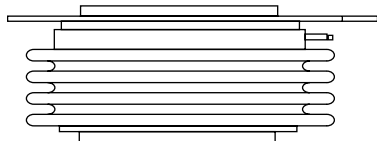


Phase Control Thyristors (Hockey PUK Version), 650 A



TO-200AC (B-PUK)

FEATURES

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



RoHS
COMPLIANT

PRODUCT SUMMARY

$I_{T(AV)}$	650 A
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TYPICAL APPLICATIONS

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

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		650	A
	T_{hs}	55	°C
$I_{T(RMS)}$		1230	A
	T_{hs}	25	°C
I_{TSM}	50 Hz	9000	A
	60 Hz	9420	
I^2t	50 Hz	405	kA ² s
	60 Hz	370	
V_{DRM}/V_{RRM}		400 to 2000	V
t_q	Typical	100	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
ST330C..L	04	400	500	50
	08	800	900	
	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			650 (314)	A
					55 (75)	°C
Maximum RMS on-state current	I _{T(RMS)}	DC at 25 °C heatsink temperature double side cooled			1230	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	9000	
		t = 8.3 ms			9420	
		t = 10 ms	100 % V _{RRM} reapplied		7570	
		t = 8.3 ms			7920	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reapplied		405	
		t = 8.3 ms			370	
		t = 10 ms	100 % V _{RRM} reapplied	287		
		t = 8.3 ms		262		
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10 ms, no voltage reapplied			4050	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			0.91	V
High level value of threshold voltage	V _{T(TO)2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.93	
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			0.57	mΩ
High level value of on-state slope resistance	r _{t2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.57	
Maximum on-state voltage	V _{TM}	I _{pk} = 1730 A, T _J = T _J maximum, t _p = 10 ms sine pulse			1.90	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, $t_r \leq 1\text{ μs}$ $T_J = T_J$ maximum, anode voltage $\leq 80\%$ V_{DRM}	1000	A/μs
Typical delay time	t_d	Gate current 1 A, $di_g/dt = 1\text{ A/μs}$ $V_d = 0.67\%$ V_{DRM} , $T_J = 25\text{ °C}$	1.0	μs
Typical turn-off time	t_q	$I_{TM} = 550\text{ A}$, $T_J = T_J$ maximum, $di/dt = 40\text{ A/μs}$, $V_R = 50\text{ V}$, $dV/dt = 20\text{ V/μs}$, gate 0 V 100 Ω, $t_p = 500\text{ μs}$	100	

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	50	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		0.11	K/W
		DC operation double side cooled		0.06	
Maximum thermal resistance, case to heatsink	R_{thC-hs}	DC operation single side cooled		0.011	
		DC operation double side cooled		0.005	
Mounting force, ± 10 %				9800 (1000)	N (kg)
Approximate weight				250	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°	0.012	0.010	0.008	0.008	T _J = T _J maximum	K/W
120°	0.014	0.015	0.014	0.014		
90°	0.018	0.018	0.019	0.019		
60°	0.026	0.027	0.027	0.028		
30°	0.045	0.046	0.046	0.046		

