



High-end Power Semiconductor Manufacturer

# KP320A 4600V-6500V Phase Control Thyristor

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



Mean on-state current	$I_{TAV}$		320 A									
Repetitive peak off-state voltage	$V_{DRM}$		4600 – 6500 V									
Repetitive peak reverse voltage	$V_{RRM}$											
Turn-off time	$t_q$		630 $\mu$ s									
$V_{DRM}, V_{RRM}, V$	4600	4800	5000	5200	5400	5600	5800	6000	6200	6400	6500	
Voltage code	46	48	50	52	54	56	58	60	62	64	65	
$T_j, ^\circ C$	-60 – 125											

## MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
<b>ON-STATE</b>					
$I_{TAV}$	Mean on-state current	A	320	$T_c=85^\circ C$ ; Double side cooled; 180° half-sine wave; 50 Hz	
$I_{TRMS}$	RMS on-state current	A	502.4	$T_c=85^\circ C$ ; Double side cooled; 180° half-sine wave; 50 Hz	
$I_{TSM}$	Surge on-state current	kA	4.5 5.0	$T_j=T_{j\max}$ $T_j=25^\circ C$	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/ $\mu$ s
			5.0 6.0		
$I^2t$	Safety factor	$A^2s \cdot 10^3$	100 125	$T_j=T_{j\max}$ $T_j=25^\circ C$	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/ $\mu$ s
			100 145		
<b>BLOCKING</b>					
$V_{DRM}, V_{RRM}$	Repetitive peak off-state and Repetitive peak reverse voltages	V	4600–6500	$T_{j\min} < T_j < T_{j\max}$ ; 180° half-sine wave; 50 Hz; Gate open	
$V_{DSM}, V_{RSM}$	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	4700–6600	$T_{j\min} < T_j < T_{j\max}$ ; 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	

<b>TRIGGERING</b>				
$I_{FGM}$	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
<b>SWITCHING</b>				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive (f=1 Hz)	A/ $\mu$ 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/ $\mu$ s
<b>THERMAL</b>				
$T_{stg}$	Storage temperature	$^{\circ}$ C	-60 – 125	
$T_j$	Operating junction temperature	$^{\circ}$ C	-60 – 125	
<b>MECHANICAL</b>				
F	Mounting force	kN	14.0 – 16.0	
a	Acceleration	m/s <sup>2</sup>	50 100	Device unclamped Device clamped

