

## 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
- Compliant to RoHS directive 2002/95/EC



**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

### 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
VSKD600..	08	800	900	50
	12	1200	1300	
	16	1600	1700	
	20	2000	2100	

FORWARD CONDUCTION					
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 reapplied	19.0	kA
		t = 8.3 ms			
		t = 10 ms	100 % $V_{RRM}$ reapplied	16.2	
		t = 8.3 ms			
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	1805	kA <sup>2</sup> s
		t = 8.3 ms			
		t = 10 ms	100 % $V_{RRM}$ reapplied	1319	
		t = 8.3 ms			
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied		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

BLOCKING					
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

THERMAL AND MECHANICAL SPECIFICATIONS					
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	$R_{thC-hs}$			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	



$\Delta R_{thJC}$ 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

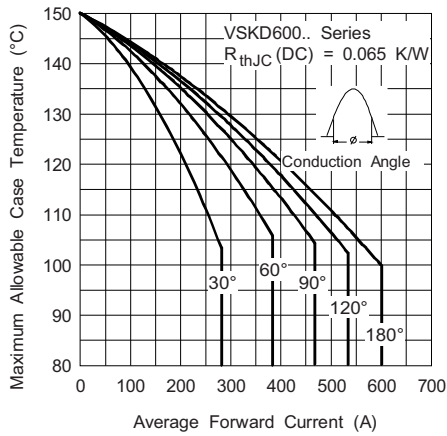


Fig. 1 - Current Ratings Characteristics

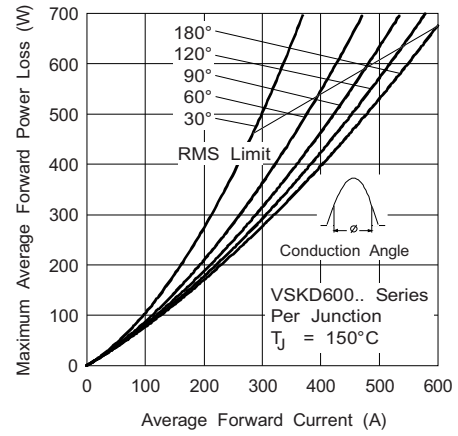


Fig. 3 - Forward Power Loss Characteristics

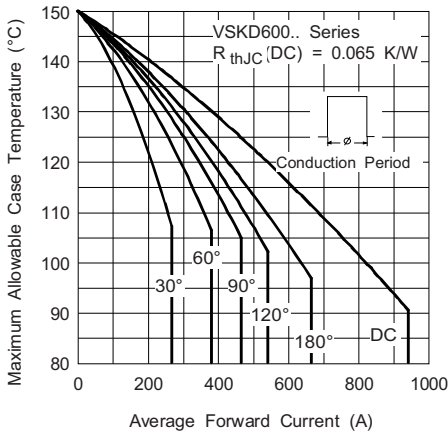


Fig. 2 - Current Ratings Characteristics

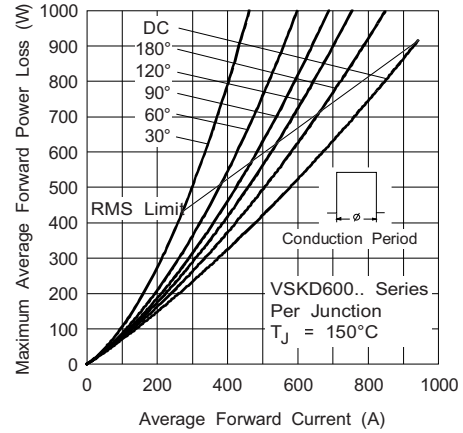


Fig. 4 - Forward Power Loss Characteristics

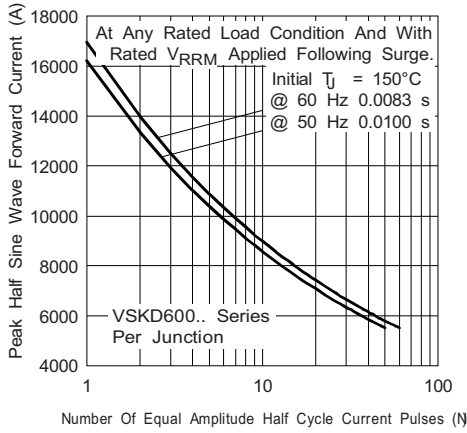


Fig. 5 - Maximum Non-Repetitive Surge Current

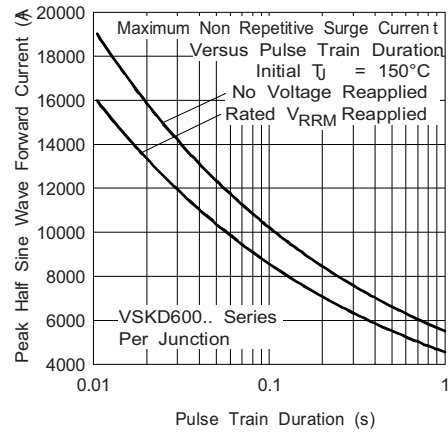


Fig. 6 - Maximum Non-Repetitive Surge Current

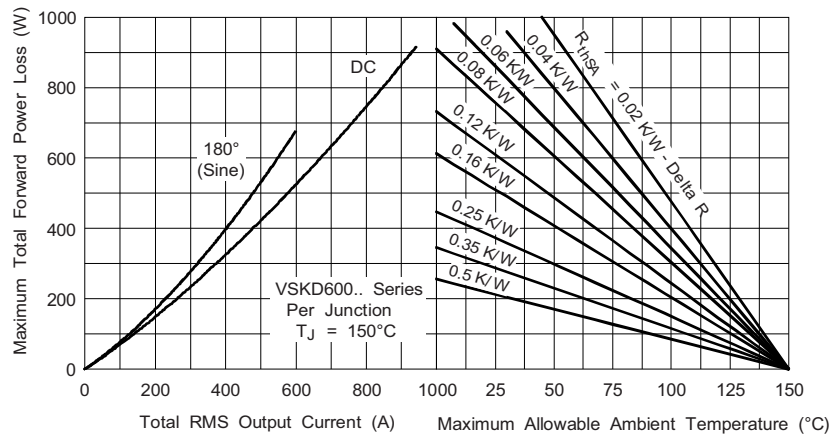


Fig. 7 - Forward Power Loss Characteristics

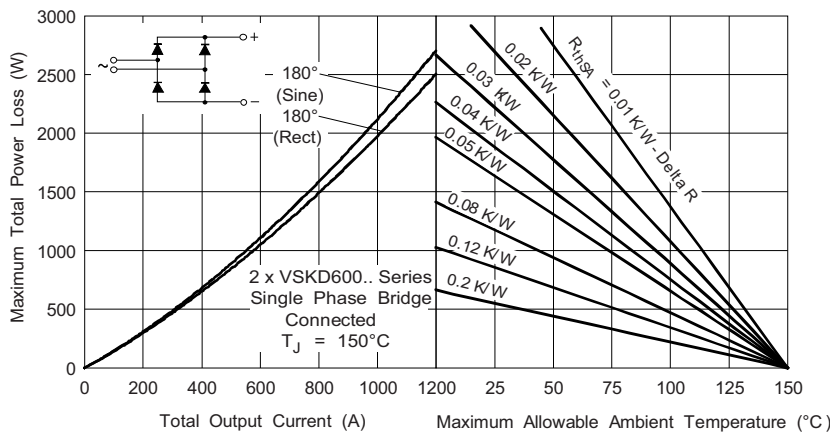


Fig. 8 - Forward Power Loss Characteristics



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Vishay Semiconductors

