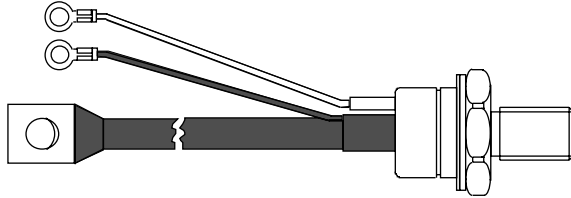


Phase Control Thyristors (Stud Version), 80 A



TO-209AC (TO-94)

FEATURES

- Hermetic glass-metal seal
- International standard case TO-209AC (TO-94)
- 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

$I_{T(AV)}$	80 A
-------------	------

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		80	A
	T_C	85	°C
$I_{T(RMS)}$		125	A
I_{TSM}	50 Hz	1900	
	60 Hz	1990	
I^2t	50 Hz	18	kA ² s
	60 Hz	16	
V_{DRM}/V_{RRM}		400 to 1200	V
t_q	Typical	110	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 $T_J = 125\text{ °C}$ mA
80RIA 81RIA	40	400	500	15
	80	800	900	
	120	1200	1300	

80RIA...PbF/81RIA...PbF Series



Vishay High Power Products Phase Control Thyristors
(Stud Version), 80 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		80	A	
				85	°C	
Maximum RMS on-state current	$I_{T(RMS)}$	DC at 75 °C case temperature		125		
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reapplied	1900	A	
		t = 8.3 ms				1990
		t = 10 ms	100 % V_{RRM} reapplied	1600		
		t = 8.3 ms				1675
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied	18	kA ² s	
		t = 8.3 ms				16
		t = 10 ms	100 % V_{RRM} reapplied	12.7		
		t = 8.3 ms				11.7
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		180.5	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		0.99	V	
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		1.13		
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		2.29	mΩ	
High level value of on-state slope resistance	r_{t2}	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		1.84		
Maximum on-state voltage	V_{TM}	$I_{pk} = 250$ A, $T_J = 25$ °C, $t_p = 10$ ms sine pulse		1.60	V	
Maximum holding current	I_H	$T_J = 25$ °C, anode supply 12 V resistive load		200	mA	
Typical latching current	I_L			400		

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum non-repetitive rate of rise of turned-on current	di/dt	$T_J = 125$ °C, $V_d = \text{Rated } V_{DRM}$, $I_{TM} = 2 \times di/dt$ snubber 0.2 μF, 15 Ω, gate pulse: 20 V, 65 Ω, $t_p = 6$ μs, $t_r = 0.5$ μs Per JEDEC standard RS-397, 5.2.2.6.		300	A/μs
Typical delay time	t_d	Gate pulse: 10 V, 15 Ω source, $t_p = 6$ μs, $t_r = 0.1$ μs, $V_d = \text{Rated } V_{DRM}$, $I_{TM} = 50$ Adc, $T_J = 25$ °C		1	μs
Typical turn-off time	t_q	$I_{TM} = 50$ A, $T_J = T_J$ maximum, $di/dt = -5$ A/μs, $V_R = 50$ V, $dV/dt = 20$ V/μs, gate bias: 0 V 25 Ω, $t_p = 500$ μs		110	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum critical rate of rise of off-state voltage	dV/dt	$T_J = 125$ °C exponential to 67 % rated V_{DRM}		500	V/μs
Maximum peak reverse and off-state leakage current	I_{RRM} , I_{DRM}	$T_J = 125$ °C rated V_{DRM}/V_{RRM} applied		15	mA



80RIA...PbF/81RIA...PbF Series

Phase Control Thyristors Vishay High Power Products
(Stud Version), 80 A

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P_{GM}	$T_J = T_J$ maximum, $t_p \leq 5$ ms		12	W
Maximum average gate power	$P_{G(AV)}$	$T_J = T_J$ maximum, $f = 50$ Hz, $d\% = 50$		3	
Maximum peak positive gate current	I_{GM}	$T_J = T_J$ maximum, $t_p \leq 5$ ms		3	A
Maximum peak positive gate voltage	$+V_{GM}$			20	V
Maximum peak negative gate voltage	$-V_{GM}$			10	
Maximum 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 6 V anode to cathode applied	270	mA
		$T_J = 25$ °C		120	
		$T_J = 125$ °C		60	
Maximum DC gate voltage required to trigger	V_{GT}	$T_J = -40$ °C		3.5	V
		$T_J = 25$ °C		2.5	
		$T_J = 125$ °C		1.5	
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	6	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		0.30	K/W
Maximum thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth, flat and greased		0.1	
Mounting torque, ± 10 %		Non-lubricated threads		15.5 (137)	N · m (lbf · in)
		Lubricated threads		14 (120)	
Approximate weight				130	g
Case style		See dimensions - link at the end of datasheet		TO-209AC (TO-94)	

ΔR_{thJC} CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.042	0.030	$T_J = T_J$ maximum	K/W
120°	0.050	0.052		
90°	0.064	0.070		
60°	0.095	0.100		
30°	0.164	0.165		

