

Thyristor/Diode (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

PRIMARY CHARACTERISTICS

$I_{T(AV)}$	570 A
Type	Modules - thyristor/diode
Package	Super MAGN-A-PAK

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{T(AV)}, I_{F(AV)}$	$T_C = 85\text{ }^{\circ}\text{C}$	570	A
$I_{T(RMS)}$	$T_C = 85\text{ }^{\circ}\text{C}$	894	
I_{TSM}	50 Hz	18 000	
	60 Hz	18 800	kA ² s
I^2t	50 Hz	1620	
	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-VSKH570-16PbF	16	1600	1700	110



ON-STATE CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum average on-state current at case temperature	$I_{T(AV)}, I_{F(AV)}$	180° conduction, half sine wave			570	A
					85	°C
Maximum RMS on-state current	$I_{T(RMS)}$	180° conduction, half sine wave at $T_C = 85\text{ °C}$			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^2t for fusing	I^2t	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 $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	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 % x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J$ maximum			0.59	V
High level value of threshold voltage	$V_{T(TO)2}$	(I > π x $I_{T(AV)}$), $T_J = T_J$ maximum			0.63	
Low level value 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			0.41	mΩ
High level value on-state slope resistance	r_{t2}	(I > π x $I_{T(AV)}$), $T_J = T_J$ maximum			0.38	
Maximum on-state voltage drop	SCR V_{TM}	$I_{pk} = 1500\text{ A}$, $T_J = 25\text{ °C}$, $t_p = 10\text{ ms}$ sine pulse			1.36	V
	Diode V_{FM}					
Maximum holding current	I_H	$T_J = 25\text{ °C}$, 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 $A/\mu s$
Typical delay time	t_d	Gate current 1 A, $di_g/dt = 1\text{ A}/\mu s$ $V_d = 0.67\% V_{DRM}, T_J = 25\text{ °C}$			2.0 μs
Typical turn-off time	t_q	$I_{TM} = 750\text{ A}; T_J = T_J$ maximum, $di/dt = -60\text{ A}/\mu s$, $V_R = 50\text{ V}, dV/dt = 20\text{ V}/\mu s$, gate 0 V 100 Ω			65 to 240 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 $V_D = 80\% V_{DRM}$			1000 $V/\mu s$
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	V
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	R_{thC-hs}		0.02	
Mounting torque ± 10 %	Super MAGN-A-PAK 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 to 8	Nm
	busbar to super MAGN-A-PAK		12 to 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

