Bulletin I25196 rev. B 01/00

International
IOR Rectifier

ST1200C..K SERIES

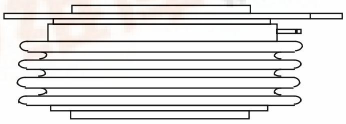
PHASE CONTROL THYRISTORS

Hockey Puk Version

1650A

Features

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case A-24 (K-PUK)
- High profile hockey-puk



case style A-24 (K-PUK)

Typical Applications

- DC motor controls
- Controlled DC power supplies
- AC controllers

Major Ratings and Characteristics

Parameters		ST1200C..K	Units
$I_{T(AV)}$		1650	A
	@ T_{hs}	55	°C
$I_{T(RMS)}$		3080	A
	@ T_{hs}	25	°C
I_{TSM}	@ 50Hz	30500	A
	@ 60Hz	32000	A
I^2t	@ 50Hz	4651	KA^2s
	@ 60Hz	4250	KA^2s
V_{DRM}/V_{RRM}		1200 to 2000	V
t_q	typical	200	µs
T_J		- 40 to 125	°C

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM}, max. repetitive peak and off-state voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max mA
ST1200C..K	12	1200	1300	100
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

On-state Conduction

	Parameter	ST1200C..K	Units	Conditions		
$I_{T(AV)}$	Max. average on-state current	1650 (700)	A	180° conduction, half sine wave		
	@ Heatsink temperature	55 (85)	°C	double side (single side) cooled		
$I_{T(RMS)}$	Max. RMS on-state current	3080	A	DC @ 25°C heatsink temperature double side cooled		
I_{TSM}	Max. peak, one-cycle non-repetitive surge current	30500		t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		32000		t = 8.3ms		
		25700		t = 10ms	100% V_{RRM} reapplied	
		26900		t = 8.3ms		
I^2t	Maximum I^2t for fusing	4651	KA^2s	t = 10ms	No voltage reapplied	
		4250		t = 8.3ms		
		3300		t = 10ms	100% V_{RRM} reapplied	
		3000		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	46510	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$	Low level value of threshold voltage	0.91	V	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
$V_{T(TO)2}$	High level value of threshold voltage	1.01		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
r_{t1}	Low level value of on-state slope resistance	0.21	mΩ	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
r_{t2}	High level value of on-state slope resistance	0.19		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
V_{TM}	Max. on-state voltage	1.73	V	I_{pk}= 4000A, $T_J = T_J$ max, t_p = 10ms sine pulse		
I_H	Maximum holding current	600	mA	T_J = 25°C, anode supply 12V resistive load		
I_L	Typical latching current	1000				

Switching

	Parameter	ST1200C..K	Units	Conditions
di/dt	Max. non-repetitive rate of rise of turned-on current	1000	A/µs	Gate drive 20V, 20Ω, $t_r \leq$ 1µs $T_J = T_J$ max, anode voltage ≤ 80% V_{DRM}
t_d	Typical delay time	1.9	µs	Gate current 1A, di_g/dt = 1A/µs V_d = 0.67% V_{DRM}, T_J = 25°C
t_q	Typical turn-off time	200		I_{TM} = 550A, $T_J = T_J$ max, di/dt = 40A/µs, V_R = 50V dv/dt = 20V/µs, Gate 0V 100Ω, t_p = 500µs

Blocking

	Parameter	ST1200C..K	Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	V/µs	$T_J = T_J$ max. linear to 80% rated V_{DRM}
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	100	mA	$T_J = T_J$ max, rated V_{DRM}/V_{RRM} applied

Triggering

	Parameter	ST1200C..K		Units	Conditions	
		TYP.	MAX.			
P_{GM}	Maximum peak gate power	16		W	$T_J = T_J$ max, $t_p \leq$ 5ms	
$P_{G(AV)}$	Maximum average gate power	3			$T_J = T_J$ max, f = 50Hz, d% = 50	
I_{GM}	Max. peak positive gate current	3.0		A	$T_J = T_J$ max, $t_p \leq$ 5ms	
$+V_{GM}$	Maximum peak positive gate voltage	20		V	$T_J = T_J$ max, $t_p \leq$ 5ms	
$-V_{GM}$	Maximum peak negative gate voltage	5.0				
I_{GT}	DC gate current required to trigger	200	-	mA	T_J = - 40°C	Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
		100	200		T_J = 25°C	
		50	-		T_J = 125°C	
V_{GT}	DC gate voltage required to trigger	1.4	-	V	T_J = - 40°C	
		1.1	3.0		T_J = 25°C	
		0.9	-		T_J = 125°C	
I_{GD}	DC gate current not to trigger	10		mA	$T_J = T_J$ max	Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated V_{DRM} anode-to-cathode applied
V_{GD}	DC gate voltage not to trigger	0.25		V		

