



Phase Control Thyristors (Hockey PUK Version), 790 A



B-PUK (TO-200AC)

FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case B-PUK (TO-200AC)
- 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

PRIMARY CHARACTERISTICS

$I_{T(AV)}$	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
Package	B-PUK (TO-200AC)
Circuit configuration	Single SCR

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) 55 (85)	A °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}	$t = 10 \text{ ms}$ $t = 8.3 \text{ ms}$ No voltage reappplied 100 % V_{RRM} reappplied	10 100 10 700 8600 9150	A
Maximum I^2t for fusing	I^2t	$t = 10 \text{ ms}$ $t = 8.3 \text{ ms}$ No voltage reappplied 100 % V_{RRM} reappplied	510 475 370 347	kA^2s
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reappplied	5100	kA^2/s
Low level value of threshold voltage	$V_{T(TO)1}$	$(16.7 \% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J \text{ maximum}$	1.04	V
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J \text{ maximum}$	1.13	
Low level value of on-state slope resistance	r_{11}	$(16.7 \% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J \text{ maximum}$	0.61	$\text{m}\Omega$
High level value of on-state slope resistance	r_{12}	$(I > \pi \times I_{T(AV)})$, $T_J = T_J \text{ maximum}$	0.35	
Maximum on-state voltage	V_{TM}	$I_{pk} = 1700 \text{ A}$, $T_J = T_J \text{ maximum}$, $t_p = 10 \text{ ms}$ sine pulse	2.07	V
Maximum holding current	I_H	$T_J = 25 \text{ }^\circ\text{C}$, 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 , $t_r \leq 1 \text{ }\mu\text{s}$ $T_J = T_J \text{ maximum}$, anode voltage $\leq 80 \% V_{DRM}$	1000	A/ μs
Typical delay time	t_d	Gate current 1 A, $di_g/dt = 1 \text{ A}/\mu\text{s}$ $V_d = 0.67 \% V_{DRM}$, $T_J = 25 \text{ }^\circ\text{C}$	1.0	μs
Maximum turn-off time	t_q	$I_{TM} = 750 \text{ A}$, $T_J = T_J \text{ maximum}$, $di/dt = 60 \text{ A}/\mu\text{s}$ $V_R = 50$, $dV/dt = 20 \text{ V}/\mu\text{s}$, Gate 0 V 100 Ω , $t_p = 500 \text{ }\mu\text{s}$	200	

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum critical rate of rise of off-state voltage	dV/dt	$T_J = T_J \text{ maximum}$ linear to 80 % rated V_{DRM}	500	V/ μs
Maximum peak reverse and off-state leakage current	I_{RRM} , I_{DRM}	$T_J = T_J \text{ maximum}$, 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}			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 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	B-PUK (TO-200AC)	

