

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

## Phase Control Disc Thyristor Type DT40-630-18

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

|                                   |           |      |                            |      |      |      |      |      |
|-----------------------------------|-----------|------|----------------------------|------|------|------|------|------|
| Mean on-state current             | $I_{TAV}$ |      | 630 A                      |      |      |      |      |      |
| Repetitive peak off-state voltage | $V_{DRM}$ |      | 1000 ÷ 1800 V              |      |      |      |      |      |
| Repetitive peak reverse voltage   | $V_{RRM}$ |      |                            |      |      |      |      |      |
| Turn-off time                     | $t_q$     |      | 250, 320, 400, 500 $\mu$ s |      |      |      |      |      |
| $V_{DRM}, V_{RRM}, V$             | 1000      | 1100 | 1200                       | 1300 | 1400 | 1500 | 1600 | 1800 |
| Voltage code                      | 10        | 11   | 12                         | 13   | 14   | 15   | 16   | 18   |
| $T_j, ^\circ C$                   | -60 ÷ 125 |      |                            |      |      |      |      |      |

### MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters |  | Units             | Values                                     | Test conditions  |   |
|------------------------|--|-------------------|--|--|---|
| <b>ON-STATE</b>        |  |                   |  |  |   |
| $I_{TAV}$              | Mean on-state current  | A                 | 630<br>797                                 | $T_c=96^\circ C$ , Double side cooled<br>$T_c=85^\circ C$ , Double side cooled<br>180° half-sine wave; 50 Hz |   |
| $I_{TRMS}$             | RMS on-state current   | A                 | 989  | $T_c=96^\circ C$ , Double side cooled<br>180° half-sine wave; 50 Hz  |   |
| $I_{TSM}$              | Surge on-state current   | kA                | 13.5<br>16.0                               | $T_j=T_{jmax}$<br>$T_j=25^\circ C$   | 180° half-sine wave;<br>$t_p=10$ ms; single pulse;<br>$V_D=V_R=0$ V;<br>Gate pulse: $I_G=2$ A;<br>$t_{GP}=50$ $\mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s  |
|                        |  |                   | 14.0<br>16.0                               | $T_j=T_{jmax}$<br>$T_j=25^\circ C$   | 180° half-sine wave;<br>$t_p=8.3$ ms; single pulse;<br>$V_D=V_R=0$ V;<br>Gate pulse: $I_G=2$ A;<br>$t_{GP}=50$ $\mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s |
| $I^2t$                 | Safety factor  | $A^2s \cdot 10^3$ | 910<br>1280                                | $T_j=T_{jmax}$<br>$T_j=25^\circ C$   | 180° half-sine wave;<br>$t_p=10$ ms; single pulse;<br>$V_D=V_R=0$ V;<br>Gate pulse: $I_G=2$ A;<br>$t_{GP}=50$ $\mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s  |
|                        |  |                   | 810<br>1060                                | $T_j=T_{jmax}$<br>$T_j=25^\circ C$   | 180° half-sine wave;<br>$t_p=8.3$ ms; single pulse;<br>$V_D=V_R=0$ V;<br>Gate pulse: $I_G=2$ A;<br>$t_{GP}=50$ $\mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s |
| <b>BLOCKING</b>        |  |                   |  |  |   |
| $V_{DRM}, V_{RRM}$     | Repetitive peak off-state and Repetitive peak reverse voltages         | V                 | 1000 ÷ 1800                                | $T_{jmin} < T_j < T_{jmax}$ ;<br>180° half-sine wave; 50 Hz;<br>Gate open                                    |   |
| $V_{DSM}, V_{RSM}$     | Non-repetitive peak off-state and Non-repetitive peak reverse voltages | V                 | 1100 ÷ 1900                                | $T_{jmin} < T_j < T_{jmax}$ ;<br>180° half-sine wave; single pulse; Gate open                                |   |
| $V_D, V_R$             | Direct off-state and Direct reverse voltages                           | V                 | $0.6 \cdot V_{DRM}$<br>$0.6 \cdot V_{RRM}$ | $T_j=T_{jmax}$ ;<br>Gate open  |   |

