

Phase Control Thyristors (Hockey-PUK Version), 2310 A



K-PUK (A-24)

FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case K-PUK (A-24)
- High profile hockey PUK
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


**RoHS
COMPLIANT**
TYPICAL APPLICATIONS

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

PRIMARY CHARACTERISTICS	
$I_{T(AV)}$	2310 A
V_{DRM}/V_{RRM}	400 V, 600 V
V_{TM}	1.44 V
I_{GT}	100 mA
T_J	-40 °C to +125 °C
Package	K-PUK (A-24)
Circuit configuration	Single SCR

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		2310	A
	T_{hs}	55	°C
$I_{T(RMS)}$		4150	A
	T_{hs}	25	°C
I_{TSM}	50 Hz	42 500	A
	60 Hz	44 500	
I^2t	50 Hz	9027	kA ² s
	60 Hz	8240	
V_{DRM}/V_{RRM}		400 to 600	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
VS-ST1280C..K	04	400	500	100
	06	600	700	



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		2310 (885)	A
				55 (85)	°C
Maximum RMS on-state current	$I_{T(RMS)}$	25 °C heatsink temperature double side cooled		4150	
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reapplied	42 500	A
		t = 8.3 ms		44 500	
		t = 10 ms	100 % V_{RRM} reapplied	35 700	
		t = 8.3 ms		37 400	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied	9027	kA ² s
		t = 8.3 ms		8241	
		t = 10 ms	100 % V_{RRM} reapplied	6383	
		t = 8.3 ms		5828	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		90 270	kA ² √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		0.83	V
High level value of threshold voltage	$V_{T(TO)2}$	(I $> \pi \times I_{T(AV)}$), $T_J = T_J$ maximum		0.90	
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		0.077	mΩ
High level value of on-state slope resistance	r_{t2}	(I $> \pi \times I_{T(AV)}$), $T_J = T_J$ maximum		0.068	
Maximum on-state voltage	V_{TM}	$I_{pk} = 8000$ A, $T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		1.44	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 ≤ 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



TRIGGERING						
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		V
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		10		mA
DC gate voltage not to trigger	V_{GD}			0.25		V

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum operating 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, ± 10 %				24 500 (2500)	N (kg)
Approximate weight				425	g
Case style		See dimensions - link at the end of datasheet		K-PUK (A-24)	

