

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
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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}	$t = 10\text{ ms}$	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	kA
		$t = 8.3\text{ ms}$			
		$t = 10\text{ ms}$	100 % V_{RRM} reapplied		
		$t = 8.3\text{ ms}$			
Maximum I^2t for fusing	I^2t	$t = 10\text{ ms}$	No voltage reapplied		kA ² s
		$t = 8.3\text{ ms}$			
		$t = 10\text{ ms}$	100 % V_{RRM} reapplied		
		$t = 8.3\text{ ms}$			
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms}$ to 10 ms , no voltage reapplied		12 320	kA ² √s
Low level value of threshold voltage	$V_{F(TO)1}$	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.96	V
High level value of threshold voltage	$V_{F(TO)2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		1.06	
Low level value of on-state slope resistance	r_{f1}	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.51	mΩ
High level value of on-state slope resistance	r_{f2}	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ 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, $I_{TM} = 400\text{ A}$, V_{DRM} applied		1000	A/μs
Typical delay time	t_d	Gate current 1 A, $di_g/dt = 1\text{ A}/\mu\text{s}$ $V_d = 0.67\% V_{DRM}$, $T_J = 25\text{ °C}$		2.0	μs
Typical turn-off time	t_q	$I_{TM} = 750\text{ A}$, $T_J = T_J$ maximum, $di/dt = -60\text{ A}/\mu\text{s}$ $V_R = 50$, $dV/dt = 20\text{ V}/\mu\text{s}$, Gate 0 V 100 Ω		200	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum critical rate of rise of off-state voltage	dV/dt	$T_J = 130\text{ °C}$, linear to $V_D = 80\% V_{DRM}$		1000	V/μs
RMS insulation voltage	V_{INS}	$t = 1\text{ s}$		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

