



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

Phase Control Thyristor Type T393-3200-44

| | | | | |
|-----------------------------------|------------|---------------|------|------|
| Mean on-state current | I_{TAV} | 3200 A | | |
| Repetitive peak off-state voltage | V_{DRM} | 3800 ÷ 4400 V | | |
| Repetitive peak reverse voltage | V_{RRM} | | | |
| Turn-off time | t_q | 800 μ s | | |
| V_{DRM}, V_{RRM}, V | 3800 | 4000 | 4200 | 4400 |
| Voltage code | 38 | 40 | 42 | 44 |
| $T_j, ^\circ C$ | - 60 ÷ 125 | | | |

MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters | | Units | Values | Test conditions |
|------------------------|--|-------------------|--|--|
| ON-STATE | | | | |
| I_{TAV} | Mean on-state current | A | 3200 3990 | $T_c = 86^\circ C$, Double side cooled $T_c = 70^\circ C$, Double side cooled 180° half-sine wave; 50 Hz |
| I_{TRMS} | RMS on-state current | A | 5024 | $T_c = 86^\circ C$, Double side cooled 180° half-sine wave; 50 Hz |
| I_{TSM} | Surge on-state current | kA | 60.0 69.0 | $T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; 50 Hz ($t_p = 10$ ms); single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s |
| | | | 63.0 72.0 | $T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; 60 Hz ($t_p = 8.3$ ms); single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s |
| I^2t | Safety factor | $A^2s \cdot 10^3$ | 18000 23805 | $T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; 50 Hz ($t_p = 10$ ms); single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s |
| | | | 16470 21510 | $T_j = T_{jmax}$ $T_j = 25^\circ C$ 180° half-sine wave; 60 Hz ($t_p = 8.3$ ms); single pulse; $V_D = V_R = 0$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s |
| BLOCKING | | | | |
| V_{DRM}, V_{RRM} | Repetitive peak off-state and Repetitive peak reverse voltages | V | 3800 ÷ 4400 | $T_{jmin} < T_j < T_{jmax}$; 180° half-sine wave; 50 Hz; Gate open |
| V_{DSM}, V_{RSM} | Non-repetitive peak off-state and Non-repetitive peak reverse voltages | V | 3900 ÷ 4500 | $T_{jmin} < T_j < T_{jmax}$; 180° half-sine wave; 50 Hz; single pulse; Gate open |
| V_D, V_R | Direct off-state and Direct reverse voltages | V | $0.75 \cdot V_{DRM}$ $0.75 \cdot V_{RRM}$ | $T_j = T_{jmax}$; Gate open |

| TRIGGERING | | | | |
|--------------------|---|------------------|-------------|---|
| I_{FGM} | Peak forward gate current | A | 12 | $T_j = T_{j\ max}$ |
| V_{RGM} | Peak reverse gate voltage | V | 5 | |
| P_G | Gate power dissipation | W | 5 | $T_j = T_{j\ max}$ 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 | 1000 | $T_j = T_{j\ max}; V_D = 0.67 \cdot V_{DRM}; I_{TM} = 2 I_{TAV};$ Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s |
| THERMAL | | | | |
| T_{stg} | Storage temperature | $^{\circ}$ C | -60 ÷ 125 | |
| T_j | Operating junction temperature | $^{\circ}$ C | -60 ÷ 125 | |
| MECHANICAL | | | | |
| F | Mounting force | kN | 70.0 ÷ 90.0 | |
| a | Acceleration | m/s ² | 50 100 | Device unclamped Device clamped |

