


## Standard Diodes (Super MAGN-A-PAK Power Modules), 600 A



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

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	600 A
Type	Modules - diode, high voltage
Package	Super MAGN-A-PAK
Circuit configuration	Two diodes doubler circuit

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$		600	A
	$T_C$	100	°C
$I_{F(RMS)}$		942	A
	$T_C$	100	°C
$I_{FSM}$	50 Hz	19 000	A
	60 Hz	20 100	
$I^2t$	50 Hz	1805	kA <sup>2</sup> s
	60 Hz	1683	
$I^2\sqrt{t}$		18 050	kA <sup>2</sup> /s
$V_{RRM}$	Range	800 to 2000	V
$T_{Stg}, T_J$	Range	-40 to +150	°C

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	$V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ MAXIMUM AT $T_J$ MAXIMUM mA
VS-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 <sub>F(AV)</sub>	180° conduction, half sine wave			600	A
					100	°C
Maximum RMS forward current	I <sub>F(RMS)</sub>	180° conduction, half sine wave at T <sub>C</sub> = 100 °C			942	A
Maximum peak, one-cycle forward, non-repetitive surge current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum	19.0	kA
		t = 8.3 ms			20.1	
		t = 10 ms	100 % V <sub>RRM</sub>		16.2	
		t = 8.3 ms	reapplied		17.2	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied		1805	kA <sup>2</sup> s
		t = 8.3 ms			1683	
		t = 10 ms	100 % V <sub>RRM</sub>		1319	
		t = 8.3 ms	reapplied		1230	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √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 <sub>F(TO)1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.70	V
High level value of threshold voltage	V <sub>F(TO)2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.77	
Low level value of forward slope resistance	r <sub>f1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.28	mΩ
High level value of forward slope resistance	r <sub>f2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.25	
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>pk</sub> = 1800 A, T <sub>J</sub> = 25 °C, t <sub>p</sub> = 10 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 per module	$R_{thC-hs}$	Mounting surface smooth, flat and greased	0.02	
Mounting torque ± 10 %	Super MAGN-A-PAK to heatsink busbar to Super MAGN-A-PAK	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 12 to 15	Nm
Approximate weight			1500	g
Case style		See dimensions - link at the end of datasheet	Super MAGN-A-PAK	