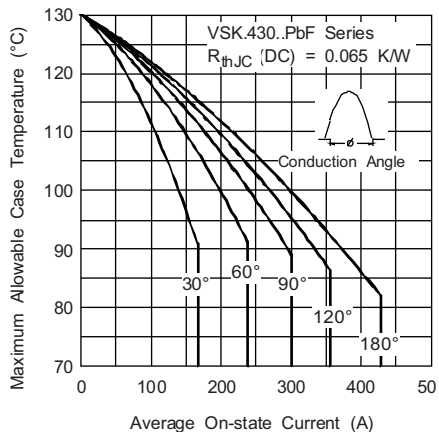


Fig. 1 - Current Ratings Characteristics

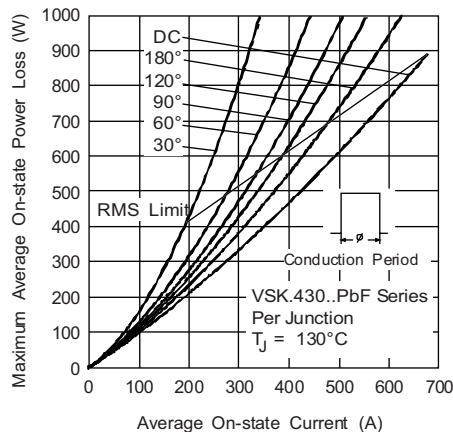


Fig. 4 - On-State Power Loss Characteristics

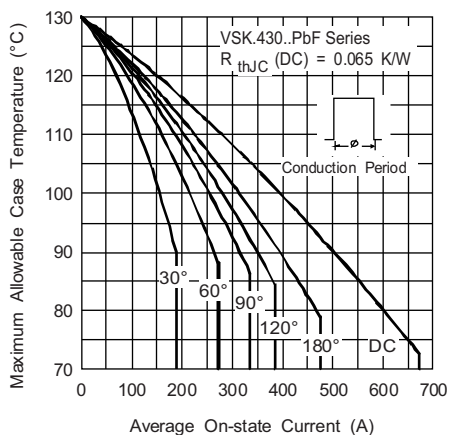


Fig. 2 - Current Ratings Characteristics

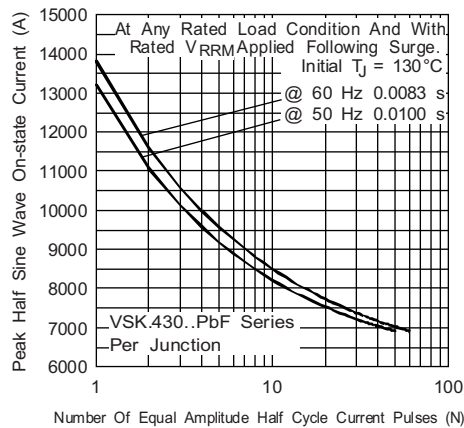


Fig. 5 - Maximum Non-Repetitive Surge Current

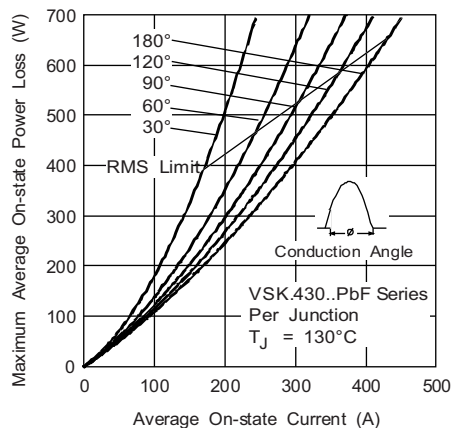


Fig. 3 - On-State Power Loss Characteristics

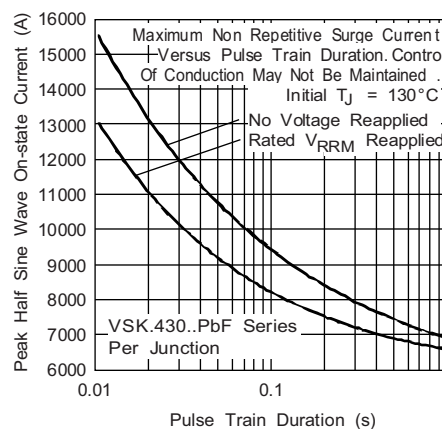


Fig. 6 - Maximum Non-Repetitive Surge Current

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

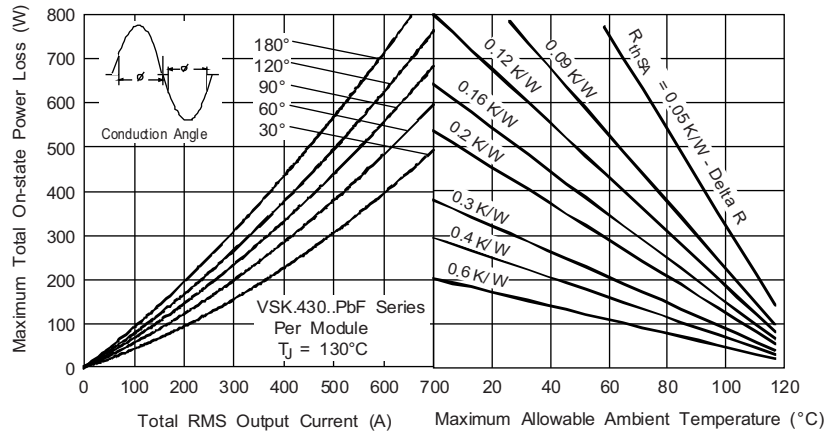


Fig. 7 - On-State Power Loss Characteristics

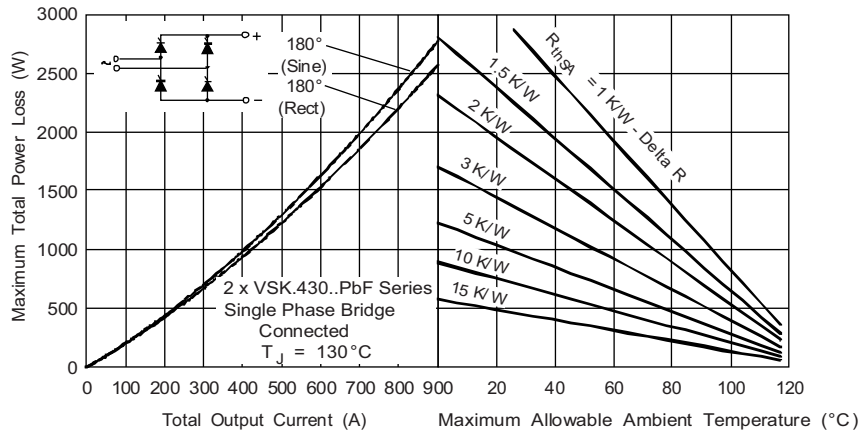


Fig. 8 - On-State Power Loss Characteristics

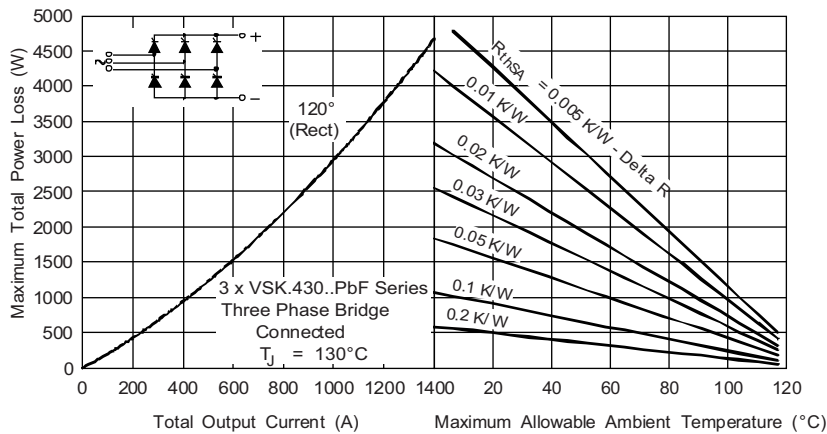


Fig. 9 - On-State Power Loss Characteristics

