

PHASE CONTROL THYRISTORS

Hockey Puk Version

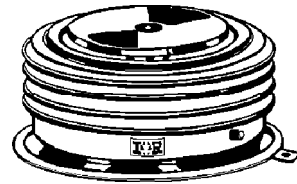
Features

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

Typical Applications

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

1745A



case style A-24 (K-PUK)

Major Ratings and Characteristics

Parameters	ST1230C..K	Units
$I_{T(AV)}$	1745	A
	@ T_{hs}	55 °C
$I_{T(RMS)}$	3200	A
	@ T_{hs}	25 °C
I_{TSM}	@ 50Hz	33500 A
	@ 60Hz	35100 A
I^2t	@ 50Hz	5615 KA ² s
	@ 60Hz	5126 KA ² s
V_{DRM}/V_{RRM}	800 to 1600	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
ST1230C..K	08	800	900	100
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

On-state Conduction

Parameter	ST1230C..K	Units	Conditions		
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	1745 (710)	A	180° conduction, half sine wave double side (single side) cooled		
	55 (85)	°C			
$I_{T(RMS)}$ Max. RMS on-state current	3200	A	DC @ 25°C heatsink temperature double side cooled		
I_{TSM} Max. peak, one-cycle non-repetitive surge current	33500		t = 10ms	No voltage	
	35100		t = 8.3ms	reapplied	
	28200		t = 10ms	100% V_{RRM}	
	29500	t = 8.3ms	reapplied		
I^2t Maximum I^2t for fusing	5615	KA ² s	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J$ max.
	5126		t = 8.3ms		
	3971		t = 10ms	100% V_{RRM}	
	3625		t = 8.3ms	reapplied	
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	56150	KA ² √s	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$ Low level value of threshold voltage	0.93	V	(16.7% x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.		
$V_{T(TO)2}$ High level value of threshold voltage	1.02		($I > \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.		
r_{t1} Low level value of on-state slope resistance	0.17	mΩ	(16.7% x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.		
r_{t2} High level value of on-state slope resistance	0.16		($I > \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.		
V_{TM} Max. on-state voltage	1.62	V	$I_{pk} = 4000A$, $T_J = T_J$ max, $t_p = 10ms$ sine pulse		
I_H Maximum holding current	600	mA	$T_J = 25^\circ C$, anode supply 12V resistive load		
I_L Typical latching current	1000				

Switching

Parameter	ST1230C..K	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	1000	A/μs	Gate drive 20V, 20Ω, $t_r \leq 1\mu s$ $T_J = T_J \text{ max, anode voltage} \leq 80\% V_{DRM}$
t_d Typical delay time	1.9	μs	Gate current 1A, $di_g/dt = 1A/\mu s$ $V_d = 0.67\% V_{DRM}, T_J = 25^\circ C$
t_q Typical turn-off time	200		$I_{TM} = 550A, T_J = T_J \text{ max, } di/dt = 40A/\mu s, V_R = 50V$ $dv/dt = 20V/\mu s, \text{ Gate } 0V \text{ } 100\Omega, t_p = 500\mu s$

Blocking

Parameter	ST1230C..K	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/μs	$T_J = T_J \text{ max. linear to } 80\% \text{ rated } V_{DRM}$
I_{RRM} I_{DRM} Max. peak reverse and off-state leakage current	100	mA	$T_J = T_J \text{ max, rated } V_{DRM}/V_{RRM} \text{ applied}$

Triggering

Parameter	ST1230C..K	Units	Conditions	
P_{GM} Maximum peak gate power	16	W	$T_J = T_J \text{ max, } t_p \leq 5ms$	
$P_{G(AV)}$ Maximum average gate power	3		$T_J = T_J \text{ max, } f = 50Hz, d\% = 50$	
I_{GM} Max. peak positive gate current	3.0	A	$T_J = T_J \text{ max, } t_p \leq 5ms$	
$+V_{GM}$ Maximum peak positive gate voltage	20	V	$T_J = T_J \text{ max, } t_p \leq 5ms$	
$-V_{GM}$ Maximum peak negative gate voltage	5.0			
I_{GT} DC gate current required to trigger	TYP.	MAX.	mA	$T_J = -40^\circ C$ $T_J = 25^\circ C$ $T_J = 125^\circ C$ Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	200	-		
	100	200		
V_{GT} DC gate voltage required to trigger	1.4	-	V	$T_J = -40^\circ C$ $T_J = 25^\circ C$ $T_J = 125^\circ C$
	1.1	3.0		
	0.9	-		
I_{GD} DC gate current not to trigger	10	mA	$T_J = T_J \text{ max}$	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		

ST1230C..K Series

Thermal and Mechanical Specification

Parameter	ST1230C..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	K/W	DC operation single side cooled
	0.021		DC operation double side cooled
R _{thC-hs} Max. thermal resistance, case to heatsink	0.006	K/W	DC operation single side cooled
	0.003		DC operation double side cooled
F Mounting force, ± 10%	24500	N	
	(2500)	(Kg)	
wt Approximate weight	425	g	
Case style	A-24 (K-PUK)		See Outline Table

