




# Standard Diodes, 600 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<sub>RMS</sub> 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](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

### TYPICAL APPLICATIONS

- Rectifying bridge for large motor drives
- Rectifying bridge for large UPS

PRODUCT SUMMARY	
I <sub>F(AV)</sub>	600 A
Type	Modules - Diode, High Voltage
Package	SMAP
Circuit	Two SCRs doubler circuit

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>		600	A
	T <sub>C</sub>	100	°C
I <sub>F(RMS)</sub>		942	A
	T <sub>C</sub>	100	°C
I <sub>FSM</sub>	50 Hz	19 000	A
	60 Hz	20 100	
I <sup>2</sup> t	50 Hz	1805	kA <sup>2</sup> s
	60 Hz	1683	
I <sup>2</sup> √t		18 050	kA <sup>2</sup> √s
V <sub>RRM</sub>	Range	800 to 2000	V
T <sub>Stg</sub> , T <sub>J</sub>	Range	-40 to +150	°C

### ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	V <sub>RRM</sub> , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> MAXIMUM mA
VS-VSKD600..	08	800	900	50
	12	1200	1300	
	16	1600	1700	
	20	2000	2100	



<b>FORWARD CONDUCTION</b>						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave		600	A	
				100	°C	
Maximum RMS forward current	$I_{F(RMS)}$	180° conduction, half sine wave at $T_C = 100\text{ °C}$		942	A	
Maximum peak, one-cycle forward, non-repetitive surge current	$I_{FSM}$	t = 10 ms	No voltage reappplied	19.0	kA	
		t = 8.3 ms		Sinusoidal half wave, initial $T_J = T_J$ maximum		20.1
		t = 10 ms	100 % $V_{RRM}$ reappplied			16.2
		t = 8.3 ms				17.2
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reappplied		1805	kA <sup>2</sup> s
		t = 8.3 ms		100 % $V_{RRM}$ reappplied	1683	
		t = 10 ms	1319			
		t = 8.3 ms	1230			
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reappplied			18 050	kA <sup>2</sup> √s
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.70	V	
High level value of threshold voltage	$V_{F(TO)2}$	(I $> \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.77		
Low level value of forward slope resistance	$r_{f1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.28	mΩ	
High level value of forward slope resistance	$r_{f2}$	(I $> \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.25		
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 1800\text{ A}$ , $T_J = 25\text{ °C}$ , $t_p = 10\text{ ms}$ sine pulse		1.45	V	

<b>BLOCKING</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
RMS insulation voltage	$V_{INS}$	t = 1 s		3000	V
Maximum peak reverse and off-state leakage current	$I_{RRM}$	$T_J = T_J$ maximum, rated $V_{RRM}$ applied		50	mA

<b>THERMAL AND MECHANICAL SPECIFICATIONS</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction operating and storage temperature range	$T_J, T_{Stg}$			-40 to 150	°C
Maximum thermal resistance, junction to case per junction	$R_{thJC}$	DC operation		0.065	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 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	

<b><math>\Delta R_{thJC}</math> CONDUCTION</b>				
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

