



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

## Phase Control Thyristor Type T143-1000-10

|                                   |                |             |
|-----------------------------------|----------------|-------------|
| Mean on-state current             | $I_{TAV}$      | 1000 A      |
| Repetitive peak off-state voltage | $V_{DRM}$      | 1000 V      |
| Repetitive peak reverse voltage   | $V_{RRM}$      |             |
| Turn-off time                     | $t_q$          | 160 $\mu$ s |
| $V_{DRM}, V_{RRM}, V$             | 1000           |             |
| Voltage code                      | 10             |             |
| $T_j, ^\circ C$                   | -60 $\div$ 150 |             |

### MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters |  | Units             | Values                                       | Test conditions  |
|------------------------|--|-------------------|--|--|
| <b>ON-STATE</b>        |  |                   |  |  |
| $I_{TAV}$              | Mean on-state current  | A                 | 1000<br>1275                                 | $T_c=104^\circ C$ , 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                 | 1570   | $T_c=104^\circ C$ , Double side cooled<br>180° half-sine wave; 50 Hz   |
| $I_{TSM}$              | Surge on-state current   | kA                | 19.0<br>22.0                                 | $T_j=T_{j\ max}$<br>$T_j=25^\circ C$<br>180° half-sine wave; 50 Hz<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  |
|                        |  |                   | 20.0<br>23.0                                 | $T_j=T_{j\ max}$<br>$T_j=25^\circ C$<br>180° half-sine wave; 60 Hz<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  | $A^2s \cdot 10^3$ | 1805<br>2420                                 | $T_j=T_{j\ max}$<br>$T_j=25^\circ C$<br>180° half-sine wave; 50 Hz<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  |
|                        |  |                   | 1660<br>2195                                 | $T_j=T_{j\ max}$<br>$T_j=25^\circ C$<br>180° half-sine wave; 60 Hz<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   | $T_{j\ min} < T_j < T_{j\ max}$ ;<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   | $T_{j\ min} < T_j < T_{j\ max}$ ;<br>180° half-sine wave; 50 Hz; single pulse;<br>Gate open  |
| $V_D, V_R$             | Direct off-state and Direct reverse voltages                           | V                 | $0.75 \cdot V_{DRM}$<br>$0.75 \cdot V_{RRM}$ | $T_j=T_{j\ max}$ ;<br>Gate open  |

| <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       | 400         | $T_j = T_{j \max}; V_D = 0.67 \cdot V_{DRM}; I_{TM} = 2 I_{TAV};$<br>Gate pulse: $I_G = 2$ A;<br>$t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s |
| <b>THERMAL</b>     |   |                  |             |   |
| $T_{stg}$          | Storage temperature   | $^{\circ}$ C     | -60 ÷ 150   |   |
| $T_j$              | Operating junction temperature                                    | $^{\circ}$ C     | -60 ÷ 150   |   |
| <b>MECHANICAL</b>  |   |                  |             |   |
| F                  | Mounting force  | kN               | 14.0 ÷ 16.0 |   |
| a                  | Acceleration  | m/s <sup>2</sup> | 50<br>100   | Device unclamped<br>Device clamped  |