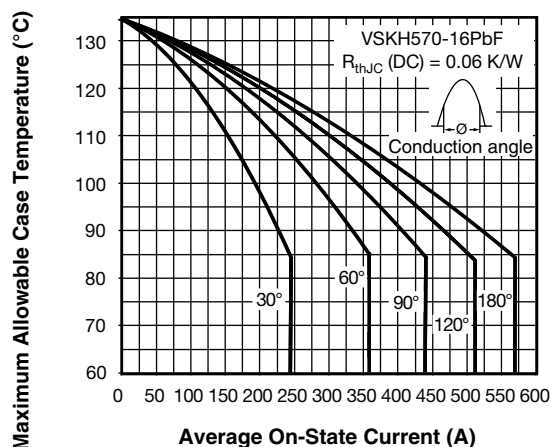


Fig. 1 - Current Ratings Characteristics

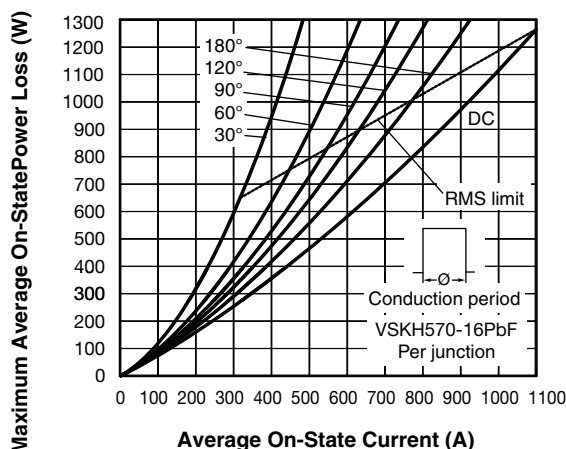


Fig. 4 - On-State Power Loss Characteristics

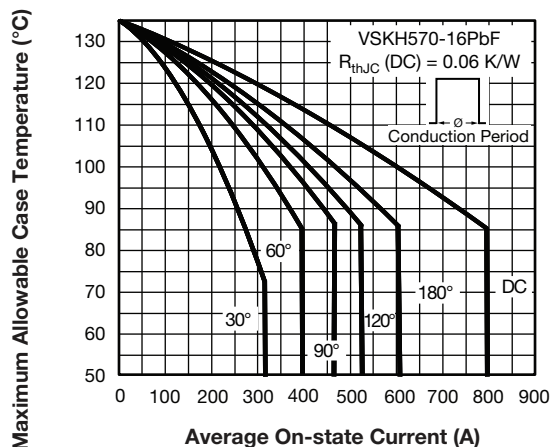


Fig. 2 - Current Ratings Characteristics

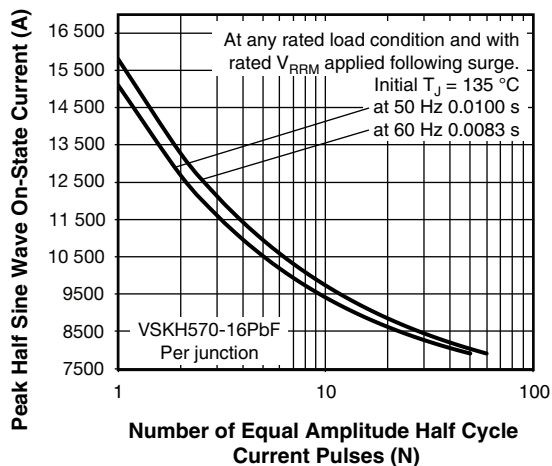


Fig. 5 - Maximum Non-Repetitive Surge Current

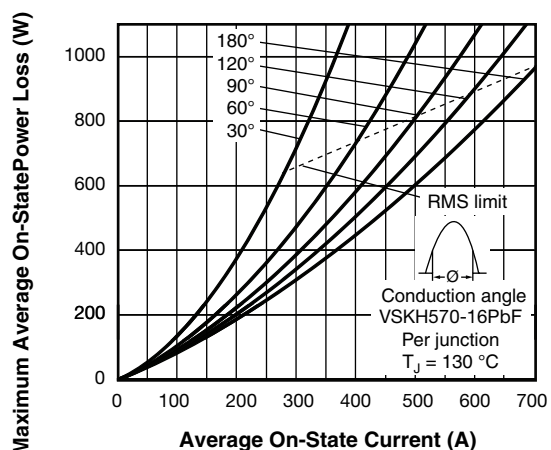


Fig. 3 - On-State Power Loss Characteristics

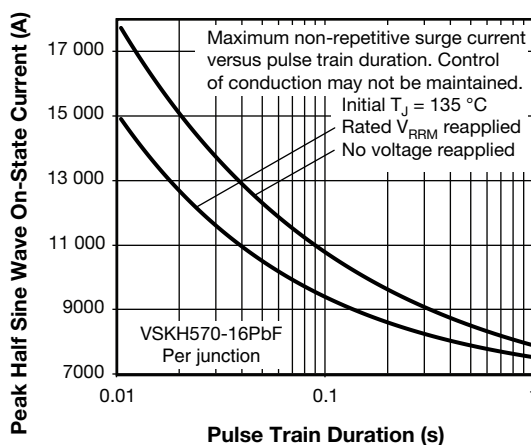


Fig. 6 - Maximum Non-Repetitive Surge Current

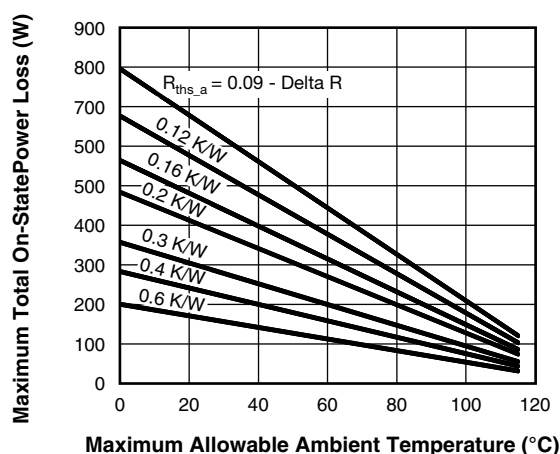
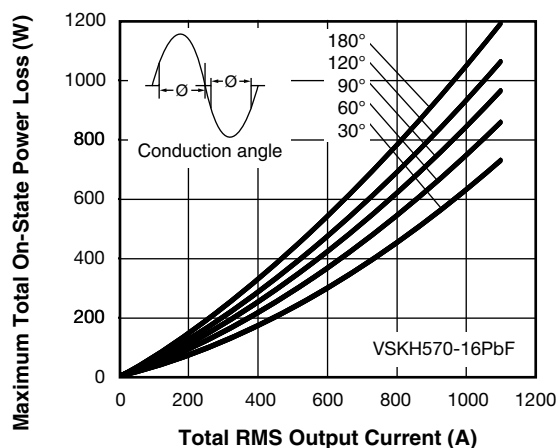


