

Phase Control Thyristors (Hockey PUK Version), 790 A



TO-200AC (B-PUK)

FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912


**RoHS
COMPLIANT**

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY

Package	TO-200AC (B-PUK)
Diode variation	Single SCR
$I_{T(AV)}$	790 A
V_{DRM}/V_{RRM}	2000 V, 2200 V, 2400 V
V_{TM}	2.07 V
I_{GT}	100 mA
T_J	-40 °C to 125 °C

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		790	A
	T_{hs}	55	°C
$I_{T(RMS)}$		1557	A
	T_{hs}	25	°C
I_{TSM}	50 Hz	10 100	A
	60 Hz	10 700	
I^2t	50 Hz	510	kA ² s
	60 Hz	475	
V_{DRM}/V_{RRM}		2000 to 2400	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-ST650C..L	20	2000	2100	80
	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		790 (324)	A
				55 (85)	°C
Maximum RMS on-state current	$I_{T(RMS)}$	DC at 25 °C heatsink temperature double side cooled		1857	
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reapplied	10 100	A
		t = 8.3 ms		10 700	
		t = 10 ms	100 % V_{RRM} reapplied	8600	
		t = 8.3 ms		9150	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied	510	kA ² s
		t = 8.3 ms		475	
		t = 10 ms	100 % V_{RRM} reapplied	370	
		t = 8.3 ms		347	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		5100	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		1.04	V
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		1.13	
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		0.61	mΩ
High level value of on-state slope resistance	r_{t2}	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.35	
Maximum on-state voltage	V_{TM}	$I_{pk} = 1700$ A, $T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		2.07	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
Maximum turn-off time	t_q	$I_{TM} = 750$ A, $T_J = T_J$ maximum, $dI/dt = 60$ A/μs $V_R = 50$, $dV/dt = 20$ 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		80	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		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, $t_p \leq 5$ 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		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 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	0.011	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

