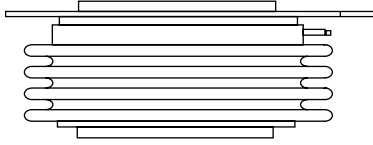


## Phase Control Thyristors (Stud Version), 1650 A



A-24 (K-PUK)

### FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case A-24 (K-PUK)
- High profile hockey PUK
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level


**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

$I_{T(AV)}$	1650 A
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### TYPICAL APPLICATIONS

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

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		1650	A
	$T_{hs}$	55	°C
$I_{T(RMS)}$		3080	A
	$T_{hs}$	25	°C
$I_{TSM}$	50 Hz	30 500	A
	60 Hz	32 000	
$I^2t$	50 Hz	4651	kA <sup>2</sup> s
	60 Hz	4250	
$V_{DRM}/V_{RRM}$		1200 to 2000	V
$t_q$	Typical	200	µs
$T_J$		- 40 to 125	°C

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	$V_{DRM}/V_{RRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK VOLTAGE V	$I_{DRM}/I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM mA
ST1200C..K	12	1200	1300	100
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current at heatsink temperature	$I_{T(AV)}$	180° conduction, half sine wave double side (single side) cooled		1650 (700)	A
				55 (85)	°C
Maximum RMS on-state current	$I_{T(RMS)}$	DC at 25 °C heatsink temperature double side cooled		3080	A
Maximum peak, one-cycle non-repetitive surge current	$I_{TSM}$	t = 10 ms	No voltage reapplied	30 500	
		t = 8.3 ms		32 000	
		t = 10 ms	100 % $V_{RRM}$ reapplied	25 700	
		t = 8.3 ms		26 900	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	4651	kA <sup>2</sup> s
		t = 8.3 ms		4250	
		t = 10 ms	100 % $V_{RRM}$ reapplied	3300	
		t = 8.3 ms		3000	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied		46 510	kA <sup>2</sup> /s
Low level value of threshold voltage	$V_{T(TO)1}$	(16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$ , $T_J = T_J$ maximum		0.91	V
High level value of threshold voltage	$V_{T(TO)2}$	(I > $\pi \times I_{T(AV)}$ , $T_J = T_J$ maximum		1.01	
Low level value of on-state slope resistance	$r_{t1}$	(16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$ , $T_J = T_J$ maximum		0.21	mΩ
High level value of on-state slope resistance	$r_{t2}$	(I > $\pi \times I_{T(AV)}$ , $T_J = T_J$ maximum		0.19	
Maximum on-state voltage	$V_{TM}$	$I_{pk} = 4000$ A, $T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		1.73	V
Maximum holding current	$I_H$	$T_J = 25$ °C, anode supply 12 V resistive load		600	mA
Typical latching current	$I_L$			1000	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum non-repetitive rate of rise of turned-on current	$di/dt$	Gate drive 20 V, 20 Ω, $t_r \leq 1$ μs $T_J = T_J$ maximum, anode voltage $\leq 80$ % $V_{DRM}$		1000	A/μs
Typical delay time	$t_d$	Gate current 1 A, $di_g/dt = 1$ A/μs $V_d = 0.67$ % $V_{DRM}$ , $T_J = 25$ °C		1.9	μs
Typical turn-off time	$t_q$	$I_{TM} = 550$ A, $T_J = T_J$ maximum, $di/dt = 40$ A/μs, $V_R = 50$ V, $dV/dt = 20$ V/μs, gate 0 V 100 Ω, $t_p = 500$ μs		200	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum critical rate of rise of off-state voltage	$dV/dt$	$T_J = T_J$ maximum linear to 80 % rated $V_{DRM}$		500	V/μs
Maximum peak reverse and off-state leakage current	$I_{RRM}$ , $I_{DRM}$	$T_J = T_J$ maximum, rated $V_{DRM}/V_{RRM}$ applied		100	mA



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

<b>THERMAL AND MECHANICAL SPECIFICATIONS</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum operating junction temperature range	$T_J$		- 40 to 125	°C
Maximum storage temperature range	$T_{Stg}$		- 40 to 150	
Maximum thermal resistance, junction to heatsink	$R_{thJ-hs}$	DC operation single side cooled	0.042	K/W
		DC operation double side cooled	0.021	
Maximum thermal resistance, case to heatsink	$R_{thC-hs}$	DC operation single side cooled	0.006	
		DC operation double side cooled	0.003	
Mounting force, $\pm 10$ %			24 500 (2500)	N (kg)
Approximate weight			425	g
Case style		See dimensions - link at the end of datasheet	A-24 (K-PUK)	

