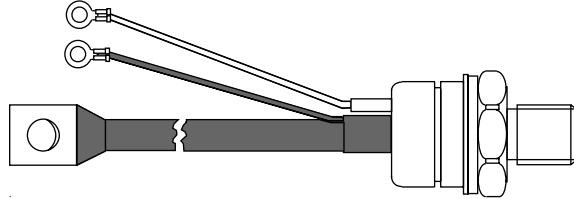


Phase Control Thyristors (Stud Version), 180 A



TO-209AB (TO-93)

FEATURES

- Hermetic glass-metal seal
- International standard case TO-209AB (TO-93)
- RoHS compliant
- Lead (Pb)-free
- Designed and qualified for industrial level



RoHS
COMPLIANT

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY

$I_{T(AV)}$	180 A
-------------	-------

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		180	A
	T_C	80	°C
$I_{T(RMS)}$		285	A
I_{TSM}	50 Hz	3800	
	60 Hz	4000	
I^2t	50 Hz	72	kA ² s
	60 Hz	66	
V_{DRM}/V_{RRM}		400 to 1000	V
t_q	Typical	100	µs
T_J		- 40 to 125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

PART 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
180/181RKI	40	400	500	30
	80	800	900	
	100	1000	1100	

180RKI...PbF /181RKI...PbF Series



Vishay High Power Products Phase Control Thyristors
(Stud Version), 180 A

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current at case temperature	$I_{T(AV)}$	180° conduction, half sine wave		180	A
				80	°C
Maximum RMS on-state current	I_{RMS}	DC at 79 °C case temperature		285	
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reapplied	3800	A
		t = 8.3 ms		4000	
		t = 10 ms	100 % V_{RRM} reapplied	3500	
		t = 8.3 ms		3660	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied	72	kA ² s
		t = 8.3 ms		66	
		t = 10 ms	100 % V_{RRM} reapplied	61	
		t = 8.3 ms		56	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		720	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		0.83	V
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.89	
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		0.92	mΩ
High level value of on-state slope resistance	r_{t2}	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.81	
Maximum on-state voltage	V_{TM}	$I_{pk} = 570$ A, $T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		1.35	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}		300	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	$I_{TM} = 50$ A, $T_J = T_J$ maximum, $di/dt = 10$ A/μs, $V_R = 100$ V $dV/dt = 20$ V/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		30	mA



180RKI...PbF /181RKI...PbF Series

Phase Control Thyristors Vishay High Power Products
(Stud Version), 180 A

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		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		V
Maximum peak negative gate voltage	$-V_{GM}$		5.0		
DC gate current required to trigger	I_{GT}	$T_J = -40$ °C	130	-	mA
		$T_J = 25$ °C	65	150	
		$T_J = 125$ °C	35	-	
DC gate voltage required to trigger	V_{GT}	$T_J = -40$ °C	2.0	-	V
		$T_J = 25$ °C	1.2	2.5	
		$T_J = 125$ °C	0.9	-	
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

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 case	R_{thJC}	DC operation	0.15	K/W
Maximum thermal resistance, junction to ambient	R_{thCS}	Mounting surface, smooth, flat and greased	0.04	
Mounting force, ± 10 %		Non-lubricated threads	31 (275)	Nm (lbf · in)
		Lubricated threads	24.5 (210)	
Approximate weight			280	g
Case style		See dimensions - link at the end of datasheet	TO-209AB (TO-93)	

ΔR_{thJC} CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.050	0.032	$T_J = T_J$ maximum	K/W
120°	0.063	0.059		
90°	0.080	0.082		
60°	0.118	0.124		
30°	0.225	0.228		

