

Phase Control Thyristors (Hockey PUK Version), 1473 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

$I_{T(AV)}$	1473 A
V_{DRM}/V_{RRM}	1200 V, 1400 V, 1600 V, 1800 V, 2000 V, 2200 V, 2400 V
V_{TM}	1.80 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
$I_{T(AV)}$		1473	A
	T_{hs}	55	°C
$I_{T(RMS)}$		2913	A
	T_{hs}	25	°C
I_{TSM}	50 Hz	20.0	A
	60 Hz	21.2	
I^2t	50 Hz	2000	kA ² s
	60 Hz	1865	
$I^2\sqrt{t}$		20 000	kA ² √s
V_{DRM}/V_{RRM}	Range	1200 to 2400	V
t_q	Typical	300	μs
T_J	Range	-40 to +125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	V_{RRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM} MAXIMUM AT $T_J = 125\text{ °C}$ mA
VS-ST1000C..K	12	1200	1300	100
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	
	22	2200	2300	
	24	2400	2500	

**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			1473 (630)	A
					55 (85)	°C
Maximum RMS on-state current	I _{T(RMS)}	DC at 25 °C heatsink temperature double side cooled			6540	A
Maximum peak, one-cycle, non-repetitive surge current	I _{TSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T _J = T _J maximum	20.0	kA
		t = 8.3 ms			21.2	
		t = 10 ms	100 % V _{RRM} reapplied		17.0	
		t = 8.3 ms			18.1	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reapplied		2000	kA ² s
		t = 8.3 ms			1865	
		t = 10 ms	100 % V _{RRM} reapplied		1445	
		t = 8.3 ms			1360	
Maximum I ² √t for fusing	I ² √t	t = 0.1 ms to 10 ms, no voltage reapplied			20 000	kA ² √s
Low level value of threshold voltage	V _{T(TO)1}	(16.7 % × π × I _{T(AV)} < I < π × I _{T(AV)} , T _J = T _J maximum			0.950	V
High level value of threshold voltage	V _{T(TO)2}	(I > π × I _{T(AV)}), T _J = T _J maximum			1.024	
Low level value of on-state slope resistance	r _{t1}	(16.7 % × π × I _{T(AV)} < I < π × I _{T(AV)} , T _J = T _J maximum			0.283	mΩ
High level value of on-state slope resistance	r _{t2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.265	
Maximum on-state voltage drop	V _{TM}	I _{pk} = 3000 A, T _J = 125 °C, t _p = 10 ms sine pulse			1.80	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	300	

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 ≤ 5 ms		16		W
Maximum peak 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 ≤ 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	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

