

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

Phase Control Disc Thyristor Type DT40-400-24

High power cycling capability / Low on-state and switching losses
Designed for traction and industrial applications

| | | | | | | | | | | | | |
|-----------------------------------|-----------|------|----------------------------|------|------|------|------|------|------|------|------|--|
| Mean on-state current | I_{TAV} | | 400 A | | | | | | | | | |
| Repetitive peak off-state voltage | V_{DRM} | | 1000 ÷ 2400 V | | | | | | | | | |
| Repetitive peak reverse voltage | V_{RRM} | | | | | | | | | | | |
| Turn-off time | t_q | | 250, 320, 400, 500 μ s | | | | | | | | | |
| V_{DRM}, V_{RRM}, V | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1800 | 2000 | 2200 | 2400 | |
| Voltage code | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 18 | 20 | 22 | 24 | |
| $T_j, ^\circ C$ | -60 ÷ 125 | | | | | | | | | | | |

MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters | | Units | Values | Test conditions | |
|------------------------|--|-------------------|--|---|---|
| ON-STATE | | | | | |
| I_{TAV} | Mean on-state current | A | 400 602 | $T_c=102^\circ C$, Double side cooled $T_c=85^\circ C$, Double side cooled 180° half-sine wave; 50 Hz | |
| I_{TRMS} | RMS on-state current | A | 628 | $T_c=102^\circ C$, Double side cooled 180° half-sine wave; 50 Hz | |
| I_{TSM} | Surge on-state current | kA | 12.0 14.0 | $T_j=T_{jmax}$ $T_j=25^\circ C$ | 180° half-sine wave; $t_p=10$ ms; single pulse; $V_D=V_R=0$ V; Gate pulse: $I_G=2$ A; $t_{GP}=50$ μ s; $di_G/dt \geq 1$ A/ μ s |
| | | | 13.0 15.0 | $T_j=T_{jmax}$ $T_j=25^\circ C$ | 180° half-sine wave; $t_p=8.3$ ms; single pulse; $V_D=V_R=0$ V; Gate pulse: $I_G=2$ A; $t_{GP}=50$ μ s; $di_G/dt \geq 1$ A/ μ s |
| I^2t | Safety factor | $A^2s \cdot 10^3$ | 720 980 | $T_j=T_{jmax}$ $T_j=25^\circ C$ | 180° half-sine wave; $t_p=10$ ms; single pulse; $V_D=V_R=0$ V; Gate pulse: $I_G=2$ A; $t_{GP}=50$ μ s; $di_G/dt \geq 1$ A/ μ s |
| | | | 700 930 | $T_j=T_{jmax}$ $T_j=25^\circ C$ | 180° half-sine wave; $t_p=8.3$ ms; single pulse; $V_D=V_R=0$ V; Gate pulse: $I_G=2$ A; $t_{GP}=50$ μ s; $di_G/dt \geq 1$ A/ μ s |
| BLOCKING | | | | | |
| V_{DRM}, V_{RRM} | Repetitive peak off-state and Repetitive peak reverse voltages | V | 1000 ÷ 2400 | $T_{jmin} < T_j < T_{jmax}$; 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 ÷ 2500 | $T_{jmin} < T_j < T_{jmax}$; 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 | 4 | $T_j = T_{j\max}$ 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 | $T_j = T_{j\max}$; $V_D = 0.67 \cdot V_{DRM}$; $I_{TM} = 2100$ A; Gate pulse: $I_G = 2$ A; $t_{GP} = 50$ μ s; $di_G/dt \geq 2$ 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 | 1.80 | $T_j = 25$ $^{\circ}$ C; $I_{TM} = 1256$ A | |
| $V_{T(TO)}$ | On-state threshold voltage, max | V | 1.083 | $T_j = T_{j\max}$; | |
| r_T | On-state slope resistance, max | m Ω | 0.670 | $0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$ | |
| I_L | Latching current, max | mA | 1000 | $T_j = 25$ $^{\circ}$ C; $V_D = 12$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50$ μ s; $di_G/dt \geq 1$ A/ μ s | |
| I_H | Holding current, max | mA | 300 | $T_j = 25$ $^{\circ}$ 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 | 0.55 | $T_j = T_{j\max}$; | |
| I_{GD} | Gate non-trigger direct current, min | mA | 60.00 | $V_D = 0.67 \cdot V_{DRM}$; Direct gate current | |
| SWITCHING | | | | | |
| t_{gd} | Delay time, max | μ s | 1.25 | $T_j = 25$ $^{\circ}$ C; $V_D = 1000$ V; $I_{TM} = I_{TAV}$; $di/dt = 200$ A/ μ s; | |
| t_{gt} | Turn-on time, max | μ s | 8.00 | 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 ²⁾ , max | μ s | 250, 320, 400, 500 | $dv_D/dt = 50$ V/ μ s; $T_j = T_{j\max}$; $I_{TM} = I_{TAV}$; $di_R/dt = -10$ A/ μ s; $V_R = 100$ V; $V_D = 0.67 \cdot V_{DRM}$ | |
| Q_{rr} | Total recovered charge, max | μ C | 1580 | $T_j = T_{j\max}$; $I_{TM} = 400$ A; | |
| t_{rr} | Reverse recovery time, max | μ s | 24 | $di_R/dt = -10$ A/ μ s; | |
| I_{rrM} | Peak reverse recovery current, max | A | 132 | $V_R = 100$ V | |

