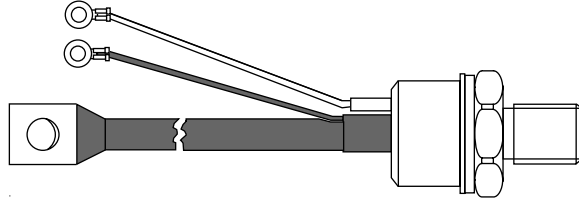


Phase Control Thyristors (Stud Version), 180 A



TO-209AB (TO-93)

FEATURES

- Hermetic glass-metal seal
- International standard case TO-209AB (TO-93)
- RoHS compliant
- 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	A
	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

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

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	$I_{T(RMS)}$	DC at 79 °C case temperature		285	A
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reappplied	3800	A
		t = 8.3 ms		100 % V_{RRM} reappplied	
		t = 10 ms	Sinusoidal half wave, initial $T_J = T_J$ maximum		
		t = 8.3 ms		3660	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reappplied	72	kA ² s
		t = 8.3 ms		100 % V_{RRM} reappplied	
		t = 10 ms	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 reappplied		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	$r_{\theta 1}$	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.92	mΩ
High level value of on-state slope resistance	$r_{\theta 2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ 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



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	$+V_{GM}$	$T_J = T_J$ 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	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	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 case	R_{thJC}	DC operation	0.15	K/W
Maximum thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth, flat and greased	0.04	
Mounting torque, ± 10 %		Non-lubricated threads	31 (275)	N · m (lb · 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