Note

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

180RKI...PbF /181RKI...PbF Series



Vishay High Power Products Phase Control Thyristors
(Stud Version), 180 A

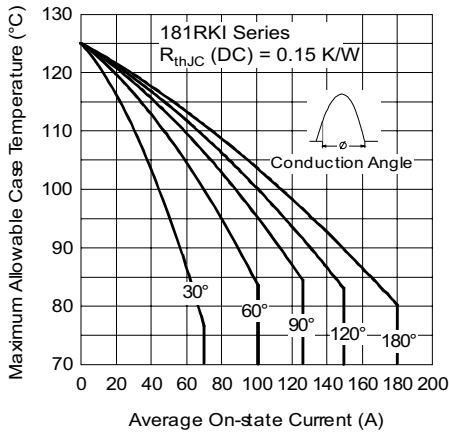


Fig. 1 - Current Ratings Characteristics

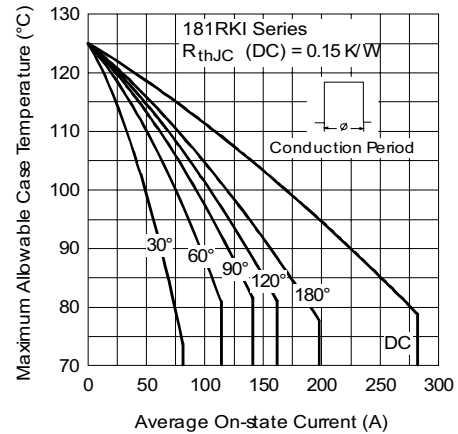


Fig. 2 - Current Ratings Characteristics

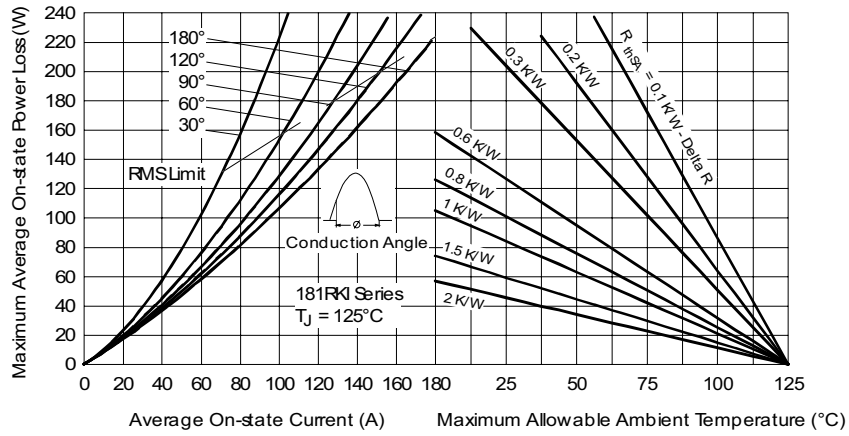


Fig. 3 - On-State Power Loss Characteristics

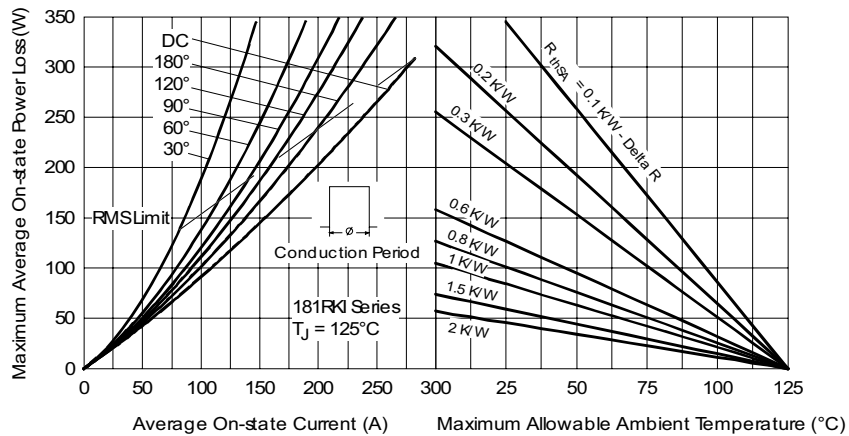


Fig. 4 - On-State Power Loss Characteristics



180RKI...PbF /181RKI...PbF Series

Phase Control Thyristors (Stud Version), 180 A

Vishay High Power Products

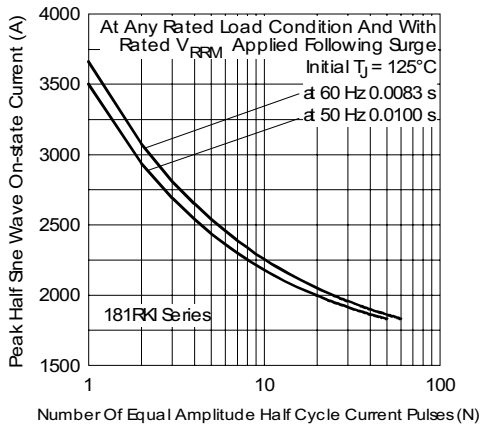


Fig. 5 - Maximum Non-Repetitive Surge Current

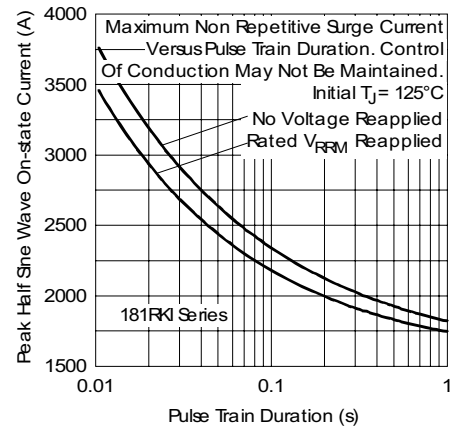


Fig. 6 - Maximum Non-Repetitive Surge Current

