



**TET ESTEL AS**  
ESTONIA

**November**  
**2015**

**Series**  
**T233-500**

**Phase Control Press-Pack**  
**Thyristor**  
**Type T233-500**

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

Maximum mean on-state current	$I_{TAV}$	<b>500 A</b>							
Maximum repetitive peak off-state and reverse voltage	$U_{DRM}$ $U_{RRM}$	<b>1000 ÷ 1800 V</b>							
Turn-off time	$t_q$	<b>160; 200; 250 <math>\mu</math>s</b>							
$U_{DRM}, U_{RRM}, V$		1000	1100	1200	1300	1400	1500	1600	1800
Voltage code		10	11	12	13	14	15	16	18
$T_{vj}, ^\circ C$		- 60 ÷ 125							

**MAXIMUM ALLOWABLE RATINGS**

Symbols and parameters		Units	T233-500	Conditions
$I_{TAV}$	Mean on-state current	A	500 765	$T_c=87^\circ C$ , $T_c=55^\circ C$ , 180° half-sine wave, 50 Hz
$I_{TRMS}$	RMS on-state current	A	785	$T_c=87^\circ C$
$I_{TSM}$	Surge on-state current	kA	9,0 10,0	$T_{vj}=125^\circ C$ $T_{vj}=25^\circ C$ tp=10 ms $U_R=0$
$I^2t$	Limiting load integral	$kA^2s$	405 500	$T_{vj}=125^\circ C$ $T_{vj}=25^\circ C$
$U_{DRM}, U_{RRM}$	Repetitive peak off-state and reverse voltage	V	1000÷1800	$T_j \min \leq T_{vj} \leq T_{jM}$ 180° half-sine wave, 50 Hz Gate open
$U_{DSM}, U_{RSM}$	Non-repetitive peak off-state and reverse voltage	V	1100÷1900	$T_j \min \leq T_{vj} \leq T_{jM}$ 180° half-sine wave tp=10 ms, Single pulse Gate open
(di <sub>T</sub> /dt) crit	Critical rate of rise of on-state current : non - repetitive repetitive	A/ $\mu$ s	320 160	$T_{vj}=125^\circ C$ ; $U_D=0,67 U_{DRM}$ , Gate pulse : 10V, 5 $\Omega$ , 1 $\mu$ s rise time, 10 $\mu$ s
$U_{RGM}$	Peak reverse gate voltage	V	5	$T_j \min \leq T_{vj} \leq T_{jM}$
$T_{stg}$	Storage temperature	$^\circ C$	-60÷80	
$T_{vj}$	Junction temperature	$^\circ C$	-60÷125	

**CHARACTERISTICS**

$U_{TM}$	Peak on-state voltage	V	1,8	$T_{vj}=25^\circ C$ , $I_{TM}=3,14 I_{TAV}$
$U_{T(TO)}$	Threshold voltage	V	1,0	$T_{vj}=125^\circ C$
$R_T$	On-state slope resistance	m $\Omega$	0,55	1,57 $I_{TAV} < I_T < 4,71 I_{TAV}$
$I_{DRM}$ $I_{RRM}$	Repetitive peak off-state and reverse current	mA	50 50	$T_{vj}=125^\circ C$ , $U_D = U_{DRM}$ $U_R = U_{RRM}$

