

Thyristor/Thyristor (SUPER MAGN-A-PAK Power Modules), 570 A



SUPER MAGN-A-PAK

FEATURES

- High current capability
- High surge capability
- Industrial standard package
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- Designed and qualified for industrial level
- UL approved file E78996 
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

TYPICAL APPLICATIONS

- Motor starters
- DC motor controls - AC motor controls
- Uninterruptible power supplies

PRODUCT SUMMARY

$I_{T(AV)}$	570 A
Type	Modules - Thyristor, Standard
Package	SMAP
Circuit	Two SCRs Doubler Circuit

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{T(AV)}$	$T_C = 85\text{ }^{\circ}\text{C}$	570	A
$I_{T(RMS)}$	$T_C = 85\text{ }^{\circ}\text{C}$	894	
I_{TSM}	50 Hz	18 000	
	60 Hz	18 800	
I^2t	50 Hz	1620	kA ² s
	60 Hz	1473	
$I^2\sqrt{t}$		16 200	kA ² $\sqrt{s}$
V_{DRM}/V_{RRM}		1600	V
T_{Stg}	Range	-40 to +125	$^{\circ}\text{C}$
T_J	Range	-40 to +135	

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	V_{RRM}/V_{DRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}/I_{DRM} MAXIMUM AT $T_J = T_J$ MAXIMUM mA
VS-VSKT570-16PbF	16	1600	1700	110



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			570	A
					85	°C
Maximum RMS on-state current	I _{T(RMS)}	180° conduction, half sine wave at T _C = 85 °C			894	A
Maximum peak, one-cycle, non-repetitive on-state surge current	I _{TSM} , I _{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T _J = T _J maximum	18.0	kA
		t = 8.3 ms			18.8	
		t = 10 ms	100 % V _{RRM} reapplied		15.1	
		t = 8.3 ms			15.8	
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reapplied		1620	kA ² s
		t = 8.3 ms			1473	
		t = 10 ms	100 % V _{RRM} reapplied		1146	
		t = 8.3 ms			1042	
Maximum I ² /√t for fusing	I ² /√t	t = 0.1 ms to 10 ms, no voltage reapplied			16 200	kA ² /√s
Low level value or threshold voltage	V _{T(TO)1}	(16.7 % × π × I _{T(AV)} < I < π × I _{T(AV)}), T _J = T _J maximum			0.59	V
High level value of threshold voltage	V _{T(TO)2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.63	
Low level value on-state slope resistance	r _{t1}	(16.7 % × π × I _{T(AV)} < I < π × I _{T(AV)}), T _J = T _J maximum			0.41	mΩ
High level value on-state slope resistance	r _{t2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.38	
Maximum on-state voltage drop	V _{TM}	I _{pk} = 1500 A, T _J = 25 °C, t _p = 10 ms sine pulse			1.36	V
Maximum holding current	I _H	T _J = 25 °C, anode supply 12 V resistive load			500	mA
Maximum latching current	I _L				1000	

SWITCHING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum rate of rise of turned-on current	di/dt	$T_J = T_J$ maximum, $I_{TM} = 400\text{ A}$, V_{DRM} applied	1000	A/μs
Typical delay time	t_d	Gate current 1 A, $di_g/dt = 1\text{ A/μs}$ $V_d = 0.67\text{ % }V_{DRM}$, $T_J = 25\text{ °C}$	2.0	μs
Typical turn-off time	t_q	$I_{TM} = 750\text{ A}$; $T_J = T_J$ maximum, $di/dt = -60\text{ A/μs}$, $V_R = 50\text{ V}$, $dV/dt = 20\text{ V/μs}$, gate 0 V 100 Ω	65 to 240	

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 $V_D = 80\text{ % }V_{DRM}$	1000	V/μs
RMS insulation voltage	V_{INS}	t = 1 s	3000	V
Maximum peak reverse and off-state leakage current	I_{RRM}, I_{DRM}	$T_J = T_J$ maximum, rated V_{DRM}/V_{RRM} applied	110	mA