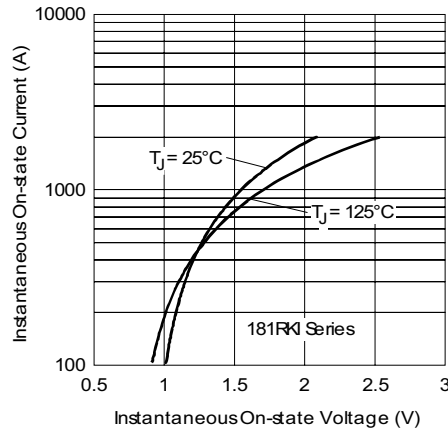


Fig. 7 - On-State Voltage Drop Characteristics

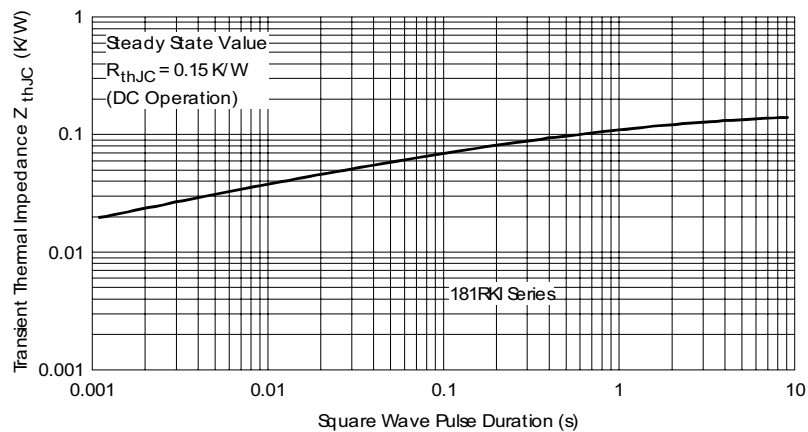


Fig. 8 - Thermal impedance Z_{thJC} Characteristics

180RKI...PbF /181RKI...PbF Series



Vishay High Power Products Phase Control Thyristors
(Stud Version), 180 A

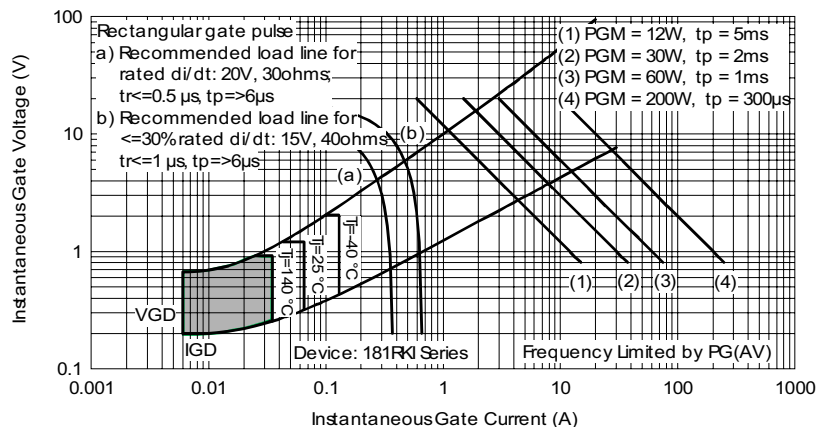


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	18	1	RKI	100	PbF
	①	②	③	④	⑤
	1	-	$I_{T(AV)}$ rated average output current (rounded/10)		
	2	-	0 = Eyelet terminals (gate and auxiliary cathode leads) 1 = Fast-on terminals (gate and auxiliary cathode leads)		
	3	-	Thyristor		
	4	-	Voltage code x 10 = V_{RRM} (see Voltage Ratings table)		
	5	-	Lead (Pb)-free		

LINKS TO RELATED DOCUMENTS

Dimensions	http://www.vishay.com/doc?95077
------------	---



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.