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

| <b>TRIGGERING</b>  |   |                  |           |  |
|--------------------|---|------------------|-----------|--|
| $I_{FGM}$          | 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   |
| <b>SWITCHING</b>   |   |                  |           |  |
| $(di_T/dt)_{crit}$ | Critical rate of rise of on-state current non-repetitive (f=1 Hz) | A/ $\mu$ S       | 1250      | $T_j = T_{j\ max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; $I_{TM} = 2000$ A;<br>Gate pulse: $I_G = 2$ A;<br>$t_{GP} = 50$ $\mu$ S; $di_G/dt \geq 2$ 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>  |   |                  |           |  |
| F                  | Mounting force  | kN               | 14.0÷16.0 |  |
| 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          | 1.65                                  | $T_j = 25$ $^{\circ}$ C; $I_{TM} = 1978$ A   |   |
| $V_{T(TO)}$            | On-state threshold voltage, max                                     | V          | 0.966                                 | $T_j = T_{j\ max}$ ;   |   |
| $r_T$                  | On-state slope resistance, max                                      | m $\Omega$ | 0.362                                 | $0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$  |   |
| $I_L$                  | Latching current, max   | mA         | 1000                                  | $T_j = 25$ $^{\circ}$ C; $V_D = 12$ V;<br>Gate pulse: $I_G = 2$ A;<br>$t_{GP} = 50$ $\mu$ S; $di_G/dt \geq 1$ A/ $\mu$ S                         |   |
| $I_H$                  | Holding current, max  | mA         | 300                                   | $T_j = 25$ $^{\circ}$ C;<br>$V_D = 12$ V; Gate open  |   |
| <b>BLOCKING</b>        |   |            |                                       |  |   |
| $I_{DRM}, I_{RRM}$     | Repetitive peak off-state and Repetitive peak reverse currents, max | mA         | 100                                   | $T_j = T_{j\ max}$ ;<br>$V_D = V_{DRM}$ ; $V_R = V_{RRM}$  |   |
| $(dv_D/dt)_{crit}$     | Critical rate of rise of off-state voltage <sup>1)</sup> , min      | V/ $\mu$ S | 200, 320, 500, 1000, 1600, 2000, 2500 | $T_j = T_{j\ max}$ ;<br>$V_D = 0.67 \cdot V_{DRM}$ ; Gate open   |   |
| <b>TRIGGERING</b>      |   |            |                                       |  |   |
| $V_{GT}$               | Gate trigger direct voltage, max                                    | V          | 3.00                                  | $T_j = T_{j\ min}$   | $V_D = 12$ V; $I_D = 3$ A;<br>Direct gate current |
|                        |   |            | 2.50                                  | $T_j = 25$ $^{\circ}$ C  |   |
|                        |   |            | 1.50                                  | $T_j = T_{j\ max}$   |   |
| $I_{GT}$               | Gate trigger direct current, max                                    | mA         | 400                                   | $T_j = T_{j\ min}$   |   |
|                        |   |            | 250                                   | $T_j = 25$ $^{\circ}$ C  |   |
|                        |   |            | 150                                   | $T_j = T_{j\ max}$   |   |
| $V_{GD}$               | Gate non-trigger direct voltage, min                                | V          | 0.30                                  | $T_j = T_{j\ max}$ ;<br>$V_D = 0.67 \cdot V_{DRM}$ ;   |   |
| $I_{GD}$               | Gate non-trigger direct current, min                                | mA         | 35.00                                 | Direct gate current  |   |
| <b>SWITCHING</b>       |   |            |                                       |  |   |
| $t_{gd}$               | Delay time, max   | $\mu$ S    | 0.80                                  | $T_j = 25$ $^{\circ}$ C; $V_D = 1000$ V; $I_{TM} = I_{TAV}$ ;<br>$di/dt = 200$ A/ $\mu$ S;   |   |
| $t_{gt}$               | Turn-on time, max   | $\mu$ S    | 3.00                                  | Gate pulse: $I_G = 2$ A; $V_G = 20$ V;<br>$t_{GP} = 50$ $\mu$ S; $di_G/dt = 2$ A/ $\mu$ S  |   |
| $t_q$                  | Turn-off time <sup>2)</sup> , max                                   | $\mu$ S    | 250, 320, 400, 500                    | $dv_D/dt = 50$ V/ $\mu$ S; $T_j = T_{j\ max}$ ; $I_{TM} = I_{TAV}$ ;<br>$di_R/dt = -10$ A/ $\mu$ S; $V_R = 100$ V;<br>$V_D = 0.67 \cdot V_{DRM}$ |   |
| $Q_{rr}$               | Total recovered charge, max   | $\mu$ C    | 1890                                  | $T_j = T_{j\ max}$ ; $I_{TM} = 630$ A;   |   |
| $t_{rr}$               | Reverse recovery time, max  | $\mu$ S    | 25                                    | $di_R/dt = -10$ A/ $\mu$ S;  |   |
| $I_{rrM}$              | Peak reverse recovery current, max                                  | A          | 151                                   | $V_R = 100$ V  |   |

