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

# Phase Control Thyristor Chip
# Type TG90-1600-65

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Maximum allowable mean on-state current[1)] | | | $I_{TAV}$ | 1600 A | | | |
| Repetitive peak off-state voltage | | | $V_{DRM}$ | 5400...6500 V | | | |
| Repetitive peak reverse voltage | | | $V_{RRM}$ | | | | |
| Turn-off time | | | $t_q$ | 800 µs | | | |
| $V_{DRM}$, $V_{RRM}$, V | 5400 | 5600 | 5800 | 6000 | 6200 | 6400 | 6500 |
| Voltage code | 54 | 56 | 58 | 60 | 62 | 64 | 65 |
| $T_j$, °C | –60...+125 | | | | | | |

## MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters | | Units | Values | Test conditions | |
|---|---|---|---|---|---|
| **ON-STATE** | | | | | |
| $I_{TAV}$ | Maximum allowable mean on-state current[1)] | A | 1600<br>2235<br>2709 | $T_c$= 102 °C, Double side cooled<br>$T_c$= 85 °C, Double side cooled<br>$T_c$= 70 °C, Double side cooled<br>180° half-sine wave; 50 Hz | |
| $I_{TRMS}$ | RMS on-state current[1)] | A | 2512 | $T_c$= 102 °C, Double side cooled<br>180° half-sine wave; 50 Hz | |
| $I_{TSM}$ | Surge on-state current[1)] | kA | 32.0<br>37.0 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °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 µs; $di_G/dt$≥1 A/µs |
| | | | 34.0<br>39.0 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °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 µs; $di_G/dt$≥1 A/µs |
| $I^2t$ | Safety factor[1)] | $A^2s{\cdot}10^3$ | 5100<br>6800 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °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 µs; $di_G/dt$≥1 A/µs |
| | | | 4700<br>6300 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °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 µs; $di_G/dt$≥1 A/µs |
| **BLOCKING** | | | | | |
| $V_{DRM}$, $V_{RRM}$ | Repetitive peak off-state and Repetitive peak reverse voltages | V | 5400...6500 | $T_{j\,min}$< $T_j$ <$T_{j\,max}$;<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 | 5500...6600 | $T_{j\,min}$< $T_j$ <$T_{j\,max}$;<br>180° half-sine wave; single pulse;<br>Gate open | |
| $V_D$, $V_R$ | Direct off-state and Direct reverse voltages | V | 0.6·$V_{DRM}$<br>0.6·$V_{RRM}$ | $T_j$=$T_{j\,max}$;<br>Gate open | |

Advance Data

| | | | | |
|---|---|---|---|---|
| **TRIGGERING** | | | | |
| $I_{FGM}$ | Peak forward gate current | A | 10 | $T_j=T_{j\,max}$ |
| $V_{RGM}$ | 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/µs | 630 | $T_j=T_{j\,max}$; $V_D=0.67 \cdot V_{DRM}$; $I_{TM}=2\ I_{TAV}$; Gate pulse: $I_G=2$ A; $t_{GP}=50$ µs; $di_G/dt \geq 2$ A/µs |
| **THERMAL** | | | | |
| $T_{stg}$ | Storage temperature | °C | –60...+50 | |
| $T_j$ | Operating junction temperature | °C | –60...+125 | |
| **MECHANICAL** | | | | |
| F | Mounting force[1)] | kN | 60.0...70.0 | |
| $F_{cg}$ | Force on control gate | N | 7.8 | |

## CHARACTERISTICS

| Symbols and parameters | | Units | Values | Conditions | |
|---|---|---|---|---|---|
| **ON-STATE** | | | | | |
| $V_{TM}$ | Peak on-state voltage[1)], max | V | 2.70 | $T_j=25$ °C; $I_{TM}=6300$ A | |
| $V_{T(TO)}$ | On-state threshold voltage, max | V | 1.00 | $T_j=T_{j\,max}$; $0.5\ \pi\ I_{TAV} < I_T < 1.5\ \pi\ I_{TAV}$ | |
| $r_T$ | On-state slope resistance[1)], max | mΩ | 0.320 | | |
| $I_L$ | Latching current, max | mA | 1500 | $T_j=25$ °C; $V_D=12$ V; Gate pulse: $I_G=2$ A; $t_{GP}=50$ µs; $di_G/dt \geq 1$ A/µs | |
| $I_H$ | Holding current, max | mA | 300 | $T_j=25$ °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[2)], min | V/µs | 500, 1000, 1600 | $T_j=T_{j\,max}$; $V_D=0.67 \cdot V_{DRM}$; Gate open | |
| **TRIGGERING** | | | | | |
| $V_{GT}$ | Gate trigger direct voltage, max | V | 5.00<br>3.00<br>2.00 | $T_j=T_{j\,min}$<br>$T_j=25$ °C<br>$T_j=T_{j\,max}$ | $V_D=12$ V; $I_D=3$ A; Direct gate current |
| $I_{GT}$ | Gate trigger direct current, max | mA | 500<br>300<br>200 | $T_j=T_{j\,min}$<br>$T_j=25$ °C<br>$T_j=T_{j\,max}$ | |
| $V_{GD}$ | Gate non-trigger direct voltage, min | V | 0.35 | $T_j=T_{j\,max}$; $V_D=0.67 \cdot V_{DRM}$; Direct gate current | |
| $I_{GD}$ | Gate non-trigger direct current, min | mA | 15.00 | | |
| **SWITCHING** | | | | | |
| $t_{gd}$ | Delay time, max | µs | 4.00 | $T_j=25$ °C; $V_D=1500$ V; $I_{TM}=I_{TAV}$; di/dt=200 A/µs; Gate pulse: $I_G=2$ A; $V_G=20$ V; $t_{GP}=50$ µs; $di_G/dt=2$ A/µs | |
| $t_q$ | Turn-off time[3)], max | µs | 800 | $dv_D/dt=50$ V/µs; $T_j=T_{j\,max}$; $I_{TM}=I_{TAV}$; $di_R/dt=-10$ A/µs; $V_R=100$ V; $V_D=0.67\ V_{DRM}$ | |