ΔR_{thJC} CONDUCTION						
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

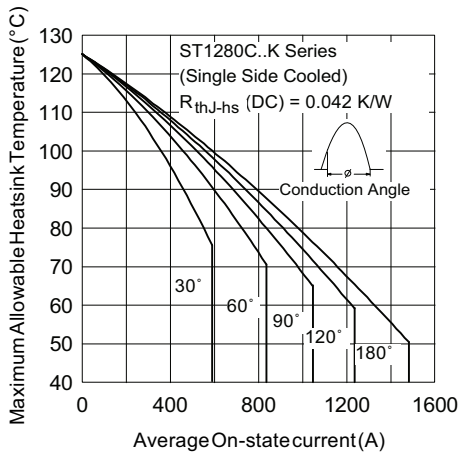


Fig. 1 - Current Ratings Characteristics

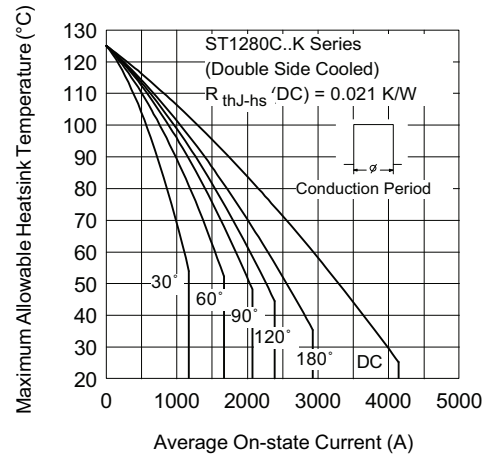


Fig. 4 - Current Ratings Characteristics

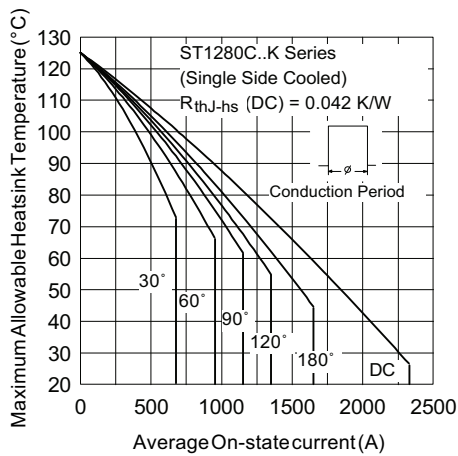


Fig. 2 - Current Ratings Characteristics

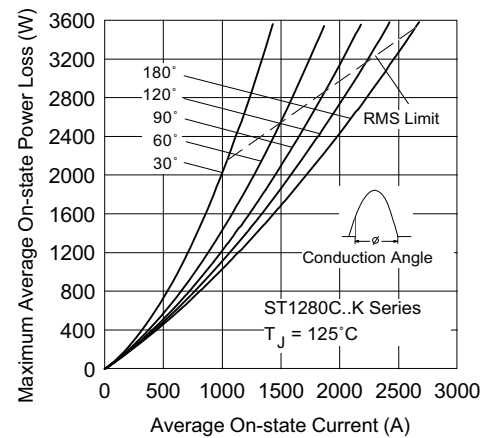


Fig. 5 - On-State Power Loss Characteristics

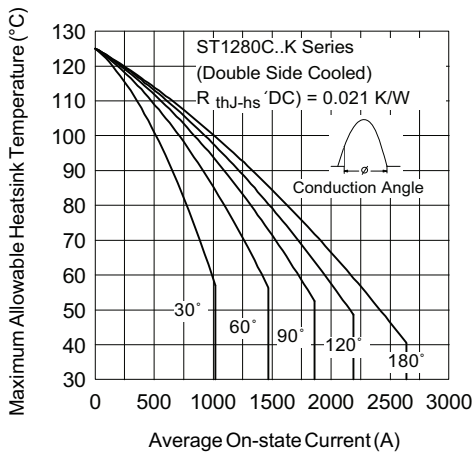


Fig. 3 - Current Ratings Characteristics

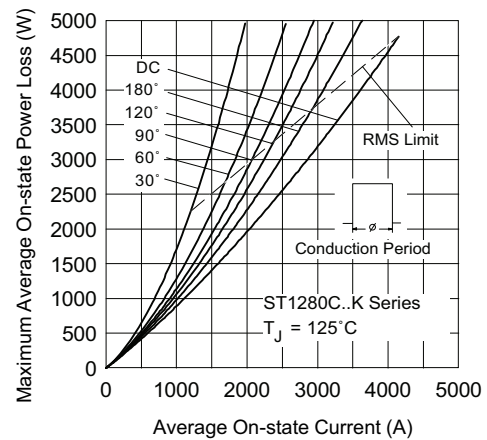


Fig. 6 - On-State Power Loss Characteristics

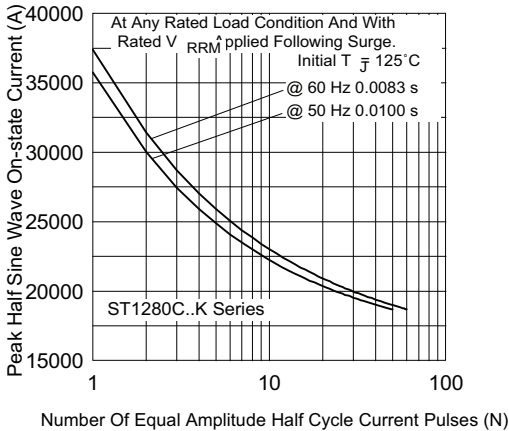


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

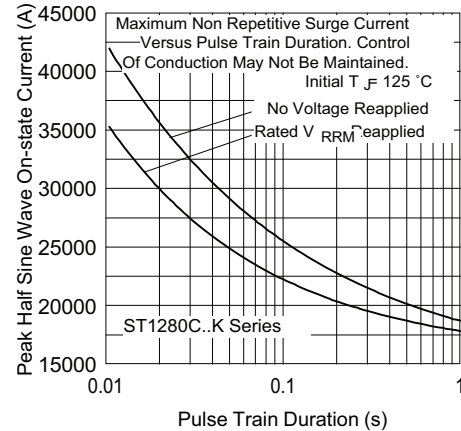


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

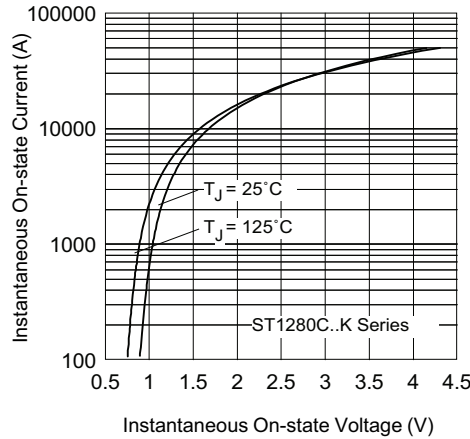


Fig. 9 - On-State Voltage Drop Characteristics

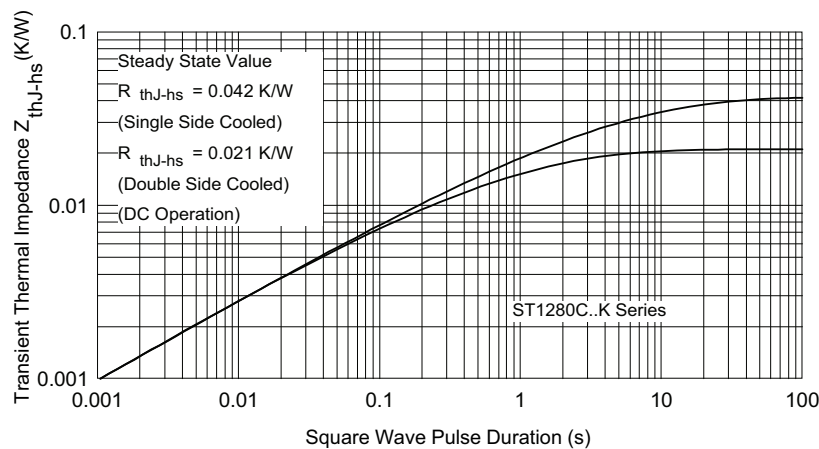