<b><math>\Delta R_{thJC}</math> CONDUCTION</b>						
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDITIONS	UNITS
	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE		
180°	0.003	0.003	0.002	0.002	$T_J = T_J$ maximum	K/W
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		

**Note**

- The table above shows the increment of thermal resistance  $R_{thJC}$  when devices operate at different conduction angles than DC

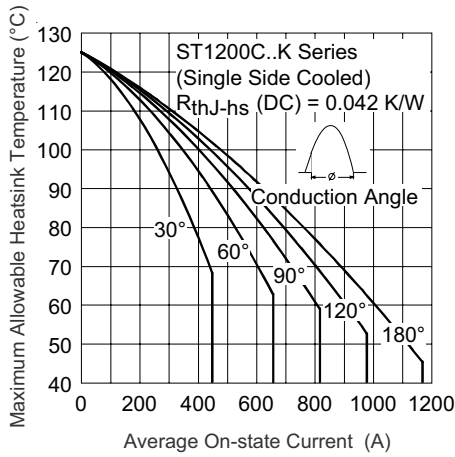


Fig. 1 - Current Ratings Characteristics

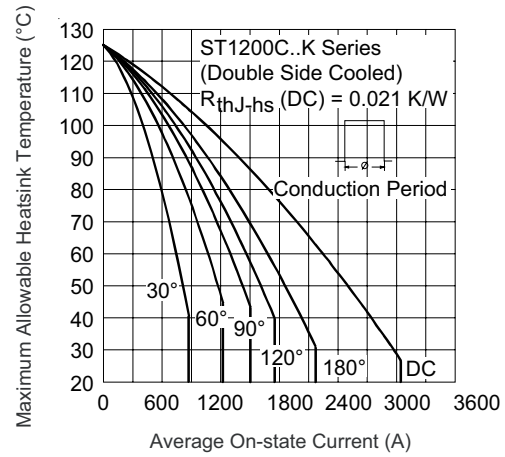


Fig. 4 - Current Ratings Characteristics

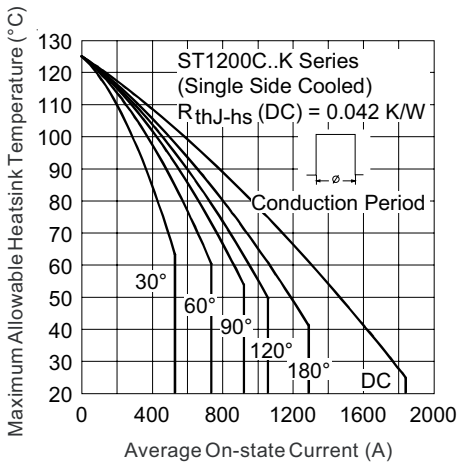


Fig. 2 - Current Ratings Characteristics

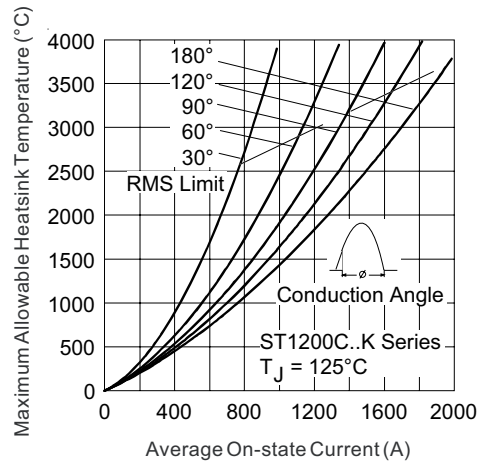


Fig. 5 - On-State Power Loss Characteristics

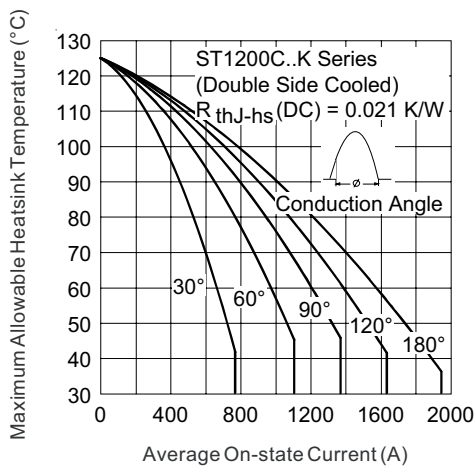


