Thyristor/Diode and Thyristor/Thyristor, 430 A (SUPER MAGN-A-PAK Power Modules)

SUPER MAGN-A-PAK

FEATURES

- High current capability
- High surge capability
- High voltage ratings up to 2000 V
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- Industrial standard package
- UL approved file E78996
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY	
$I_{T(AV)}$	430 A
Type	Modules - Thyristor
Package	SMAP
Circuit	Two SCRs doubler circuit

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{T(AV)}$		430	A
	T_C	82	°C
$I_{T(RMS)}$		675	A
	T_C	82	°C
I_{TSM}	50 Hz	15.7	kA
	60 Hz	16.4	
I^2t	50 Hz	1232	kA^2s
	60 Hz	1125	
$I^2\sqrt{t}$		12 320	$kA^2\sqrt{s}$
V_{RRM}	Range	1600 to 2000	V
T_J	Range	- 40 to 150	°C
T_{Stg}	Range	- 40 to 130	

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
VSK.430..	16	1600	1700	100
	18	1800	1900	
	20	2000	2100	

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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			430	A
					82	°C
Maximum RMS on-state current	$I_{T(RMS)}$	180° conduction, half sine wave at T_C = 82 °C			675	A
Maximum peak, one-cycle, non-repetitive surge current	I_{TSM}, I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T_J = T_J maximum	15.7	kA
		t = 8.3 ms			16.4	
		t = 10 ms	100 % V_{RRM} reapplied		13.2	
		t = 8.3 ms			13.8	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		1232	kA^2s
		t = 8.3 ms			1125	
		t = 10 ms	100 % V_{RRM} reapplied		871	
		t = 8.3 ms			795	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			12 320	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x π x $I_{T(AV)}$ < I < π x $I_{T(AV)}$), T_J = T_J maximum			0.96	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{T(AV)}$), T_J = T_J maximum			1.06	
Low level value of on-state slope resistance	r_{f1}	(16.7 % x π x $I_{T(AV)}$ < I < π x $I_{T(AV)}$), T_J = T_J maximum			0.51	mΩ
High level value of on-state slope resistance	r_{f2}	(I > π x $I_{T(AV)}$), T_J = T_J maximum			0.45	
Maximum on-state voltage drop	V_{TM}	I_{pk} = 1500 A, T_J = 25 °C, t_p = 10 ms sine pulse			1.65	V
Maximum forward voltage drop	V_{FM}	I_{pk} = 1500 A, T_J = 25 °C, t_p = 10 ms sine pulse			1.65	V
Maximum holding current	I_H	T_J = 25 °C, anode supply 12 V resistive load			500	mA
Typical 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 A, V_{DRM} applied	1000	A/µs
Typical delay time	t_d	Gate current 1 A, dI_g/dt = 1 A/µs V_d = 0.67 % V_{DRM}, T_J = 25 °C	2.0	µs
Typical turn-off time	t_q	I_{TM} = 750 A, T_J = T_J maximum, dI/dt = - 60 A/µs V_R = 50, dV/dt = 20 V/µs, Gate 0 V 100 Ω	200	

BLOCKING				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum critical rate of rise of off-state voltage	dV/dt	T_J = 130 °C, linear to V_D = 80 % 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	100	mA

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THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER		**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum junction operating temperature range		T_J		- 40 to 130	°C
Maximum storage temperature range		T_{Stg}		- 40 to 150	
Maximum thermal resistance, junction to case per junction		R_{thJC}	DC operation	0.065	K/W
Maximum thermal resistance, case to heatsink		R_{thC-hs}		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 to 8	Nm
	busbar to SMAP			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