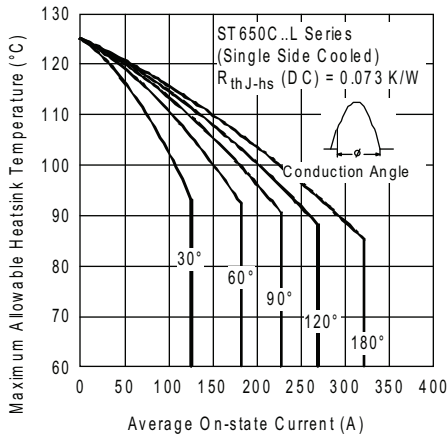


Fig. 1 - Current Ratings Characteristics

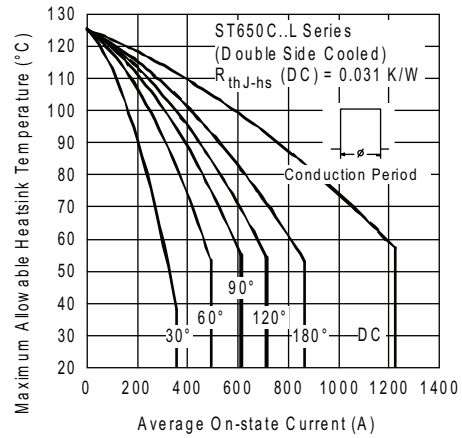


Fig. 4 - Current Ratings Characteristics

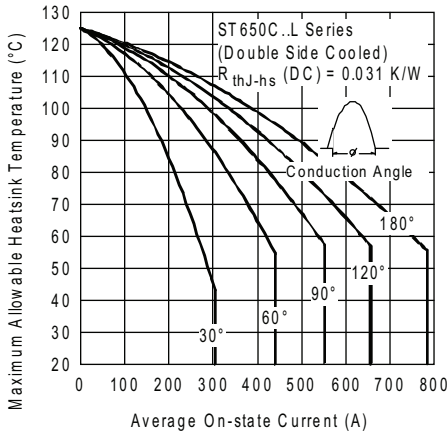


Fig. 2 - Current Ratings Characteristics



Fig. 5 - On-State Power Loss Characteristics

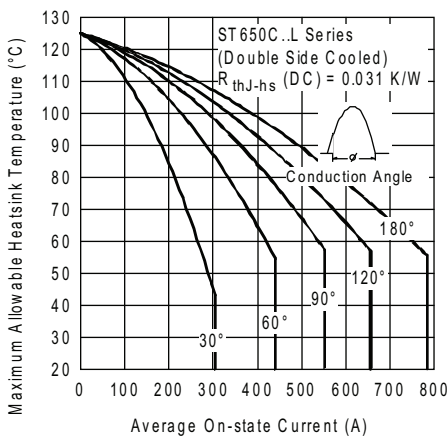


Fig. 3 - Current Ratings Characteristics



Fig. 6 - On-State Power Loss Characteristics

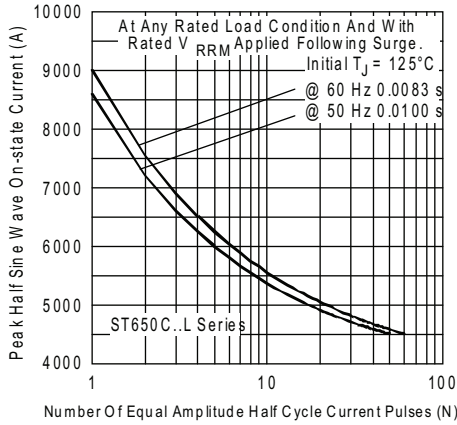


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

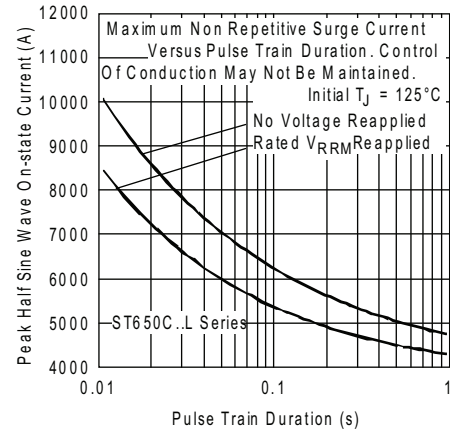


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

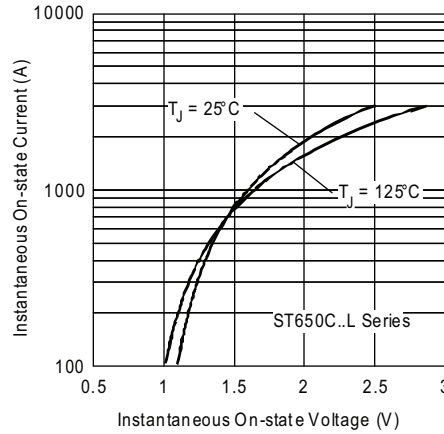


Fig. 9 - On-State Voltage Drop Characteristics

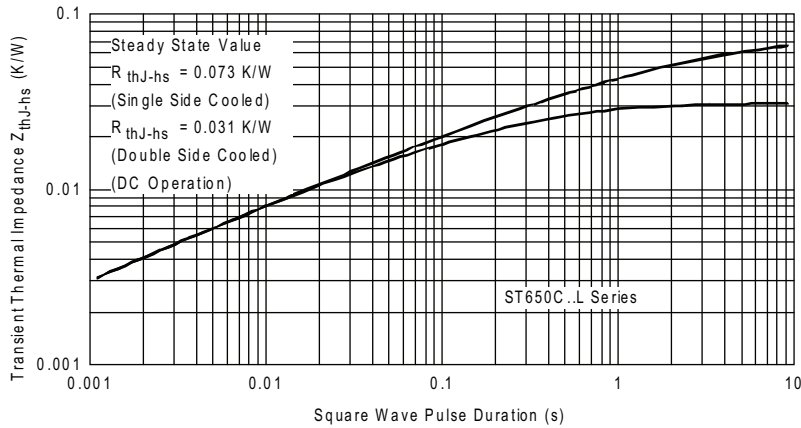


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics



Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	ST	65	0	C	24	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)		
	8	-	1 = Fast-on terminals (gate and auxiliary cathode unsoldered leads)				2 = Eyelet terminals (gate and auxiliary cathode soldered leads)		
	9	-	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
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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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