

Phase Control Thyristors (Hockey PUK Version), 410 A



A-PUK (TO-200AB)

PRIMARY CHARACTERISTICS					
I _{T(AV)}	410 A				
V _{DRM} /V _{RRM}	400 V, 800 V, 1200 V, 1400 V, 1600 V, 1800 V, 2000 V				
V_{TM}	1.69 V				
I _{GT}	90 mA				
T_J	-40 °C to +125 °C				
Package	A-PUK (TO-200AB)				
Circuit configuration	Single SCR				

FEATURES

- · Center amplifying gate
- Metal case with ceramic insulator
- International standard case A-PUK (TO-200AB)



- Designed and qualified for industrial level
- Material categorization: For definitions of compliance please see <u>www.vishay.com/doc?99912</u>

TYPICAL APPLICATIONS

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

MAJOR RATINGS AND CHARACTERISTICS						
PARAMETER	TEST CONDITIONS	VALUES	UNITS			
1		410	А			
I _{T(AV)}	T _{hs}	55	°C			
ı		780	А			
IT(RMS)	T _{hs}	25	°C			
I _{TSM}	50 Hz	5700	Δ.			
	60 Hz	5970	A			
124	50 Hz	163	1.42-			
l ² t	60 Hz	149	– kA ² s			
V _{DRM} /V _{RRM}		400 to 2000	V			
t _q	Typical	100	μs			
TJ		-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	$\begin{array}{c} I_{DRM}/I_{RRM,} \text{ MAXIMUM} \\ \text{AT T}_J = T_J \text{ MAXIMUM} \\ \text{mA} \end{array}$				
	04	400	500					
	08	800	900					
	12	1200	1300					
VS-ST230CC	14	1400	1500	30				
	16	1600	1700					
	18	1800	1900					
	20	2000	2100					

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ABSOLUTE MAXIMUM RATINGS	S					
PARAMETER	SYMBOL		VALUES	UNITS		
Maximum average on-state current	_	180° condu	180° conduction, half sine wave			Α
at heatsink temperature	$I_{T(AV)}$	double side	(single side) co	oled	55 (85)	°C
Maximum RMS on-state current	I _{T(RMS)}	DC at 25 °C	heatsink tempe	erature double side cooled	780	
		t = 10 ms	No voltage		5700	
Maximum peak, one-cycle	ı	t = 8.3 ms	reapplied		5970	Α
non-repetitive surge current	I _{TSM}	t = 10 ms 100 % V _{RRM}		4800]	
		t = 8.3 ms	reapplied	Sinusoidal half wave,	5000	
Maximum I ² t for fusing		t = 10 ms No v	No voltage reapplied	initial $T_J = T_J$ maximum	163	- kA ² s
	l ² t	t = 8.3 ms			148	
		t = 10 ms			115	
		t = 8.3 ms	reapplied		105	
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10	t = 0.1 to 10 ms, no voltage reapplied			kA²√s
Low level value of threshold voltage	V _{T(TO)1}	(16.7 % x π	(16.7 % x π x $I_{T(AV)}$ < I < π x $I_{T(AV)}$), $T_J = T_J$ maximum			V
High level value of threshold voltage	V _{T(TO)2}	$(I > \pi \times I_{T(AV)})$	$(I > \pi \times I_{T(AV)}), T_J = T_J \text{ maximum}$]
Low level value of on-state slope resistance	r _{t1}	(16.7 % x π x $I_{T(AV)}$ < I < π x $I_{T(AV)}$), $T_J = T_J$ maximum			0.88	
High level value of on-state slope resistance	r _{t2}	$(I > \pi \times I_{T(AV)}), T_J = T_J \text{ maximum}$			0.81	mΩ
Maximum on-state voltage	V_{TM}	$I_{pk} = 880 \text{ A}, T_J = T_J \text{ maximum}, t_p = 10 \text{ ms sine pulse}$			1.69	V
Maximum holding current	I _H	T _ 05 °C	anada aunabi 1	2 V registive lead	600	m A
Maximum (typical) latching current	IL	T _J = 25 °C, anode supply 12 V resistive load		1000 (300)	mA	