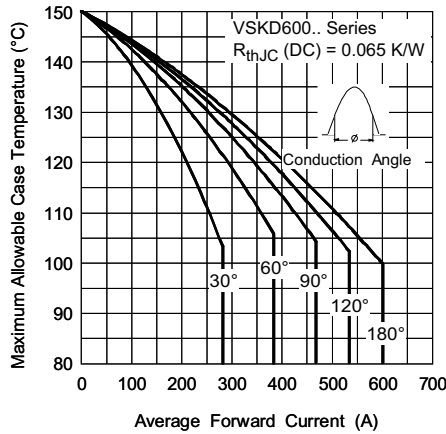


Fig. 1 - Current Ratings Characteristics

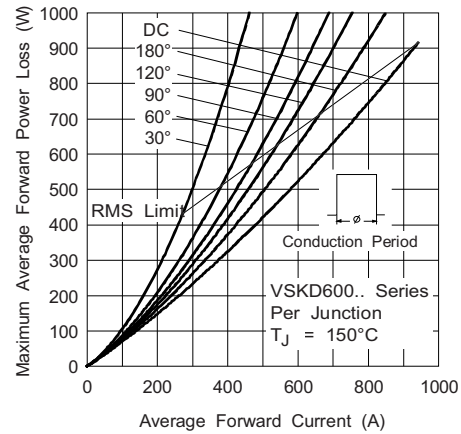


Fig. 4 - Forward Power Loss Characteristics

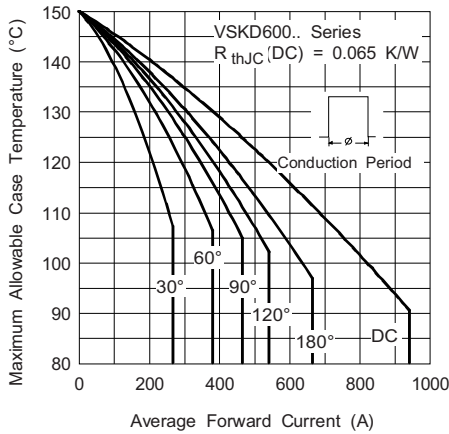


Fig. 2 - Current Ratings Characteristics

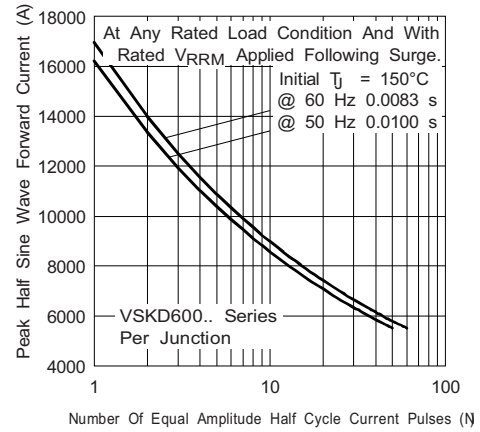


Fig. 5 - Maximum Non-Repetitive Surge Current

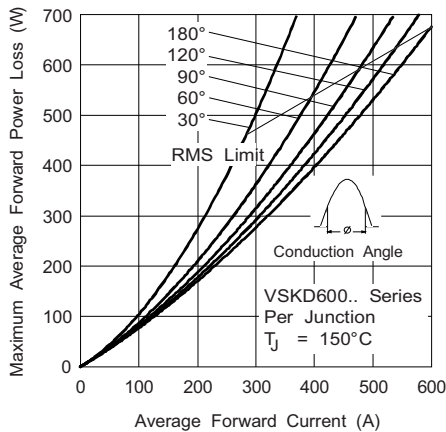


Fig. 3 - Forward Power Loss Characteristics