TRIGGERING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak gate power	P_{GM}	$T_J = T_J$ maximum, $t_p \leq 5$ ms	10	W
Maximum peak 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	$+V_{GM}$		20	
Maximum peak negative gate voltage	$-V_{GM}$		5.0	
Maximum DC gate current required to trigger	I_{GT}	$T_J = 25$ °C, V_{ak} 12 V	200	mA
DC gate voltage required to trigger	V_{GT}		3.0	
DC gate current not to trigger	I_{GD}	$T_J = T_J$ maximum	10	mA
DC gate voltage not to trigger	V_{GD}		0.25	V

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction operating temperature range	T_J		-40 to +135	°C
Maximum storage temperature range	T_{Stg}		-40 to +125	
Maximum thermal resistance, junction to case per junction	R_{thJC}	DC operation	0.06	K/W
Maximum thermal resistance, case to heatsink per module	R_{thC-hs}	Mounting surface smooth, flat and greased	0.02	
Mounting torque ± 10 %	SMAP to heatsink	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound.	6-8	Nm
	busbar to SMAP		12-15	
Approximate weight			1500	g
Case style		See dimensions (link at the end of datasheet)	SUPER MAGN-A-PAK	

ΔR_{thJC} CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.009	0.006	$T_J = T_J$ maximum	K/W
120°	0.011	0.011		
90°	0.014	0.015		
60°	0.021	0.022		
30°	0.037	0.038		