## CHARACTERISTICS

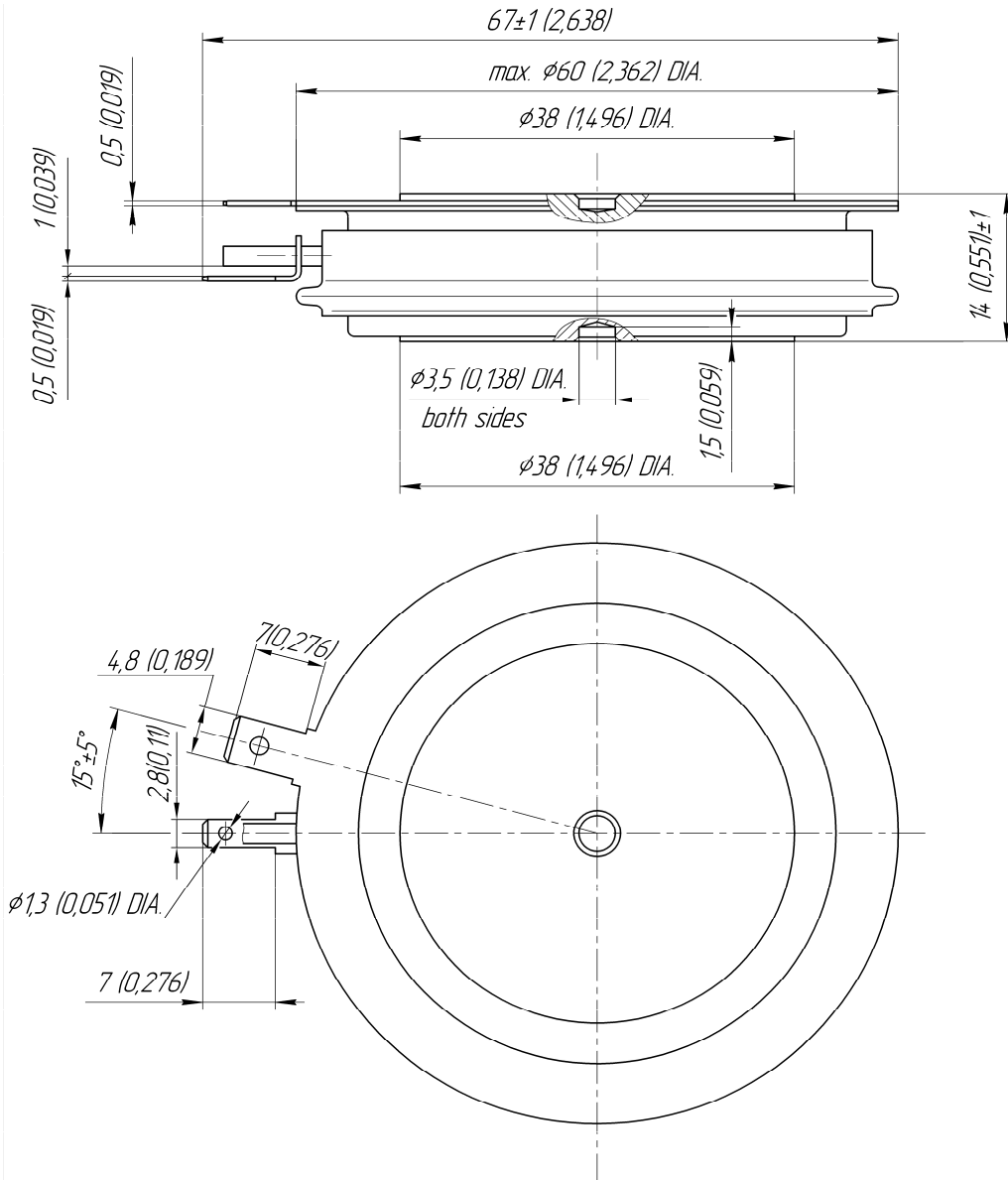
| Symbols and parameters |   | Units      | Values | Conditions  |   |
|------------------------|---|------------|--------|---|---|
| <b>ON-STATE</b>        |   |            |        |   |   |
| $V_{TM}$               | Peak on-state voltage, max  | V          | 1.50   | $T_j = 25 \text{ }^{\circ}\text{C}; I_{TM} = 3140$ A  |   |
| $V_{T(TO)}$            | On-state threshold voltage, max                                     | V          | 0.85   | $T_j = T_{j \max};$   |   |
| $r_T$                  | On-state slope resistance, max                                      | m $\Omega$ | 0.270  | $0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$   |   |
| $I_L$                  | Latching current, max   | mA         | 1000   | $T_j = 25 \text{ }^{\circ}\text{C}; V_D = 12$ 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    | $T_j = 25 \text{ }^{\circ}\text{C};$<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 | 1000   | $T_j = T_{j \max};$<br>$V_D = 0.67 \cdot V_{DRM};$ Gate open  |   |
| <b>TRIGGERING</b>      |   |            |        |   |   |
| $V_{GT}$               | Gate trigger direct voltage, max                                    | V          | 4.00   | $T_j = T_{j \min}$<br>$T_j = 25 \text{ }^{\circ}\text{C}$<br>$T_j = T_{j \max}$   | $V_D = 12$ V; $I_D = 3$ A;<br>Direct gate current |
|                        |   |            | 2.50   |   |   |
|                        |   |            | 2.00   |   |   |
| $I_{GT}$               | Gate trigger direct current, max                                    | mA         | 400    | $T_j = T_{j \min}$<br>$T_j = 25 \text{ }^{\circ}\text{C}$<br>$T_j = T_{j \max}$   |   |
|                        |   |            | 250    |   |   |
|                        |   |            | 200    |   |   |
| $V_{GD}$               | Gate non-trigger direct voltage, min                                | V          | 0.25   | $T_j = T_{j \max};$<br>$V_D = 0.67 \cdot V_{DRM};$  |   |
| $I_{GD}$               | Gate non-trigger direct current, min                                | mA         | 10.00  | Direct gate current   |   |
| <b>SWITCHING</b>       |   |            |        |   |   |
| $t_{gd}$               | Delay time  | $\mu$ s    | 2.00   | $T_j = 25 \text{ }^{\circ}\text{C}; V_D = 0.4 \cdot V_{DRM}; I_{TM} = I_{TAV};$<br>Gate pulse: $I_G = 2$ A;<br>$t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s |   |
| $t_q$                  | Turn-off time <sup>2)</sup> , max                                   | $\mu$ s    | 160    | $dv_D/dt = 50$ 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>$V_D = 0.67 \cdot V_{DRM}$                    |   |

| <b>THERMAL</b>    |   |              |                 |                |                     |
|-------------------|---|--------------|-----------------|----------------|---------------------|
| $R_{thjc}$        | Thermal resistance, junction to case, max | °C/W         | 0.030           | Direct current | Double side cooled  |
| $R_{thjc-A}$      |   |              | 0.066           |                | Anode side cooled   |
| $R_{thjc-K}$      |   |              | 0.054           |                | Cathode side cooled |
| $R_{thck}$        | Thermal resistance, case to heatsink, max | °C/W         | 0.006           | Direct current |                     |
| <b>MECHANICAL</b> |   |              |                 |                |                     |
| w                 | Weight, typ                               | 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) |                |                     |

### **PART NUMBERING GUIDE**

|   |     |      |    |   |
|---|-----|------|----|---|
| T | 143 | 1000 | 10 | N |
| 1 | 2   | 3    | 4  | 5 |

1. Phase Control Thyristor
2. Design version
3. Mean on-state current, A
4. Voltage code
5. Ambient conditions: N – normal; T – tropical



All dimensions in millimeters (inches)