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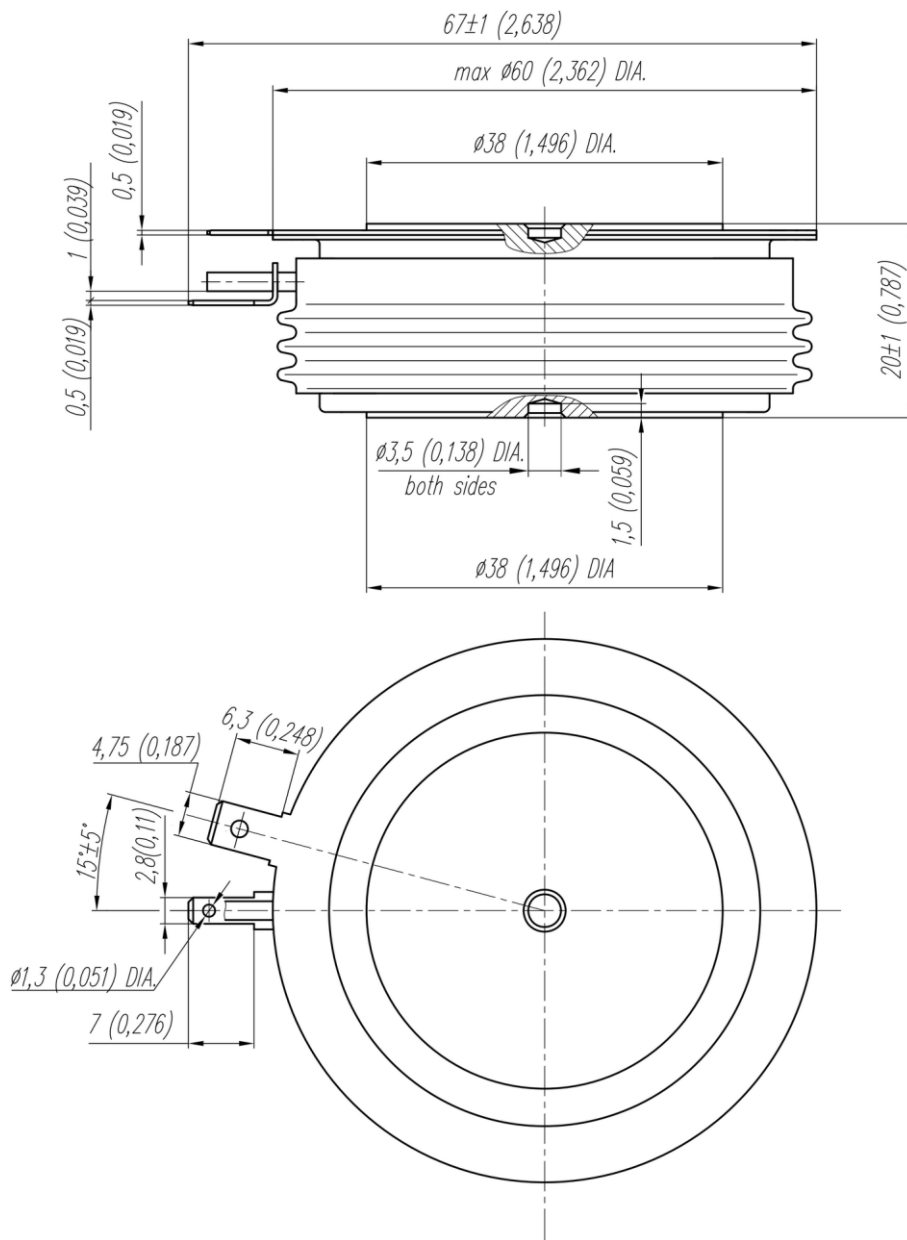
| THERMAL | | | | | |
|-------------------|---|--------------|------------------|----------------|---------------------|
| R_{thjc} | Thermal resistance, junction to case, max | °C/W | 0.0320 | Direct current | Double side cooled |
| R_{thjc-A} | | | 0.0704 | | Anode side cooled |
| R_{thjc-K} | | | 0.0576 | | Cathode side cooled |
| R_{thck} | Thermal resistance, case to heatsink, max | °C/W | 0.0060 | Direct current | |
| MECHANICAL | | | | | |
| w | Weight, max | g | 260 | | |
| D_s | Surface creepage distance | mm (inch) | 19.44 (0.765) | | |
| D_a | Air strike distance | mm (inch) | 12.10 (0.476) | | |

