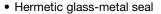
Vishay Semiconductors

Phase Control Thyristors (Stud Version), 180 A



PRIMARY CHARACTERISTICS				
I _{T(AV)}	180 A			
V _{DRM} /V _{RRM}	400 V, 800 V, 1000 V			
V_{TM}	1.35 V			
I _{GT}	65 mA			
TJ	-40 °C to +125 °C			
Package	TO-93 (TO-209AB)			
Circuit configuration	Single SCR			

FEATURES





• International standard case TO-93 (TO-209AB)

Designed and qualified for industrial level

ROHS COMPLIANT

 Material categorization: For definitions of compliance please see www.vishav.com/doc?99912

TYPICAL APPLICATIONS

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

MAJOR RATINGS AND CHARACTERISTICS					
PARAMETER	TEST CONDITIONS	VALUES	UNITS		
1		180	А		
I _{T(AV)}	T _C	80	°C		
I _{T(RMS)}		285			
ı	50 Hz	3800	A		
I _{TSM}	60 Hz	4000			
2 _t	50 Hz	72	1.42		
1-1	60 Hz	66	kA ² s		
V _{DRM} /V _{RRM}		400 to 1000	V		
tq	Typical	100	μs		
TJ		-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				
1/0 10001/1	40	400	500					
VS-180RKI VS-181RKI	80	800	900	30				
10 1011111	100	1000	1100					



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ABSOLUTE MAXIMUM RATINGS		1			T	
PARAMETER	SYMBOL		TEST CONE	DITIONS	VALUES	UNITS
Maximum average on-state current at case temperature	$I_{T(AV)}$	180° conduc	180° conduction, half sine wave		180 80	A °C
Maximum RMS on-state current	I _{RMS}	DC at 79 °C	case temperatu	re	285	
		t = 10 ms	No voltage		3800	
Maximum peak, one-cycle		t = 8.3 ms	reapplied		4000	A kA ² s
non-repetitive surge current	I _{TSM}	t = 10 ms	100 % V _{RRM}		3500	
		t = 8.3 ms	reapplied	Sinusoidal half wave,	3660	
Maximum 12t fau funia a	l ² t	t = 10 ms	No voltage	intial $T_J = T_J$ maximum	72	
		t = 8.3 ms	reapplied		66	
Maximum I ² t for fusing		t = 10 ms	100 % V _{RRM}		61	
		t = 8.3 ms	reapplied		56	
Maximum l ² √t for fusing	I²√t	t = 0.1 ms to 10 ms, no voltage reapplied		720	kA²√s	
Low level value of threshold voltage	V _{T(TO)1}	(16.7 % x π	$x \mid_{T(AV)} < I < \pi \times I$	$T(AV)$, $T_J = T_J$ maximum	0.83	V
High level value of threshold voltage	V _{T(TO)2}	$(I > \pi \times I_{T(AV)}), T_J = T_J \text{ maximum}$		0.89	V	
Low level value of on-state slope resistance	r _{t1}	(16.7 % x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J$ maximum		0.92	mΩ	
High level value of on-state slope resistance	r _{t2}	$(I > \pi \times I_{T(AV)}), T_J = T_J \text{ maximum}$		0.81	11122	
Maximum on-state voltage	V_{TM}	$I_{pk} = 570 \text{ A}, T_J = T_J \text{ maximum, } t_p = 10 \text{ ms sine pulse}$		1.35	V	
Maximum holding current	Ι _Η	T 25 °C 6	unada sunniv 12	V registive lead	600	mA
Typical latching current	ΙL	T _J = 25 °C, anode supply 12 V resistive load		1000	IIIA	

SWITCHING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum non-repetitive rate of rise of turned-on current	dl/dt	Gate drive 20 V, 20 Ω , $t_r \le 1~\mu s$ $T_J = T_J$ maximum, anode voltage $\le 80~\%~V_{DRM}$	300	A/μs
Typical delay time	t _d	Gate current 1 A, $dl_g/dt = 1 A/\mu s$ $V_d = 0.67 \% V_{DRM}$, $T_J = 25 °C$	1.0	110
Typical turn-off time	t _q	$I_{TM} = 50 \text{ A}, T_J = T_J \text{ maximum, dI/dt} = 10 \text{ A/}\mu\text{s},$ $V_R = 100 \text{ V}, \text{dV/dt} = 20 \text{ V/}\mu\text{s}$	100	μs