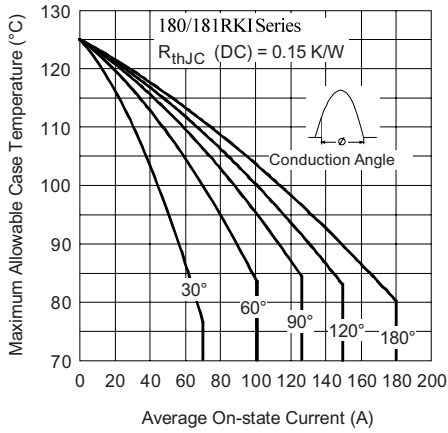


Fig. 1 - Current Ratings Characteristics

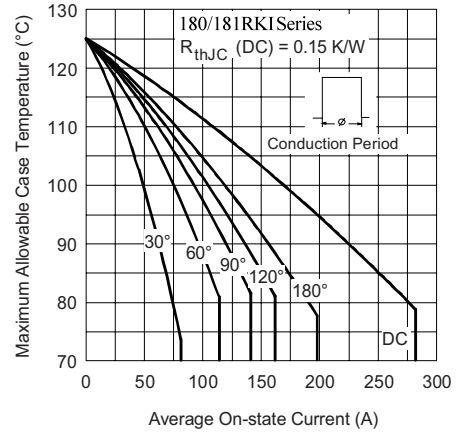


Fig. 2 - Current Ratings Characteristics

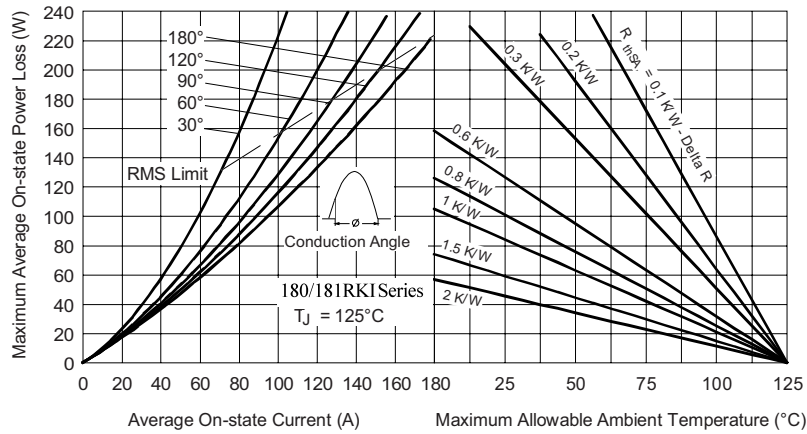


Fig. 3 - On-State Power Loss Characteristics

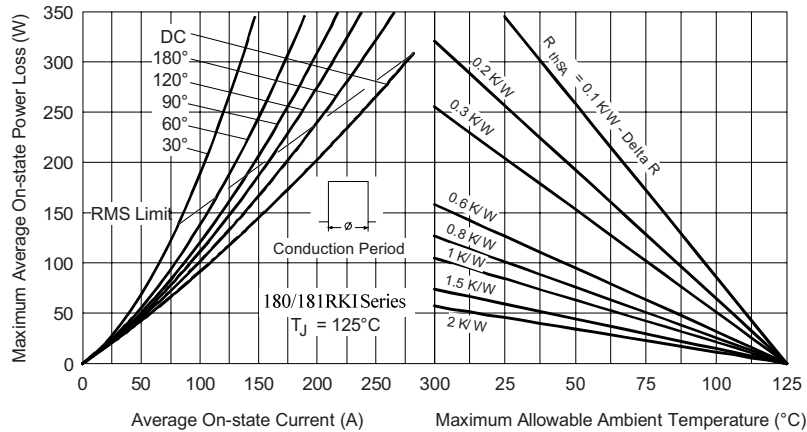


Fig. 4 - On-State Power Loss Characteristics

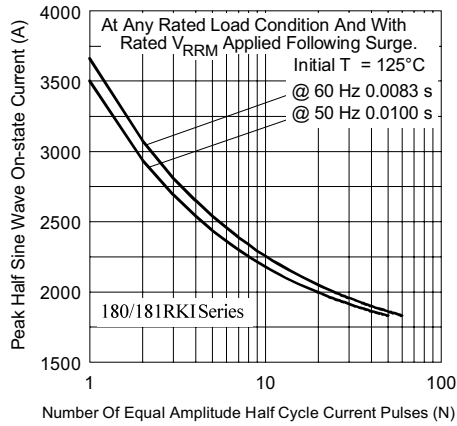


Fig. 5 - Maximum Non-Repetitive Surge Current

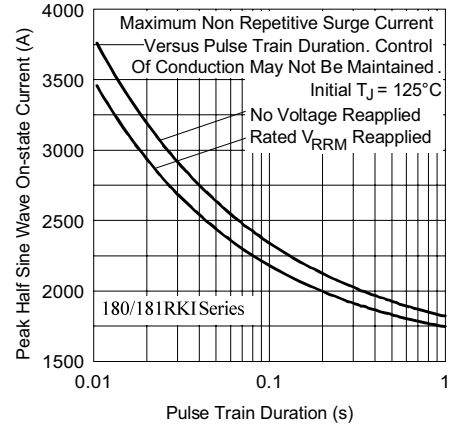


Fig. 6 - Maximum Non-Repetitive Surge Current

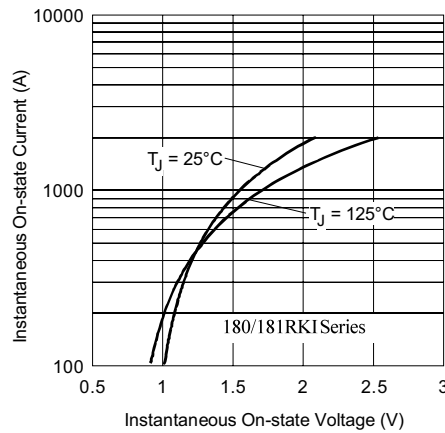


Fig. 7 - On-State Voltage Drop Characteristics

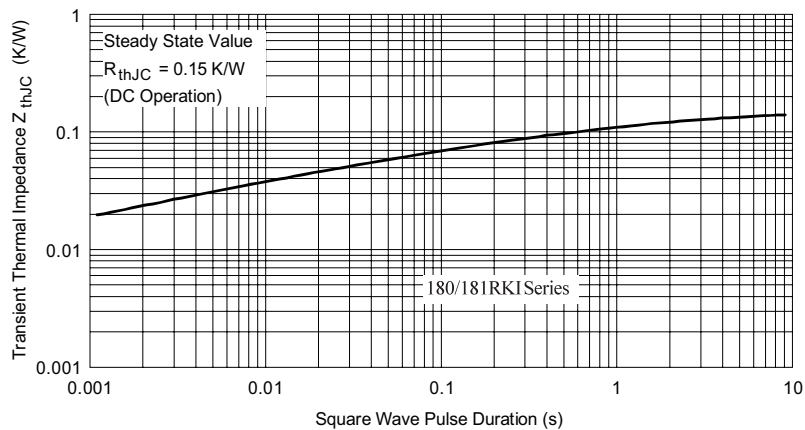


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

180/181RKI Series

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

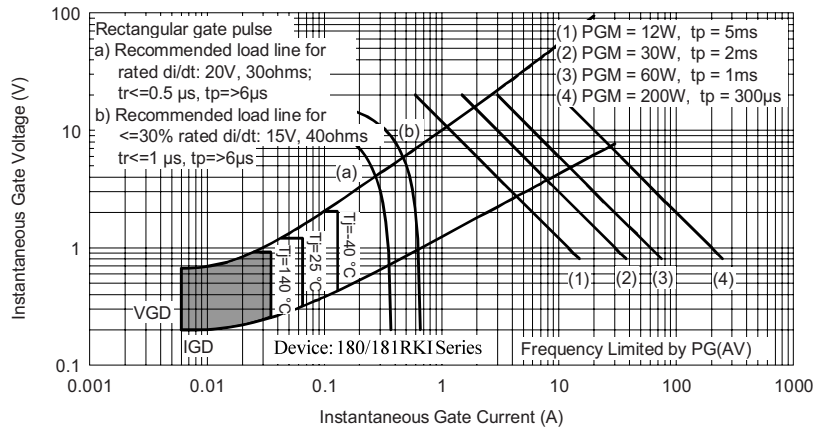


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	18	1	RKI	100
	(1)	(2)	(3)	(4)

- 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)

LINKS TO RELATED DOCUMENTS

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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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