



High-end Power Semiconductor Manufacturer

KK400A 2000-2400V

Fast Switching Thyristor

- Low switching losses
- Low reverse recovery charge
- Distributed amplified gate for high di_T/dt



Mean on-state current		I_{TAV}	400 A
Repetitive peak off-state voltage		V_{DRM}	2000 – 2400 V
Repetitive peak reverse voltage		V_{RRM}	
Turn-off time		t_q	50.0 μs
V_{DRM}, V_{RRM}, V	2000	2200	2400
Voltage code	20	22	24
$T_j, ^\circ C$	– 60 – 125		

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions	
ON-STATE					
I_{TAV}	Mean on-state current	A	400 600	$T_c=85^{\circ}\text{C}$; Double side cooled; $T_c=55^{\circ}\text{C}$; 180° half-sine wave; 50 Hz	
I_{TRMS}	RMS on-state current	A	628	$T_c=85^{\circ}\text{C}$; Double side cooled; 180° half-sine wave; 50 Hz	
I_{TSM}	Surge on-state current	kA	6.6 7.6	$T_j=T_{j\max}$ $T_j=25^{\circ}\text{C}$	180° half-sine wave; 50 Hz ($t_p=10\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=I_{FGM}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt=1\text{ A}/\mu\text{s}$
			7.0 8.1	$T_j=T_{j\max}$ $T_j=25^{\circ}\text{C}$	180° half-sine wave; 60 Hz ($t_p=8.3\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=I_{FGM}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt=1\text{ A}/\mu\text{s}$
I^2t	Safety factor	$\text{A}^2\text{s}\cdot 10^3$	215 285	$T_j=T_{j\max}$ $T_j=25^{\circ}\text{C}$	180° half-sine wave; 50 Hz ($t_p=10\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=I_{FGM}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt=1\text{ A}/\mu\text{s}$
			200 270	$T_j=T_{j\max}$ $T_j=25^{\circ}\text{C}$	180° half-sine wave; 60 Hz ($t_p=8.3\text{ ms}$); single pulse; $V_D=V_R=0\text{ V}$; Gate pulse: $I_G=I_{FGM}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt=1\text{ A}/\mu\text{s}$
BLOCKING					
V_{DRM}, V_{RRM}	Repetitive peak off-state and Repetitive peak reverse voltages	V	2000–2400	$T_{j\min}<T_j<T_{j\max}$; 180° half-sine wave; 50 Hz; Gate open	
V_{DSM}, V_{RSM}	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	2100–2500	$T_{j\min}<T_j<T_{j\max}$; 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	

