

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



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 
- Compliant to RoHS directive 2002/95/EC



RoHS
COMPLIANT

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY

$I_{T(AV)}$	430 A
-------------	-------

MAJOR RATINGS AND CHARACTERISTICS

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

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 $T_C = 82\text{ °C}$			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		kA ² s
		t = 8.3 ms			13.8		
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		1232	kA ² s	
		t = 8.3 ms			1125		
		t = 10 ms	100 % V_{RRM} reapplied		871		kA ² √s
		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 √s	
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % × π × $I_{T(AV)}$ < I < π × $I_{T(AV)}$), $T_J = T_J$ maximum			0.96	V	
High level value of threshold voltage	$V_{F(TO)2}$	(I > π × $I_{T(AV)}$), $T_J = T_J$ maximum			1.06		
Low level value of on-state slope resistance	r_{f1}	(16.7 % × π × $I_{T(AV)}$ < I < π × $I_{T(AV)}$), $T_J = T_J$ maximum			0.51	mΩ	
High level value of on-state slope resistance	r_{f2}	(I > π × $I_{T(AV)}$), $T_J = T_J$ maximum			0.45		
Maximum on-state voltage drop	V_{TM}	$I_{pk} = 1500\text{ A}$, $T_J = 25\text{ °C}$, $t_p = 10\text{ ms}$ sine pulse			1.65	V	
Maximum forward voltage drop	V_{FM}	$I_{pk} = 1500\text{ A}$, $T_J = 25\text{ °C}$, $t_p = 10\text{ ms}$ sine pulse			1.65	V	
Maximum holding current	I_H	$T_J = 25\text{ °C}$, 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



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 $\pm 10\%$	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