Note

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

80RIA...PbF/81RIA...PbF Series



Vishay High Power Products Phase Control Thyristors
(Stud Version), 80 A

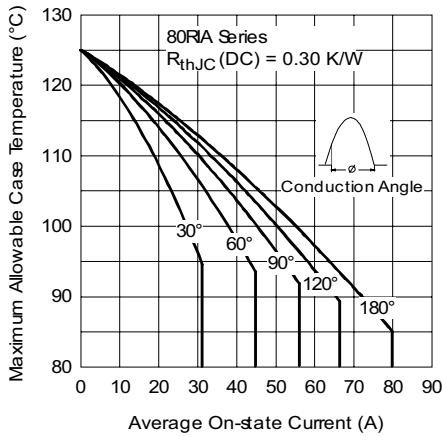


Fig. 1 - Current Ratings Characteristics

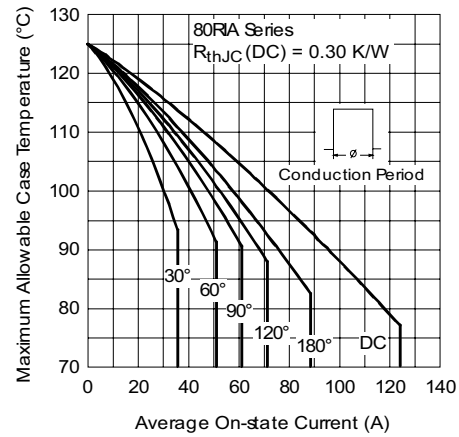


Fig. 2 - Current Ratings Characteristics

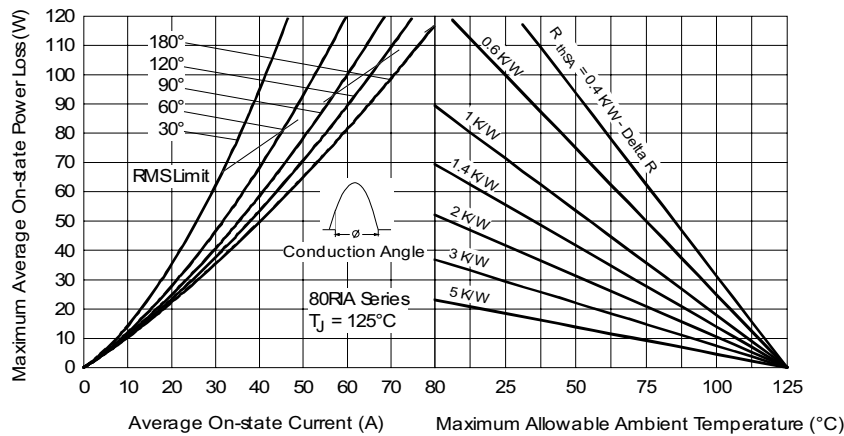


Fig. 3 - On-State Power Loss Characteristics

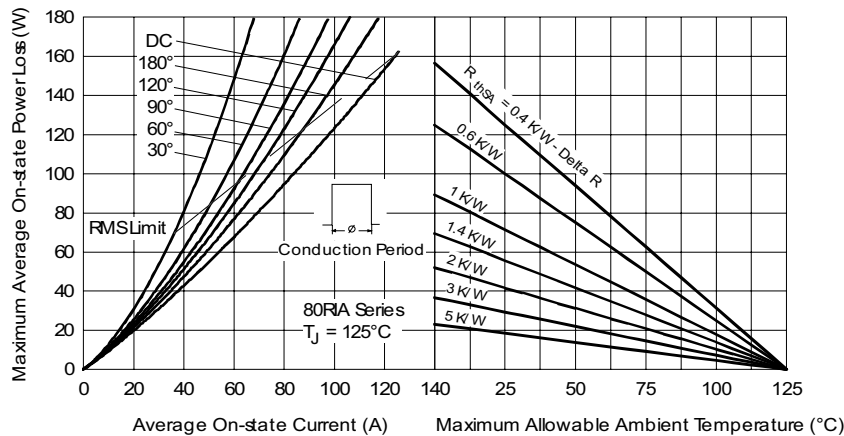


Fig. 4 - On-State Power Loss Characteristics



80RIA...PbF/81RIA...PbF Series

Phase Control Thyristors (Stud Version), 80 A Vishay High Power Products

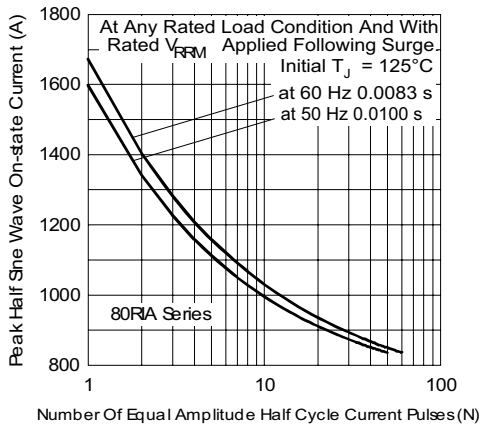


Fig. 5 - Maximum Non-Repetitive Surge Current

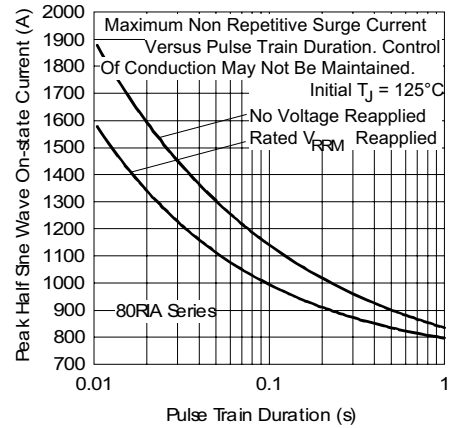


Fig. 6 - Maximum Non-Repetitive Surge Current

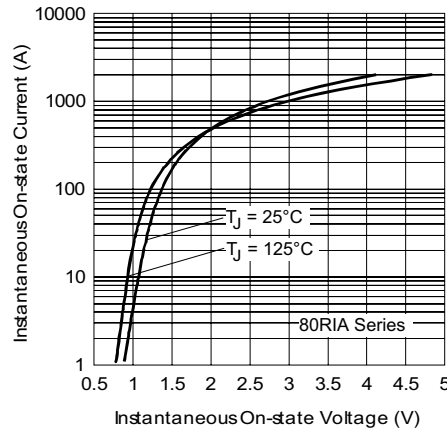


Fig. 7 - On-State Voltage Drop Characteristics

