

Single Thyristor (MAGN-A-PAK Block Power Module), 500 A



MAGN-A-PAK Block

FEATURES

- Electrically isolated base plate
- 3000 V_{RMS} isolating voltage
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL approved file E78996
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

PRIMARY CHARACTERISTICS	
I _{T(AV)}	500 A
Type	Modules - thyristor, standard
Package	MAGN-A-PAK block

APPLICATIONS

- Battery chargers
- Welders
- Power converters
- Alternators

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
V _{DRM} /V _{RRM}		800	V
I _{T(AV)}	76 °C	500	A
I _{T(RMS)}		785	
I _{TSM}	50 Hz	14 000	
	60 Hz	14 658	
I ² t	50 Hz	980	kA ² s
	60 Hz	894	
I ² √t		9800	kA ² √s
T _J	Range	-40 to +130	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS			
TYPE NUMBER	V _{RRM} /V _{DRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V _{RSM} /V _{DSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I _{RRM} /I _{DRM} AT 130 °C mA
VS-VSKS500/08PbF	800	900	80



ON-STATE CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum average on-state current at case temperature	$I_{T(AV)}$	180° conduction half sine wave		500	A	
				76	°C	
Maximum RMS on-state current	$I_{T(RMS)}$	As AC switch		785	A	
Maximum peak, one-cycle on-state, non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reappplied	16 646		
		t = 8.3 ms		17 430		
		t = 10 ms	100 % V_{RRM} reappplied	14 000		
		t = 8.3 ms		14 658		
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reappplied	1385		kA ² s
		t = 8.3 ms		1265		
		t = 10 ms	100 % V_{RRM} reappplied	894		
		t = 8.3 ms		894		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reappplied		1385	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 maximum		0.6839	V	
High level value of threshold voltage	$V_{T(TO)2}$	(I > $\pi \times I_{T(AV)}$), T_J maximum		0.7598		
Low level value on-state slope resistance	r_{t1}	(16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$), T_J maximum		0.393	mΩ	
High level value on-state slope resistance	r_{t2}	(I > $\pi \times I_{T(AV)}$), T_J maximum		0.389		
Maximum on-state voltage drop	V_{TM}	$T_J = 25\text{ °C}$, $I_{pk} = 500\text{ A}$		1.1	V	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Typical delay time	t_d	Gate current 1 A, $di_g/dt = 1\text{ A}/\mu\text{s}$, $V_d = 0.67\% V_{DRM}$, $T_J = 25\text{ °C}$, $I_t = 400\text{ A}$		1.3	μs
Typical turn-off time	t_q	$I_{TM} = 750\text{ A}$, $T_J = T_J$ maximum, $di/dt = 60\text{ A}/\mu\text{s}$, $V_R = 50\text{ V}$, $dV/dt = 20\text{ V}/\mu\text{s}$, Gate 0 V 100 Ω, $t_p = 500\text{ μs}$		200	

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 67 % rated V_{DRM}		500	V/μs
Maximum peak reverse and off-state leakage current	I_{DRM} , I_{RRM}	$T_J = T_J$ maximum, rated V_{DRM}/V_{RRM} applied		80	mA
RMS insulation voltage	V_{INS}	50 Hz, circuit to base, all terminal shorted, t = 1 s		3000	V



TRIGGERING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak gate power	P_{GM}	$T_J = T_J$ maximum, $t_p \leq 5$ ms	10.0	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 required DC gate voltage to trigger	V_{GT}	$T_J = 25$ °C Anode supply: 12 V resistive load	3	V
Maximum required DC gate current to trigger	I_{GT}		200	mA
Maximum holding current	I_H		600	
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 voltage not to trigger	V_{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	0.30	V
DC gate current not to trigger	I_{GD}		10	mA
Maximum non-repetitive rate of rise of turned-on current	di/dt	Gate drive 20 V, 20 Ω , $t_r \leq 1$ μ s $T_J = T_J$ maximum, anode voltage ≤ 80 % V_{DRM} , $I_t = 400$ A	1000	A/ μ s

