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| | **TET ESTEL AS**<br>ESTONIA | **November 2015** |

**Series**
**T333-400**

# Phase Control Press-Pack Thyristor Type T333-400

Center amplifying gate
Low on-state and switching losses
Designed for traction and industrial applications

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|---|---|---|---|---|---|
| Maximum mean on-state current | | | $I_{TAV}$ | **400 A** | |
| Maximum repetitive peak off-state and reverse voltage | | | $U_{DRM}$ $U_{RRM}$ | **1600 ÷2400 V** | |
| Turn-off time | | | **tq** | **160; 200; 250; 320 µs** | |
| $U_{DRM}$, $U_{RRM}$, V | 1600 | 1800 | 2000 | 2200 | 2400 |
| Voltage code | 16 | 18 | 20 | 22 | 24 |
| Tvj, °C | - 60 ÷ 125 | | | | |

## MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters | | Units | T333-400 | Conditions | |
|---|---|---|---|---|---|
| $I_{TAV}$ | Mean on-state current | A | 400<br>715 | Tc=93 °C,<br>Tc=55 °C,<br>180° half-sine wave, 50 Hz | |
| $I_{TRMS}$ | RMS on-state current | A | 628 | Tc=93 °C | |
| $I_{TSM}$ | Surge on-state current | kA | 8,0<br>9,0 | Tvj=125°C<br>Tvj=25°C | tp=10 ms<br>$U_R$=0 |
| $I^2t$ | Limiting load integral | $kA^2s$ | 320<br>405 | Tvj=125°C<br>Tvj=25°C | |
| $U_{DRM}$,$U_{RRM}$ | Repetitive peak off-state and reverse voltage | V | 1600÷2400 | Tj min≤Tvj≤Tjm<br>180° half-sine wave, 50 Hz<br>Gate open | |
| $U_{DSM}$,$U_{RSM}$ | Non-repetitive peak off-state and reverse voltage | V | 1700÷2500 | Tj min≤Tvj≤Tjm<br>180° half-sine wave<br>tp=10 ms, Single pulse<br>Gate open | |
| (di$_T$/dt) crit | Critical rate of rise of on-state current :<br>non - repetitive<br>repetitive | A/µs | <br><br>320<br>160 | Tvj=125°C ; $U_D$=0,67 $U_{DRM}$,<br>Gate pulse : 10V,5 Ω,<br>1µs rise time, 10 µs | |
| $U_{RGM}$ | Peak reverse gate voltage | V | 5 | Tj min≤Tvj≤Tjm | |
| Tstg | Storage temperature | °C | -60÷80 | | |
| Tvj | Junction temperature | °C | -60÷125 | | |
| **CHARACTERISTICS** | | | | | |
| $U_{TM}$ | Peak on-state voltage | V | 1,8 | Tvj=25°C, $I_{TM}$=3,14 $I_{TAV}$ | |
| $U_{T(TO)}$ | Threshold voltage | V | 1,1 | Tvj=125°C<br>1,57 $I_{TAV}$< $I_T$ <4,71 $I_{TAV}$ | |
| $R_T$ | On-state slope resistance | mΩ | 0,6 | | |
| $I_{DRM}$<br>$I_{RRM}$ | Repetitive peak off-state and reverse current | mA | <br>50<br>50 | Tvj=125°C,<br>$U_D$ = $U_{DRM}$<br>$U_R$= $U_{RRM}$ | |