Note

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

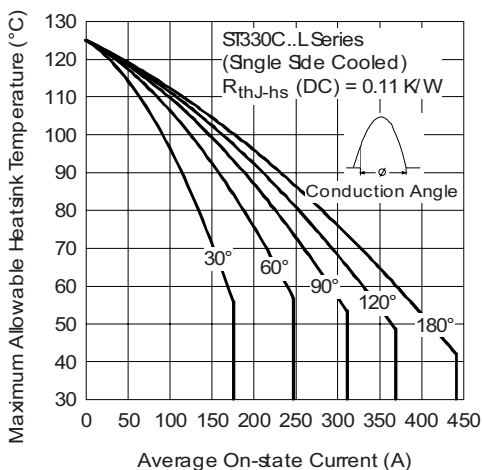


Fig. 1 - Current Ratings Characteristics

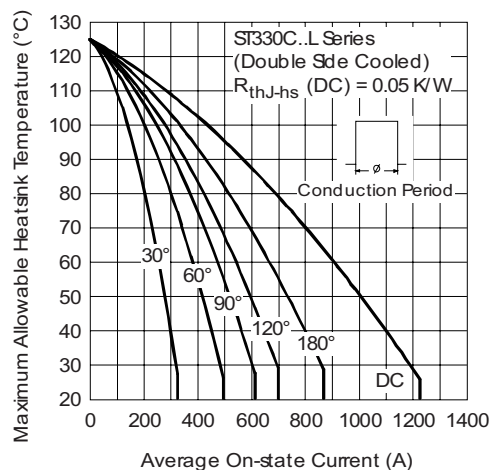


Fig. 4 - Current Ratings Characteristics

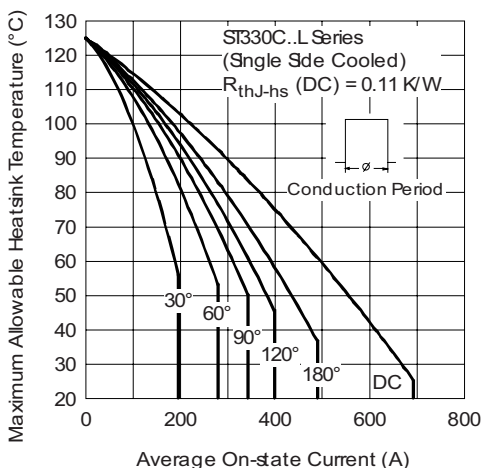


Fig. 2 - Current Ratings Characteristics

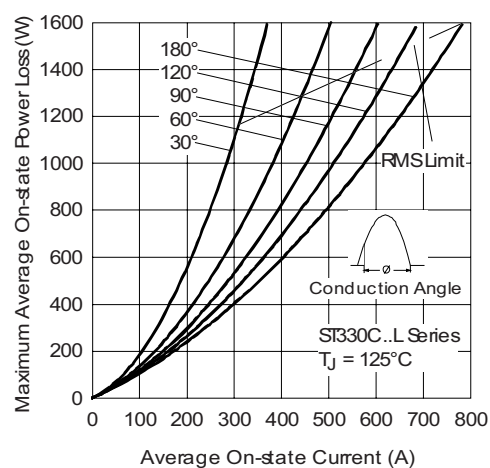


Fig. 5 - On-State Power Loss Characteristics

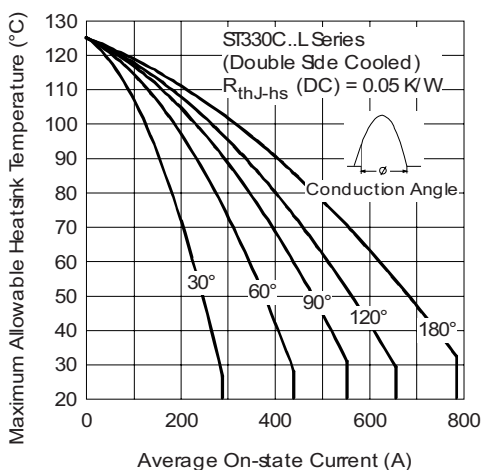


Fig. 3 - Current Ratings Characteristics

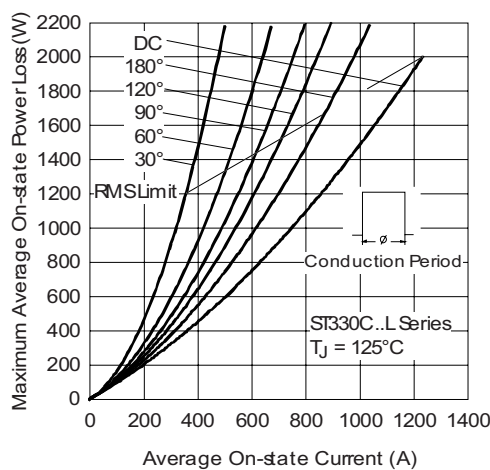


Fig. 6 - On-State Power Loss Characteristics

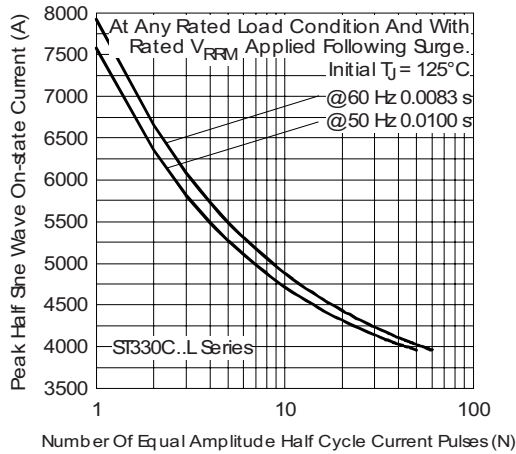


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

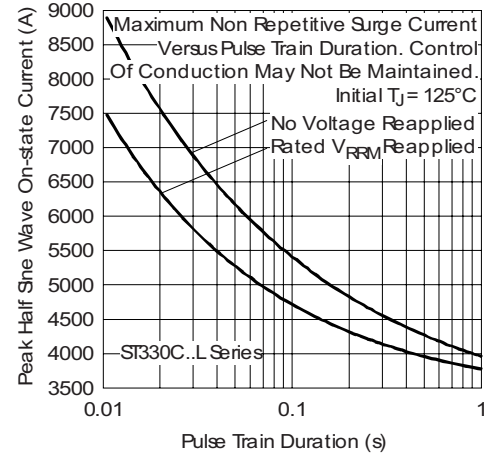


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

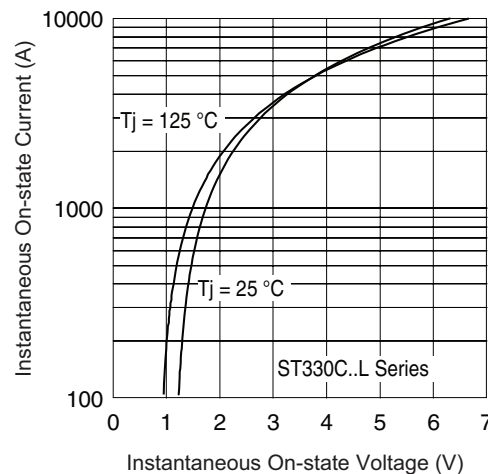


Fig. 9 - On-State Voltage Drop Characteristics

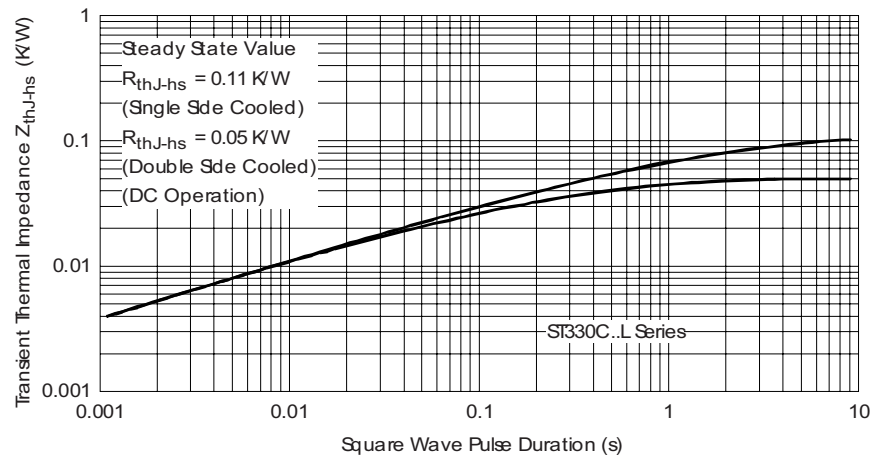