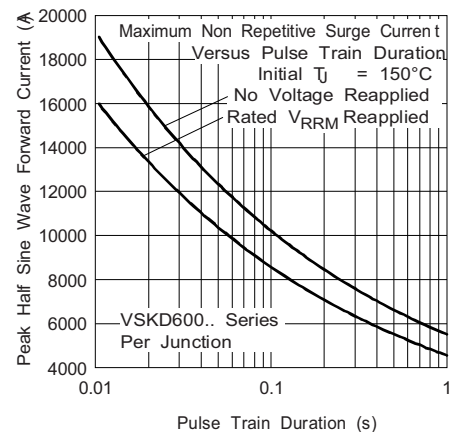


Fig. 6 - Maximum Non-Repetitive Surge Current

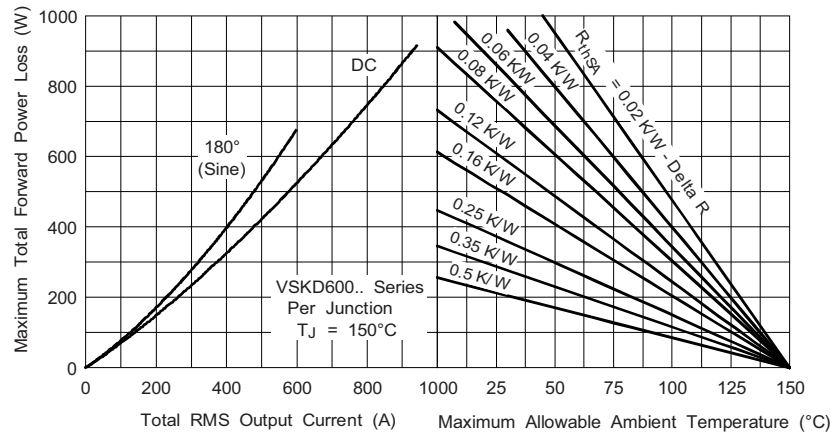


Fig. 7 - Forward Power Loss Characteristics

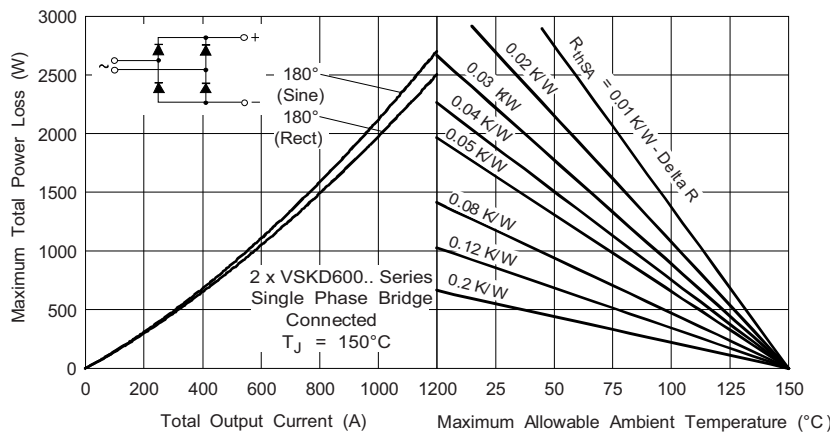


Fig. 8 - Forward Power Loss Characteristics

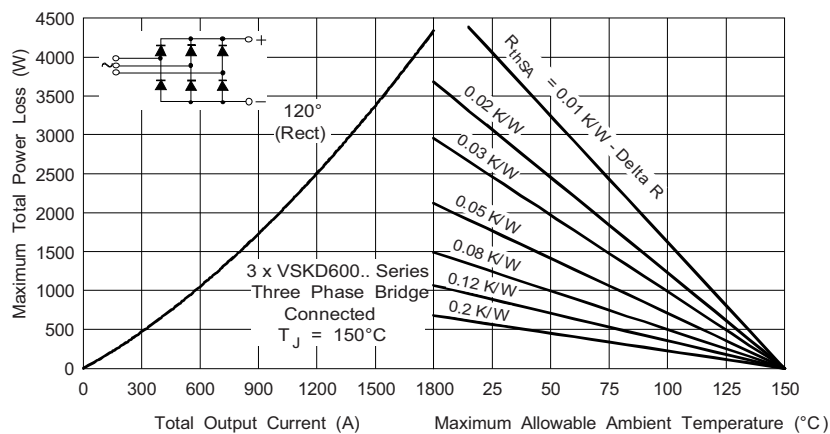


Fig. 9 - Forward Power Loss Characteristics

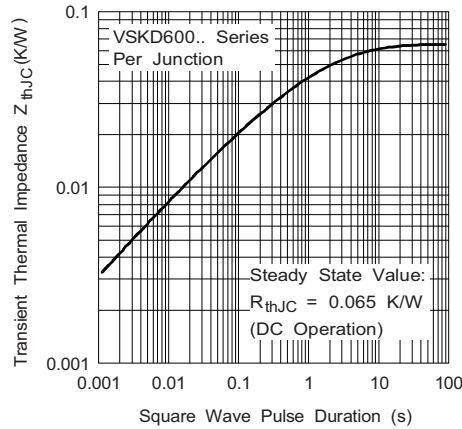


Fig. 10 - Thermal Impedance  $Z_{thJC}$  Characteristic