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction operating and storage temperature range	T_J, T_{Stg}		-40 to +130	°C
Maximum thermal resistance, junction to case per junction	R_{thJC}	DC operation	0.08	K/W
Maximum thermal resistance, case to heatsink per module	R_{thCS}	Mounting surface smooth, flat and greased	0.035	
Mounting torque ± 10 %	MAGN-A-PAK block to heatsink	A mounting compound is recommended and the torque should be rechecked after a period of 3 h to allow for the spread of the compound. Lubricated threads.	6 to 8	Nm
	busbar to MAGN-A-PAK block		12 to 15	
Approximate weight			430	g
			15.3	oz.
Case style			MAGN-A-PAK block	

ΔR CONDUCTION PER JUNCTION											
DEVICES	SINUSOIDAL CONDUCTION AT T_J MAXIMUM					RECTANGULAR CONDUCTION AT T_J MAXIMUM					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VS-VSKS500	0.013	0.0148	0.018	0.026	0.044	0.082	0.0142	0.019	0.027	0.044	K/W

Note

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

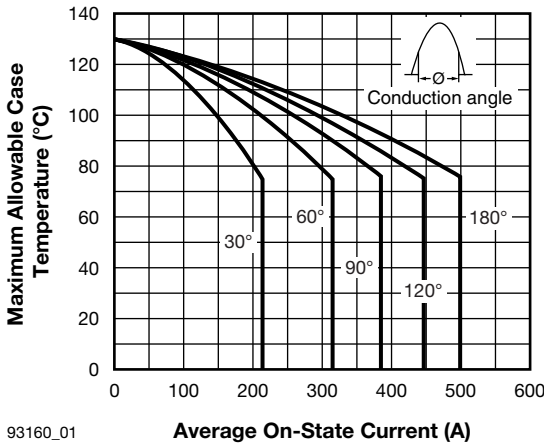


Fig. 1 - Current Rating Characteristics

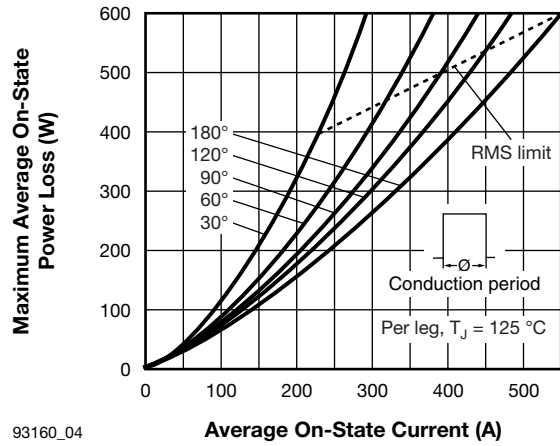


Fig. 4 - On-State Power Loss Characteristics

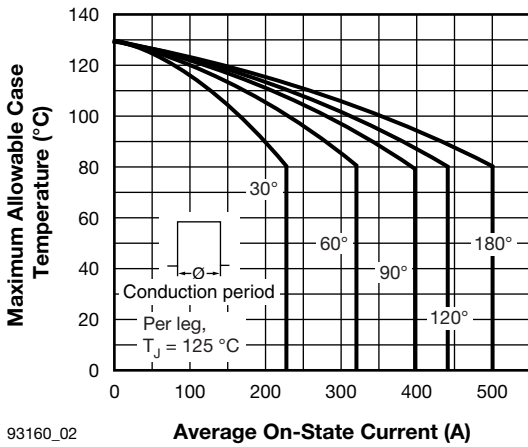


Fig. 2 - Current Rating Characteristics

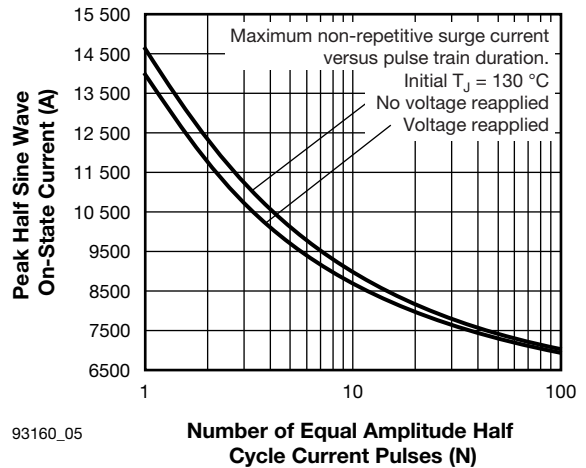


Fig. 5 - Maximum Non-Repetitive Surge Current

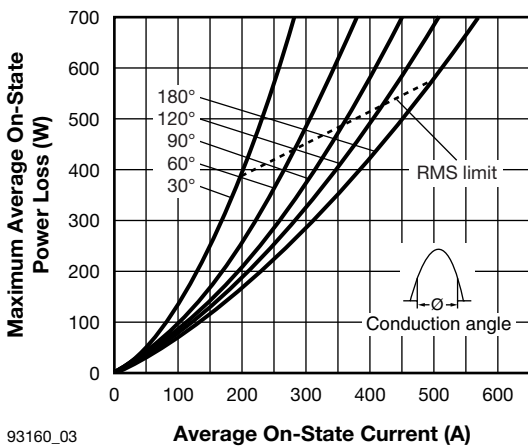


Fig. 3 - On-State Power Loss Characteristics

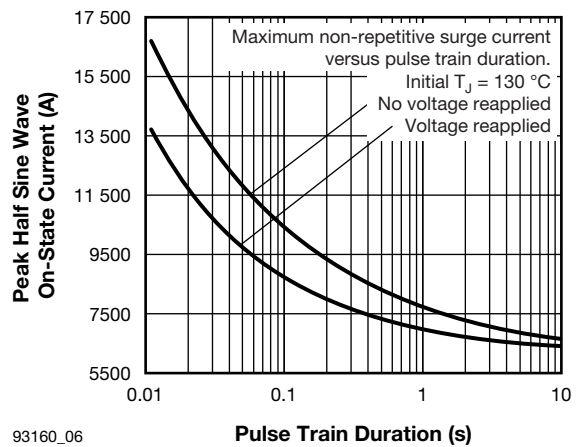


Fig. 6 - Maximum Non-Repetitive Surge Current

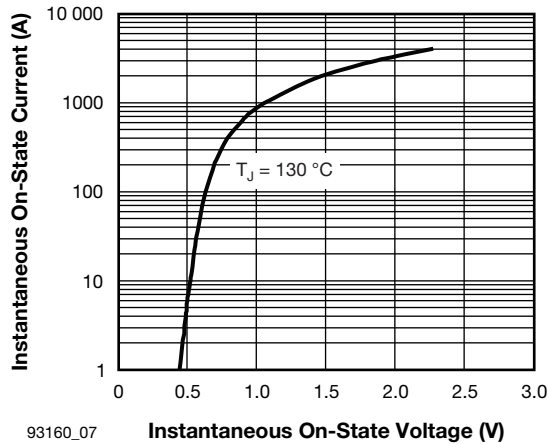


Fig. 7 - On-State Voltage Drop Characteristics

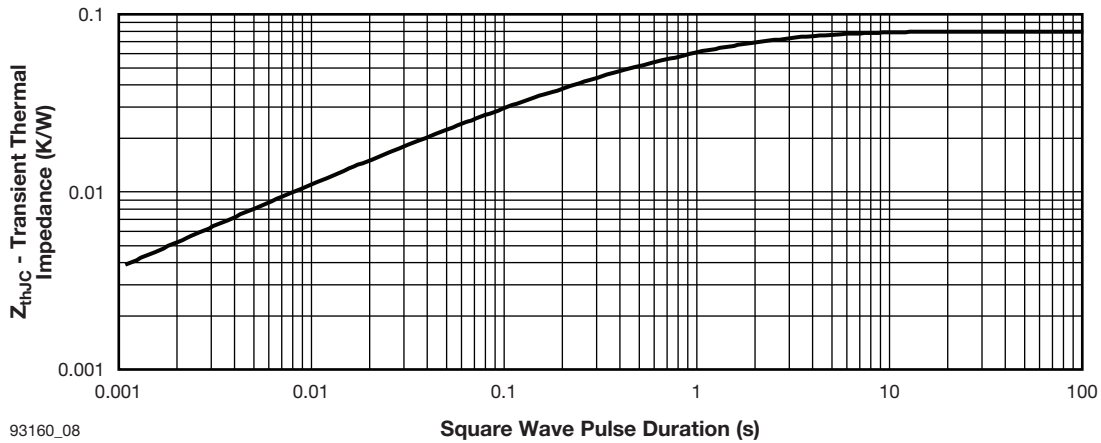


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	VSK	S	500	/	08	PbF
	①	②	③	④		⑤	⑥