SWITCHING							
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS			
Maximum non-repetitive rate of rise of turned-on current	dl/dt	Gate drive 20 V, 20 Ω , $t_r \le 1~\mu s$ $T_J = T_J$ maximum, anode voltage $\le 80~\%~V_{DRM}$	1000	A/µs			
Typical delay time	t _d	Gate current 1 A, $dl_g/dt = 1 A/\mu s$ $V_d = 0.67 \% V_{DRM}, T_J = 25 °C$	1.0				
Typical turn-off time	t _q	I_{TM} = 300 A, T_J = T_J maximum, dl/dt = 20 A/μs, V_R = 50 V, dV/dt = 20 V/μs, gate 0 V 100 Ω , t_p = 500 μs	100	μs			

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	30	mA



TRIGGERING						
DADAMETED	SYMBOL	TE	TEGT CONDITIONS		VALUES	
PARAMETER	STINIBUL	"	ST CONDITIONS	TYP.	MAX.	UNITS
Maximum peak gate power	P _{GM}	T _J = T _J maximum	, t _p ≤ 5 ms	10.0		w
Maximum average gate power	P _{G(AV)}	$T_J = T_J \text{ maximum}$, f = 50 Hz, d% = 50	2	.0	l vv
Maximum peak positive gate current	I _{GM}	$T_J = T_J \text{ maximum}$, t _p ≤ 5 ms	3	.0	Α
Maximum peak positive gate voltage	+ V _{GM}			:0	V	
Maximum peak negative gate voltage	- V _{GM}	$T_J = T_J$ maximum, $t_p \le 5$ ms			5.0	
	I _{GT}	T _J = - 40 °C	Maximum required gate trigger/	180	-	
DC gate current required to trigger		T _J = 25 °C		90	150	mA
		T _J = 125 °C	current/voltage are the lowest	40	-	
		T _J = - 40 °C	value which will trigger all units	2.9	-	
DC gate voltage required to trigger	V _{GT}	T _J = 25 °C	12 V anode to cathode applied	1.8	3.0	V
		T _J = 125 °C		1.2	-	
DC gate current not to trigger	I _{GD}		Maximum gate current/voltage		0	mA
DC gate voltage not to trigger	V _{GD}	$T_J = T_J \text{ maximum}$	not to trigger is the maximum value which will not trigger any unit with rated V _{DRM} anode to cathode applied	0.25		V

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS		
Maximum operating temperature range	TJ		-40 to 125	°C		
Maximum storage temperature range T _{Stg}			-40 to 150			
Maximum thermal resistance,	В	DC operation single side cooled	0.17			
junction to heatsink	R _{thJ-hs}	DC operation double side cooled	0.08	K/W		
Maximum thermal resistance,	R _{thC-hs}	DC operation single side cooled	0.033	7 ~w		
case to heatsink		DC operation double side cooled	0.017			
Mounting force, ± 10 %			4900 (500)	N (kg)		
Approximate weight			50	g		
Case style		See dimensions - link at the end of datasheet	A-PUK (TO-200AB)			

△R _{thJC} CONDUCTION								
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDITIONS	UNITS		
CONDUCTION ANGLE	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE	TEST CONDITIONS	UNITS		
180°	0.015	0.017	0.011	0.011				
120°	0.018	0.019	0.019	0.019	$T_J = T_J \text{ maximum}$			
90°	0.024	0.024	0.026	0.026		K/W		
60°	0.035	0.035	0.036	0.036				
30°	0.060	0.060	0.060	0.061				