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

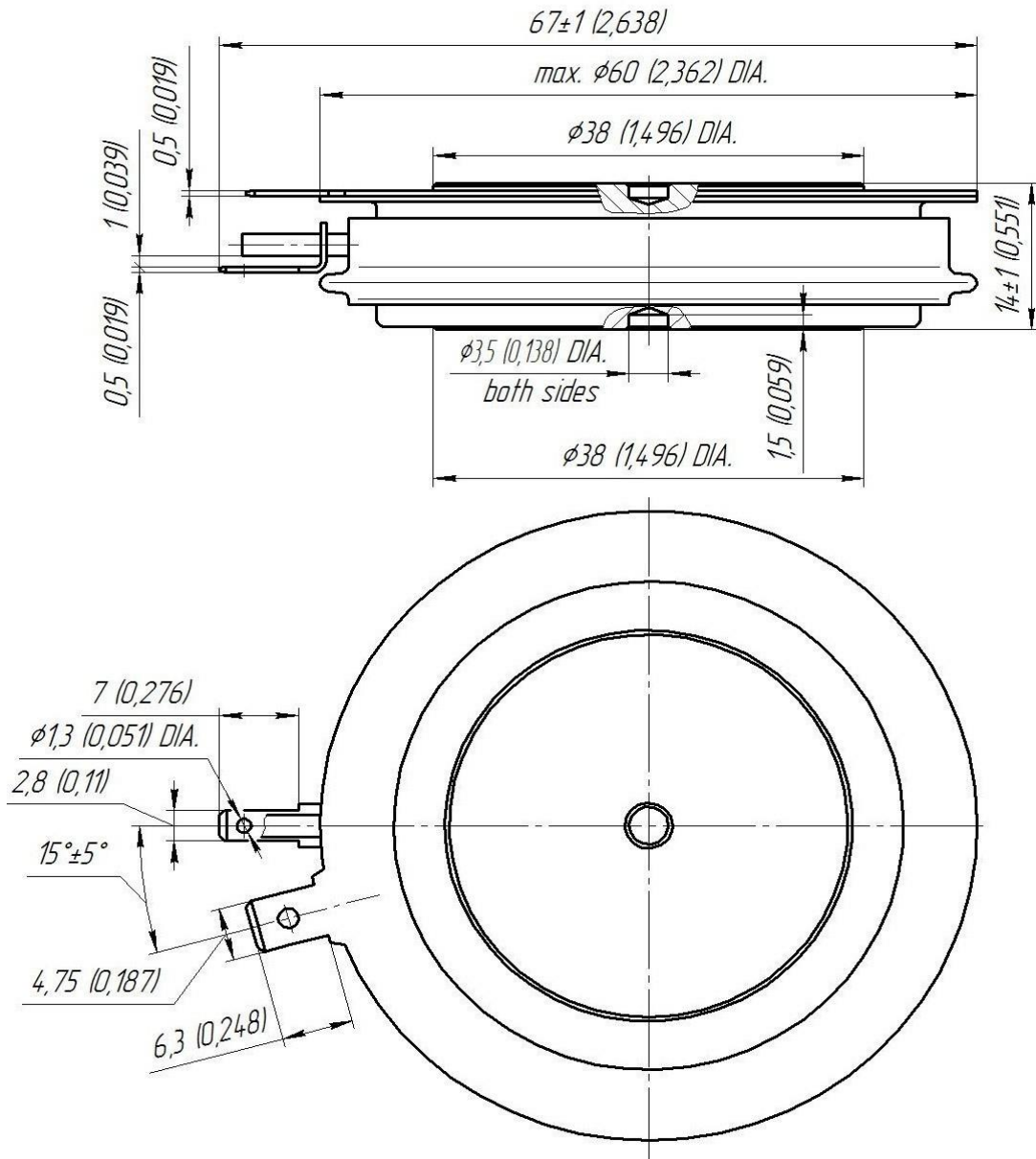
| <b>THERMAL</b>    |   |              |                 |                |                     |
|-------------------|---|--------------|-----------------|----------------|---------------------|
| $R_{thjc}$        | Thermal resistance, junction to case, max | °C/W         | 0.0300          | Direct 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 |                     |
| <b>MECHANICAL</b> |   |              |                 |                |                     |
| w                 | Weight, max                               | g            | 210             |                |                     |
| $D_s$             | Surface creepage distance                 | mm<br>(inch) | 7.86<br>(0.309) |                |                     |
| $D_a$             | Air strike distance                       | mm<br>(inch) | 6.10<br>(0.240) |                |                     |

