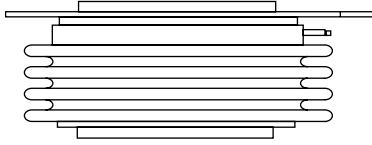


## Phase Control Thyristors (Hockey PUK Version), 1350 A



TO-200AC (B-PUK)

**FEATURES**

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


**RoHS  
COMPLIANT**
**PRODUCT SUMMARY**

$I_{T(AV)}$	1350 A
-------------	--------

**TYPICAL APPLICATIONS**

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

**MAJOR RATINGS AND CHARACTERISTICS**

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		1350	A
	$T_{hs}$	55	°C
$I_{T(RMS)}$		2700	A
	$T_{hs}$	25	°C
$I_{TSM}$	50 Hz	24 400	A
	60 Hz	25 600	
$I^2t$	50 Hz	2986	kA <sup>2</sup> s
	60 Hz	2726	
$V_{DRM}/V_{RRM}$		400 to 600	V
$t_q$	Typical	150	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
ST780C..L	04	400	500	80
	06	600	700	

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		1350 (500)	A
				55 (85)	°C
Maximum RMS on-state current	$I_{T(RMS)}$	DC at 25 °C heatsink temperature double side cooled		2700	A
Maximum peak, one-cycle non-repetitive surge current	$I_{TSM}$	t = 10 ms	No voltage reapplied	24 400	
		t = 8.3 ms		25 600	
		t = 10 ms	100 % $V_{RRM}$ reapplied	20 550	
		t = 8.3 ms		21 500	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	2986	kA <sup>2</sup> s
		t = 8.3 ms		2726	
		t = 10 ms	100 % $V_{RRM}$ reapplied	2112	
		t = 8.3 ms		1928	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		29 860	kA <sup>2</sup> /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		0.80	V
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$ , $T_J = T_J$ maximum		0.90	
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		0.14	mΩ
High level value of on-state slope resistance	$r_{t2}$	$(I > \pi \times I_{T(AV)})$ , $T_J = T_J$ maximum		0.13	
Maximum on-state voltage	$V_{TM}$	$I_{pk} = 3600$ A, $T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		1.31	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 $\leq 80\%$ $V_{DRM}$		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



<b>TRIGGERING</b>						
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	$+V_{GM}$	$T_J = T_J$ maximum, $t_p \leq 5$ 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	10		mA	
DC gate voltage not to trigger	$V_{GD}$		0.25		V	

<b>THERMAL AND MECHANICAL SPECIFICATIONS</b>					
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, $\pm 10$ %			14 700 (1500)	N (kg)	
Approximate weight			255	g	
Case style		See dimensions - link at the end of datasheet	TO-200AC (B-PUK)		

<b><math>\Delta R_{thJ-hs}</math> CONDUCTION</b>						
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

# ST780CLPbF Series



Vishay High Power Products Phase Control Thyristors  
(Hockey PUK Version), 1350 A