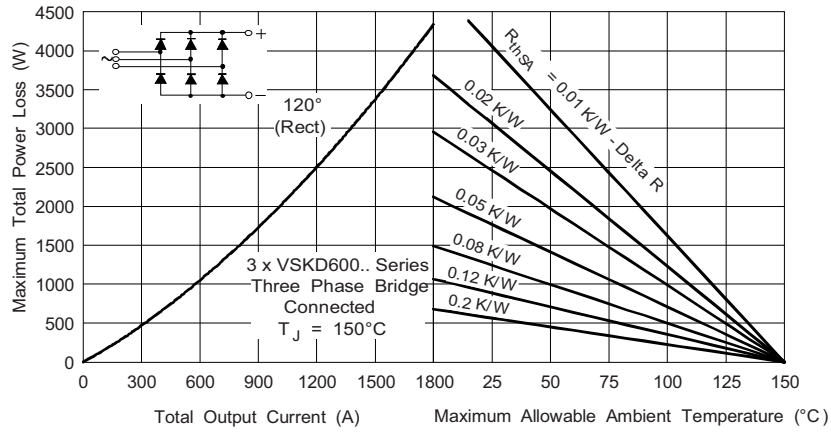


Fig. 9 - Forward Power Loss Characteristics

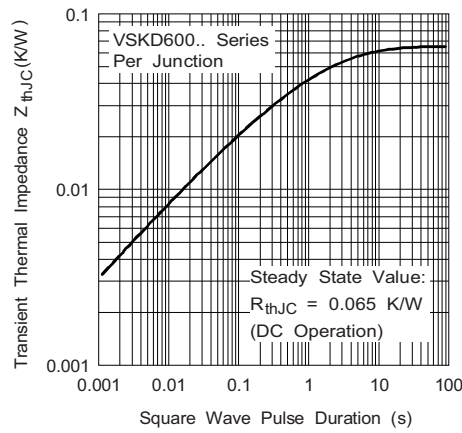


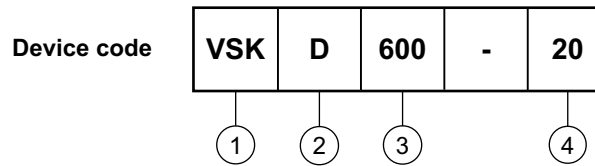
Fig. 10 - Thermal Impedance  $Z_{thJC}$  Characteristic

# VSKD600 Series



Vishay Semiconductors Standard Diodes, 600 A  
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## ORDERING INFORMATION TABLE



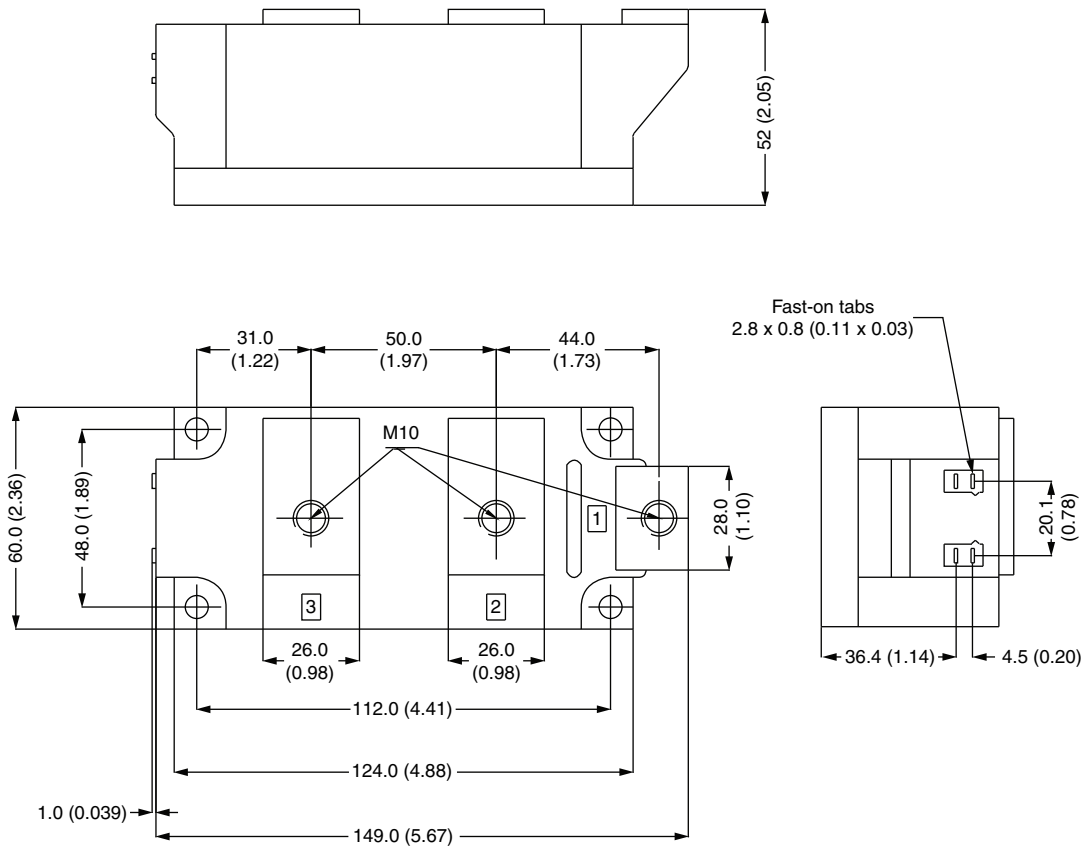
- 1 - Module type
- 2 - Circuit configuration D = 2 diodes in series (see Circuit Configuration table)
- 3 - Current rating
- 4 - Voltage code x 100 =  $V_{RRM}$  (see Voltage Ratings table)

CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes doubler circuit	D	

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

## Super MAGN-A-PAK Diode

**DIMENSIONS** in millimeters (inches)





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