**ORDERING INFORMATION TABLE**

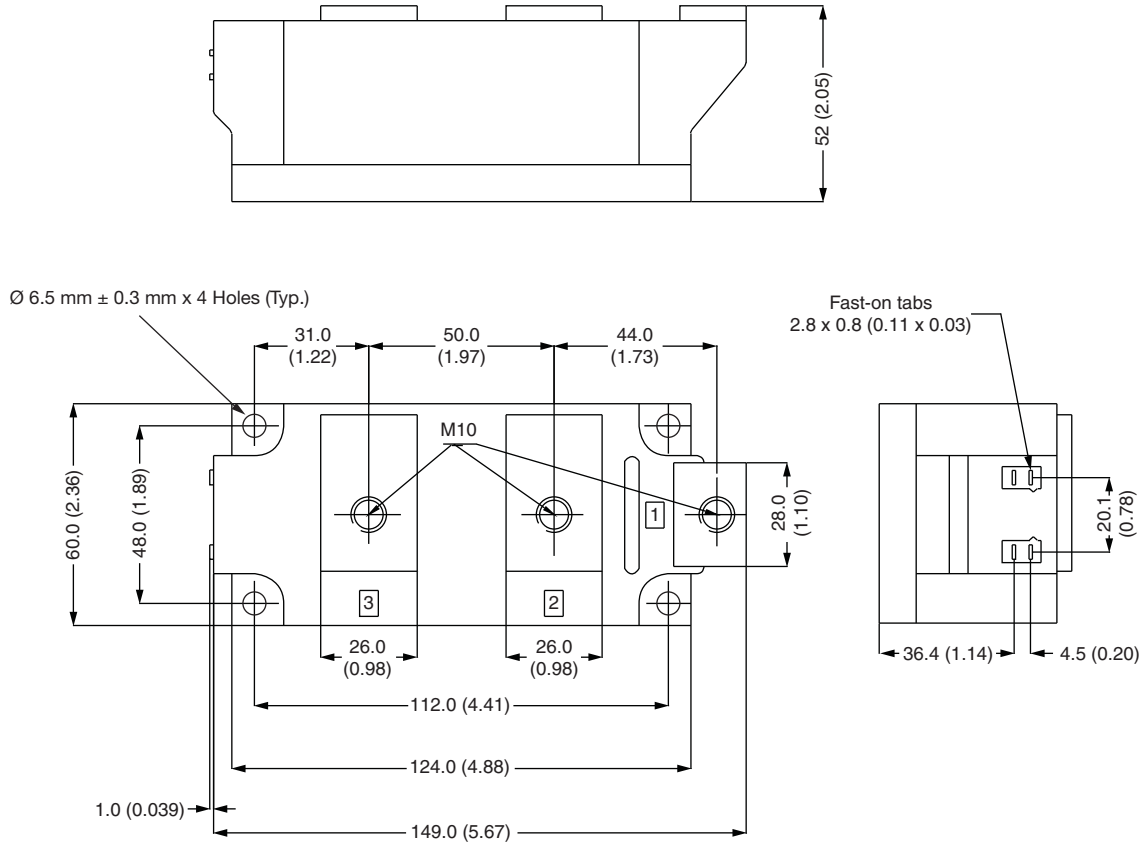
Device code	<b>VS-</b>	<b>VSK</b>	<b>D</b>	<b>600</b>	<b>-</b>	<b>20</b>
	①	②	③	④		⑤
	<b>1</b>	-	Vishay Semiconductors product			
	<b>2</b>	-	Module type			
	<b>3</b>	-	Circuit configuration D = 2 diodes in series (see Circuit Configuration table)			
	<b>4</b>	-	Current rating			
	<b>5</b>	-	Voltage code x 100 = $V_{RRM}$ (see Voltage Ratings table)			