Advance Data

| THERMAL | | | | | |
|---|---|---|---|---|---|
| $R_{thjc}$ | Thermal resistance, junction to case[1)], max | °C/W | 0.0065 | Direct current | Double side cooled |
| $R_{thjc-A}$ | | | 0.0143 | | Anode side cooled |
| $R_{thjc-K}$ | | | 0.0117 | | Cathode side cooled |
| **MECHANICAL** | | | | | |
| m | Weight, max | g | 381 | | |

## PART NUMBERING GUIDE

| TG | 90 | 1600 | 65 | A2 | B2 |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |

1. Phase Control Thyristor Chip with a distributed gate
2. Maximum diameter, mm
3. Mean on-state current, A
4. Voltage code
5. Critical rate of rise of off-state voltage, V/µs
6. Turn-off time ($dv_D/dt$=50 V/µs)

## NOTES

[1)] Depending on the specifications of the housing used. The specified values are relevant when using the Proton-Electrotex T.H1 housing.

[2)] Critical rate of rise of off-state voltage

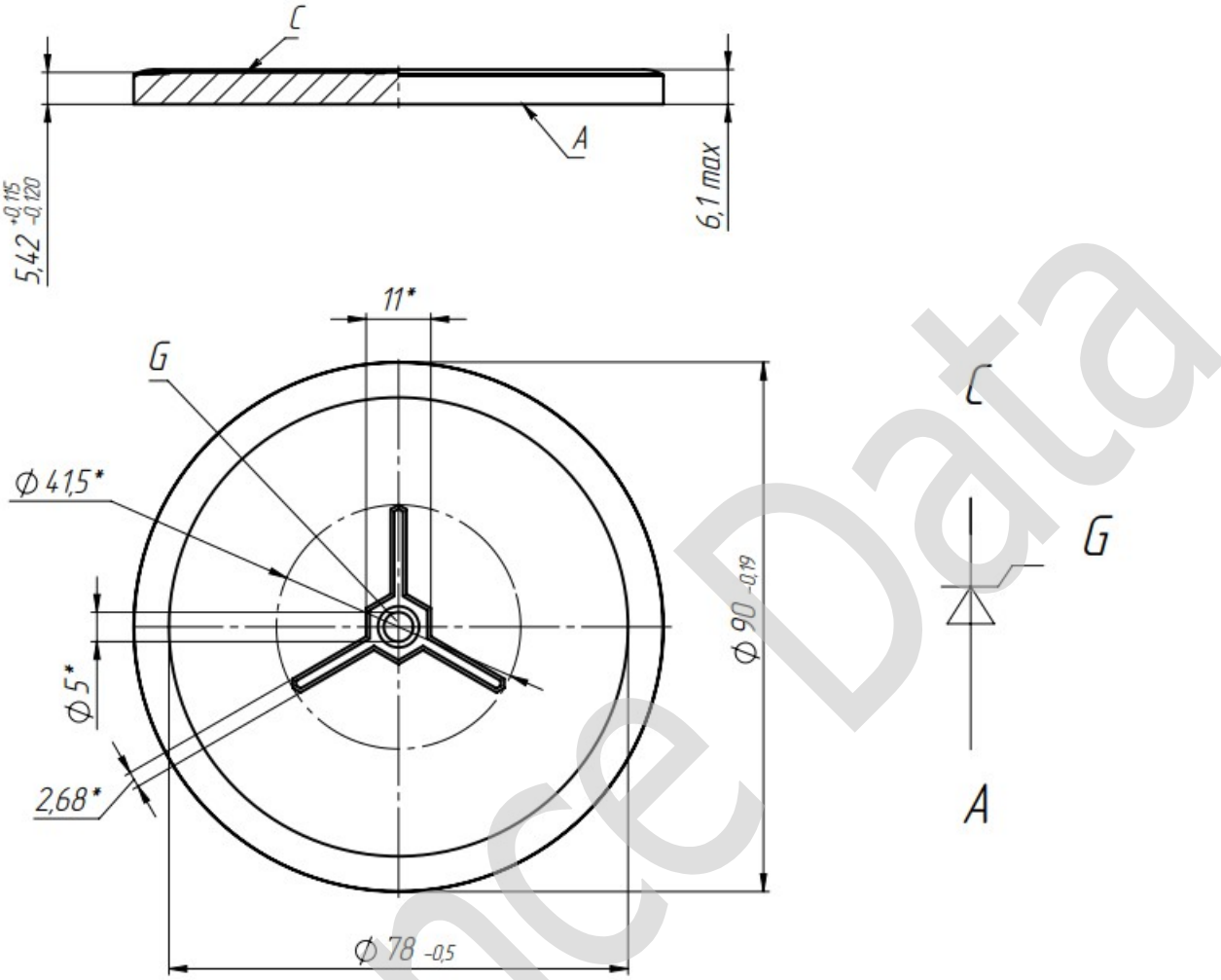
| Symbol of Group | E2 | A2 | T1 |
|---|---|---|---|
| $(dv_D/dt)_{crit}$, V/µs | 500 | 1000 | 1600 |

[3)] Turn-off time ($dv_D/dt$=50 V/µs)

| Symbol of Group | B2 |
|---|---|
| $t_q$, µs | 800 |

Advance Data

## OVERALL DIMENSIONS




*Dimensions for reference.

All dimensions in millimeters

Advance Data

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