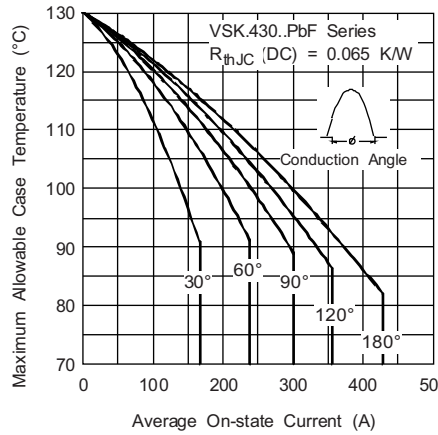


Fig. 1 - Current Ratings Characteristics

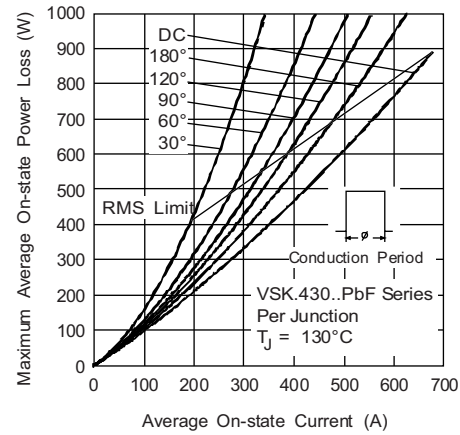


Fig. 4 - On-State Power Loss Characteristics

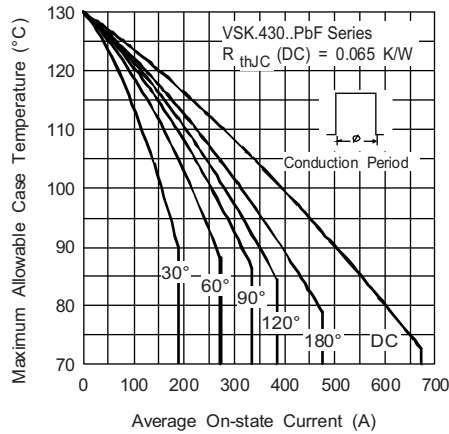


Fig. 2 - Current Ratings Characteristics

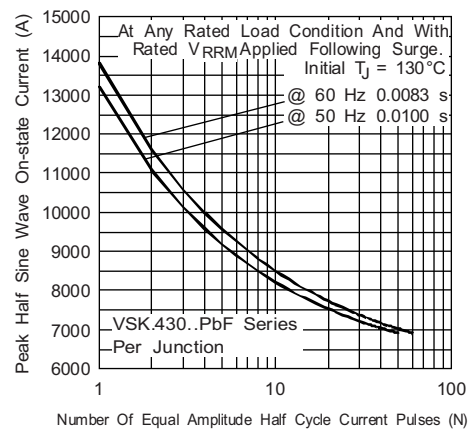


Fig. 5 - Maximum Non-Repetitive Surge Current

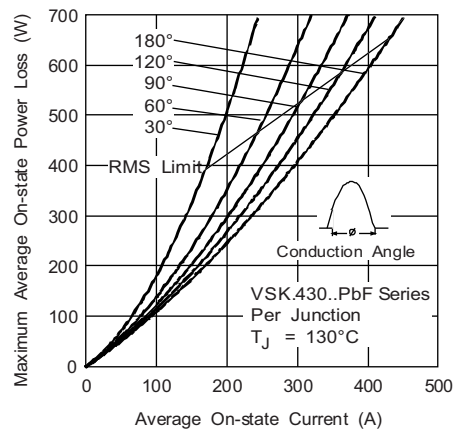


Fig. 3 - On-State Power Loss Characteristics

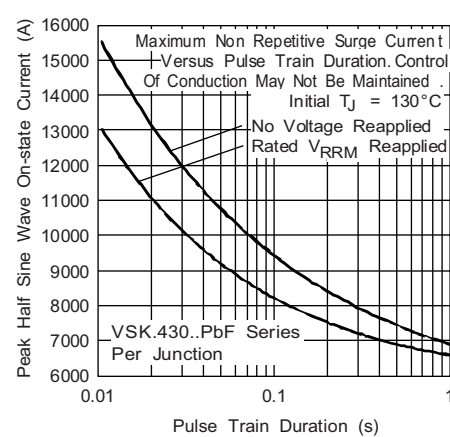


Fig. 6 - Maximum Non-Repetitive Surge Current

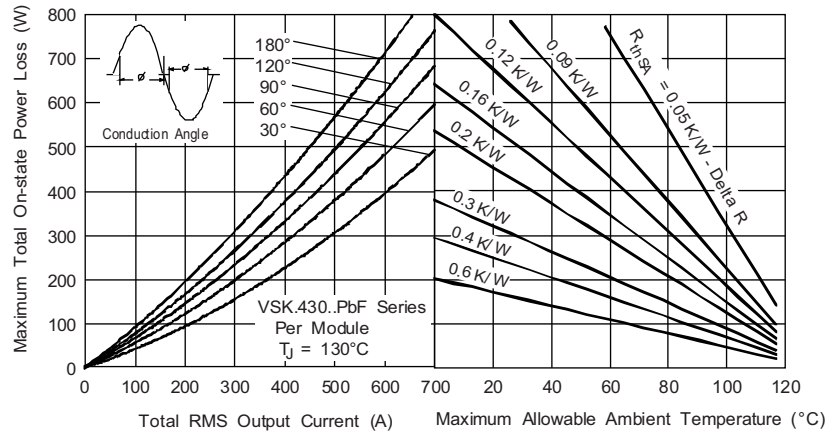