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

ST330CLPbF Series



Vishay High Power Products Phase Control Thyristors
(Hockey PUK Version), 650 A

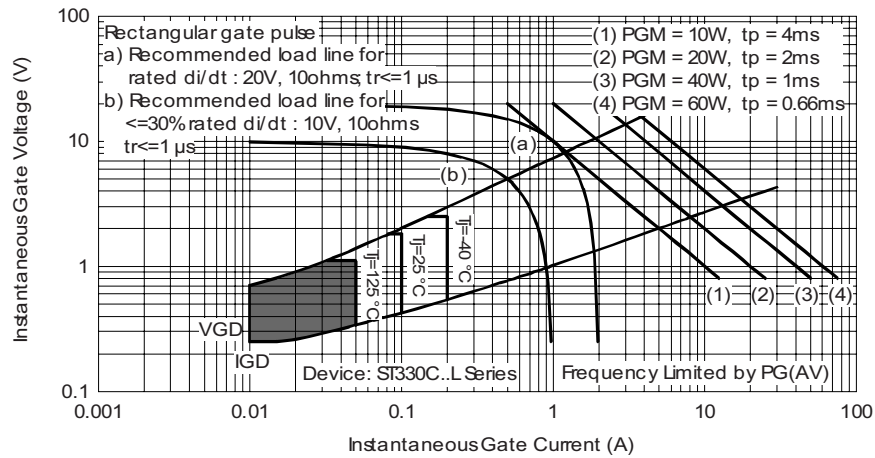


Fig. 11 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	ST	33	0	C	16	L	1	-	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- ① - Thyristor
- ② - Essential part number
- ③ - 0 = Converter grade
- ④ - C = Ceramic PUK
- ⑤ - Voltage code x 100 = V_{RRM} (see Voltage Ratings table)
- ⑥ - L = PUK case TO-200AC (B-PUK)
- ⑦ - 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)
- ⑧ - Critical dV/dt : • None = 500 V/ μ s (standard selection)
• L = 1000 V/ μ s (special selection)
- ⑨ - Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95076



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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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