Note

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

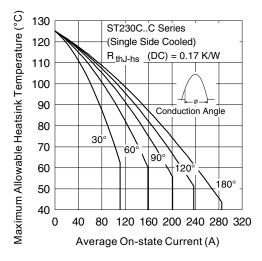


Fig. 1 - Current Ratings Characteristics

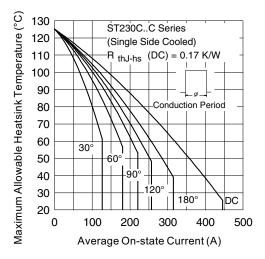


Fig. 2 - Current Ratings Characteristics

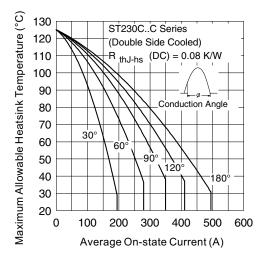


Fig. 3 - Current Ratings Characteristics

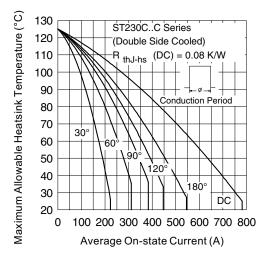


Fig. 4 - Current Ratings Characteristics

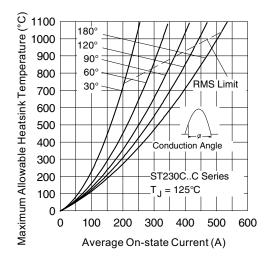


Fig. 5 - On-State Power Loss Characteristics

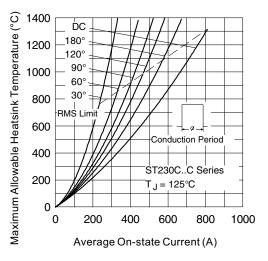
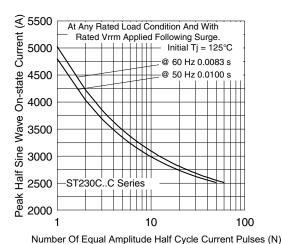


Fig. 6 - On-State Power Loss Characteristics



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

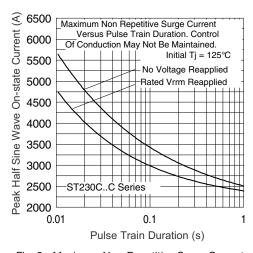


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

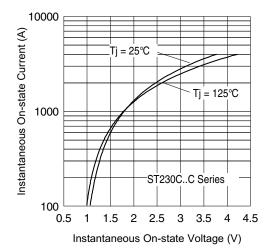


Fig. 9 - On-State Voltage Drop Characteristics

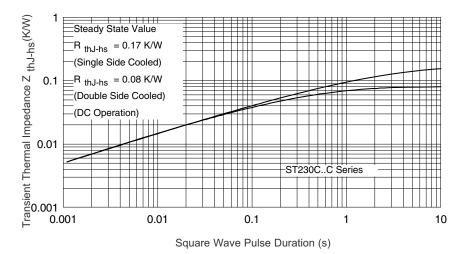


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

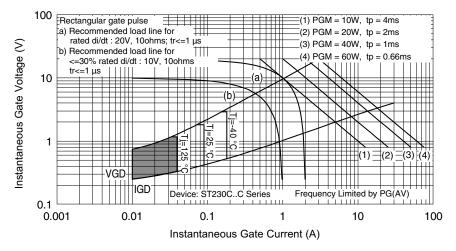
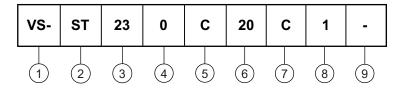


Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Thyristor

Essential part number

4 - 0 = converter grade

5 - C = ceramic PUK

6 - Voltage code x 100 = V_{RRM} (see Voltage Ratings table)

7 - C = PUK case A-PUK (TO-200AB)

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)

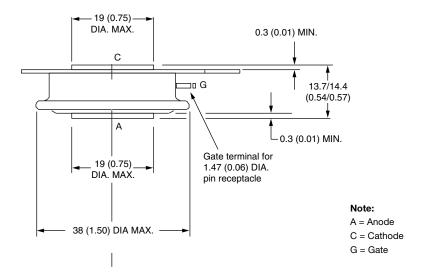
LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?95074			

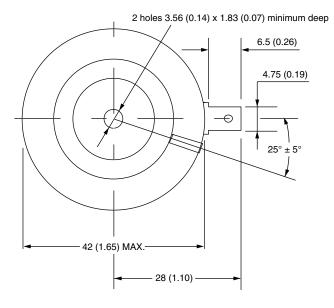


A-PUK (TO-200AB)

DIMENSIONS in millimeters (inches)

Anode to gate Creepage distance: 7.62 (0.30) minimum Strike distance: 7.12 (0.28) 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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