Fig. 7 - On-State Power Loss Characteristics

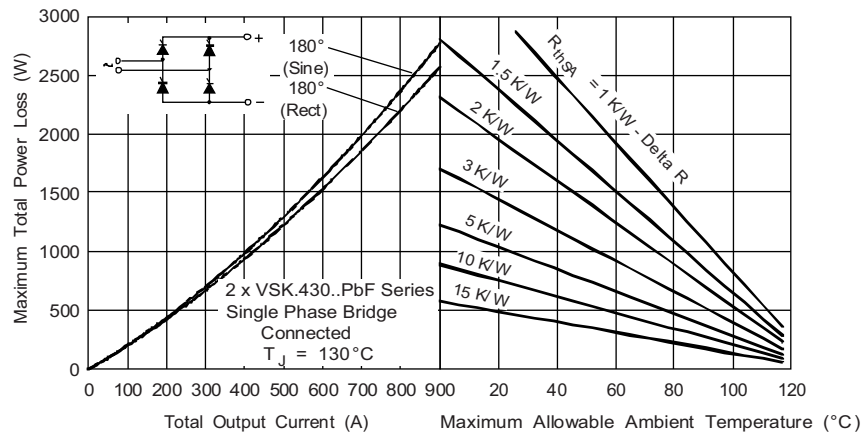


Fig. 8 - On-State Power Loss Characteristics

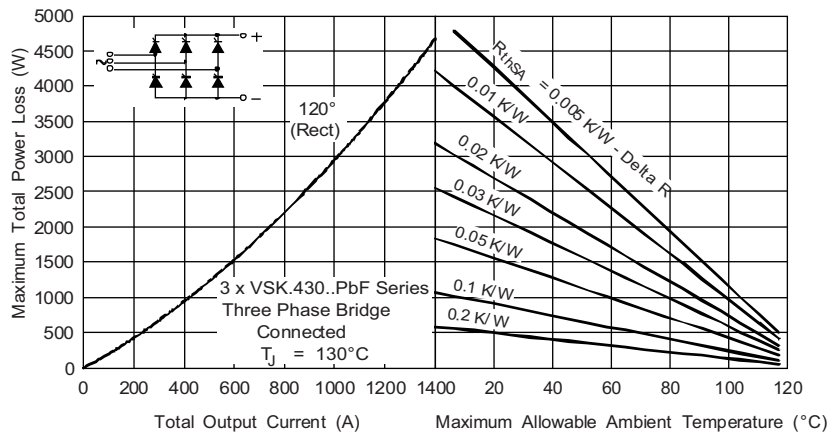
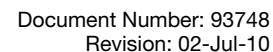
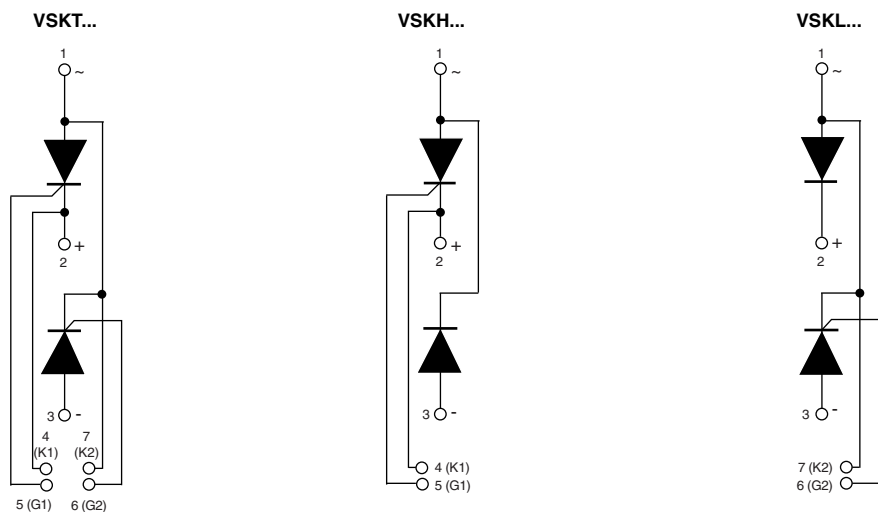


Fig. 9 - On-State Power Loss Characteristics

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



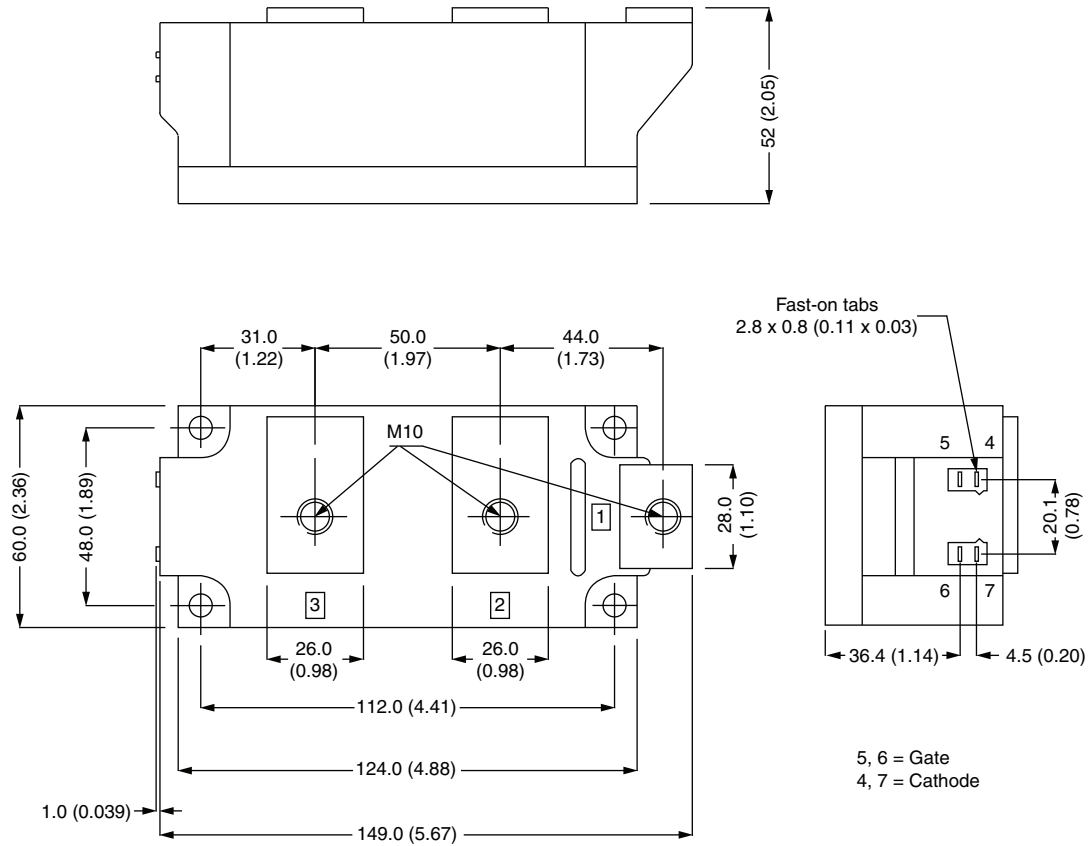
CIRCUIT CONFIGURATION



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

Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)





Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.