- 1** - Vishay Semiconductors product
- 2** - Module type
- 3** - Circuit configuration (S = single SCR)
- 4** - Current rating (500 = 500 A)
- 5** - Voltage rating (08 = 800 V)
- 6** - PbF = lead (Pb)-free

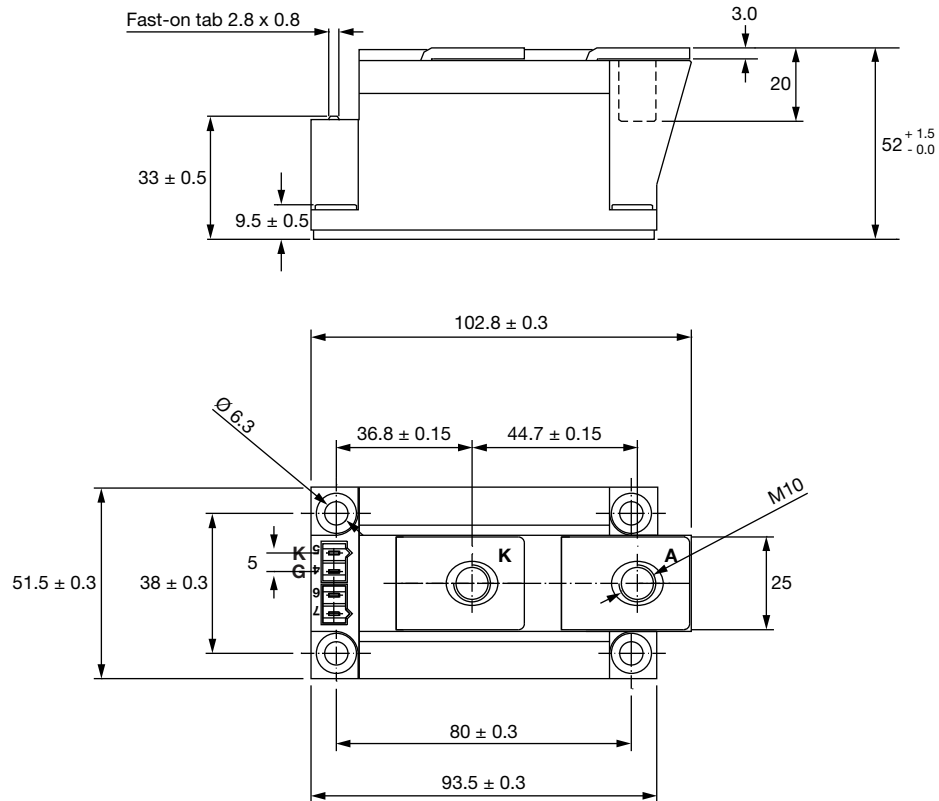


CIRCUIT CONFIGURATION	
CIRCUIT DESCRIPTION	CIRCUIT DRAWING
Single SCR	<p>The circuit drawing consists of two parts. On the left is a physical view of the VS-VSKS500/08PbF SCR package, showing a central vertical component with two side leads. The top lead is labeled '1', the middle lead is labeled '2', and the bottom lead is labeled 'K1 G1'. On the right is a schematic diagram of the SCR. It shows a triangle representing the cathode, with a horizontal line above it representing the gate. The top terminal is labeled '2 (+)', the bottom terminal is labeled '3 (-)', the left terminal is labeled 'K1', and the right terminal is labeled 'G1'.</p>

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95379

Thyristor MAP Block

DIMENSIONS in millimeters



Notes

- Dimensions are nominal
- Full engineering drawings are available on request



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