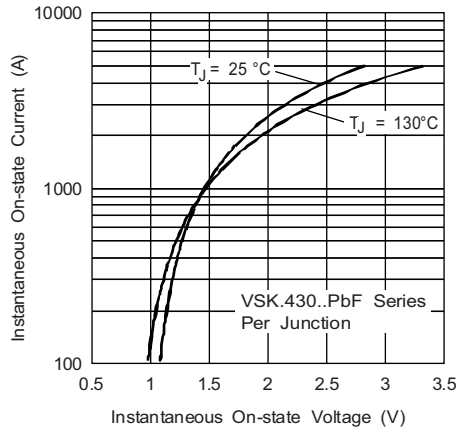


Fig. 10 - On-State Voltage Drop Characteristics

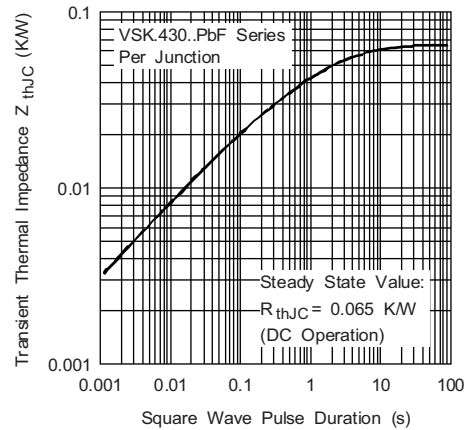


Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

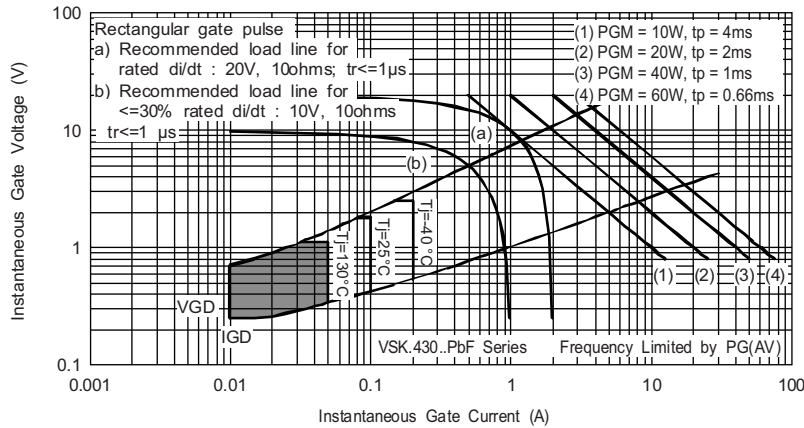


Fig. 12 - Gate Characteristics

ORDERING INFORMATION TABLE

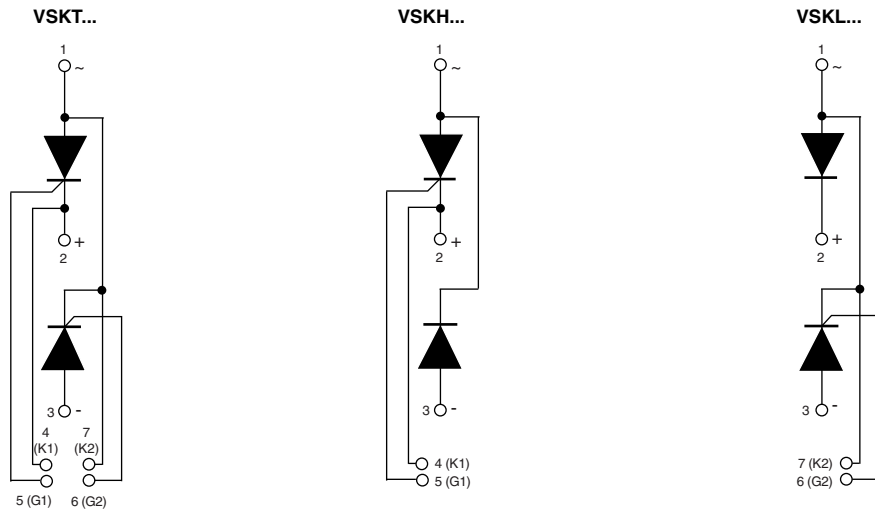
Device code	VSK	T	430	-	20	PbF		
	①	②	③		④	⑤		
	1	-	Module type		2	-		
		2	-	Circuit configuration (see end of datasheet)		3	-	
			3	-	4	-		
				4	-	Current rating		
					5	-		
						4	-	
							Voltage code x 100 = V_{RRM} (see Voltage Ratings table)	
							5	-
								Lead (Pb)-free

Note

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



CIRCUIT CONFIGURATION



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



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