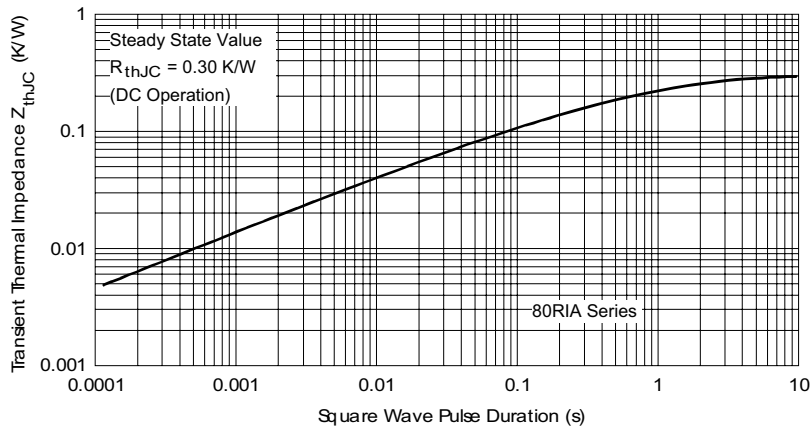


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

80RIA...PbF/81RIA...PbF Series



Vishay High Power Products Phase Control Thyristors
(Stud Version), 80 A

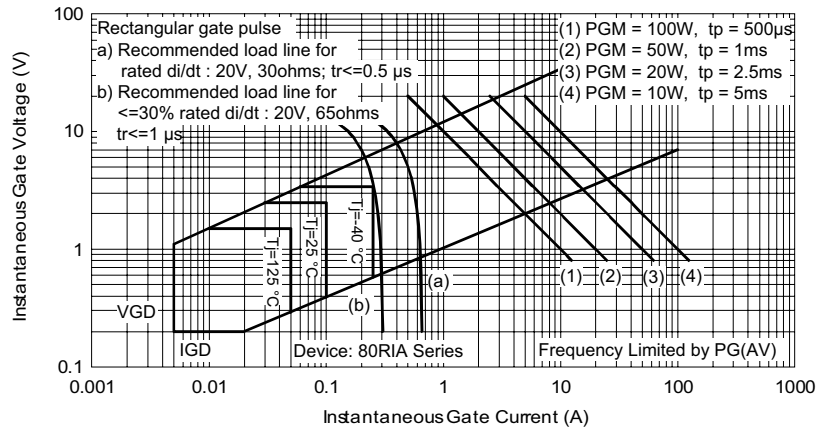


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	8	0	RIA	120	M	PbF
	(1)	(2)	(3)	(4)	(5)	(6)
	1	-	$I_{TAV} \times 10$ A			
	2	-	0 = Eyelet terminals (gate and auxiliary cathode leads) 1 = Fast-on terminals (gate and auxiliary cathode leads)			
	3	-	RIA = Essential part number			
	4	-	Voltage code x 100 = V_{RRM} (see Voltage Ratings table)			
	5	-	• None = Stud base 1/2"-20UNF- 2 A threads • M = Stud base metric threads M12 x 1.75 E 6			
	6	-	Lead (Pb)-free			

LINKS TO RELATED DOCUMENTS

Dimensions	http://www.vishay.com/doc?95003
------------	---



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.