Thermal and Mechanical Specification

	Parameter	ST1200C..K	Units	Conditions
T_J	Max. operating temperature range	-40 to 125	°C	
T_{stg}	Max. storage temperature range	-40 to 150		
R_{thJ-hs}	Max. thermal resistance, junction to heatsink	0.042 0.021	K/W	DC operation single side cooled DC operation double side cooled
R_{thC-hs}	Max. thermal resistance, case to heatsink	0.006 0.003	K/W	DC operation single side cooled DC operation double side cooled
F	Mounting force, ± 10%	24500 (2500)	N (Kg)	
wt	Approximate weight	425	g	
	Case style	A-24 (K-PUK)		See Outline Table

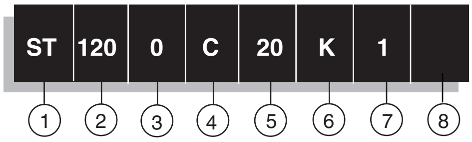
ΔR_{thJ-hs} Conduction

(The following table shows the increment of thermal resistence R_{thJ-hs} when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction		Rectangular conduction		Units	Conditions
	Single Side	Double Side	Single Side	Double Side		
180°	0.003	0.003	0.002	0.002	K/W	$T_J = T_J$ max.
120°	0.004	0.004	0.004	0.004		
90°	0.005	0.005	0.005	0.005		
60°	0.007	0.007	0.007	0.007		
30°	0.012	0.012	0.012	0.012		

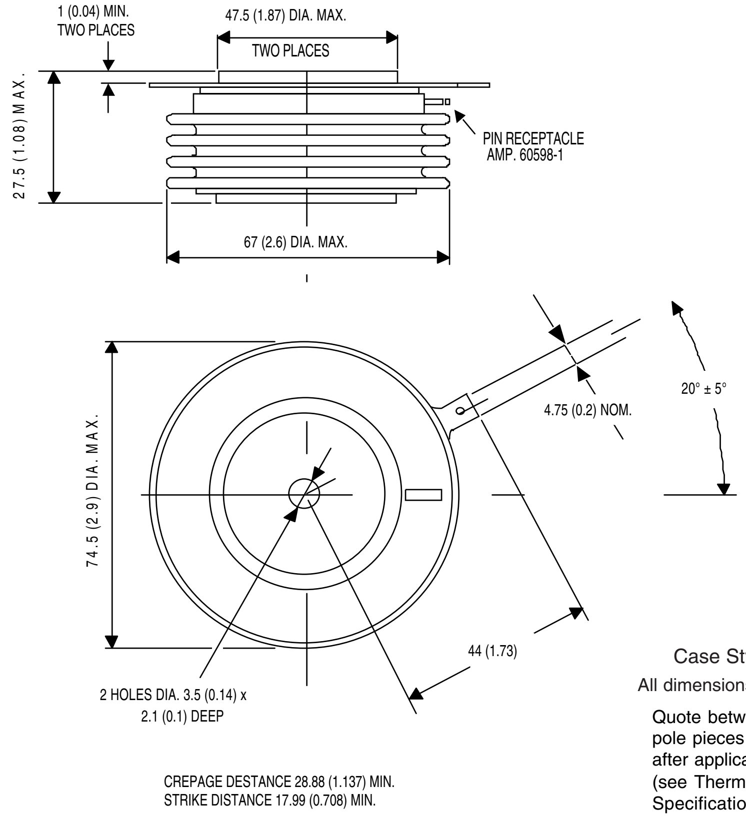
Ordering Information Table

Device Code



1 - Thyristor
2 - Essential part number
3 - 0 = Converter grade
4 - C = Ceramic Puk
5 - Voltage code: Code x 100 = V_{RRM} (See Voltage Rating Table)
6 - K = Puk Case A-24 (K-PUK)
7 - 0 = Eyelet terminals (Gate and Auxiliary Cathode Unsoldered Leads)
1 = Fast-on terminals (Gate and Auxiliary Cathode Unsoldered Leads)
2 = Eyelet terminals (Gate and Auxiliary Cathode Soldered Leads)
3 = Fast-on terminals (Gate and Auxiliary Cathode Soldered Leads)
8 - Critical dv/dt: None = 500V/µsec (Standard selection)
L = 1000V/µsec (Special selection)

Outline Table



CREPAGE DESTANCE 28.88 (1.137) MIN.
STRIKE DISTANCE 17.99 (0.708) MIN.