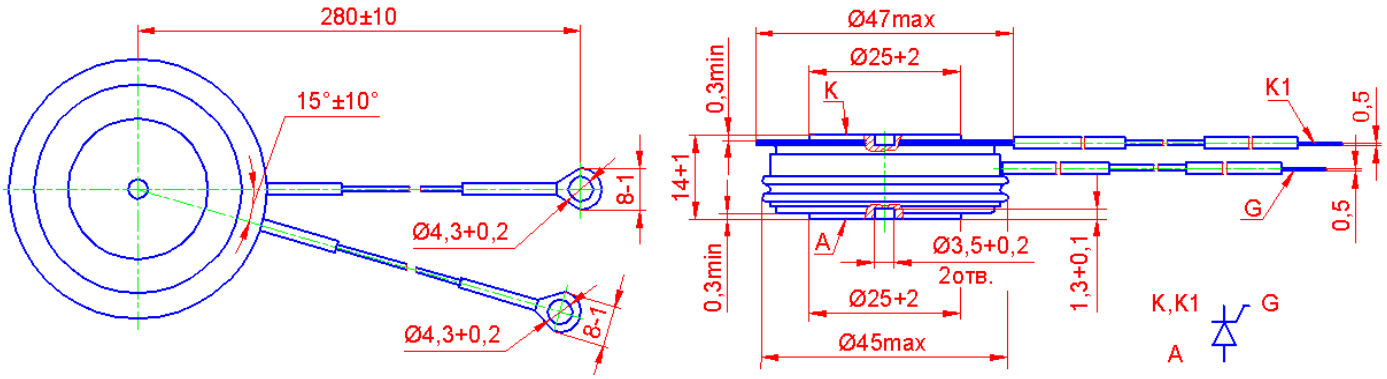
## CHARACTERISTICS

| Symbols and parameters | | Units | T333-400 | Conditions | |
|---|---|---|---|---|---|
| $I_L$ | Latching current | A | 0,7 | Tvj=25°C,$U_D$=12V<br>Gate pulse : 10V, 5Ω,<br>1 µs rise time, 10µs | |
| $I_H$ | Holding current | A | 0,5 | Tvj=25°C,$U_D$=12V, Gate open | |
| $U_{GT}$ | Gate trigger direct voltage | V | 2,5<br>5,0 | Tvj=25°C,<br>Tvj=-60°C | $U_D$=12V |
| $I_{GT}$ | Gate trigger direct current | A | 0,3<br>0,85 | Tvj=25°C,<br>Tvj=-60°C | |
| $U_{GD}$ | Gate non-trigger direct voltage | V | 0,25 | Tvj=125°C, $U_D$ = 0,67 $U_{DRM}$ | |
| $I_{GD}$ | Gate non-trigger direct current | mA | 10 | Direct gate current | |
| $t_{gd}$ | Delay time | µs | 1,6 | Tvj=25°C,$U_D$=500V<br>$I_{TM}$ = 400 A<br>Gate pulse : 10V, 5Ω,<br>1 µs rise time, 10µs | |
| $t_{gt}$ | Turn-on time | µs | 3,2 | | |
| tq | Turn-off time | µs | 160÷320 | Tvj=125°C, $I_{TM}$ =400 A<br>$di_R/dt$ =10 A/µs, $U_R$=100V<br>$U_D$ = 0,67 $U_{DRM}$<br>$du_D/dt$=50 V/µs | |
| Qrr | Recovered charge | µC | 1350 | Tvj=125°C, $I_{TM}$ =400 A<br>$di_R/dt$ =10 A/µs, $U_R$=100V | |
| trr | Reverse recovery time | µs | 24 | | |
| $I_{RRM}$ | Peak reverse recovery current | A | 110 | | |
| $(du_D/dt)_{crit}$ | Critical rate of rise of off-state voltage | V/µs | 500<br>1000 | Tvj=125°C, $U_D$ = 0,67 $U_{DRM}$<br>Gate open | |
| Rthjc | Thermal resistance junction to case | °C/W | 0,045 | Direct current,<br>double side cooled | |

## ORDERING

| | T | 333 | 400 | 22 | 7 | 3 | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | |

1. Phase control thyristor.
2. Design version.
3. Mean on-state current, A.
4. Voltage code (22=2200 V).
5. Critical rate of rise of off-state voltage (6 ≥ 500 V/µs, 7 ≥1000 V/µs).
6. Group of turn-off time ($du_D/dt$=50 V/µs, K2 ≤ 320 µs, 2 ≤ 250 µs, P2 ≤ 200 µs, 3≤ 160 µs).




Mounting force : 9 ÷ 12 kN
Weight : 120 grams