**ΔR<sub>thJC</sub> 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

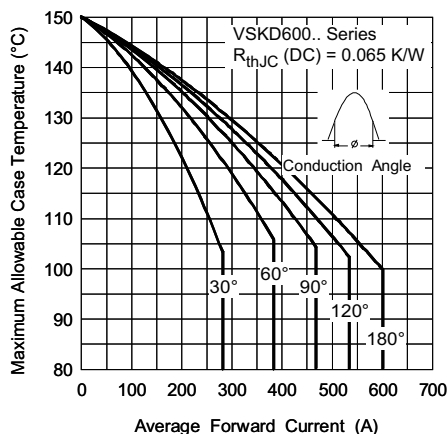


Fig. 1 - Current Ratings Characteristics

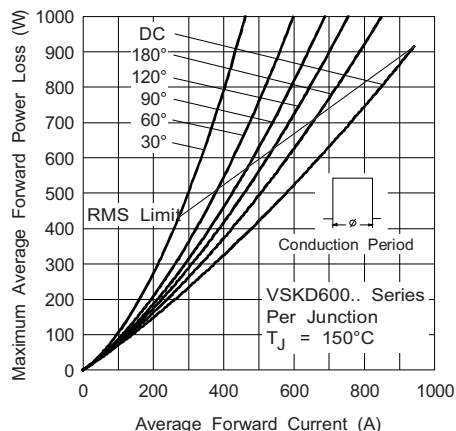


Fig. 4 - Forward Power Loss Characteristics

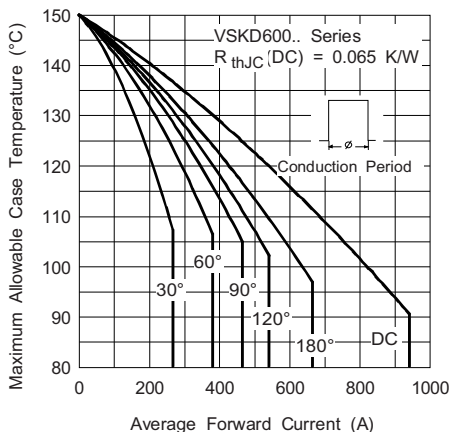


Fig. 2 - Current Ratings Characteristics

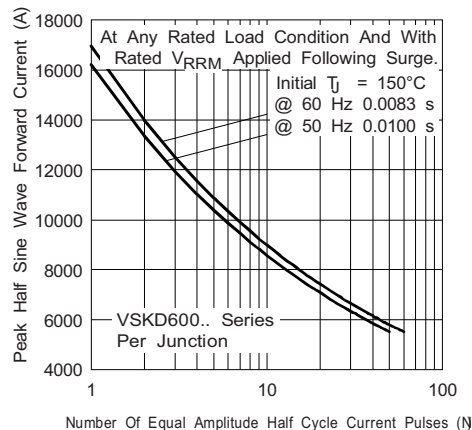


Fig. 5 - Maximum Non-Repetitive Surge Current

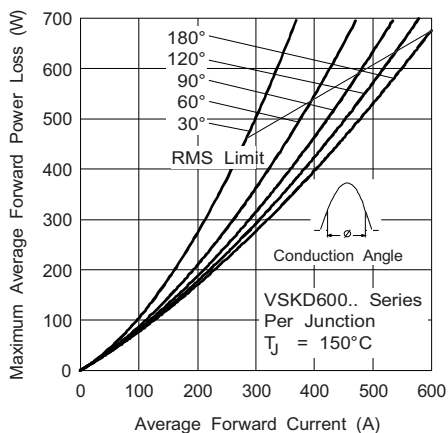


Fig. 3 - Forward Power Loss Characteristics

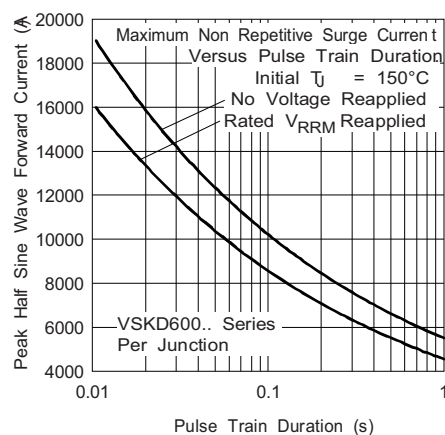


Fig. 6 - Maximum Non-Repetitive Surge Current

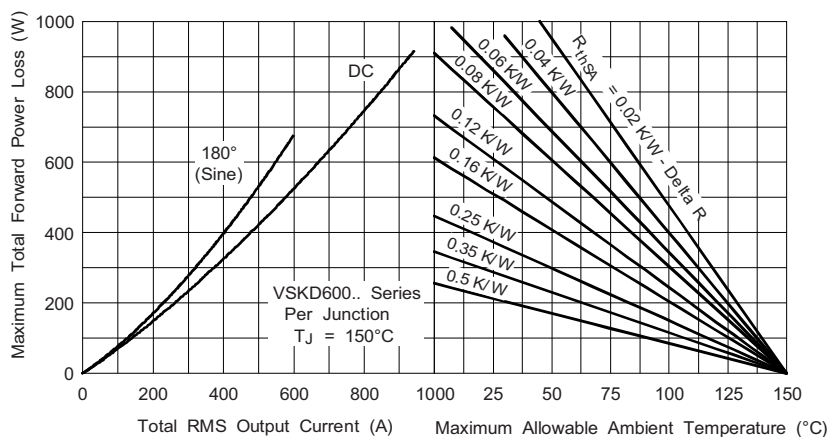


