



Phase Control Thyristors (Stud Version), 80 A



TO-209AC (TO-94)

FEATURES

- Hermetic glass-metal seal
- International standard case TO-209AC (TO-94)
- Designed and qualified for industrial level
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY

$I_{T(AV)}$	80 A
V_{DRM}/V_{RRM}	400 V, 800 V, 1200 V
V_{TM}	1.60 V
I_{GT}	120 mA
T_J	-40 °C to 125 °C
Package	TO-209AC (TO-94)
Diode variation	Single SCR

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
VS-80RIA VS-81RIA	40	400	500	15
	80	800	900	
	120	1200	1300	



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	A
Maximum peak, one-cycle non-repetitive surge current	I _{TSM}	t = 10 ms	No voltage reappplied	Sinusoidal half wave, initial T _J = T _J maximum	1900	
		t = 8.3 ms			1990	
		t = 10 ms	100 % V _{RRM} reappplied		1600	
		t = 8.3 ms			1675	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage		18	kA ² s
		t = 8.3 ms		16		
		t = 10 ms	100 % V _{RRM} reappplied	12.7		
		t = 8.3 ms		11.7		
Maximum I ² √t for fusing	I ² √t	t = 0.1 ms to 10 ms, no voltage reappplied			180.5	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			0.99	V
High level value of threshold voltage	V _{T(TO)2}	(I > π × I _{T(AV)}), T _J = T _J maximum			1.13	
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			2.29	mΩ
High level value of on-state slope resistance	r _{t2}	(I > π × 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