Note

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

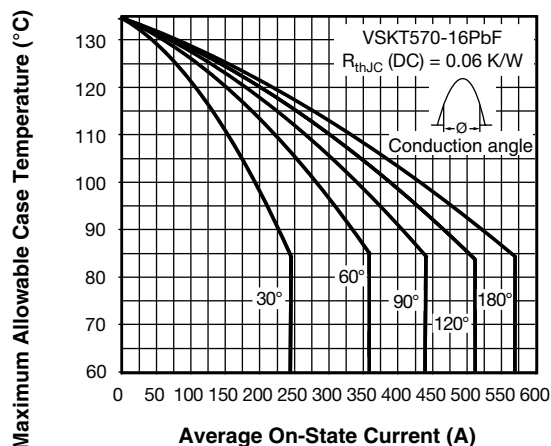


Fig. 1 - Current Ratings Characteristics

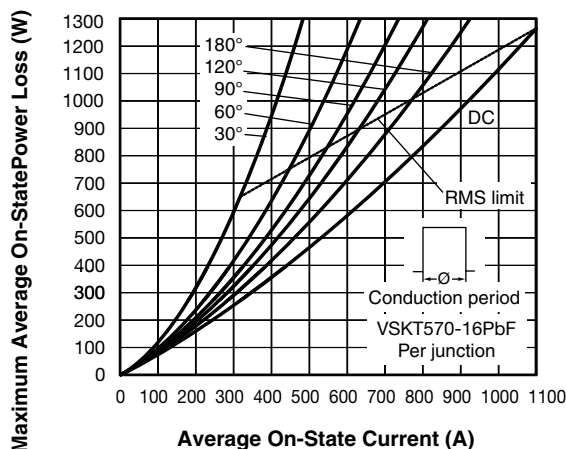


Fig. 4 - On-State Power Loss Characteristics

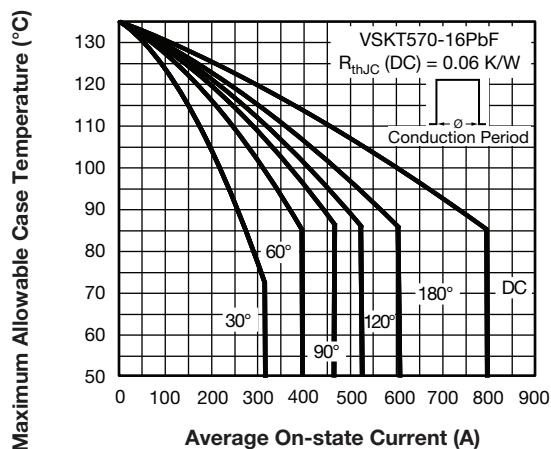


Fig. 2 - Current Ratings Characteristics

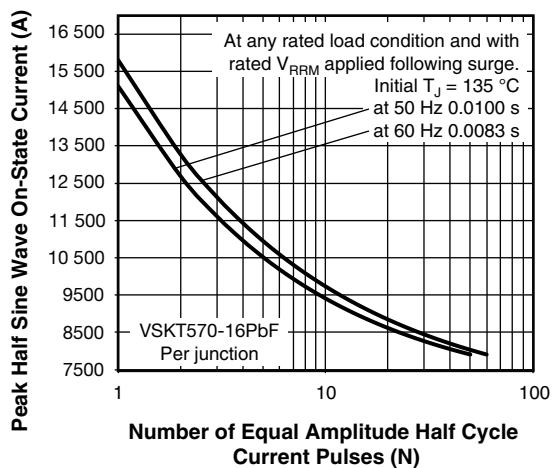


Fig. 5 - Maximum Non-Repetitive Surge Current

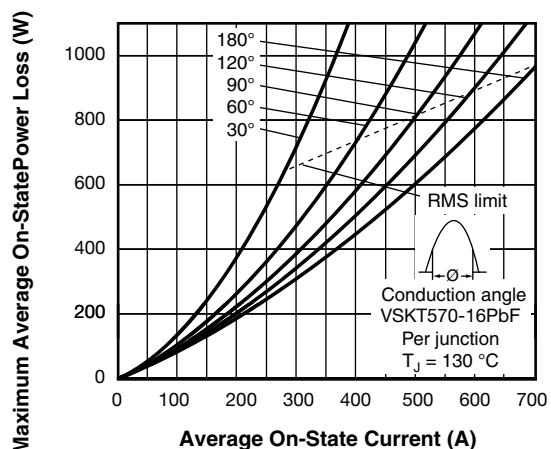


Fig. 3 - On-State Power Loss Characteristics

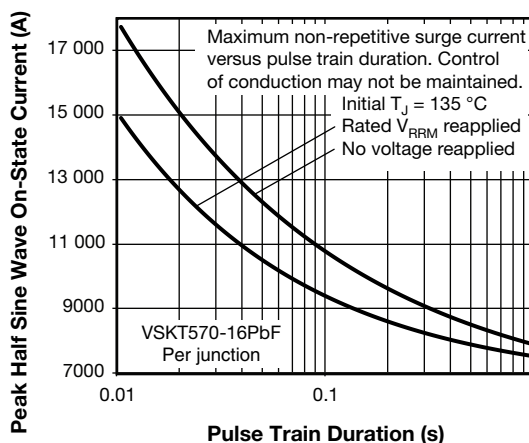


Fig. 6 - Maximum Non-Repetitive Surge Current

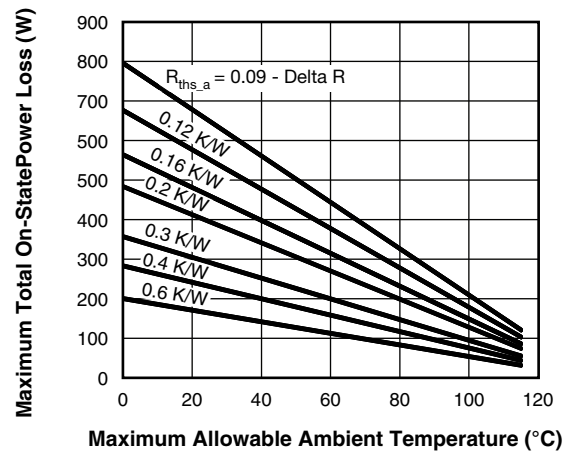
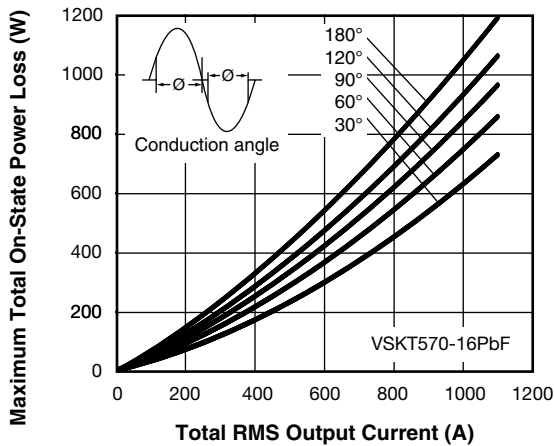