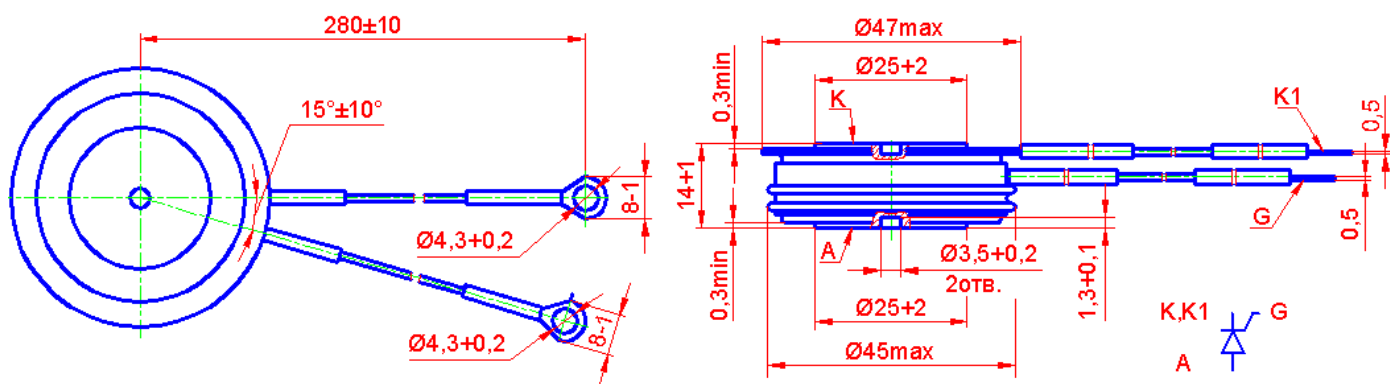
## CHARACTERISTICS

Symbols and parameters		Units	T233-500	Conditions
$I_L$	Latching current	A	0,7	$T_{vj}=25^{\circ}\text{C}, U_D=12\text{V}$ Gate pulse : 10V, 5 $\Omega$ , 1 $\mu\text{s}$ rise time, 10 $\mu\text{s}$
$I_H$	Holding current	A	0,5	$T_{vj}=25^{\circ}\text{C}, U_D=12\text{V}$ , Gate open
$U_{GT}$	Gate trigger direct voltage	V	2,5 5,0	$T_{vj}=25^{\circ}\text{C}$ , $T_{vj}=-60^{\circ}\text{C}$ $U_D=12\text{V}$
$I_{GT}$	Gate trigger direct current	A	0,3 0,85	$T_{vj}=25^{\circ}\text{C}$ , $T_{vj}=-60^{\circ}\text{C}$
$U_{GD}$	Gate non-trigger direct voltage	V	0,25	$T_{vj}=125^{\circ}\text{C}$ , $U_D = 0,67 U_{DRM}$
$I_{GD}$	Gate non-trigger direct current	mA	10	Direct gate current
tgd	Delay time	$\mu\text{s}$	1,6	$T_{vj}=25^{\circ}\text{C}, U_D=500\text{V}$ $I_{TM} = 500 \text{ A}$
tgt	Turn-on time	$\mu\text{s}$	3,2	Gate pulse : 10V, 5 $\Omega$ , 1 $\mu\text{s}$ rise time, 10 $\mu\text{s}$
tq	Turn-off time	$\mu\text{s}$	160÷250	$T_{vj}=125^{\circ}\text{C}$ , $I_{TM}=500 \text{ A}$ $di_R/dt = 10 \text{ A}/\mu\text{s}$ , $U_R=100\text{V}$ $U_D = 0,67 U_{DRM}$ $du_D/dt=50 \text{ V}/\mu\text{s}$
Qrr	Recovered charge	$\mu\text{C}$	1200	$T_{vj}=125^{\circ}\text{C}$ , $I_{TM}=500 \text{ A}$ $di_R/dt = 10 \text{ A}/\mu\text{s}$ , $U_R=100\text{V}$
trr	Reverse recovery time	$\mu\text{s}$	20	
Irrm	Peak reverse recovery current	A	120	
( $du_D/dt$ )crit	Critical rate of rise of off-state voltage	V/ $\mu\text{s}$	500 1000	$T_{vj}=125^{\circ}\text{C}$ , $U_D = 0,67 U_{DRM}$ Gate open
Rthjc	Thermal resistance junction to case	$^{\circ}\text{C}/\text{W}$	0,045	Direct current, double side cooled

## ORDERING

	T	233	500	16	7	3	
	1	2	3	4	5	6	

- Phase control thyristor.
- Design version.
- Mean on-state current, A.
- Voltage code (16=1600 V).
- Critical rate of rise of off-state voltage ( $6 \geq 500 \text{ V}/\mu\text{s}$ ,  $7 \geq 1000 \text{ V}/\mu\text{s}$ ).
- Group of turn-off time ( $du_D/dt=50 \text{ V}/\mu\text{s}$ ,  $2 \leq 250 \mu\text{s}$ ,  $P2 \leq 200 \mu\text{s}$ ,  $3 \leq 160 \mu\text{s}$ ).



Mounting force : 9 ÷ 12 kN

Weight : 120 grams