| <b>PART NUMBERING GUIDE</b>  |     |     |     |      |      |      | <b>NOTES</b>   |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |
|--|-----|-----|-----|------|------|------|--|--|--|--|--|--|--|--|-----------------|---|---|---|---|-----------------|-----|-----|-----------------------------|-----|-----|-----|------|------|------|------|
| DT   | 40  | 630 | 18  | 7    | 5    |      | 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 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> </thead> <tbody> <tr> <td style="text-align: left;"><math>(dv_D/dt)_{crit}, V/\mu s</math></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> </tbody> </table> |  |  |  |  |  |  |  | Symbol of Group | 4 | 5 | 6 | 7 | 8               | 8.5 | 9   | $(dv_D/dt)_{crit}, V/\mu s$ | 200 | 320 | 500 | 1000 | 1600 | 2000 | 2500 |
| Symbol of Group  | 4   | 5   | 6   | 7    | 8    | 8.5  | 9  |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |
| $(dv_D/dt)_{crit}, V/\mu s$  | 200 | 320 | 500 | 1000 | 1600 | 2000 | 2500   |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |
| 1. DT - Phase Control Disc Thyristor                                       |     |     |     |      |      |      | 2) Turn-off time ( $dv_D/dt=50 V/\mu s$ )  |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |
| 2. Element Diameter  |     |     |     |      |      |      | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Symbol of Group</th> <th style="text-align: center;">0</th> <th style="text-align: center;">0</th> <th style="text-align: center;">0</th> <th style="text-align: center;">0</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;"><math>t_{qr}, \mu s</math></td> <td style="text-align: center;">250</td> <td style="text-align: center;">320</td> <td style="text-align: center;">400</td> <td style="text-align: center;">500</td> </tr> </tbody> </table>   |  |  |  |  |  |  |  | Symbol of Group | 0 | 0 | 0 | 0 | $t_{qr}, \mu s$ | 250 | 320 | 400                         | 500 |     |     |      |      |      |      |
| Symbol of Group  | 0   | 0   | 0   | 0    |      |      |  |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |
| $t_{qr}, \mu s$  | 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/<br>$\mu s$ |     |     |     |      |      |      |  |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |
| 6. Turn-off time ( $dv_D/dt=50 V/\mu s$ )                                  |     |     |     |      |      |      |  |  |  |  |  |  |  |  |                 |   |   |   |   |                 |     |     |                             |     |     |     |      |      |      |      |

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

## OVERALL DIMENSIONS

Package type: T.C1



All dimensions in millimeters (inches)