| PART NUMBERING GUIDE | | | | | | | NOTES | | | | | | | | | | | | | | | | | | | | | | |
|---|-----|-----|-----|------|------|------|--|--|--|--|--|--|--|-----------------|---|---|---|---|--------------------|-----|-----|---------------------------------|-----|-----|-----|------|------|------|------|
| DT | 40 | 400 | 24 | 7 | 4 | | 1) Critical rate of rise of off-state voltage | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Symbol of Group</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>8.5</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>$(dv_o/dt)_{crit}$, V/μs</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> | | | | | | | Symbol of Group | 4 | 5 | 6 | 7 | 8 | 8.5 | 9 | $(dv_o/dt)_{crit}$, V/ μ s | 200 | 320 | 500 | 1000 | 1600 | 2000 | 2500 |
| Symbol of Group | 4 | 5 | 6 | 7 | 8 | 8.5 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| $(dv_o/dt)_{crit}$, V/ μ s | 200 | 320 | 500 | 1000 | 1600 | 2000 | 2500 | | | | | | | | | | | | | | | | | | | | | | |
| 1. DT - Phase Control Disc Thyristor | | | | | | | 2) Turn-off time ($dv_o/dt=50$ V/ μ s) | | | | | | | | | | | | | | | | | | | | | | |
| 2. Element Diameter | | | | | | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Symbol of Group</th> <th>0</th> <th>0</th> <th>0</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>t_{qr}, μs</td> <td>250</td> <td>320</td> <td>400</td> <td>500</td> </tr> </tbody> </table> | | | | | | | Symbol of Group | 0 | 0 | 0 | 0 | t_{qr} , μ s | 250 | 320 | 400 | 500 | | | | | | |
| Symbol of Group | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | |
| t_{qr} , μ s | 250 | 320 | 400 | 500 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Mean on-state current, A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Voltage code | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Critical rate of rise of on-state current non-repetitive, V/ μ s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Turn-off time ($dv_o/dt=50$ V/ μ s) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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OVERALL DIMENSIONS

Package type: T.C2



All dimensions in millimeters (inches)