



High-end Power Semiconductor Manufacturer

KP400A 3500V-4400V

Phase Control Thyristor

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



Mean on-state current		I_{TAV}	400 A	
Repetitive peak off-state voltage		V_{DRM}	3500 – 4400 V	
Repetitive peak reverse voltage		V_{RRM}		
Turn-off time		t_q	500 μ s	
V_{DRM}, V_{RRM}	3500	4000	4200	4400
Voltage code	35	40	42	44
$T_{ij}, ^\circ\text{C}$	-60 – 125			

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{TAV}	Mean on-state current	A	400	$T_c=85\text{ }^{\circ}\text{C}$, Double side cooled 180° half-sine wave; 50 Hz	
I_{TRMS}	RMS on-state current	A	628	$T_c=85\text{ }^{\circ}\text{C}$, Double side cooled 180° half-sine wave; 50 Hz	
I_{TSM}	Surge on-state current	kA	8.0 9.0	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; 50 Hz ($t_p=10\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
			9.0 10.4	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; 60 Hz ($t_p=8.3\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
I^2t	Safety factor	$\text{A}^2\text{s}\cdot 10^3$	320 420	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; 50 Hz ($t_p=10\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
			335 445	$T_j=T_{j\max}$ $T_j=25\text{ }^{\circ}\text{C}$	180° half-sine wave; 60 Hz ($t_p=8.3\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$
BLOCKING					
V_{DRM}, V_{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	3500–4400	$T_{j\min}<T_j<T_{j\max}$; 180° half-sine wave; 50 Hz; Gate open	
V_{DSM}, V_{RSM}	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	3600–4500	$T_{j\min}<T_j<T_{j\max}$; 180° half-sine wave; 50 Hz;single pulse; Gate open	
V_D, V_R	Direct off-state and Direct reverse voltages	V	$0.75\cdot V_{DRM}$ $0.75\cdot V_{RRM}$	$T_j=T_{j\max}$; Gate open	