Fig. 7 - On-State Power Loss Characteristics

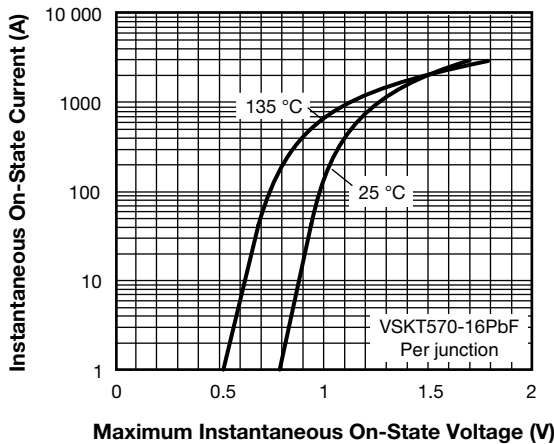


Fig. 8 - On-State Voltage Drop Characteristics

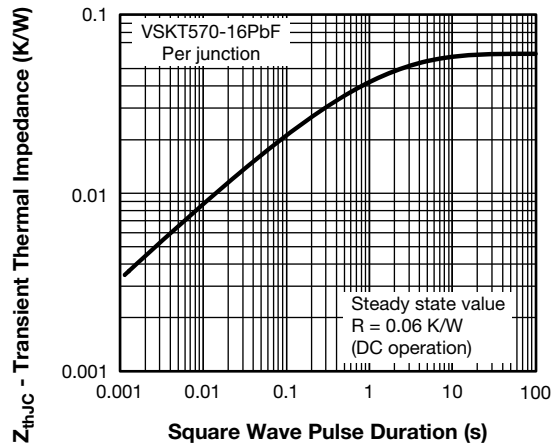


Fig. 9 - Thermal Impedance Z_{ThJC} Characteristics

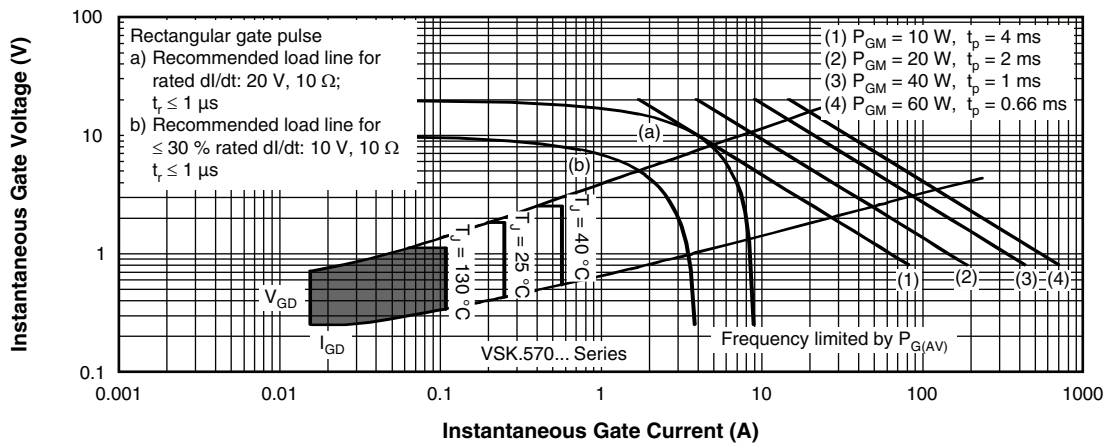


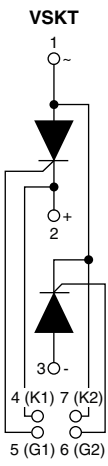
Fig. 10 - Gate Characteristics



ORDERING INFORMATION TABLE

Device code	VS-	VSK	T	570	-	16	PbF
	1	2	3	4		5	6

- 1** - Vishay Semiconductors product