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

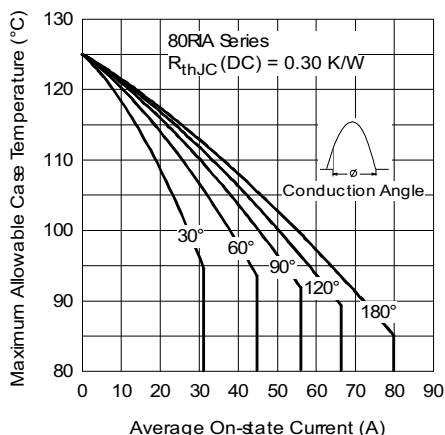


Fig. 1 - Current Ratings Characteristics

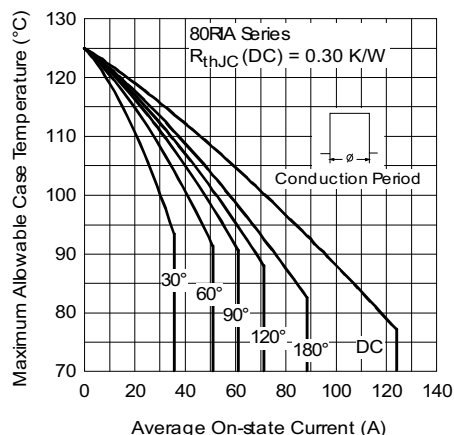


Fig. 2 - Current Ratings Characteristics

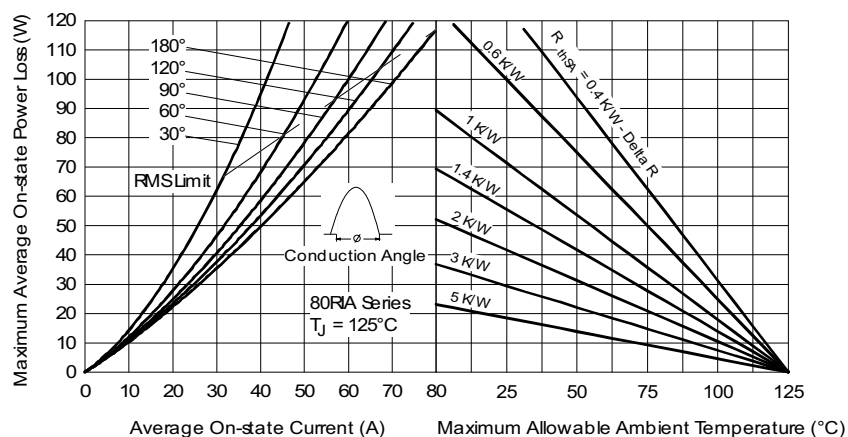


Fig. 3 - On-State Power Loss Characteristics

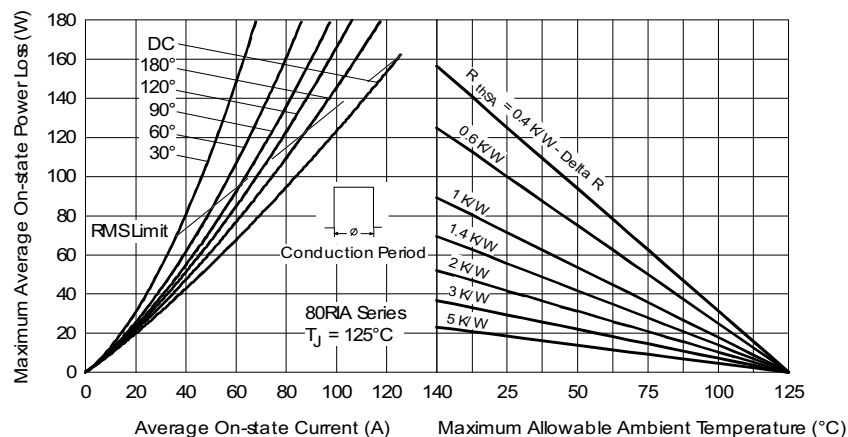


Fig. 4 - On-State Power Loss Characteristics

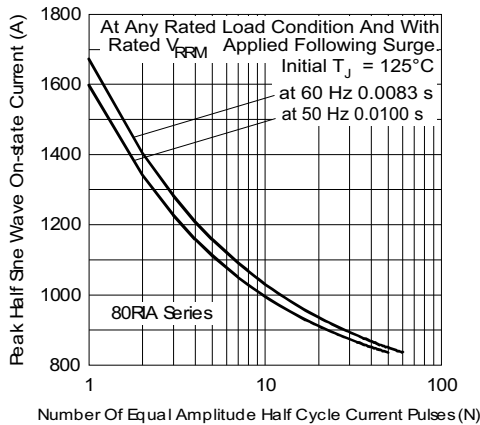


Fig. 5 - Maximum Non-Repetitive Surge Current

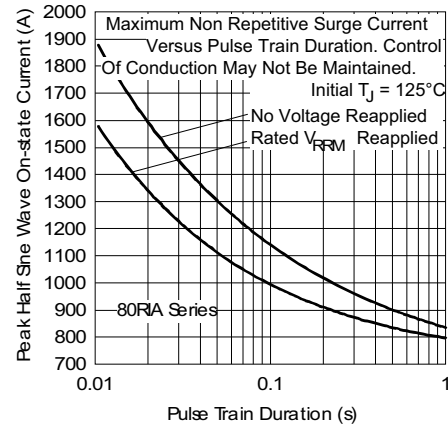


Fig. 6 - Maximum Non-Repetitive Surge Current

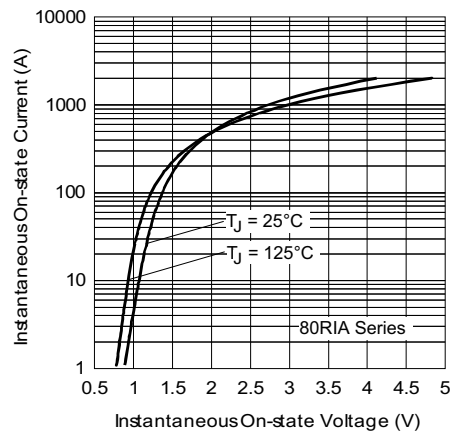


Fig. 7 - On-State Voltage Drop Characteristics

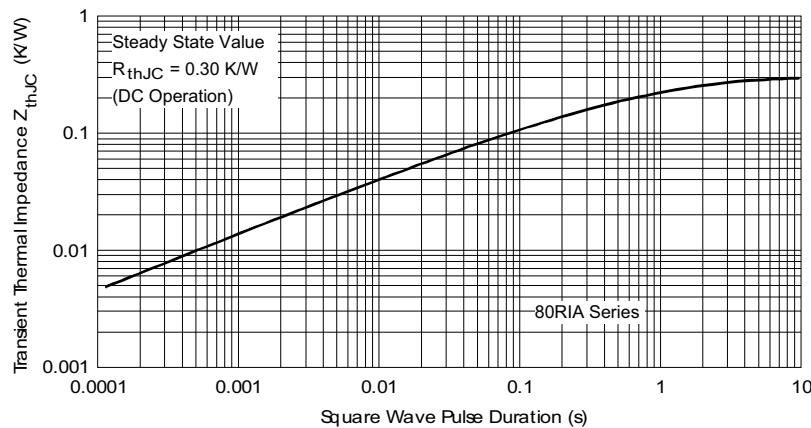


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

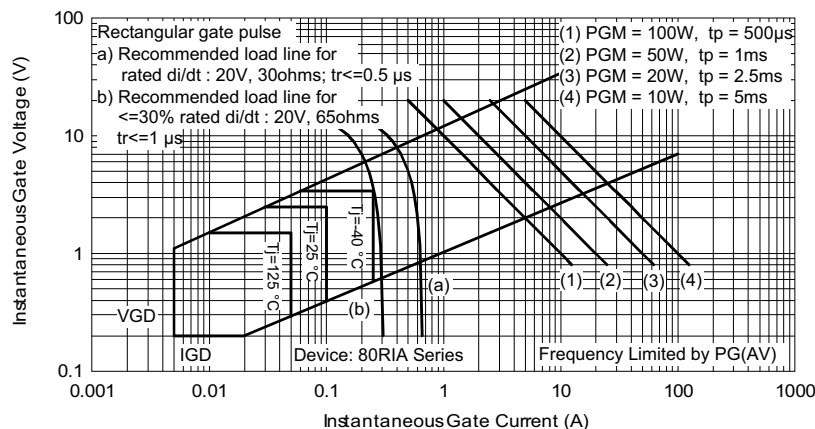


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	8	0	RIA	120	M	PbF
