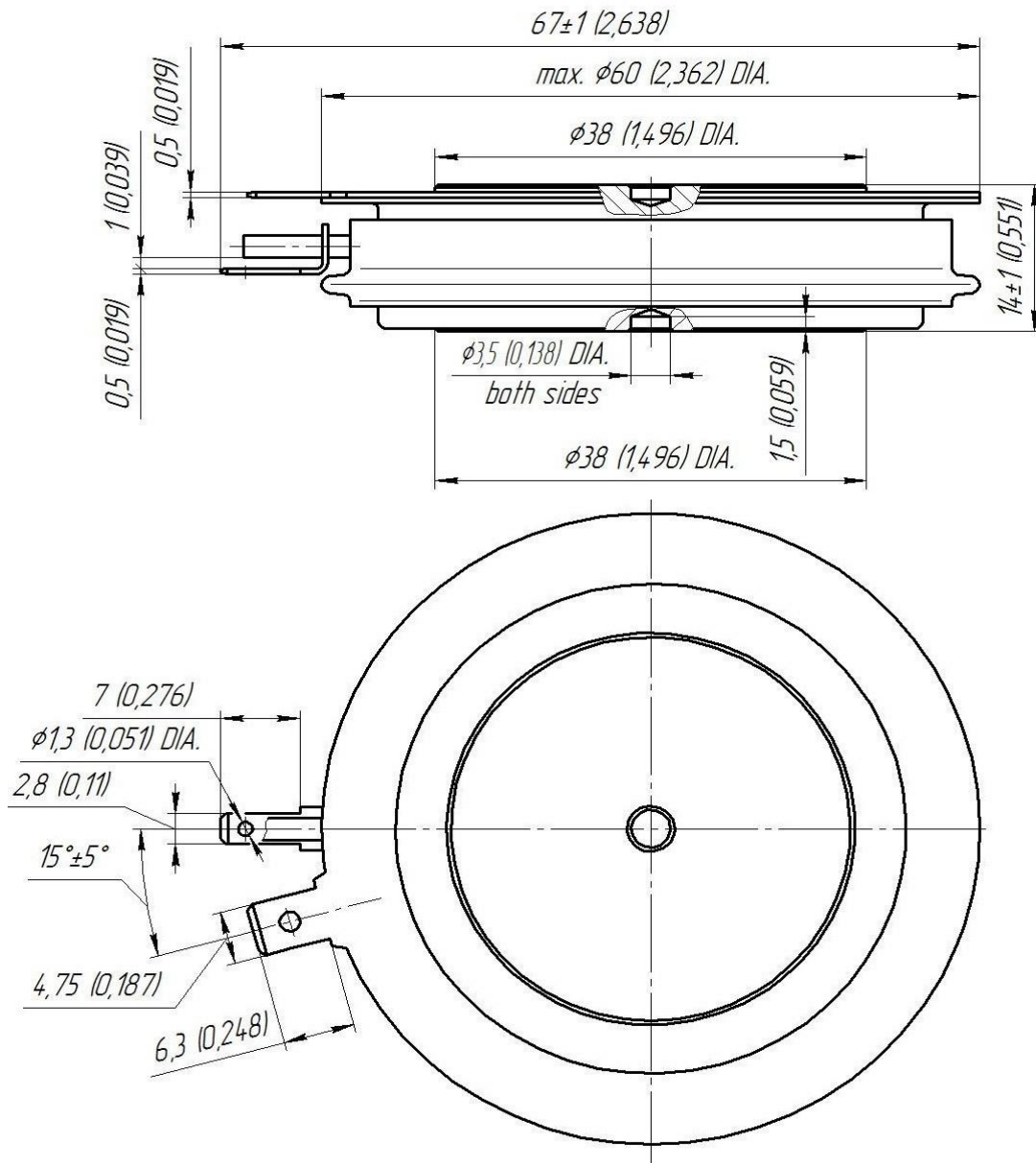
THERMAL					
R_{thjc}	Thermal resistance, junction to case, max	°C/W	0.0300	Direct current	Double side cooled
R_{thjc-A}			0.0660		Anode side cooled
R_{thjc-K}			0.0540		Cathode side cooled
R_{thck}	Thermal resistance, case to heatsink, max	°C/W	0.0060	Direct current	
MECHANICAL					
w	Weight, max	g	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																																									
FDT	40	400	15	7	8	2																																											
1	2	3	4	5	6	7																																											
1. FDT — Fast Disc 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 ($dv_D/dt=50 \text{ V}/\mu\text{s}$) 7. Group of turn-on time								1) Critical rate of rise of off-state voltage <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Symbol of Group</th> <th style="background-color: #cccccc;">4</th> <th style="background-color: #cccccc;">5</th> <th style="background-color: #cccccc;">6</th> <th style="background-color: #cccccc;">7</th> <th style="background-color: #cccccc;">8</th> <th style="background-color: #cccccc;">8,5</th> <th style="background-color: #cccccc;">9</th> </tr> </thead> <tbody> <tr> <td>$(dv_D/dt)_{crit}, \text{ V}/\mu\text{s}$</td> <td>200</td> <td>320</td> <td>500</td> <td>1000</td> <td>1600</td> <td>2000</td> <td>2500</td> </tr> </tbody> </table> 2) Turn-on time <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Symbol of group</th> <th style="background-color: #cccccc;">5</th> <th style="background-color: #cccccc;">4</th> <th style="background-color: #cccccc;">3</th> <th style="background-color: #cccccc;">2</th> </tr> </thead> <tbody> <tr> <td>$t_{gt}, \mu\text{s}$</td> <td>2.00</td> <td>2.50</td> <td>3.20</td> <td>4.00</td> </tr> </tbody> </table> 3) Turn-off time ($dv_D/dt=50 \text{ V}/\mu\text{s}$) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Symbol of group</th> <th style="background-color: #cccccc;">8</th> <th style="background-color: #cccccc;">7</th> <th style="background-color: #cccccc;">6</th> </tr> </thead> <tbody> <tr> <td>$t_{q}, \mu\text{s}$</td> <td>10.0</td> <td>12.5</td> <td>20.0</td> </tr> </tbody> </table>								Symbol of Group	4	5	6	7	8	8,5	9	$(dv_D/dt)_{crit}, \text{ V}/\mu\text{s}$	200	320	500	1000	1600	2000	2500	Symbol of group	5	4	3	2	$t_{gt}, \mu\text{s}$	2.00	2.50	3.20	4.00	Symbol of group	8	7	6	$t_{q}, \mu\text{s}$	10.0	12.5	20.0
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OVERALL DIMENSIONS

Package type: T.C1



All dimensions in millimeters (inches)