- 2** - Module type
- 3** - Circuit configuration (see below)
- 4** - Current rating
- 5** - Voltage code x 100 = V_{RRM}
- 6** - Lead (Pb)-free

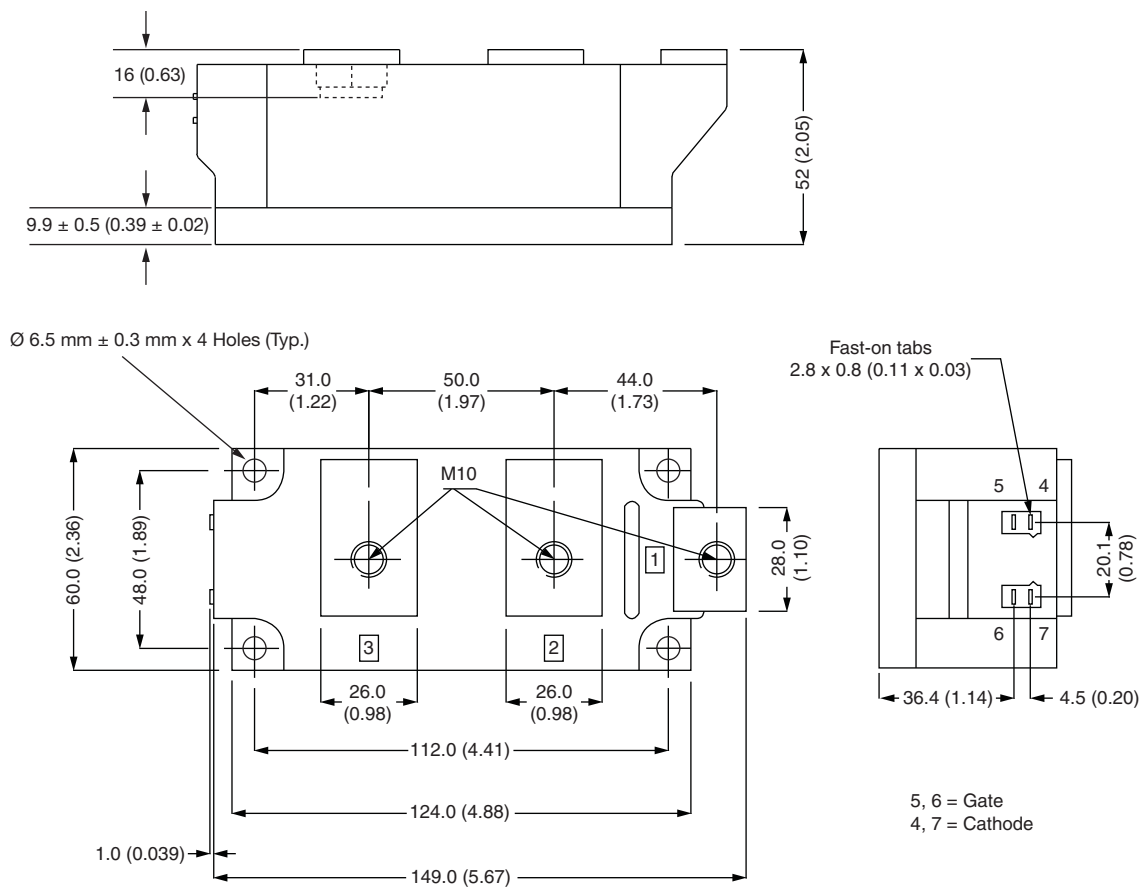
CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two SCRs doubler circuit	T	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95283



Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)





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