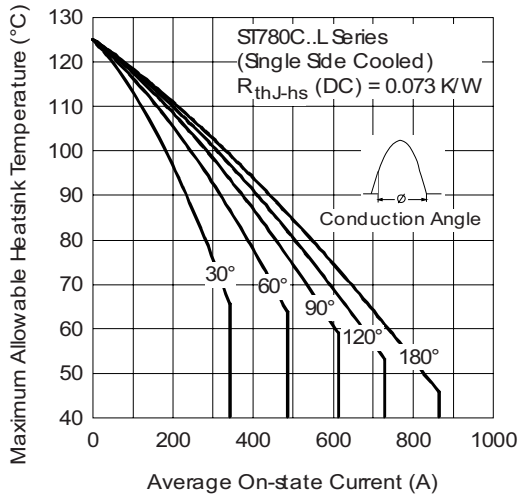


Fig. 1 - Current Ratings Characteristics

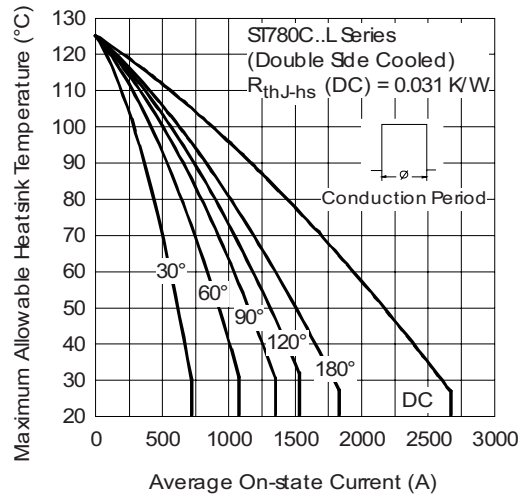


Fig. 4 - Current Ratings Characteristics

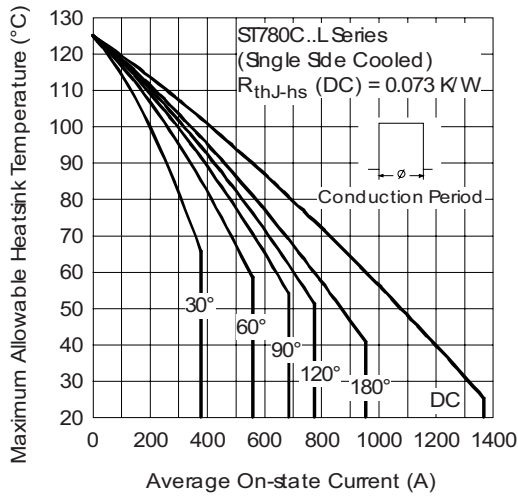


Fig. 2 - Current Ratings Characteristics

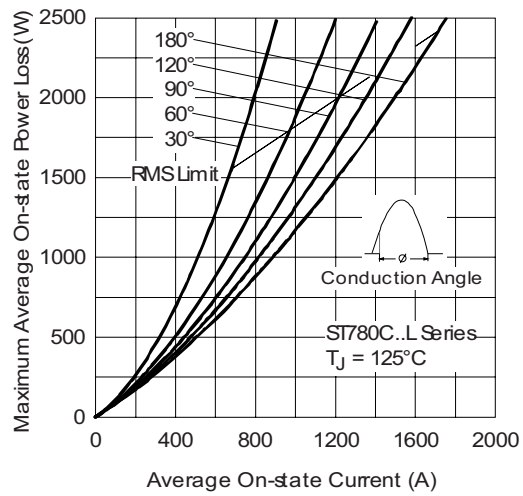


Fig. 5 - On-State Power Loss Characteristics

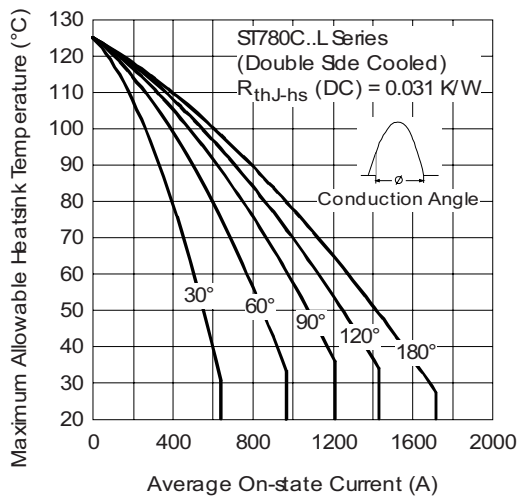


Fig. 3 - Current Ratings Characteristics

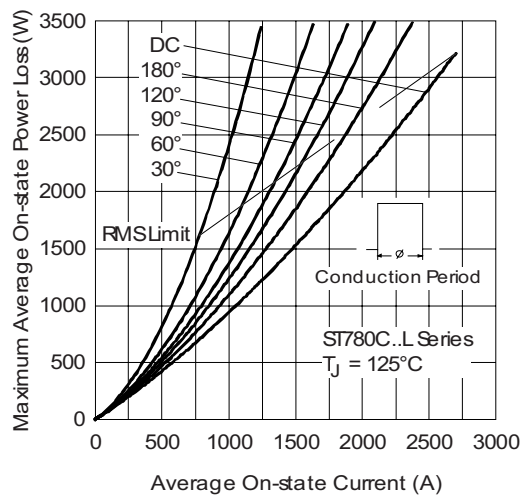


Fig. 6 - On-State Power Loss Characteristics

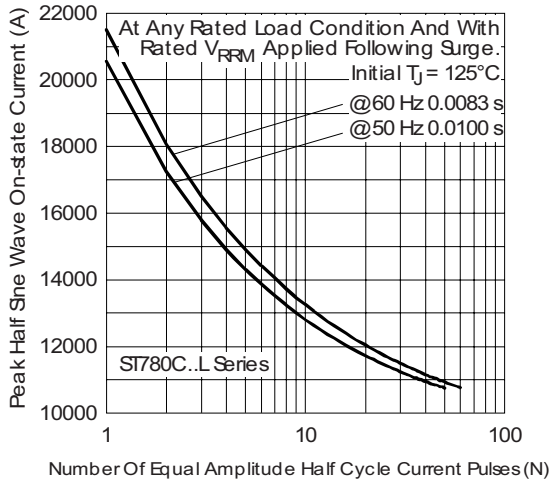


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

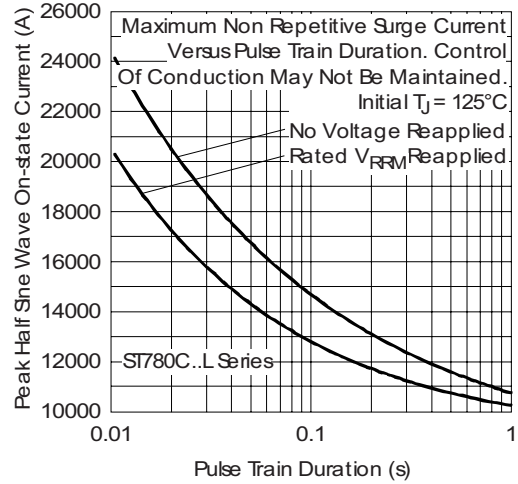


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

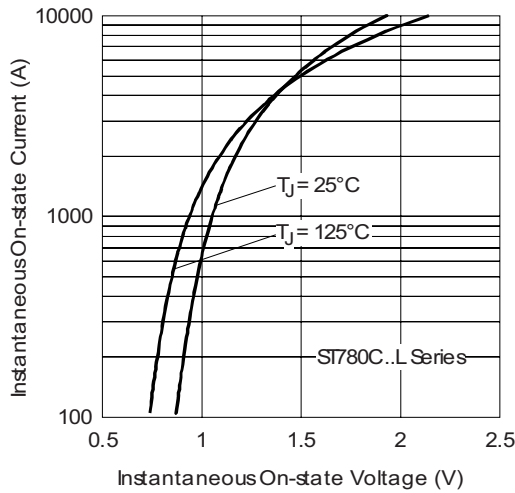


Fig. 9 - On-State Voltage Drop Characteristics

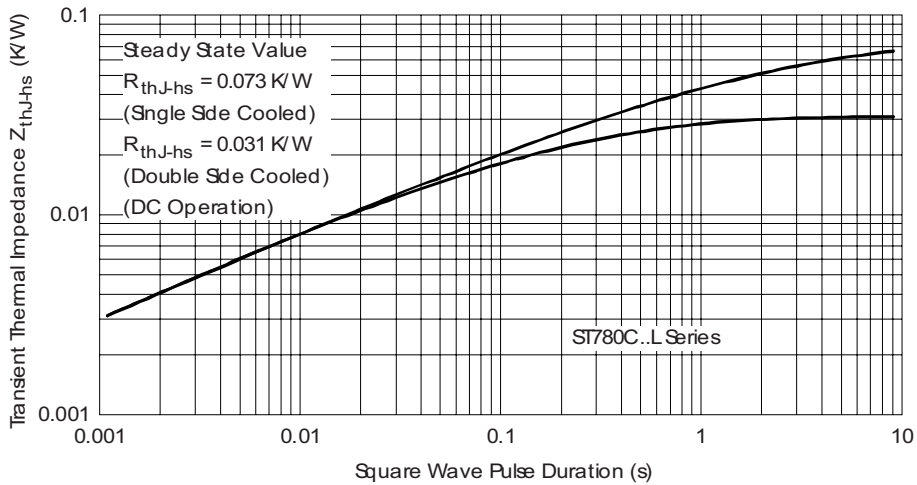


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