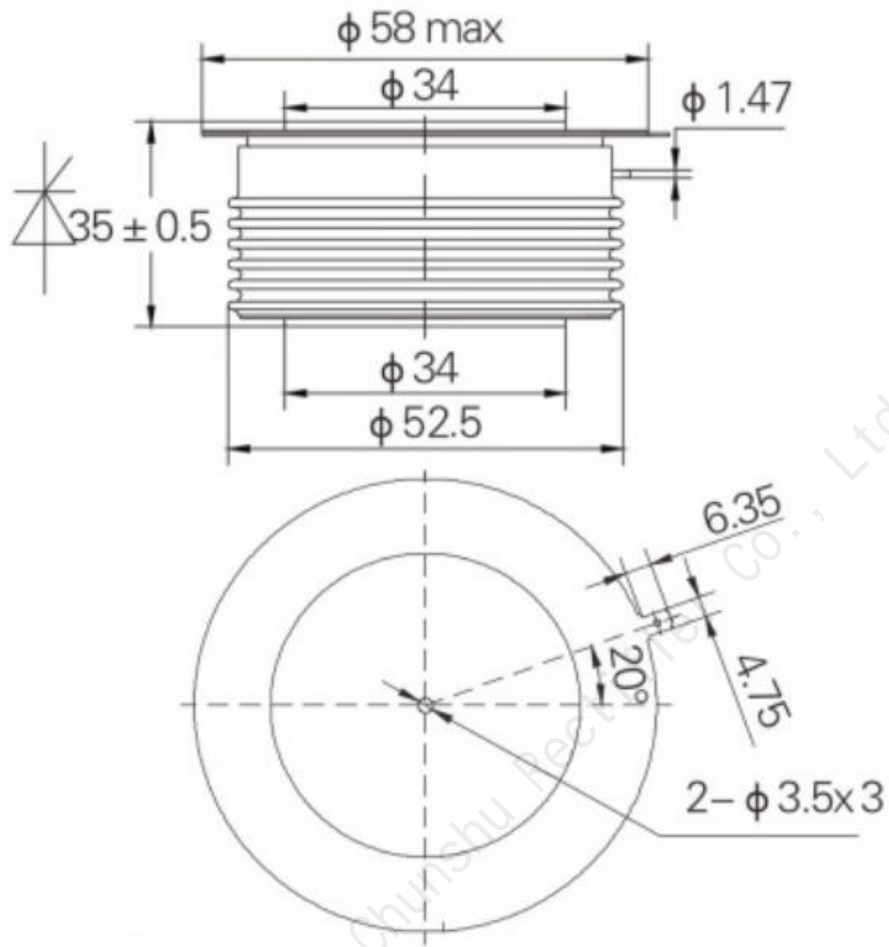
## CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
<b>ON-STATE</b>					
$V_{TM}$	Peak on-state voltage, max	V	2.80	$T_j = 25 \text{ }^{\circ}\text{C}; I_{TM} = 785$ A	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.05	$T_j = T_{j \max};$	
$r_T$	On-state slope resistance, max	m $\Omega$	2.520	$0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$	
$I_L$	Latching current, max	mA	700	$T_j = 25 \text{ }^{\circ}\text{C}; V_D = 12$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s	
$I_H$	Holding current, max	mA	300	$T_j = 25 \text{ }^{\circ}\text{C};$ $V_D = 12$ V; Gate open	
<b>BLOCKING</b>					
$I_{DRM}, I_{RRM}$	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	150	$T_j = T_{j \max};$ $V_D = V_{DRM}; V_R = V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage <sup>1)</sup> , min	V/ $\mu$ s	1000	$T_j = T_{j \max};$ $V_D = 0.67 \cdot V_{DRM};$ Gate open	
<b>TRIGGERING</b>					
$V_{GT}$	Gate trigger direct voltage, max	V	2.50 2.00	$T_j = 25 \text{ }^{\circ}\text{C}$ $T_j = T_{j \max}$	$V_D = 12$ V; $I_D = 3$ A; Direct gate current
$I_{GT}$	Gate trigger direct current, max	mA	300 200	$T_j = 25 \text{ }^{\circ}\text{C}$ $T_j = T_{j \max}$	
$V_{GD}$	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	
<b>SWITCHING</b>					
$t_{gd}$	Delay time	$\mu$ s	4.00	$T_j = 25 \text{ }^{\circ}\text{C}; V_D = 0.4 \cdot V_{DRM}; I_{TM} = I_{TAV};$ Gate pulse: $I_G = 2$ A; $t_{GP} = 50 \mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s	
$t_q$	Turn-off time <sup>2)</sup> , max	$\mu$ s	630	$dv_D/dt = 50$ V/ $\mu$ s; $T_j = T_{j \max}; I_{TM} = 1000$ A; $di_R/dt = -10$ A/ $\mu$ s; $V_R = 100$ V; $V_D = 2000$ V	
$Q_{rr}$	Total recovered charge, max	$\mu$ C	3500	$T_j = T_{j \max}; I_{TM} = 1000$ A;	
$t_{rr}$	Reverse recovery time, typ	$\mu$ s	50	$di_R/dt = -5$ A/ $\mu$ s;	
$I_{rrM}$	Peak reverse recovery current, max	A	140	$V_R = 100$ V	

<b>THERMAL</b>					
$R_{thjc}$	Thermal resistance, junction to case, max	°C/W	0.0450	Direct current	Double side cooled
$R_{thjc-A}$			0.0990		Anode side cooled
$R_{thjc-K}$			0.0810		Cathode side cooled
$R_{thck}$	Thermal resistance, case to heatsink, max	°C/W	0.0075	Direct current	
<b>MECHANICAL</b>					
w	Weight, typ	g	400		
$D_s$	Surface creepage distance	mm (inch)	38.00 (1.496)		
$D_a$	Air strike distance	mm (inch)	21.00 (0.827)		

Beijing Xinchuang Chunshu Rectifier Co., Ltd

OVERALL DIMENSIONS



KT40DT

All dimensions in millimeters