Fig. 3 - Current Ratings Characteristics

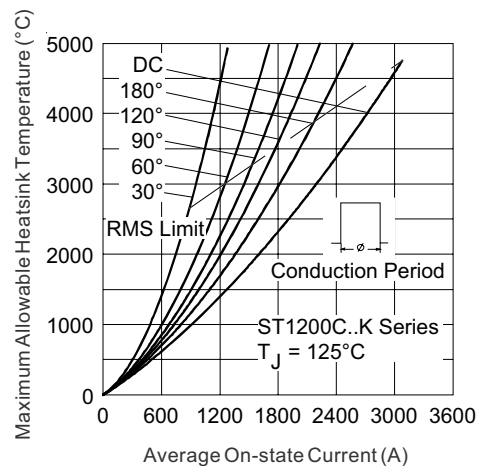


Fig. 6 - On-State Power Loss Characteristics

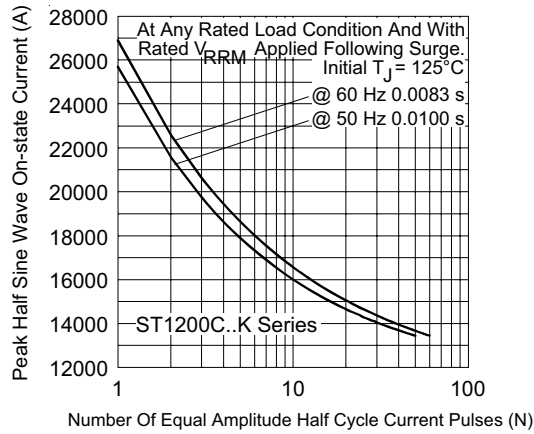


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

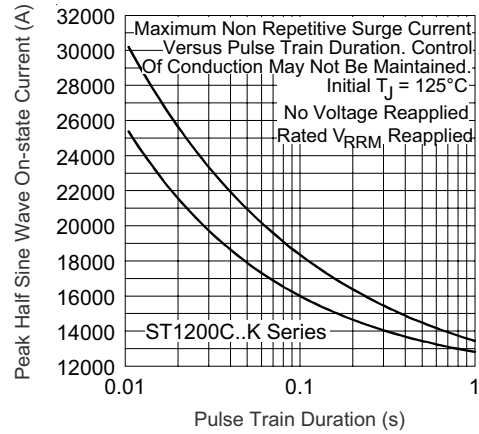


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

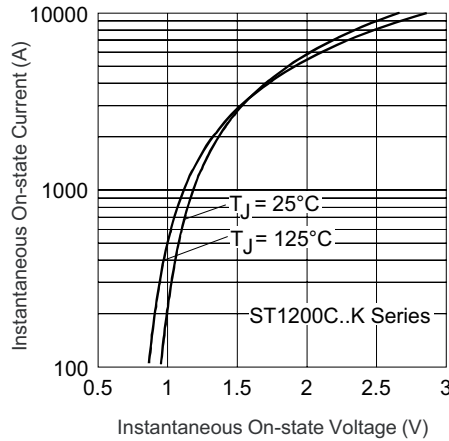


Fig. 9 - On-State Voltage Drop Characteristics

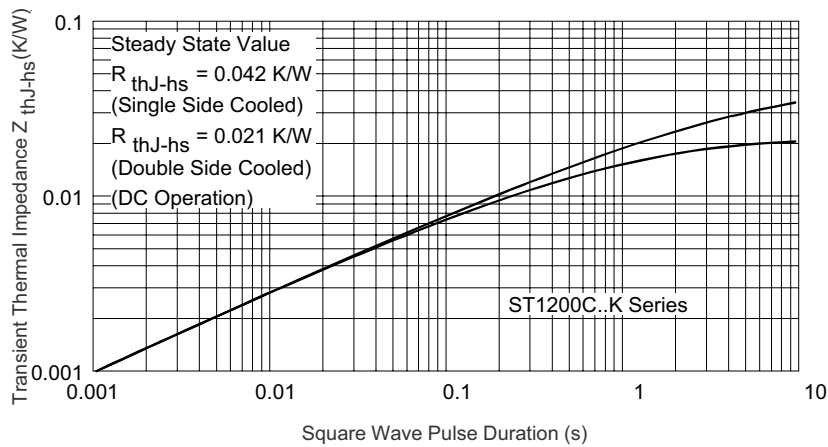


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

# ST1200C..KP Series



Vishay High Power Products Phase Control Thyristors  
(Stud Version), 1650 A

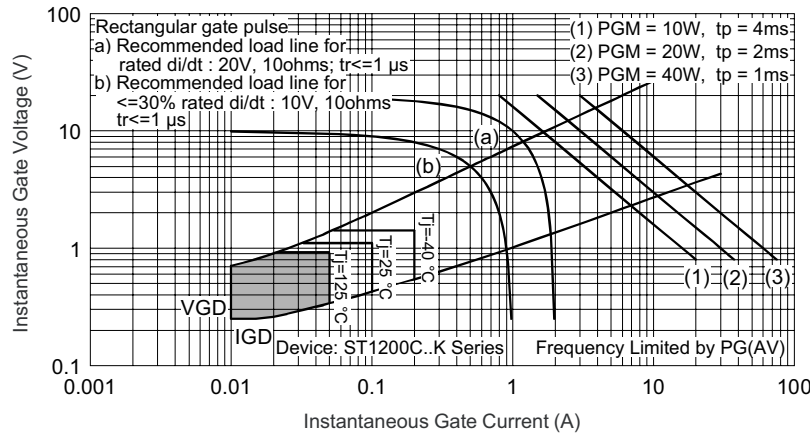


Fig. 11 - Gate Characteristics

## ORDERING INFORMATION TABLE

Device code	ST	120	0	C	20	K	1	-	P
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 1** - Thyristor