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

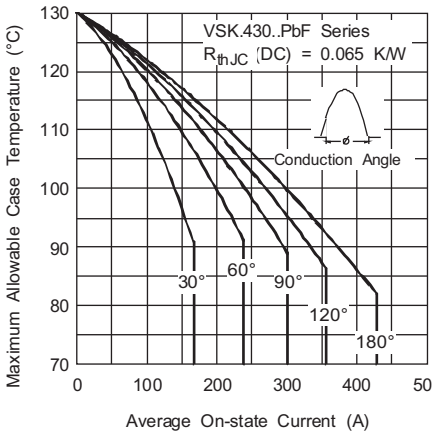

Fig. 1 - Current Ratings Characteristics

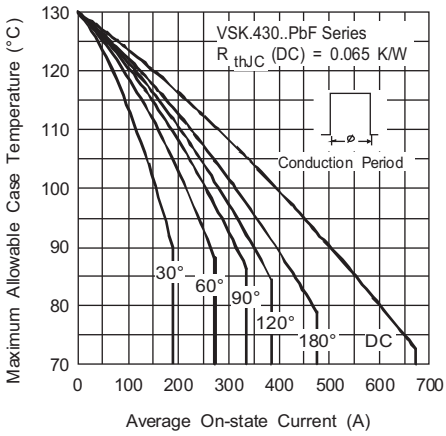

Fig. 2 - Current Ratings Characteristics

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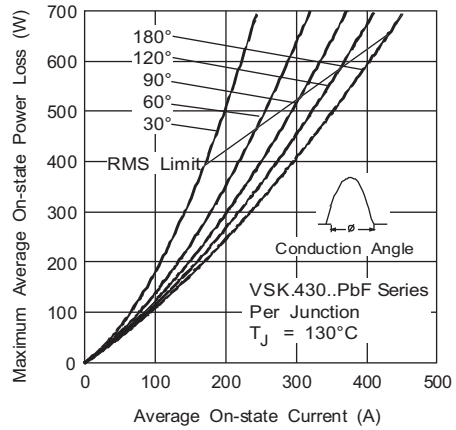