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

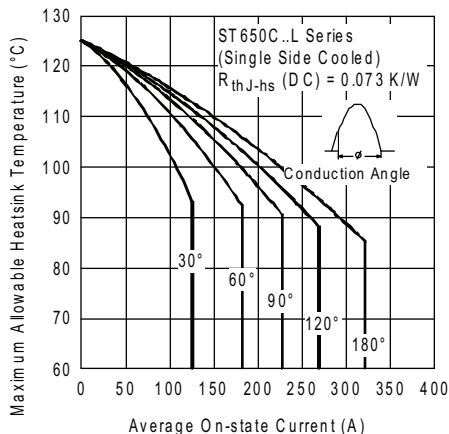


Fig. 1 - Current Ratings Characteristics

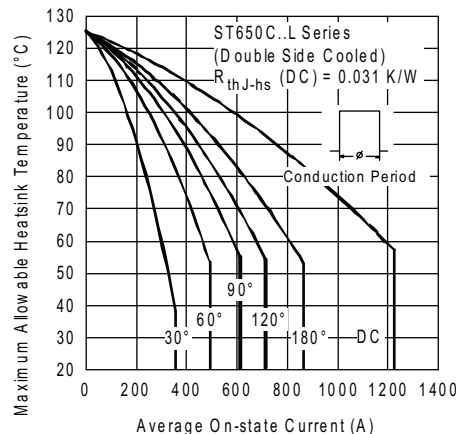


Fig. 4 - Current Ratings Characteristics

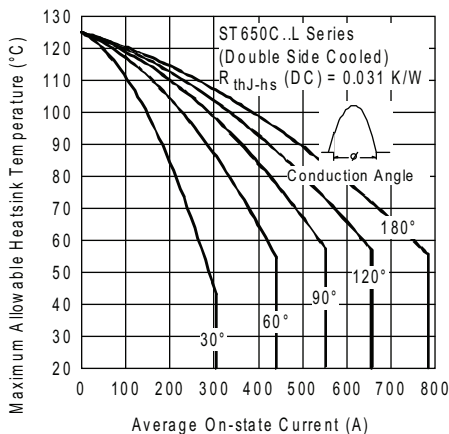


Fig. 2 - Current Ratings Characteristics

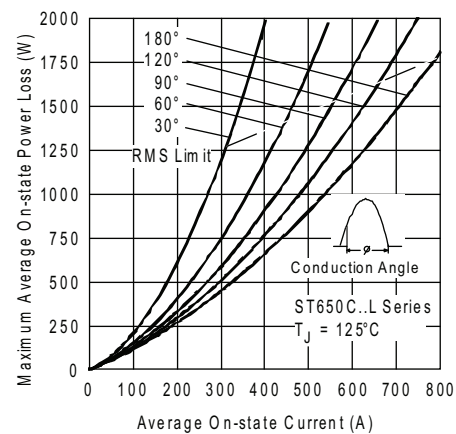


Fig. 5 - On-State Power Loss Characteristics

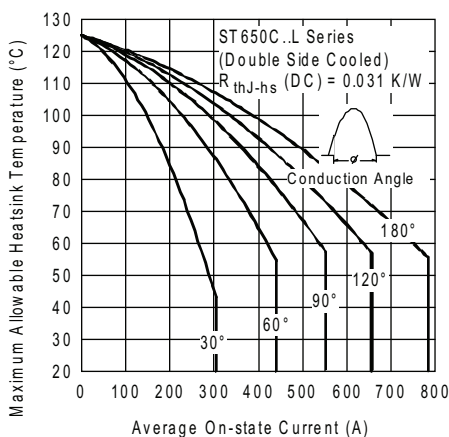


Fig. 3 - Current Ratings Characteristics

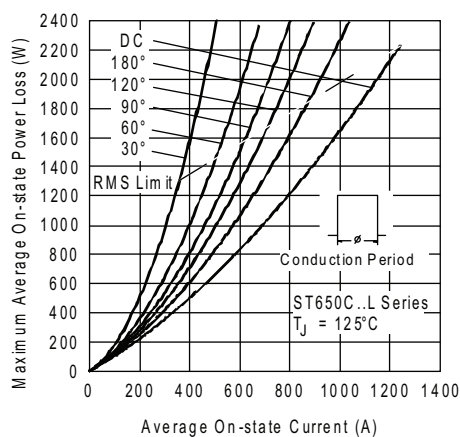


Fig. 6 - On-State Power Loss Characteristics

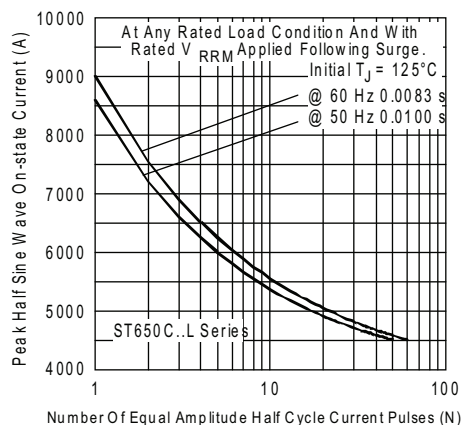


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

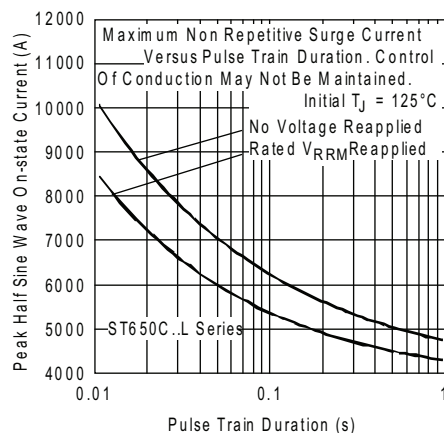


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

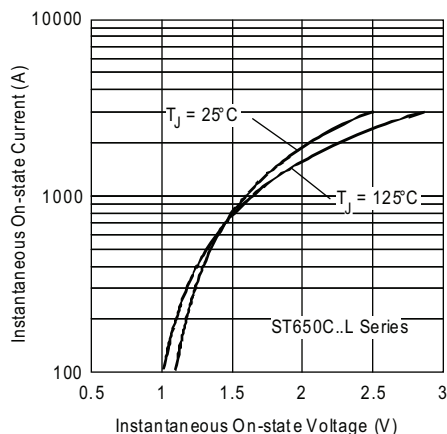
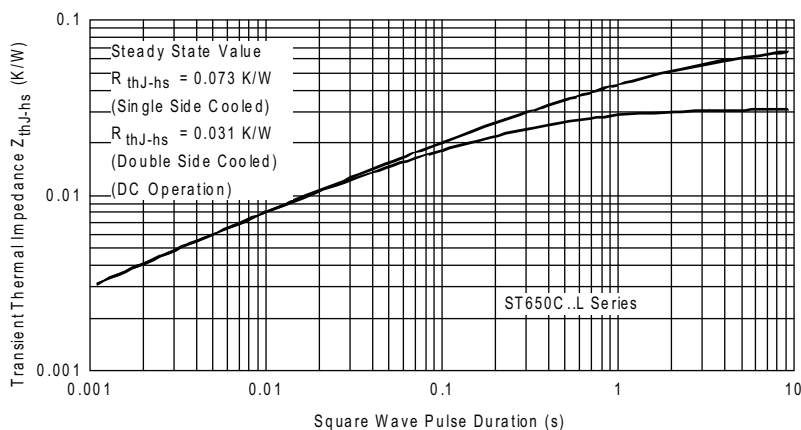