Case Style A-24 (K-PUK)

All dimensions in millimeters (inches)

Quote between upper and lower pole pieces has to be considered after application of Mounting Force (see Thermal and Mechanical Specification)

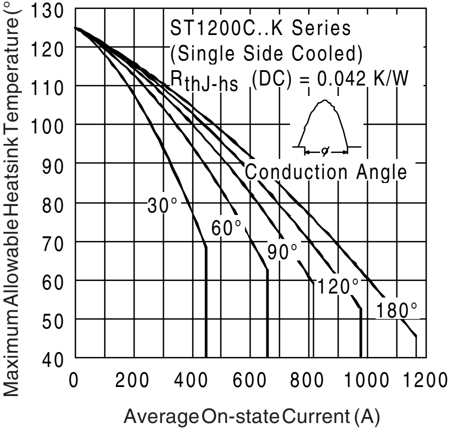


Fig. 1 - Current Ratings Characteristics

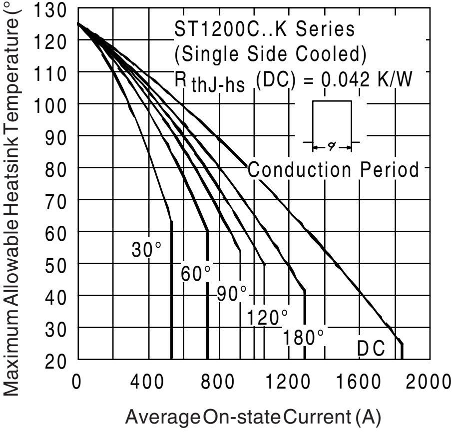


Fig. 2 - Current Ratings Characteristics

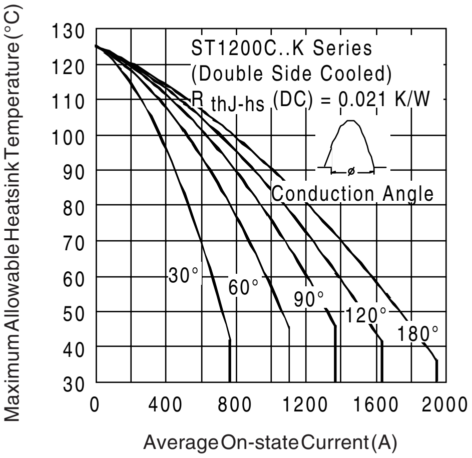


Fig. 3 - Current Ratings Characteristics

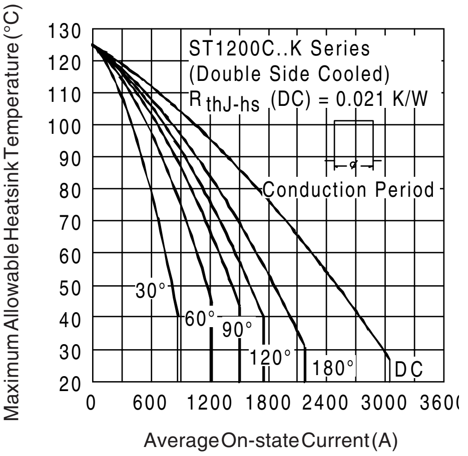


Fig. 4 - Current Ratings Characteristics

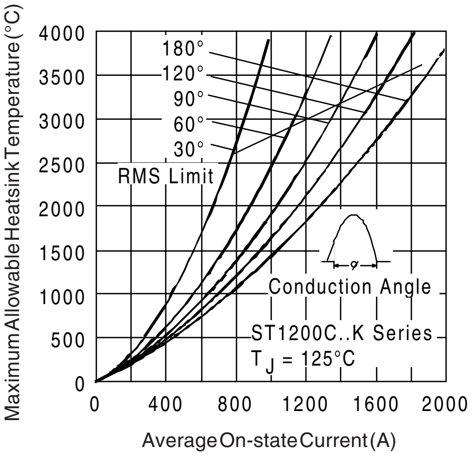