Fig. 3 - On-State Power Loss Characteristics

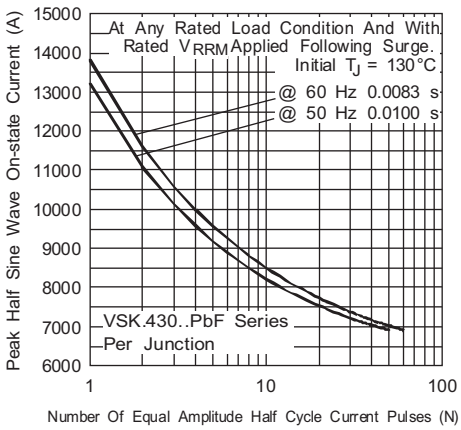

Fig. 5 - Maximum Non-Repetitive Surge Current

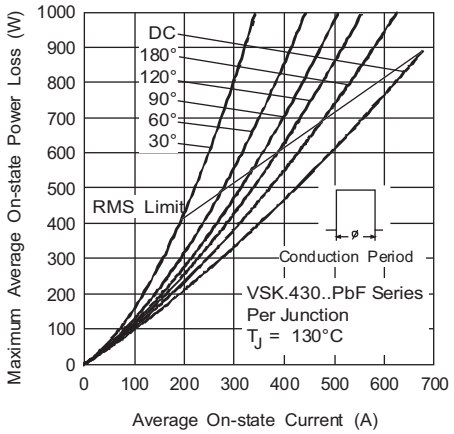

Fig. 4 - On-State Power Loss Characteristics

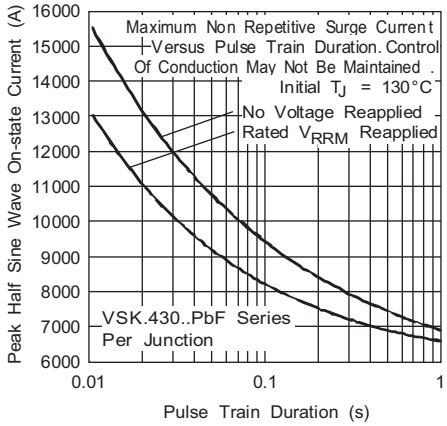

Fig. 6 - Maximum Non-Repetitive Surge Current

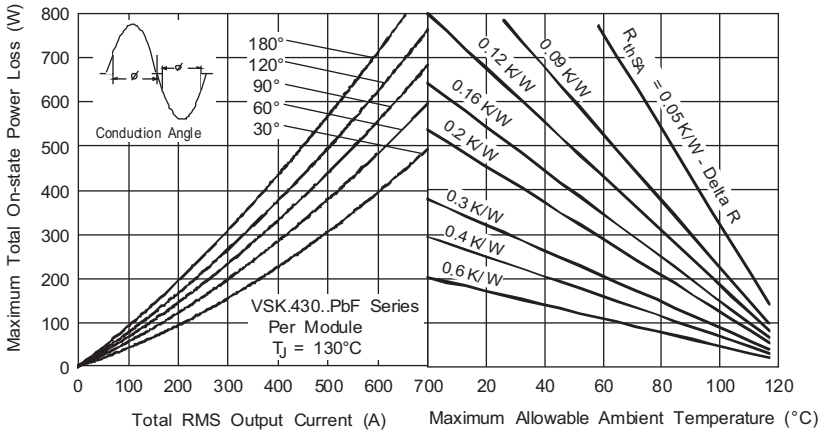

Fig. 7 - On-State Power Loss Characteristics

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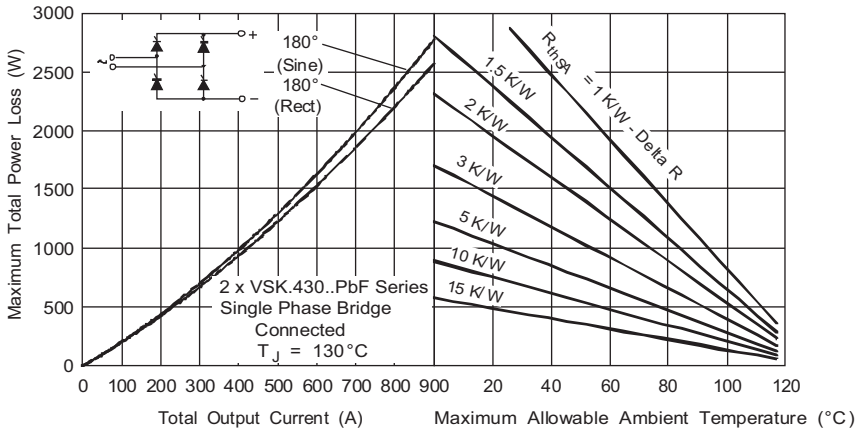

Fig. 8 - On-State Power Loss Characteristics

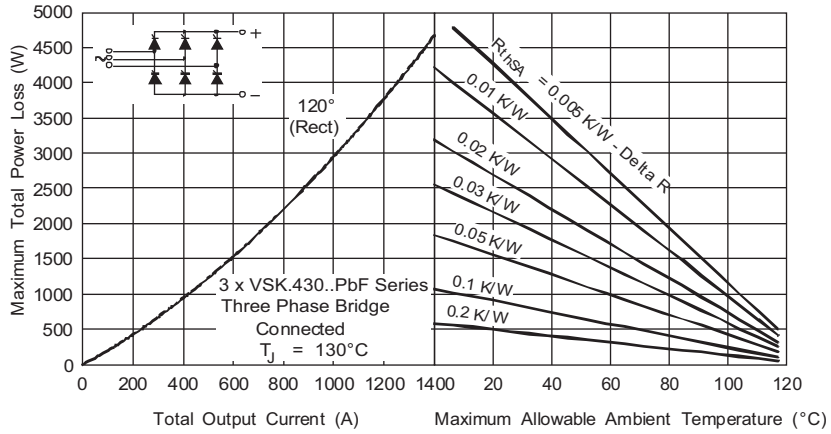

Fig. 9 - On-State Power Loss Characteristics

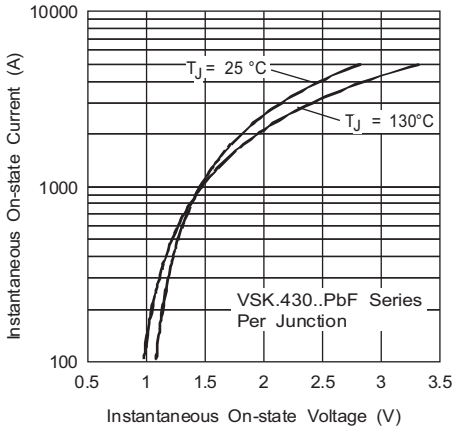

Fig. 10 - On-State Voltage Drop Characteristics

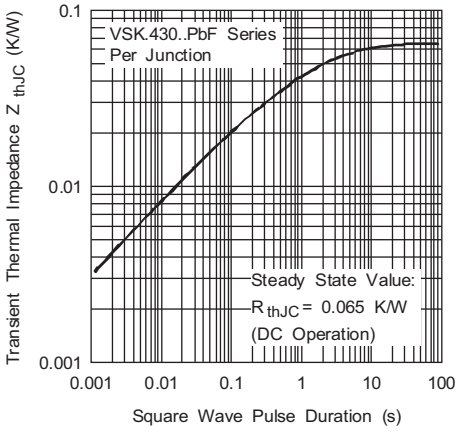

Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

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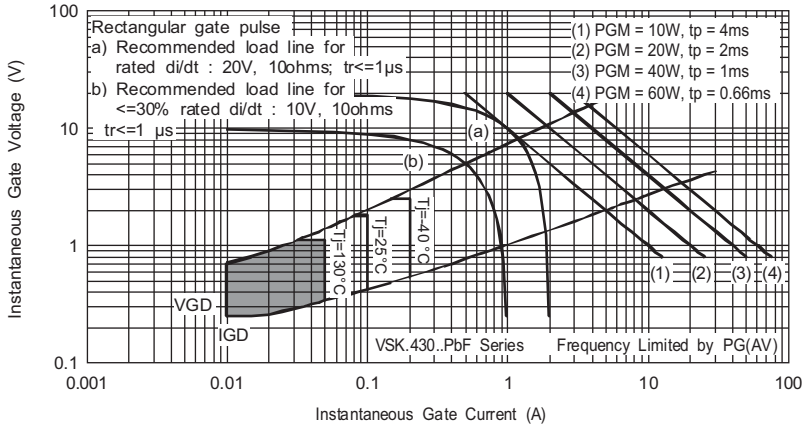