CHARACTERISTICS

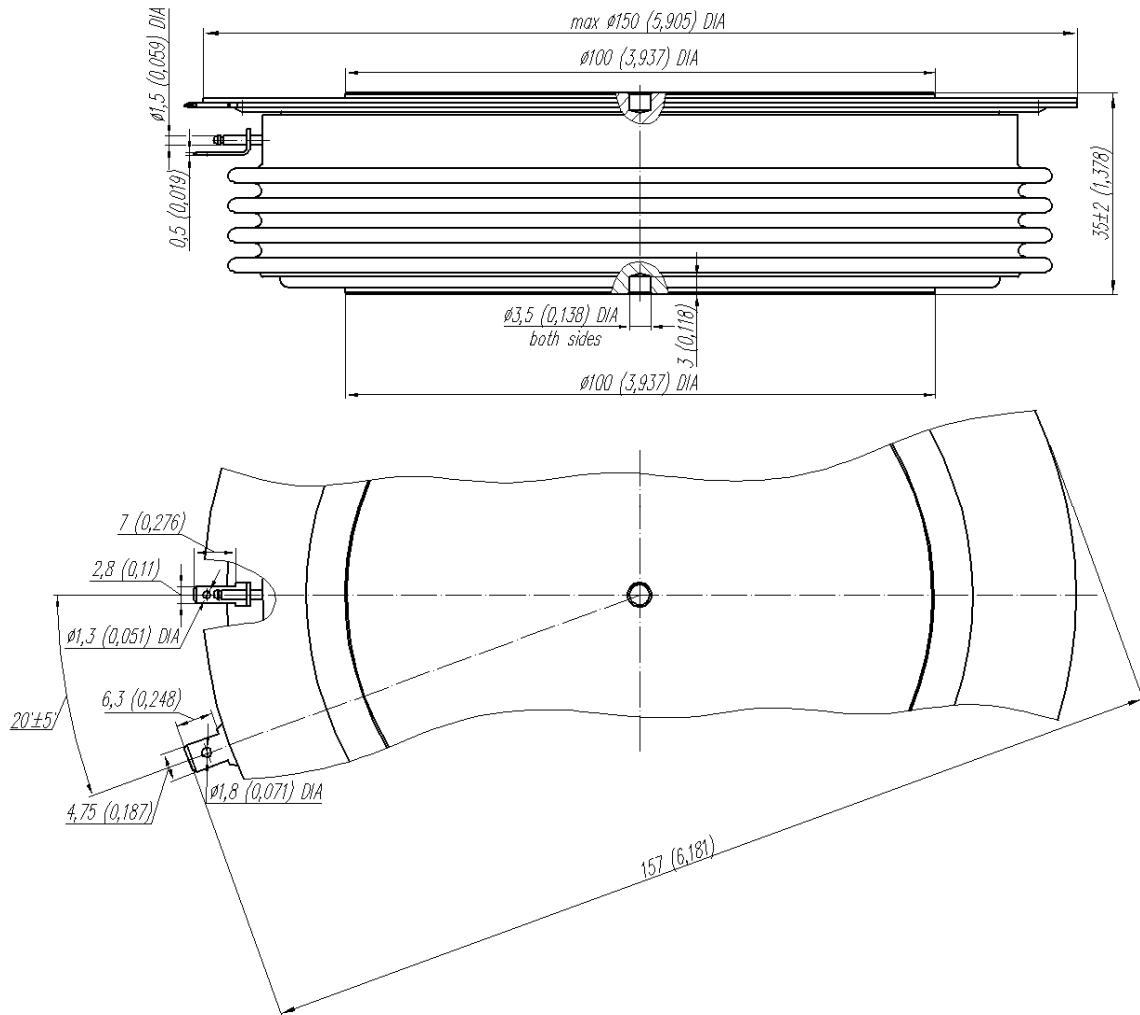
| Symbols and parameters | | Units | Values | Conditions | |
|------------------------|---|------------|--------|--|---|
| ON-STATE | | | | | |
| V_{TM} | Peak on-state voltage, max | V | 1.80 | $T_j = 25 \text{ }^{\circ}$ C; $I_{TM} = 6300$ A | |
| $V_{T(TO)}$ | On-state threshold voltage, max | V | 0.95 | $T_j = T_{j\ max};$ | |
| r_T | On-state slope resistance, max | m Ω | 0.150 | $0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$ | |
| I_L | Latching current, max | mA | 1500 | $T_j = 25 \text{ }^{\circ}$ C; $V_D = 12$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s | |
| I_H | Holding current, max | mA | 300 | $T_j = 25 \text{ }^{\circ}$ C; $V_D = 12$ V; Gate open | |
| BLOCKING | | | | | |
| I_{DRM}, I_{RRM} | Repetitive peak off-state and Repetitive peak reverse currents, max | mA | 300 | $T_j = T_{j\ max};$ $V_D = V_{DRM}; V_R = V_{RRM}$ | |
| $(dv_D/dt)_{crit}$ | Critical rate of rise of off-state voltage ¹⁾ , min | V/ μ s | 1000 | $T_j = T_{j\ max};$ $V_D = 0.67 \cdot V_{DRM};$ Gate open | |
| TRIGGERING | | | | | |
| V_{GT} | Gate trigger direct voltage, max | V | 5.00 | $T_j = T_{j\ min}$ $T_j = 25 \text{ }^{\circ}$ C $T_j = T_{j\ max}$ | $V_D = 12$ V; $I_D = 3$ A; Direct gate current |
| | | | 3.00 | | |
| | | | 2.00 | | |
| I_{GT} | Gate trigger direct current, max | mA | 500 | $T_j = T_{j\ min}$ $T_j = 25 \text{ }^{\circ}$ C $T_j = T_{j\ max}$ | |
| | | | 300 | | |
| | | | 200 | | |
| V_{GD} | Gate non-trigger direct voltage, min | V | 0.35 | $T_j = T_{j\ max};$ $V_D = 0.67 \cdot V_{DRM};$ | |
| I_{GD} | Gate non-trigger direct current, min | mA | 15.00 | Direct gate current | |
| SWITCHING | | | | | |
| t_{gd} | Delay time | μ s | 3.50 | $T_j = 25 \text{ }^{\circ}$ C; $V_D = 0.4 \cdot V_{DRM}; I_{TM} = 2000$ A; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ μ s | |
| t_q | Turn-off time ²⁾ , max | μ s | 800 | $dv_D/dt = 50$ V/ μ s; $T_j = T_{j\ max}; I_{TM} = 2000$ A; $di_R/dt = -10$ A/ μ s; $V_R = 100$ V; $V_D = 0.67 V_{DRM};$ | |

| THERMAL | | | | | |
|-------------------|---|--------------|------------------|----------------|---------------------|
| R_{thjc} | Thermal resistance, junction to case, max | °C/W | 0.0057 | Direct current | Double side cooled |
| R_{thjc-A} | | | 0.0125 | | Anode side cooled |
| R_{thjc-K} | | | 0.0103 | | Cathode side cooled |
| R_{thck} | Thermal resistance, case to heatsink, max | °C/W | 0.0010 | Direct current | |
| MECHANICAL | | | | | |
| w | Weight, typ | g | 2700 | | |
| D_s | Surface creepage distance | mm (inch) | 62.09 (2.444) | | |
| D_a | Air strike distance | mm (inch) | 23.40 (0.921) | | |

PART NUMBERING GUIDE

| | | | | |
|---|-----|------|----|---|
| T | 393 | 3200 | 44 | 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)