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



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TRIGGERING																
PARAMETER	SYMBOL	_	TEST CONDITIONS		VALUES VALUES		UES	LIMITO								
PARAMETER	STMBOL	'	EST CONDITIONS	TYP.	MAX.	UNITS										
Maximum peak gate power	P_{GM}	$T_J = T_J$ maximum,	t _p ≤ 5 ms	1	0	W										
Maximum average gate power	P _{G(AV)}	$T_J = T_J$ maximum,	f = 50 Hz, d% = 50	2	.0	VV										
Maximum peak positive gate current	I _{GM}			3	.0	Α										
Maximum peak positive gate voltage	+ V _{GM}	$T_J = T_J$ maximum,	$T_J = T_J$ maximum, $t_p \le 5$ ms		.0	V										
Maximum peak negative gate voltage	- V _{GM}		·			V										
		T _J = - 40 °C		130	-											
DC gate current required to trigger	I _{GT}	T _J = 25 °C	Maximum required gate trigger/	65	150	mA										
		T _J = 125 °C	current/voltage are the lowest value which will trigger all units	35	-											
		T _J = - 40 °C		2.0	-											
DC gate voltage required to trigger	V_{GT}	T _J = 25 °C	12 V anode to cathode applied	1.2	2.5	V										
				1								T _J = 125 °C		0.9	-	
DC gate current not to trigger	I_{GD}		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}	$T_J = T_J$ maximum		0.25		٧										

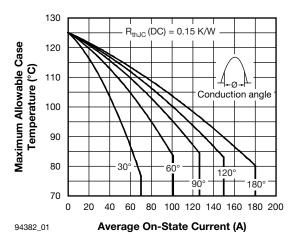
THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Maximum operating junction temperature range	TJ		-40 to 125	°C	
Maximum storage temperature range	T _{Stg}		-40 to 150	r	
Maximum thermal resistance, junction to case	R _{thJC}	DC operation	0.15	IZ 00/	
Maximum thermal resistance, junction to ambient	R _{thCS}	Mounting surface, smooth, flat and greased	0.04	- K/W	
Mounting force, ± 10 %		Non-lubricated threads	31 (275)	N·m	
		Lubricated threads	24.5 (210)	(lbf · in)	
Approximate weight			280	g	
Case style		See dimensions - link at the end of datasheet TO-93 (TO-209)		209AB)	

△R _{thJC} CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.050	0.032		
120°	0.063	0.059		
90°	0.080	0.082	$T_J = T_J$ maximum	K/W
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

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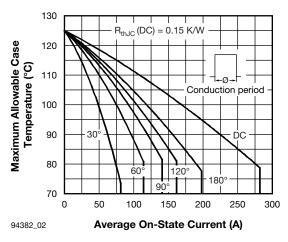
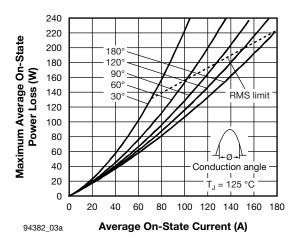


Fig. 2 - Current Ratings Characteristics



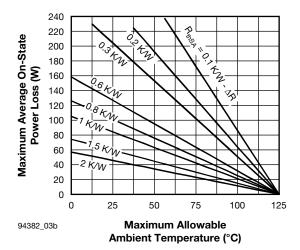
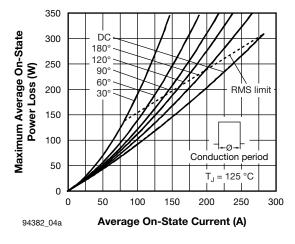


Fig. 3 - On-State Power Loss Characteristics



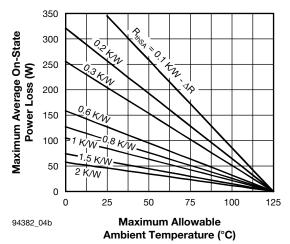


Fig. 4 - On-State Power Loss Characteristics

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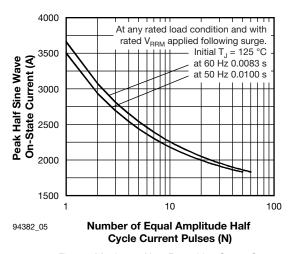