Fig. 12 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code

VSK	T	430	-	20	PbF
1	2	3		4	5

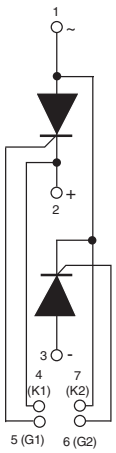
1	-	Module type
2	-	Circuit configuration (see end of datasheet)
3	-	Current rating
4	-	Voltage code x 100 = V_{RRM} (see Voltage Ratings table)
5	-	Lead (Pb)-free

Note

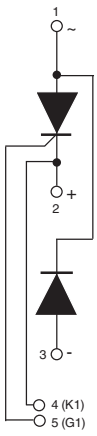
- To order the optional hardware go to www.vishay.com/doc?95172

CIRCUIT CONFIGURATION

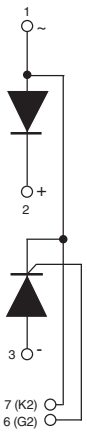
VSKT...



VSKH...



VSKL...



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

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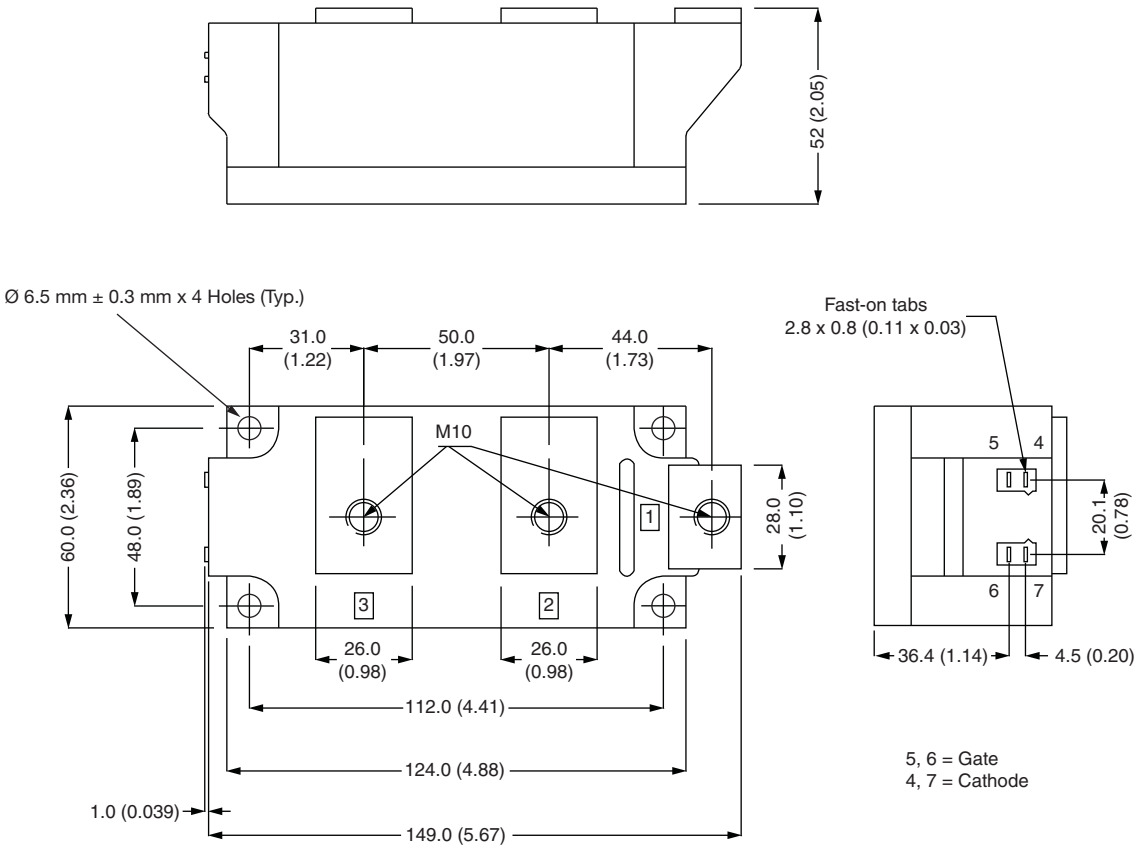
Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)



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