Fig. 7 - On-State Power Loss Characteristics

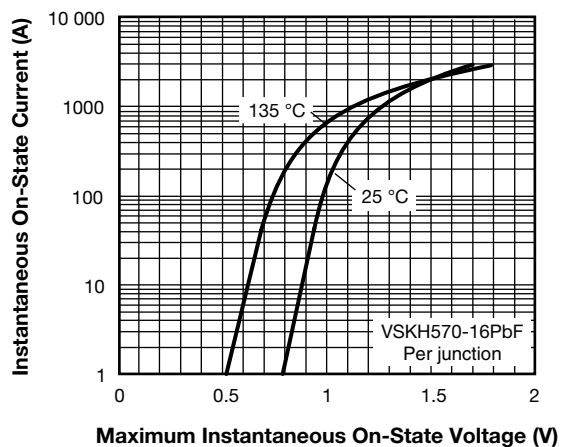
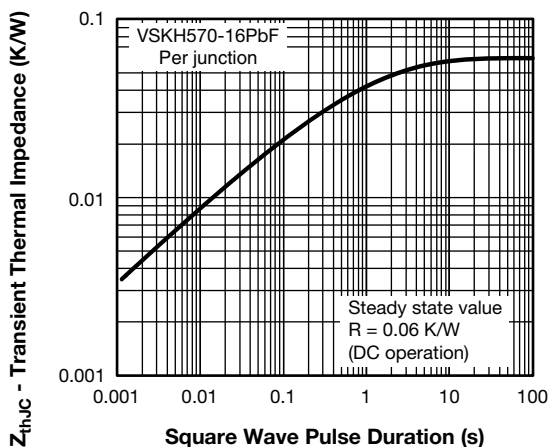


Fig. 8 - On-State Voltage Drop Characteristics

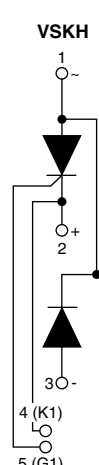

Fig. 9 - Thermal Impedance Z_{thJC} Characteristics



ORDERING INFORMATION TABLE

Device code	VS-VS	KH	570	-	16	PbF
	1	2	3		4	5
	1	2	3		4	5
	1	2	3		4	5
	1	2	3		4	5
	1	2	3		4	5

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

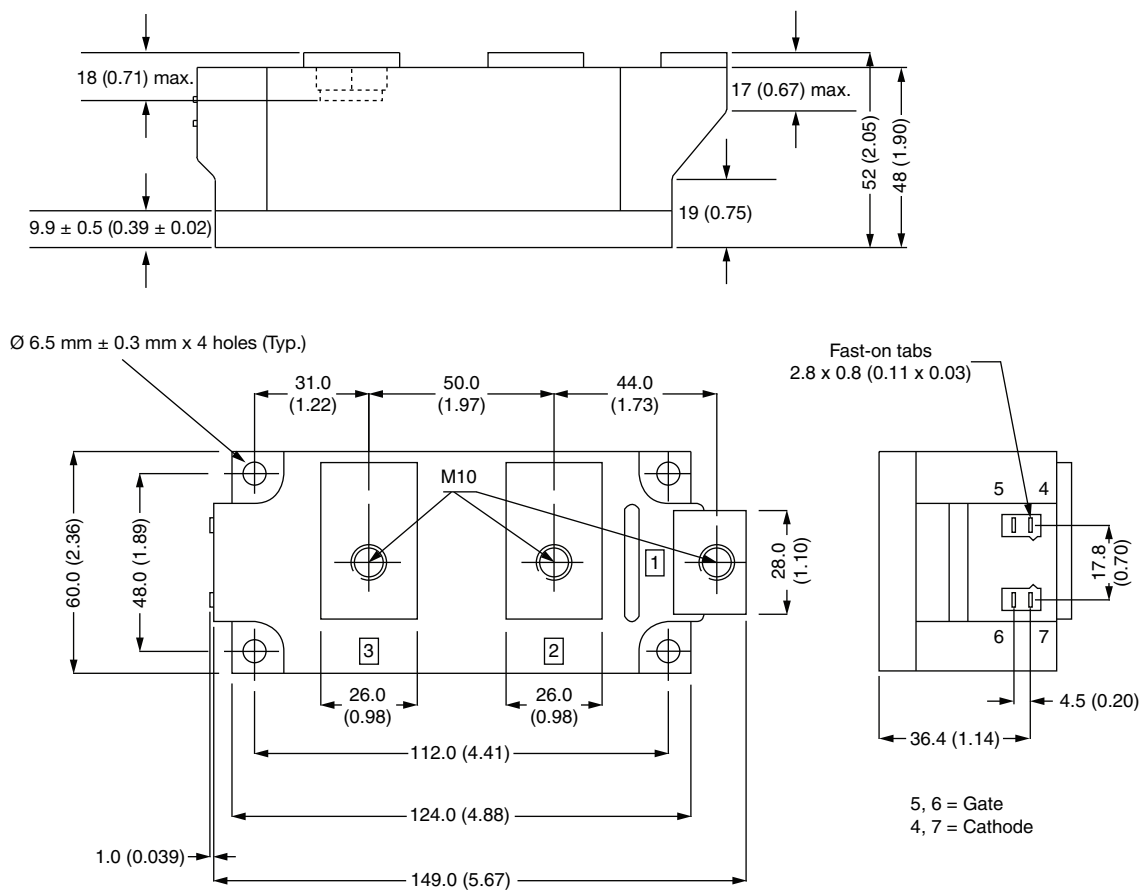
CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
SCR/diode doubler circuit	KH	

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



Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)





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