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

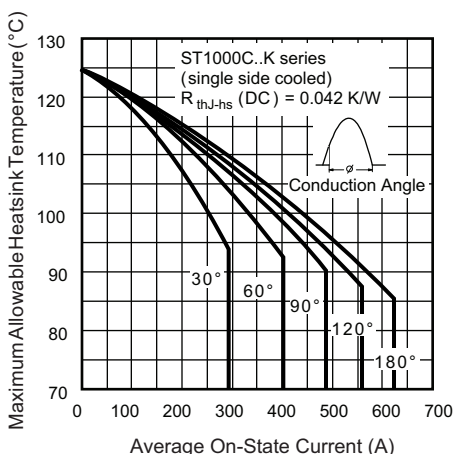


Fig. 1 - Current Ratings Characteristics

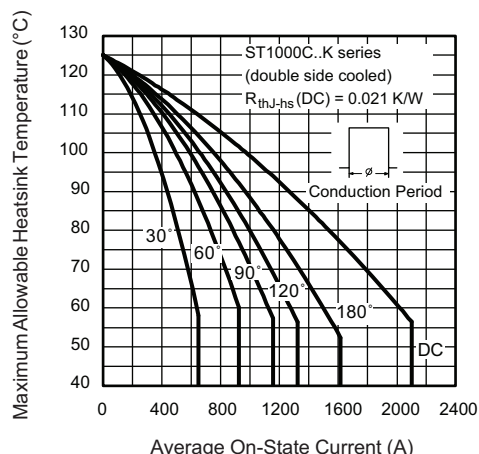


Fig. 4 - Current Ratings Characteristics

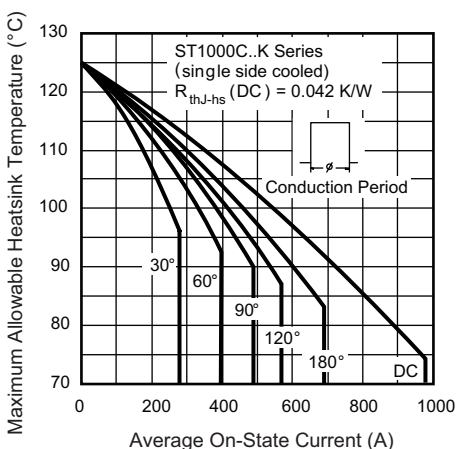


Fig. 2 - Current Ratings Characteristics

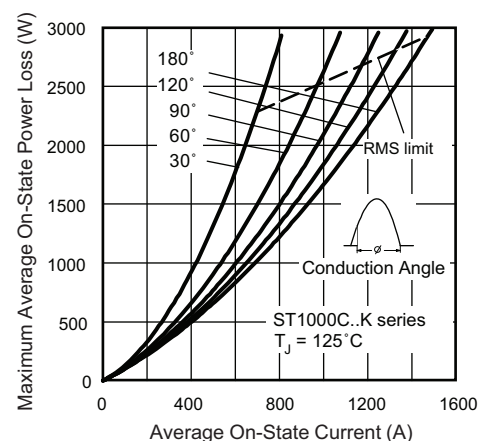


Fig. 5 - On-State Power Loss Characteristics

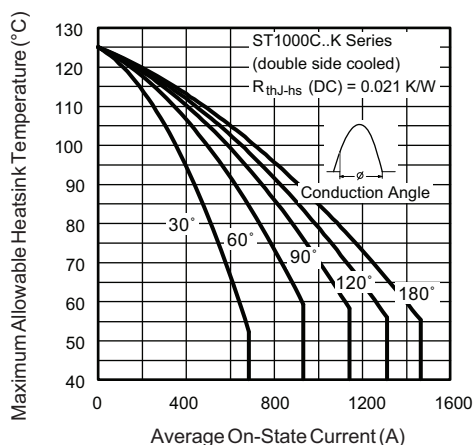


Fig. 3 - Current Ratings Characteristics

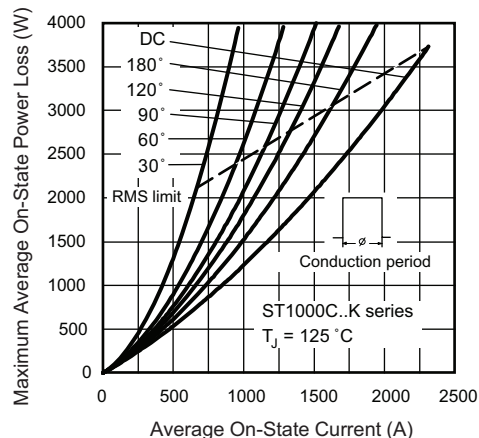


Fig. 6 - On-State Power Loss Characteristics

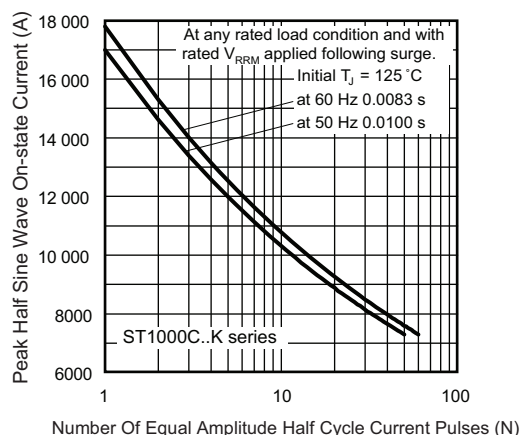


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

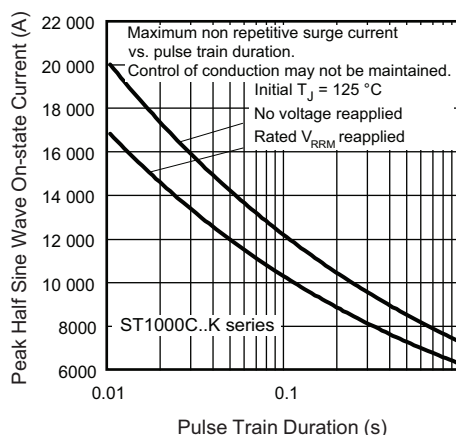


