

Phase Control Thyristors (Hockey PUK Version), 990 A



TO-200AC (B-PUK)

FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)
- Designed and qualified for industrial level
- 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

PRODUCT SUMMARY

Package	TO-200AC (B-PUK)
Diode variation	Single SCR
$I_{T(AV)}$	990 A
V_{DRM}/V_{RRM}	800 V, 1200 V, 1400 V, 1600 V, 1800 V, 2000 V
V_{TM}	1.62 V
I_{GT}	100 mA
T_J	-40 °C to 125 °C

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		990	A
	T_{hs}	55	°C
$I_{T(RMS)}$		2000	A
	T_{hs}	25	°C
I_{TSM}	50 Hz	17 800	A
	60 Hz	18 700	
I^2t	50 Hz	1591	kA ² s
	60 Hz	1452	
V_{DRM}/V_{RRM}		800 to 2000	V
t_q	Typical	150	µs
T_J		-40 to 125	°C

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-ST730CL	08	800	900	80
	12	1200	1300	
	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			990 (375)	A
					55 (85)	°C
Maximum RMS on-state current	I _{T(RMS)}	DC at 25 °C heatsink temperature double side cooled			2000	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	17 800	
		t = 8.3 ms			18 700	
		t = 10 ms	100 % V _{RRM} reapplied		15 000	
		t = 8.3 ms			15 700	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reapplied		1591	kA ² s
		t = 8.3 ms			1452	
		t = 10 ms	100 % V _{RRM} reapplied		1125	
		t = 8.3 ms			1027	
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10 ms, no voltage reapplied			15 910	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			0.98	V
High level value of threshold voltage	V _{T(TO)2}	(I > π × I _{T(AV)} , T _J = T _J maximum			1.12	
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			0.32	mΩ
High level value of on-state slope resistance	r _{t2}	(I > π × I _{T(AV)} , T _J = T _J maximum			0.27	
Maximum on-state voltage	V _{TM}	I _{pk} = 2000 A, T _J = T _J maximum, t _p = 10 ms sine pulse			1.62	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	1.0	μs
Typical turn-off time	t_q	$I_{TM} = 750$ A, $T_J = T_J$ maximum, $di/dt = 60$ A/μs, $V_R = 50$ V, $dV/dt = 20$ V/μs, gate 0 V 100 Ω, $t_p = 500$ μs	150	

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	80	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		10.0		W
Maximum average gate power	P _{G(AV)}	T _J = T _J maximum, f = 50 Hz, d% = 50		2.0		
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}	T _J = T _J maximum, t _p ≤ 5 ms		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		2.5	-	V
		T _J = 25 °C		1.8	3.0	
		T _J = 125 °C		1.1	-	
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 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	0.073	K/W	
		DC operation double side cooled	0.031		
Maximum thermal resistance, case to heatsink	R_{thC-hs}	DC operation single side cooled	0.011		
		DC operation double side cooled	0.006		
Mounting force, ± 10 %			14 700 (1500)	N (kg)	
Approximate weight			255	g	
Case style		See dimensions - link at the end of datasheet	TO-200AC (B-PUK)		

ΔR_{thJ-hs} CONDUCTION						
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDITIONS	UNITS
	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE		
180°	0.009	0.009	0.006	0.006	T _J = T _J maximum	K/W
120°	0.011	0.011	0.010	0.011		
90°	0.014	0.014	0.015	0.015		
60°	0.020	0.020	0.021	0.021		
30°	0.036	0.036	0.036	0.036		