- 2** - Essential part number
- 3** - 0 = Converter grade
- 4** - C = Ceramic PUK
- 5** - Voltage code: Code x 100 = V<sub>RRM</sub> (see Voltage Ratings 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 = 500 V/μs (standard selection)  
 • L = 1000 V/μs (special selection)
- 9** - P = Lead (Pb)-free

### LINKS TO RELATED DOCUMENTS

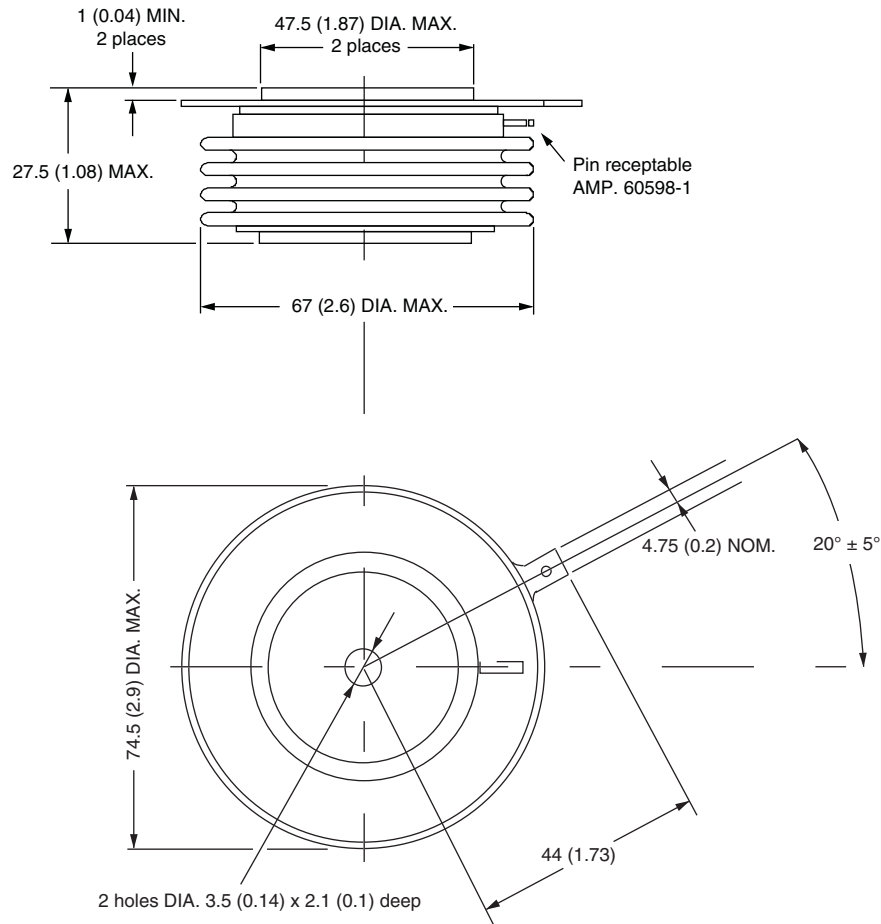
Dimensions

[www.vishay.com/doc?95081](http://www.vishay.com/doc?95081)

## A-24 (K-PUK)

**DIMENSIONS** in millimeters (inches)

Creepage distance: 28.88 (1.137) minimum  
 Strike distance: 17.99 (0.708) minimum



Quote between upper and lower pole pieces has to be considered after application of mounting force (see thermal and mechanical specification)



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