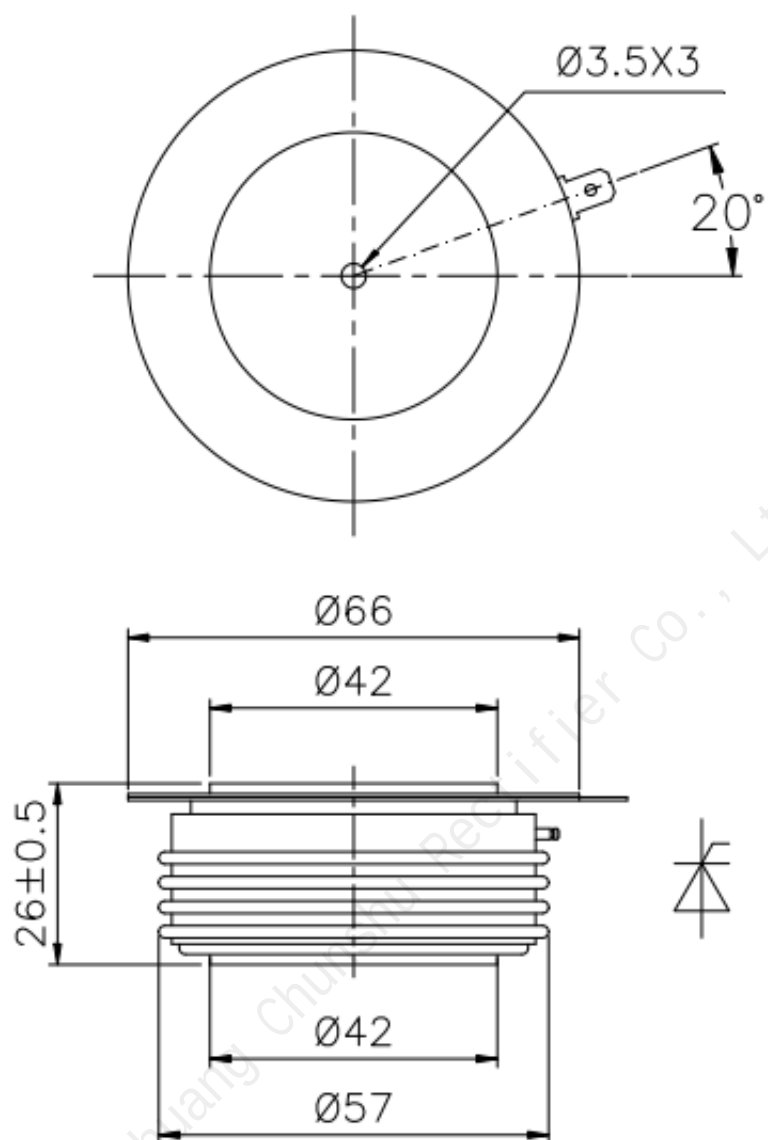
TRIGGERING				
I_{FGM}	Peak forward gate current	A	8	$T_j = T_{j \max}$
V_{RGM}	Peak reverse gate voltage	V	5	
P_G	Gate power dissipation	W	4	$T_j = T_{j \max}$ for DC gate current
SWITCHING				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive ($f=1$ Hz)	A/ μ s	400	$T_j = T_{j \max}$; $V_D = 0.67 \cdot V_{DRM}$; $I_{TM} = 2 I_{TAV}$; 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	14.0 – 16.0	
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	2.55	$T_j=25\text{ }^{\circ}\text{C}$; $I_{TM}=1256\text{ A}$	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.35	$T_j=T_{j\text{ max}}$;	
r_T	On-state slope resistance, max	m Ω	1.270	$0.5\pi I_{TAV} < I_T < 1.5\pi I_{TAV}$	
I_L	Latching current, max	mA	1000	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=12\text{ V}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$	
I_H	Holding current, max	mA	300	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=12\text{ V}$; Gate open	
BLOCKING					
I_{DRM} , I_{RRM}	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	100	$T_j=T_{j\text{ max}}$; $V_D=V_{DRM}$; $V_R=V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage ¹⁾ , min	V/ μs	1000	$T_j=T_{j\text{ max}}$; $V_D=0.67\cdot V_{DRM}$; Gate open	
TRIGGERING					
V_{GT}	Gate trigger direct voltage, max	V	3.00 2.00	$T_j=25\text{ }^{\circ}\text{C}$ $T_j= T_{j\text{ max}}$	$V_D=12\text{ V}$; $I_D=3\text{ A}$; Direct gate current
I_{GT}	Gate trigger direct current, max	mA	300 200	$T_j= 25\text{ }^{\circ}\text{C}$ $T_j= T_{j\text{ max}}$	
V_{GD}	Gate non-trigger direct voltage, min	V	0.25	$T_j=T_{j\text{ max}}$; $V_D=0.67\cdot V_{DRM}$;	
I_{GD}	Gate non-trigger direct current, min	mA	10.00	Direct gate current	
SWITCHING					
t_{gd}	Delay time	μs	3.50	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=0.4\cdot V_{DRM}$; $I_{TM}=I_{TAV}$; Gate pulse: $I_G=2\text{ A}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt\geq 1\text{ A}/\mu\text{s}$	
t_q	Turn-off time ²⁾ , max	μs	500	$dv_D/dt=50\text{ V}/\mu\text{s}$; $T_j=T_{j\text{ max}}$; $I_{TM}= I_{TAV}$; $di_R/dt=-10\text{ A}/\mu\text{s}$; $V_R=100\text{V}$; $V_D=0.67\cdot V_{DRM}$	

THERMAL					
R _{thjc}	Thermal resistance, junction to case, max	°C/W	0.0350	Direct current	Double side cooled
R _{thjc-A}			0.0770		Anode side cooled
R _{thjc-K}			0.0630		Cathode side cooled
R _{thck}	Thermal resistance, case to heatsink, max	°C/W	0.0060	Direct current	
MECHANICAL					
w	Weight, typ	g	280		
D _s	Surface creepage distance	mm (inch)	27.60 (1.087)		
D _a	Air strike distance	mm (inch)	16.00 (0.630)		

OVERALL DIMENSIONS



KT46

All dimensions in millimeters