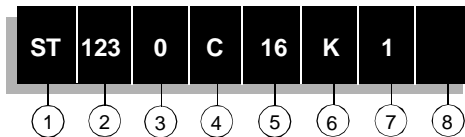
ΔR_{thJ-hs} Conduction

(The following table shows the increment of thermal resistance 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

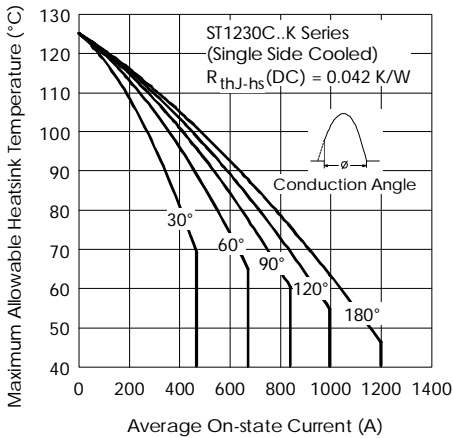
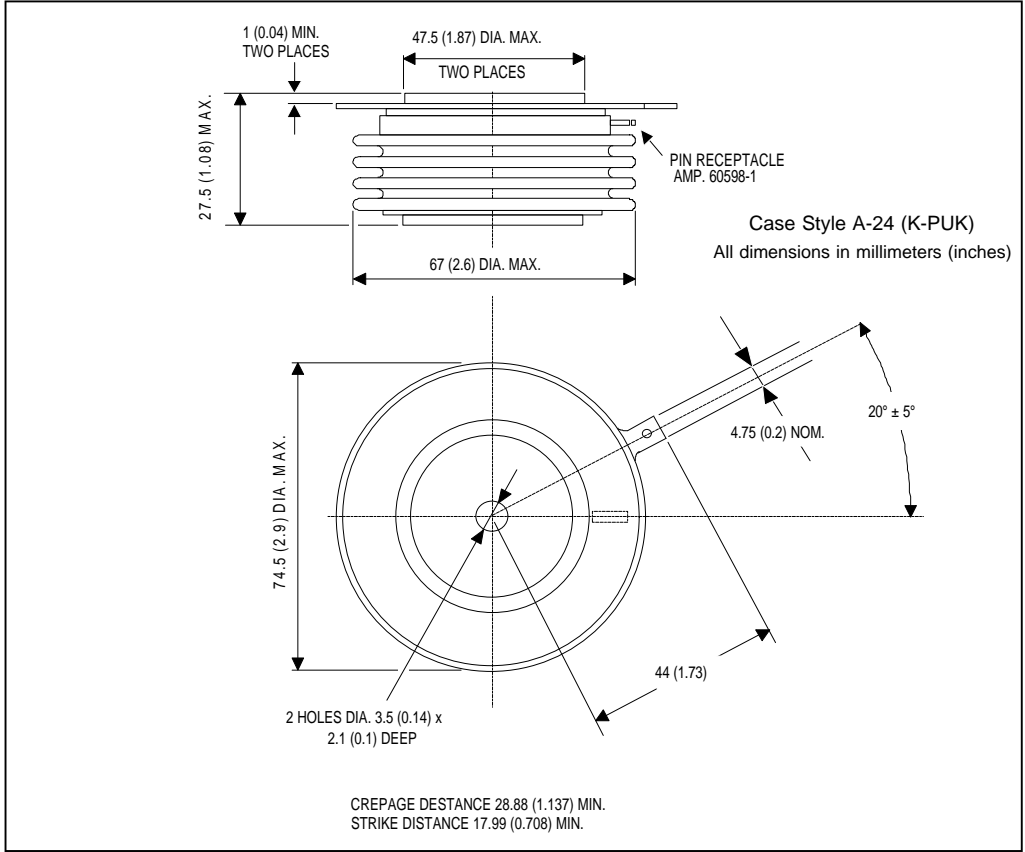


Fig. 1 - Current Ratings Characteristics

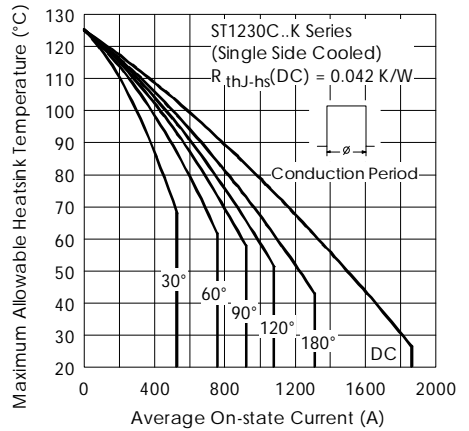


Fig. 2 - Current Ratings Characteristics