Note

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

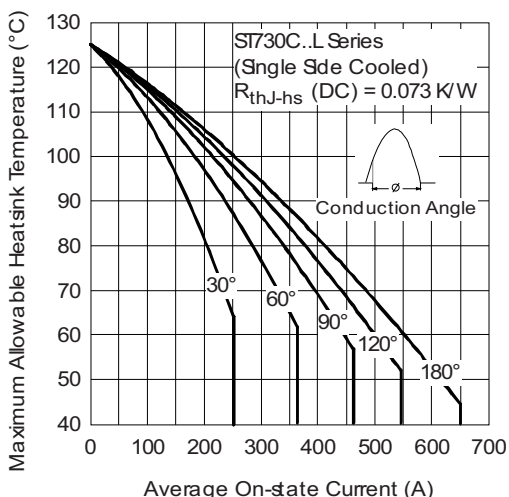


Fig. 1 - Current Ratings Characteristics

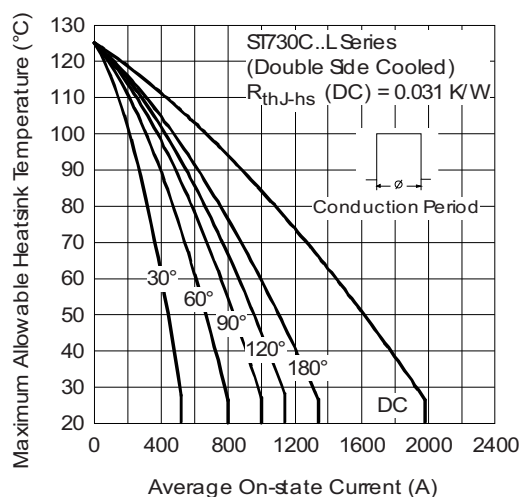


Fig. 4 - Current Ratings Characteristics

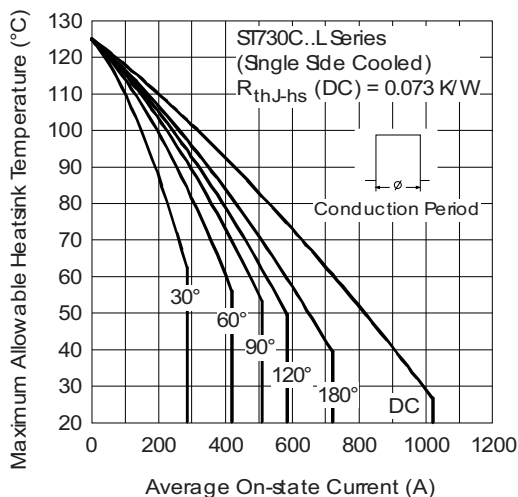


Fig. 2 - Current Ratings Characteristics

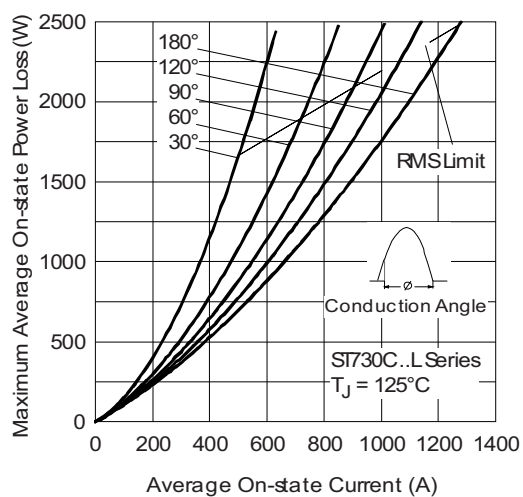


Fig. 5 - On-State Power Loss Characteristics

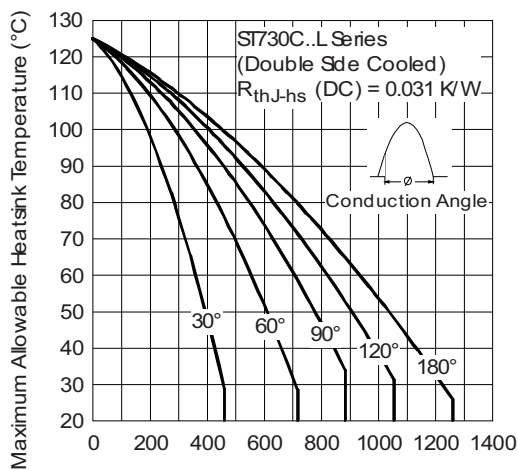


Fig. 3 - Current Ratings Characteristics

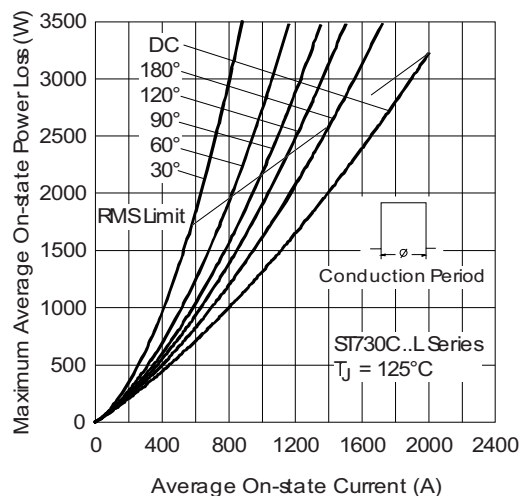


Fig. 6 - On-State Power Loss Characteristics