	1	2	3	4	5	6	7
1	Vishay Semiconductors product						
2	$I_{TAV} \times 10 \text{ A}$						
3	0 = Eyelet terminals (gate and auxiliary cathode leads) 1 = Fast-on terminals (gate and auxiliary cathode leads) 2 = Flag terminals (gate and auxiliary cathode terminals)						
4	RIA = Essential part number						
5	Voltage code $\times 100 = V_{RRM}$ (see Voltage Ratings table)						
6	- None = Stud base 1/2"-20UNF- 2 A threads - M = Stud base metric threads M12 x 1.75 E 6						
7	- None = Standard production - PbF = Lead (Pb)-free						

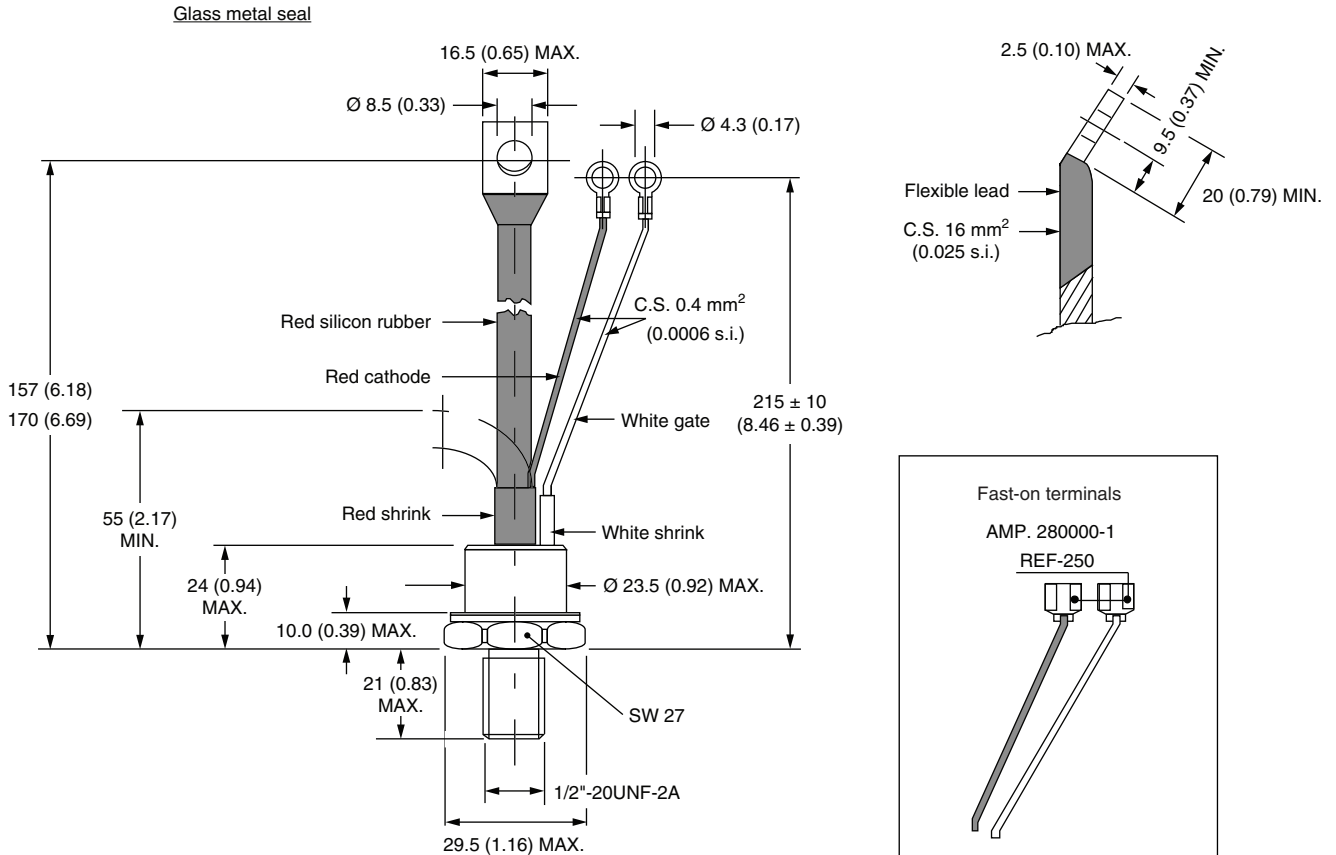
LINKS TO RELATED DOCUMENTS

Dimensions

www.vishay.com/doc?95362

TO-209AC (TO-94) for 80RIA Series

DIMENSIONS in millimeters (inches)





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. 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.