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

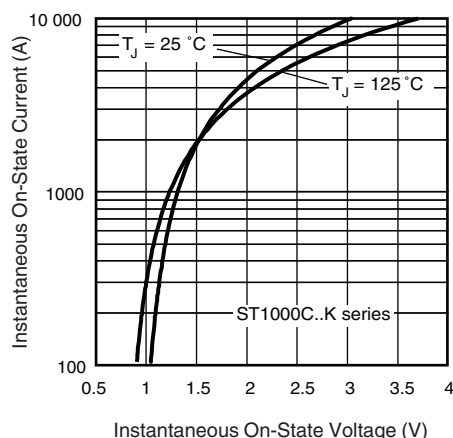


Fig. 9 - On-State Voltage Drop Characteristics

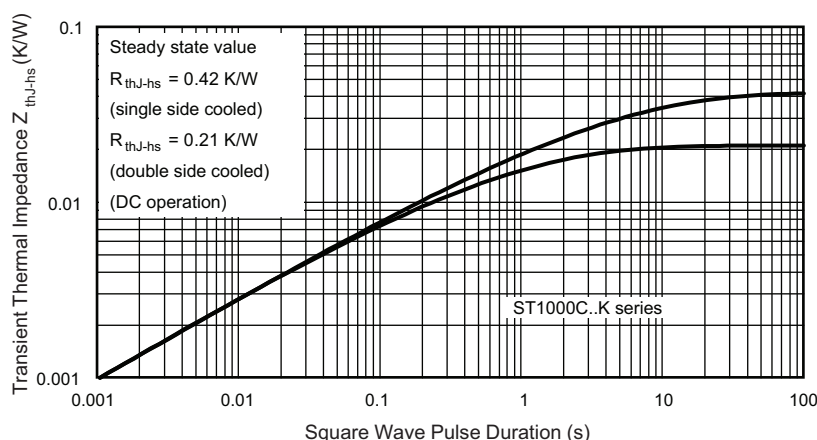


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

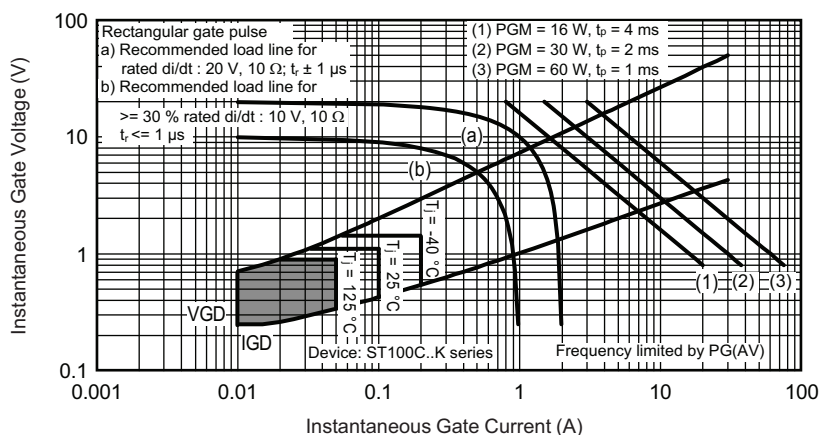


Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	ST	100	0	C	24	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

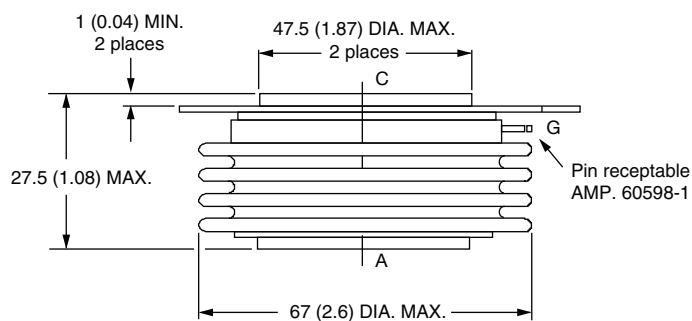
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K-PUK (A-24)

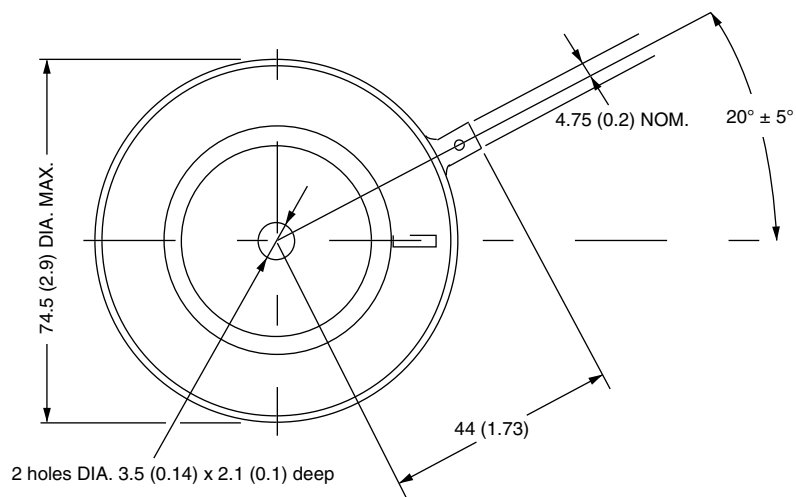
DIMENSIONS in millimeters (inches)

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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