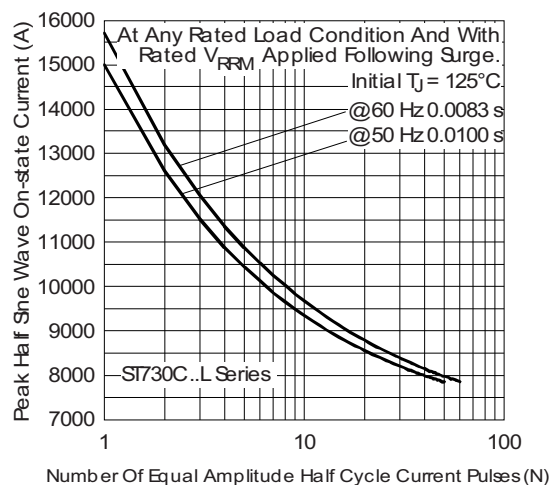


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

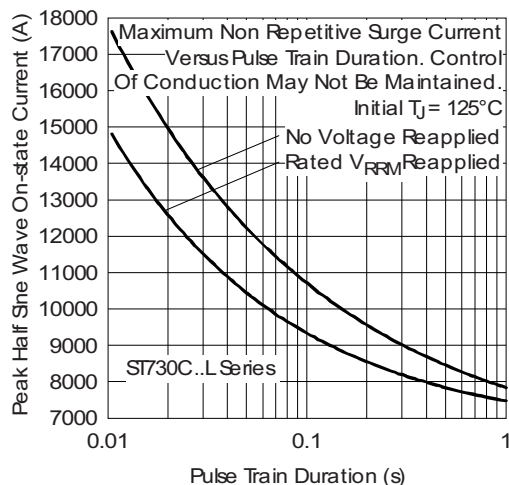


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

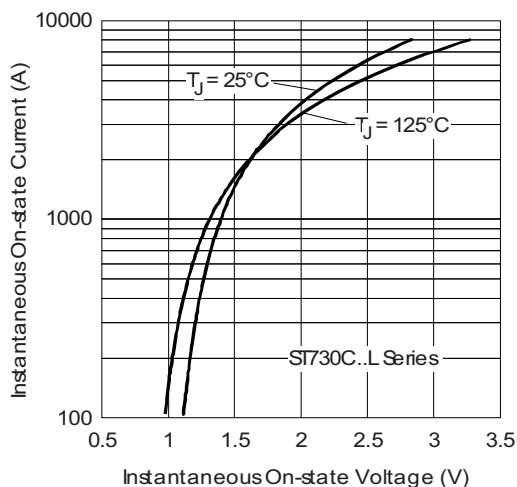


Fig. 9 - On-State Voltage Drop Characteristics

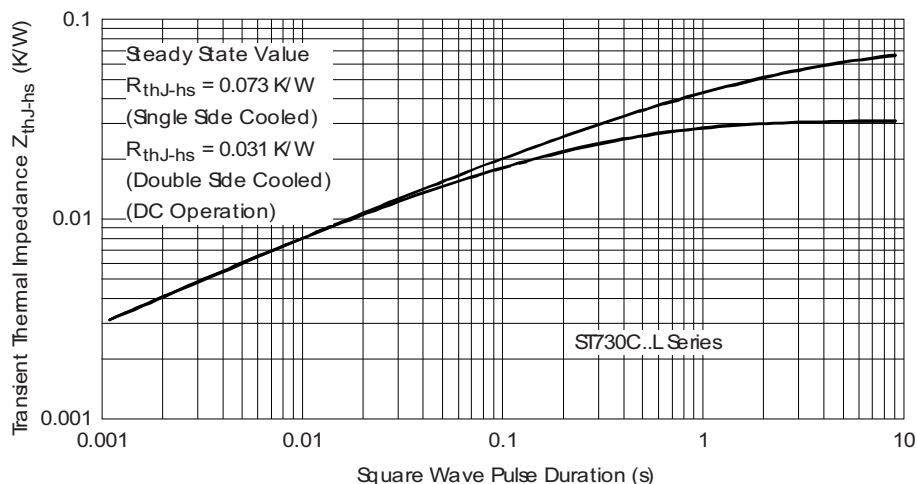


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

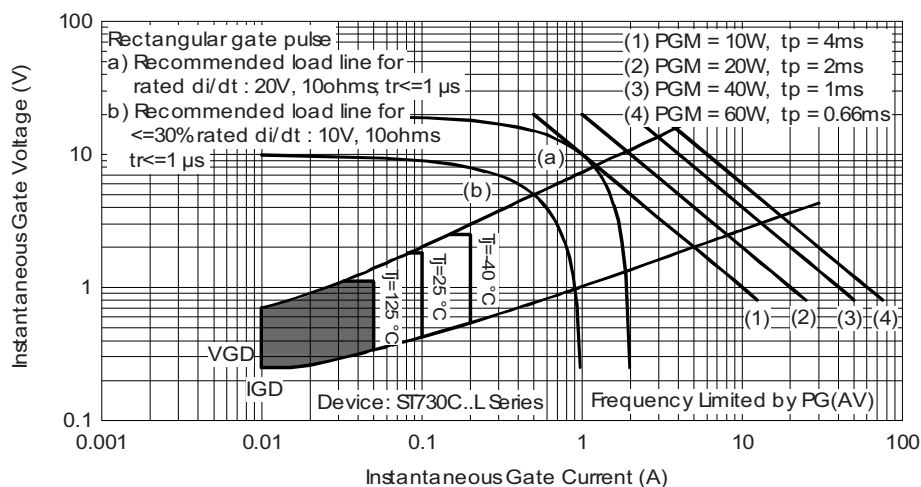


Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	ST	73	0	C	20	L	1	-
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

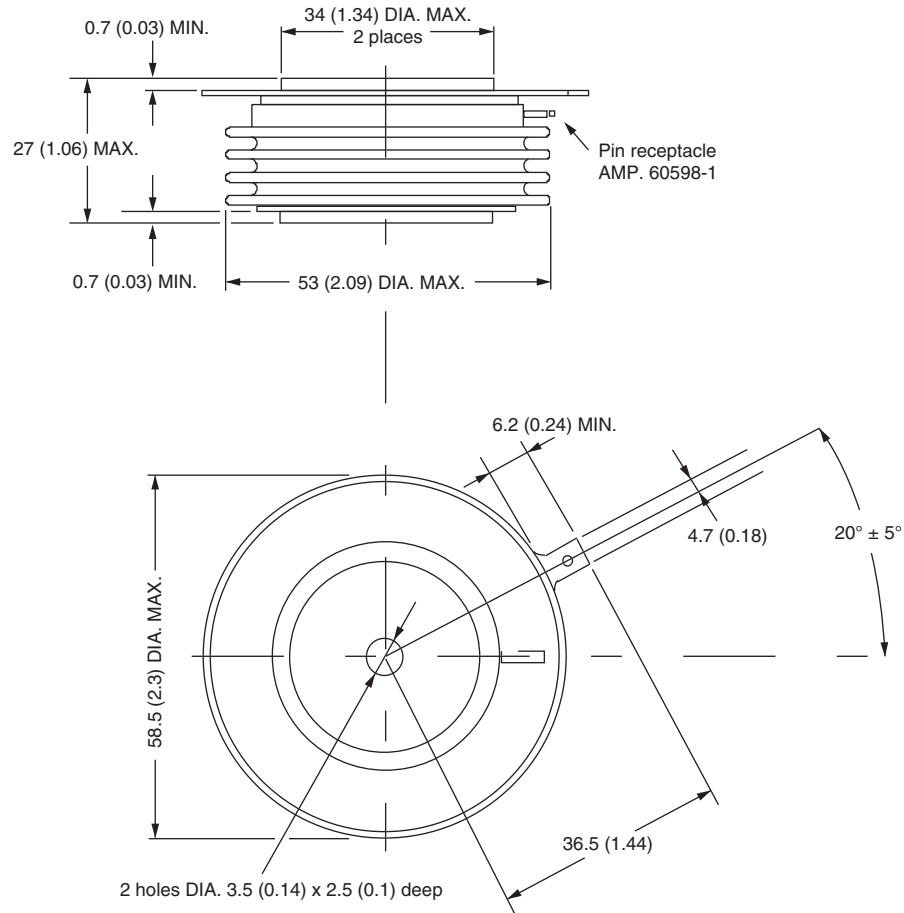
1	-	Vishay Semiconductors product
2	-	Thyristor
3	-	Essential part number
4	-	0 = Converter grade
5	-	C = Ceramic PUK
6	-	Voltage code x 100 = V_{RRM} (see Voltage Ratings table)
7	-	L = PUK case TO-200AC (B-PUK)
8	-	0 = Eyelet terminals (gate and auxiliary cathode unsoldered leads)
		1 = Fast-on terminals (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?95076

TO-200AC (B-PUK)

DIMENSIONS in millimeters (inches)

Creepage distance: 36.33 (1.430) minimum
Strike distance: 17.43 (0.686) 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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