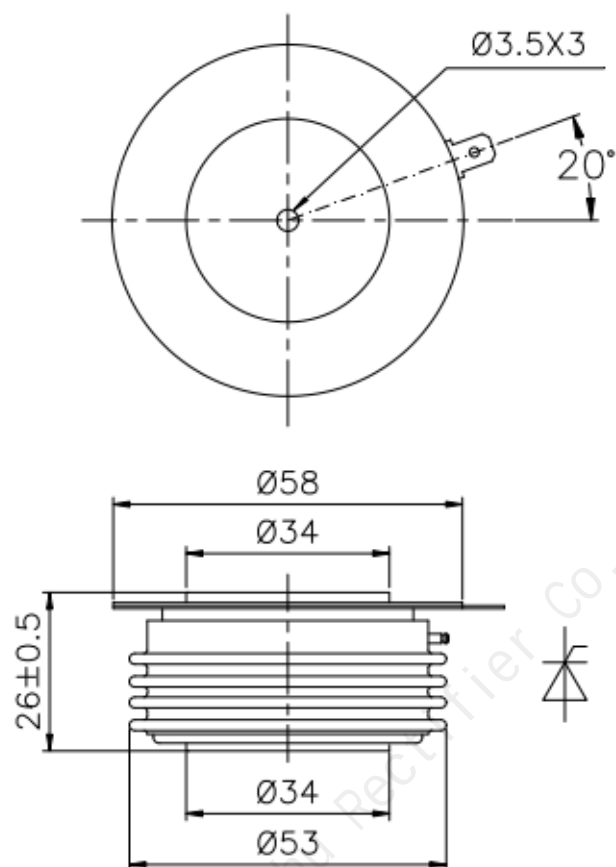
TRIGGERING				
I_{FGM}	Peak forward gate current	A	6	$T_j = T_{j\max}$
V_{RGM}	Peak reverse gate voltage	V	5	
P_G	Gate power dissipation	W	3	$T_j = T_{j\max}$ for DC gate current
SWITCHING				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive ($f=1$ Hz)	A/ μ s	1600	$T_j = T_{j\max}$; $V_D = 0.67 V_{DRM}$; $I_{TM} = 2 I_{TAV}$; Gate pulse: $I_G = I_{FGM}$; $V_G = 20$ V; $t_{GP} = 50 \mu$ s; $di_G/dt = 1$ 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	9.0 – 11.0	
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	2.10	$T_j=25\text{ }^{\circ}\text{C}$; $I_{TM}=1256\text{ A}$	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.40	$T_j=T_{j\text{ max}}$;	
r_T	On-state slope resistance, max	$\text{m}\Omega$	0.870	$0.5\pi I_{TAV} < I_T < 1.5\pi I_{TAV}$	
I_H	Holding current, max	mA	500	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=12\text{ V}$; Gate open	
BLOCKING					
I_{DRM}, I_{RRM}	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	50	$T_j=T_{j\text{ max}}$; $V_D=V_{DRM}$; $V_R=V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage ¹⁾ , min	$\text{V}/\mu\text{s}$	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	4.00 2.50 2.00	$T_j= T_{j\text{ min}}$ $T_j=25\text{ }^{\circ}\text{C}$ $T_j= T_{j\text{ max}}$	$V_D=12\text{ V}$; $I_D=3\text{ A}$; Direct gate current
I_{GT}	Gate trigger direct current, max	mA	500 300 200	$T_j= T_{j\text{ min}}$ $T_j= 25\text{ }^{\circ}\text{C}$ $T_j= T_{j\text{ max}}$	
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	2.50	$T_j=25\text{ }^{\circ}\text{C}$; $V_D=0.4\cdot V_{DRM}$; $I_{TM}=I_{TAV}$; Gate pulse: $I_G=I_{FGM}$; $V_G=20\text{ V}$; $t_{GP}=50\text{ }\mu\text{s}$; $di_G/dt=1\text{ A}/\mu\text{s}$	
t_q	Turn-off time ²⁾ , max	μs	50.0	$dv_D/dt=50\text{ V}/\mu\text{s}$	$T_j=T_{j\text{ max}}$; $I_{TM}= I_{TAV}$; $di_R/dt=-10\text{ A}/\mu\text{s}$; $V_R=100\text{V}$; $V_D=0.67\text{ }V_{DRM}$
			63.0	$dv_D/dt=200\text{ V}/\mu\text{s}$	
Q_{rr}	Total recovered charge, max	μC	400	$T_j=T_{j\text{ max}}$; $I_{TM}=400\text{ A}$;	
t_{rr}	Reverse recovery time, typ	μs	5.0	$di_R/dt=-50\text{ A}/\mu\text{s}$;	
I_{rrM}	Peak reverse recovery current, max	A	160	$V_R=100\text{ V}$	

THERMAL					
R _{thjc}	Thermal resistance, junction to case, max	°C/W	0.0500	Direct current	Double side cooled
R _{thjc-A}			0.1100		Anode side cooled
R _{thjc-K}			0.0900		Cathode side cooled
R _{thck}	Thermal resistance, case to heatsink, max	°C/W	0.0060	Direct current	
MECHANICAL					
w	Weight, typ	g	180		
D _s	Surface creepage distance	mm (inch)	19.44 (0.765)		
D _a	Air strike distance	mm (inch)	12.10 (0.476)		

OVERALL DIMENSIONS



KT40

All dimensions in millimeters