Fig. 9 - On-State Voltage Drop Characteristics

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

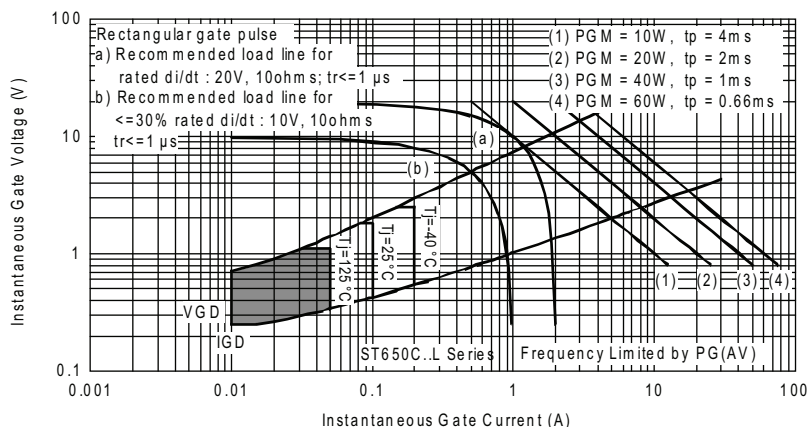


Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	ST	65	0	C	24	L	1	-
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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 B-PUK (TO-200AC)
- 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

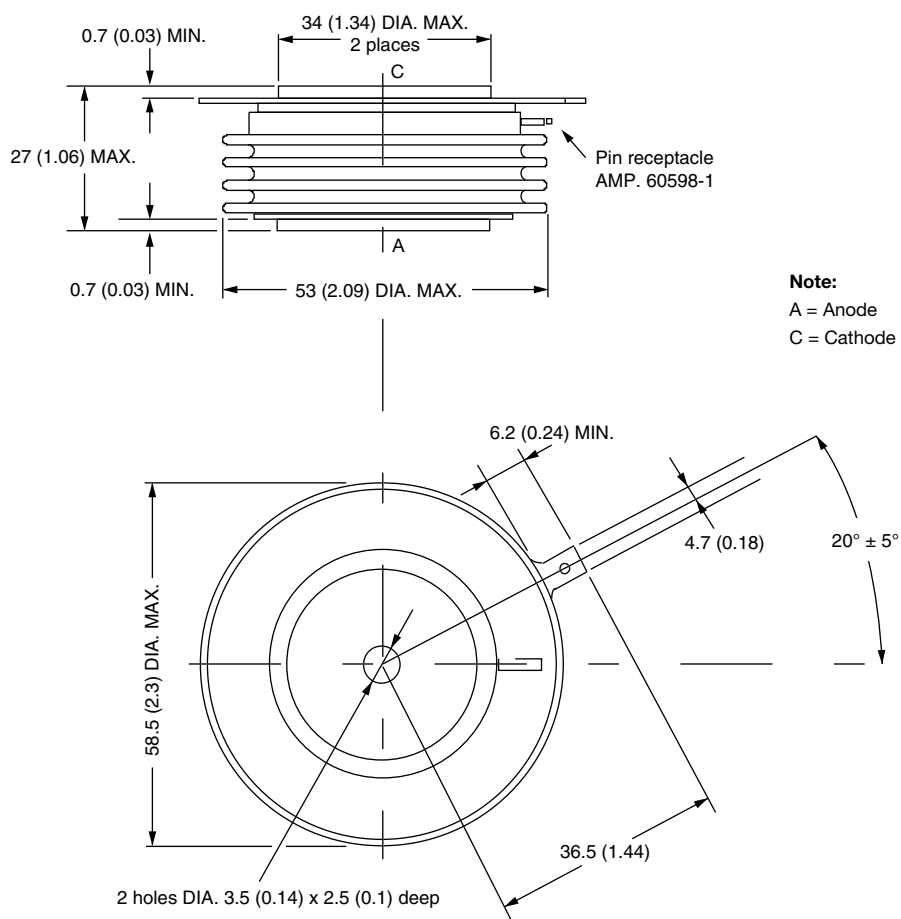
Dimensions

www.vishay.com/doc?95076

B-PUK (TO-200AC)

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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