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

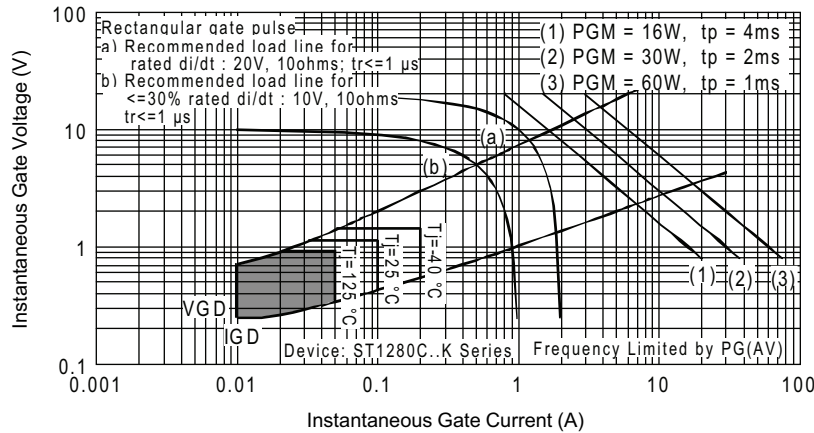


Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	ST	128	0	C	06	K	1	-
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 1** - Vishay Semiconductors product
- 2** - Thyristor
- 3** - Essential part number
- 4** - 0 = converter grade
- 5** - C = ceramic PUK
- 6** - Voltage code x 100 = V_{RRM} (see Voltage Ratings table)
- 7** - K = PUK case K-PUK (A-24)
- 8** - 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)
- 9** - Critical dv/dt: • none = 500 V/μs (standard selection)
 • L = 1000 V/μs (special selection)

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95081



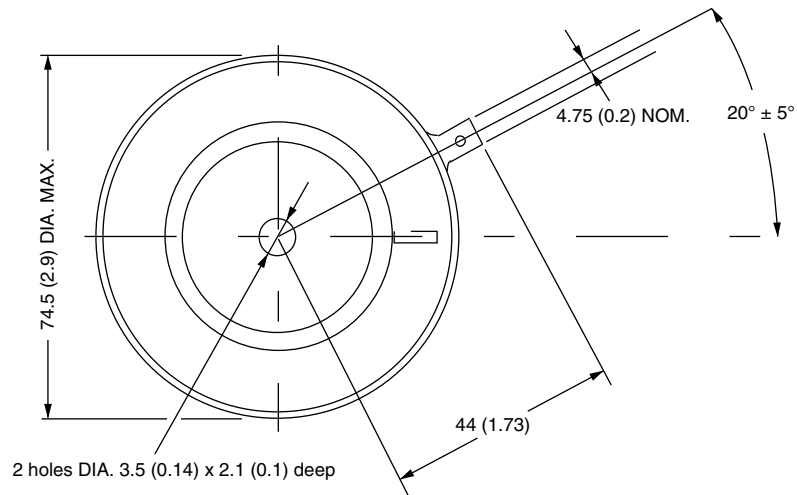
K-PUK (A-24)

DIMENSIONS in millimeters (inches)

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



Note:
A = Anode
C = Cathode
G = Gate



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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