Fig. 5- On-state Power Loss Characteristics

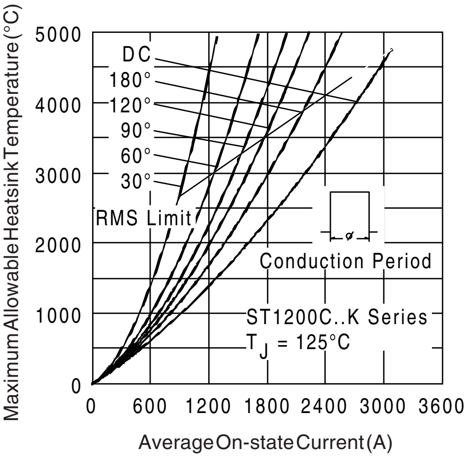


Fig. 6- On-state Power Loss Characteristics

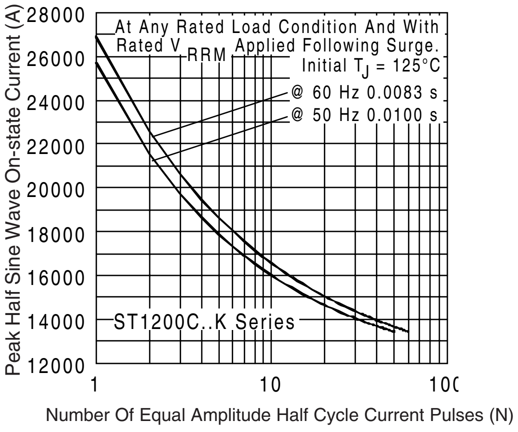


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

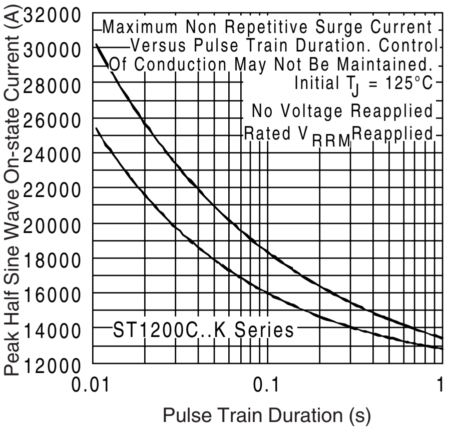


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

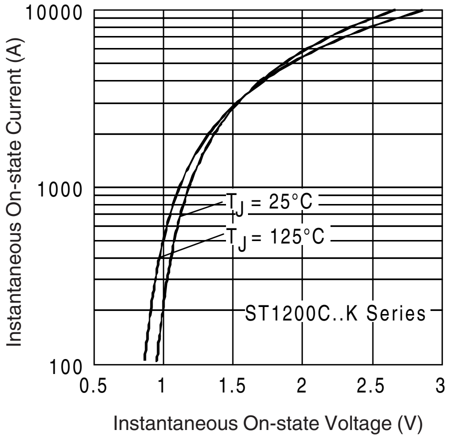


Fig. 9 - On-state Voltage Drop Characteristics

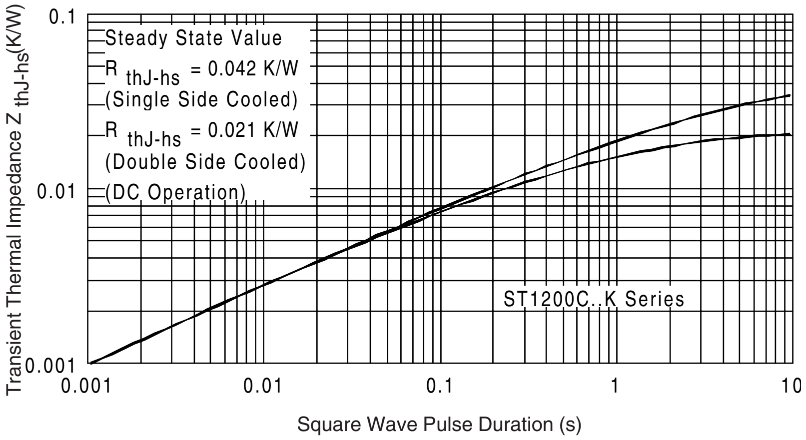


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

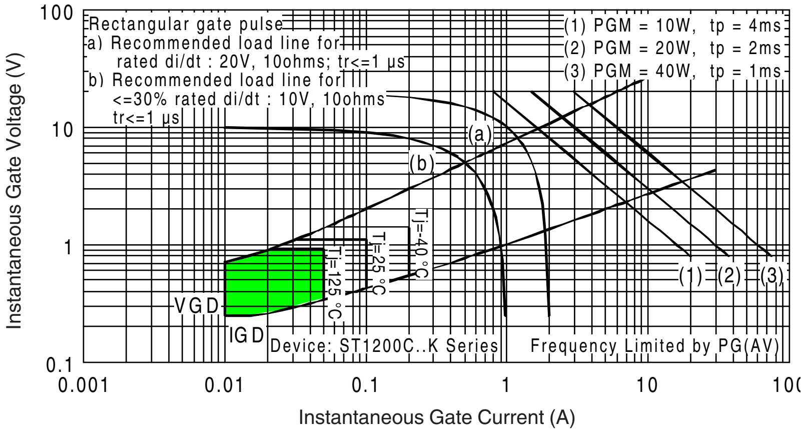


Fig. 11 - Gate Characteristics