# ST780CLPbF Series



Vishay High Power Products Phase Control Thyristors  
(Hockey PUK Version), 1350 A

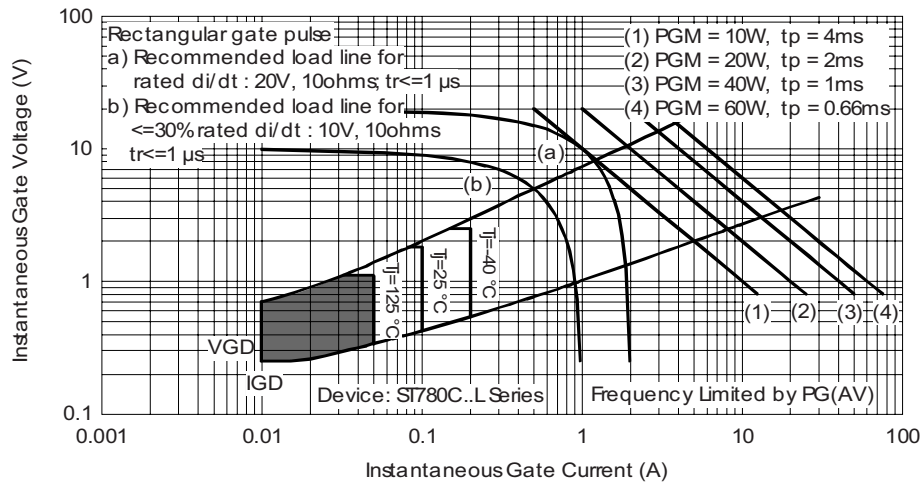


Fig. 11 - Gate Characteristics

## ORDERING INFORMATION TABLE

Device code	<b>ST</b>	<b>78</b>	<b>0</b>	<b>C</b>	<b>06</b>	<b>L</b>	<b>1</b>	<b>-</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧	⑨
	<b>1</b>	-	Thyristor	<b>2</b>	-	Essential part number	<b>3</b>	-	0 = Converter grade
	<b>4</b>	-	C = Ceramic PUK	<b>5</b>	-	Voltage code x 100 = V <sub>RRM</sub> (see Voltage Ratings table)	<b>6</b>	-	L = PUK case TO-200AC (B-PUK)
	<b>7</b>	-	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)	<b>8</b>	-	Critical dV/dt: • None = 500 V/μs (standard selection) • L = 1000 V/μs (special selection)	<b>9</b>	-	Lead (Pb)-free

### LINKS TO RELATED DOCUMENTS

Dimensions

<http://www.vishay.com/doc?95076>



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.