<b>CIRCUIT CONFIGURATION</b>		
<b>CIRCUIT DESCRIPTION</b>	<b>CIRCUIT CONFIGURATION CODE</b>	<b>CIRCUIT DRAWING</b>
Two diodes doubler circuit	D	

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?95088">www.vishay.com/doc?95088</a>

## Super MAGN-A-PAK Diode

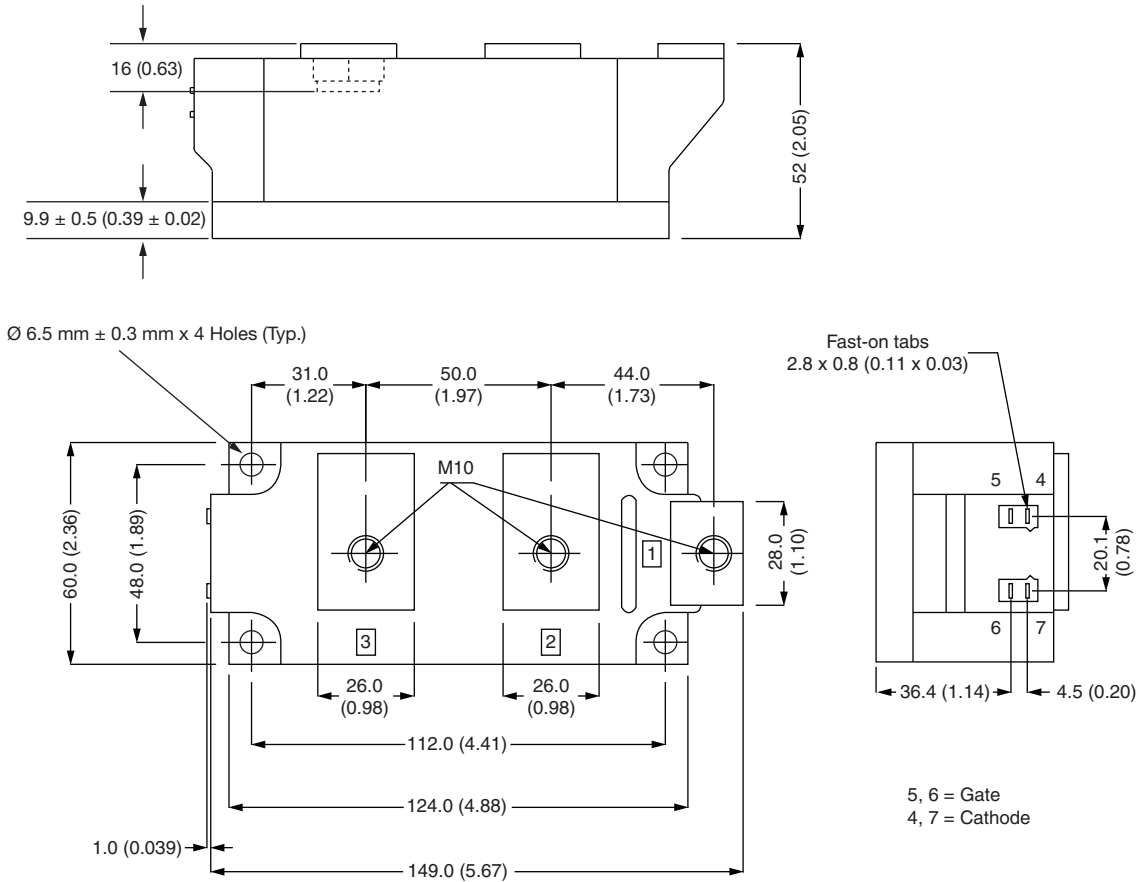
**DIMENSIONS** in millimeters (inches)





## Super MAGN-A-PAK Thyristor/Diode

**DIMENSIONS** in millimeters (inches)





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