Fig. 5 - Maximum Non-Repetitive Surge Current

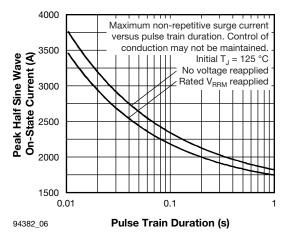


Fig. 6 - Maximum Non-Repetitive Surge Current

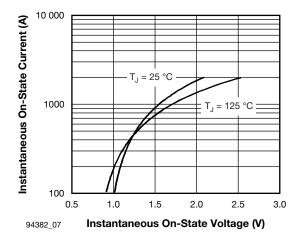


Fig. 7 - On-State Voltage Drop Characteristics

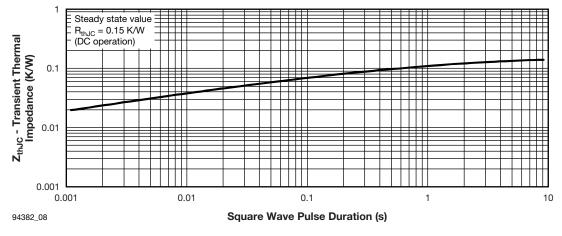


Fig. 8 - Thermal impedance Z_{thJC} Characteristics

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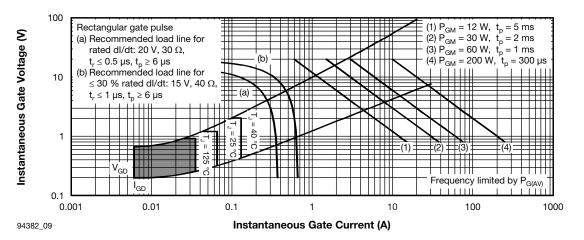
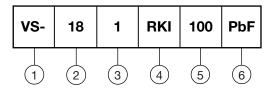


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code



- Vishay Semiconductors product
- 2 I_{T(AV)} rated average output current (rounded/10)
- 0 = eyelet terminals (gate and auxiliary cathode leads)
 - 1 = fast-on terminals (gate and auxiliary cathode leads)
- 4 Thyristor
- Voltage code x 10 = V_{RRM} (see Voltage Ratings table)
- 6 • None = standard production
 - PbF = lead (Pb)-free

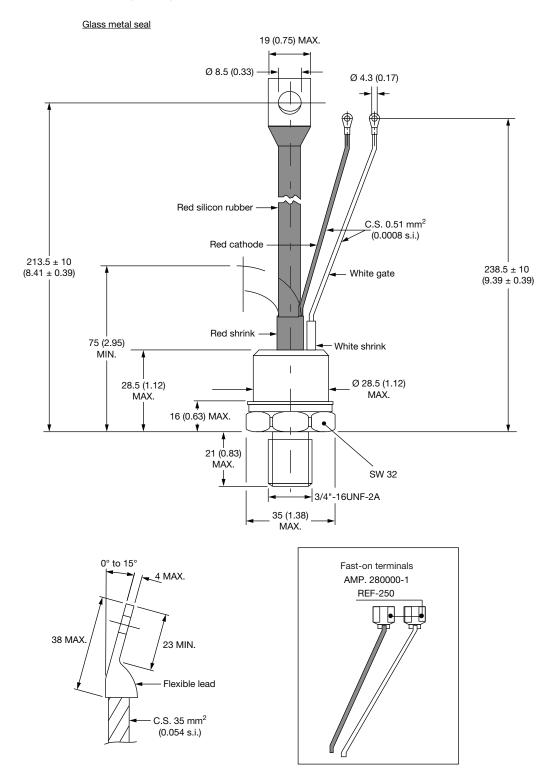
LINKS TO RELATED DOCUMENTS			
Dimensions	www.vishay.com/doc?95077		



Vishay Semiconductors

TO-209AB (TO-93)

DIMENSIONS in millimeters (inches)





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