Fig. 7 - Forward Power Loss Characteristics

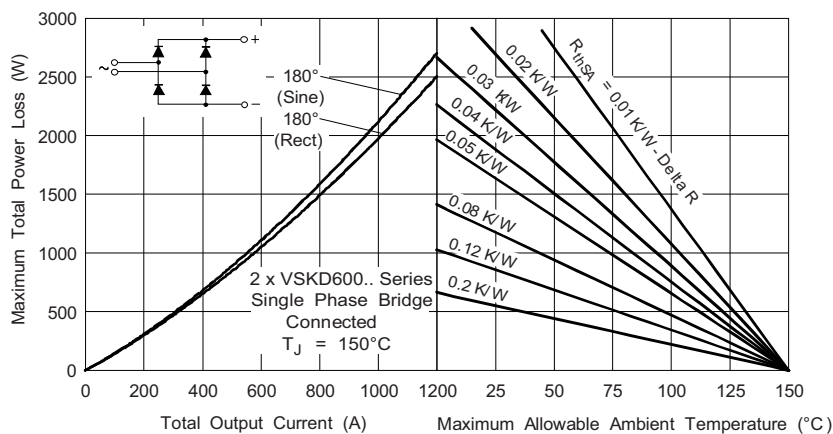


Fig. 8 - Forward Power Loss Characteristics

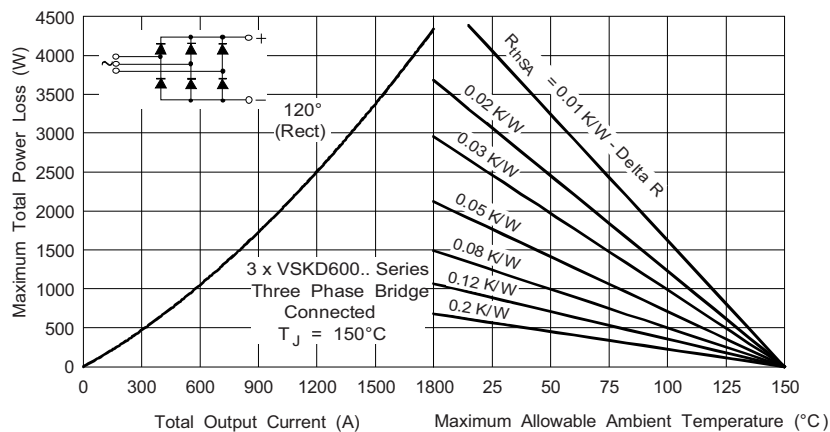
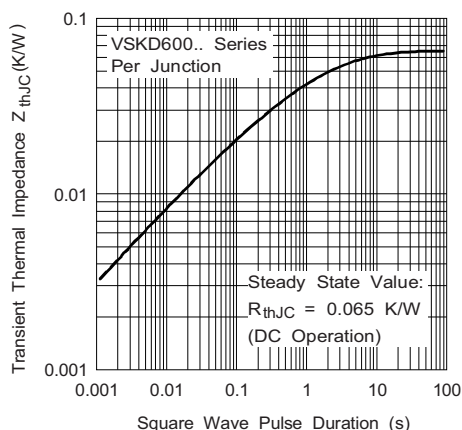
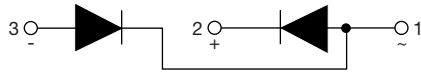


Fig. 9 - Forward Power Loss Characteristics


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

## ORDERING INFORMATION TABLE

Device code	VS-VS	KD	600	-	20	PbF
	1	2	3		4	5
1	Vishay Semiconductors product					
2	Circuit configuration D = two diodes in series (see circuit configuration table)					
3	Current rating					
4	Voltage code x 100 = $V_{RRM}$ (see voltage ratings table)					
5	Lead (Pb)-free					

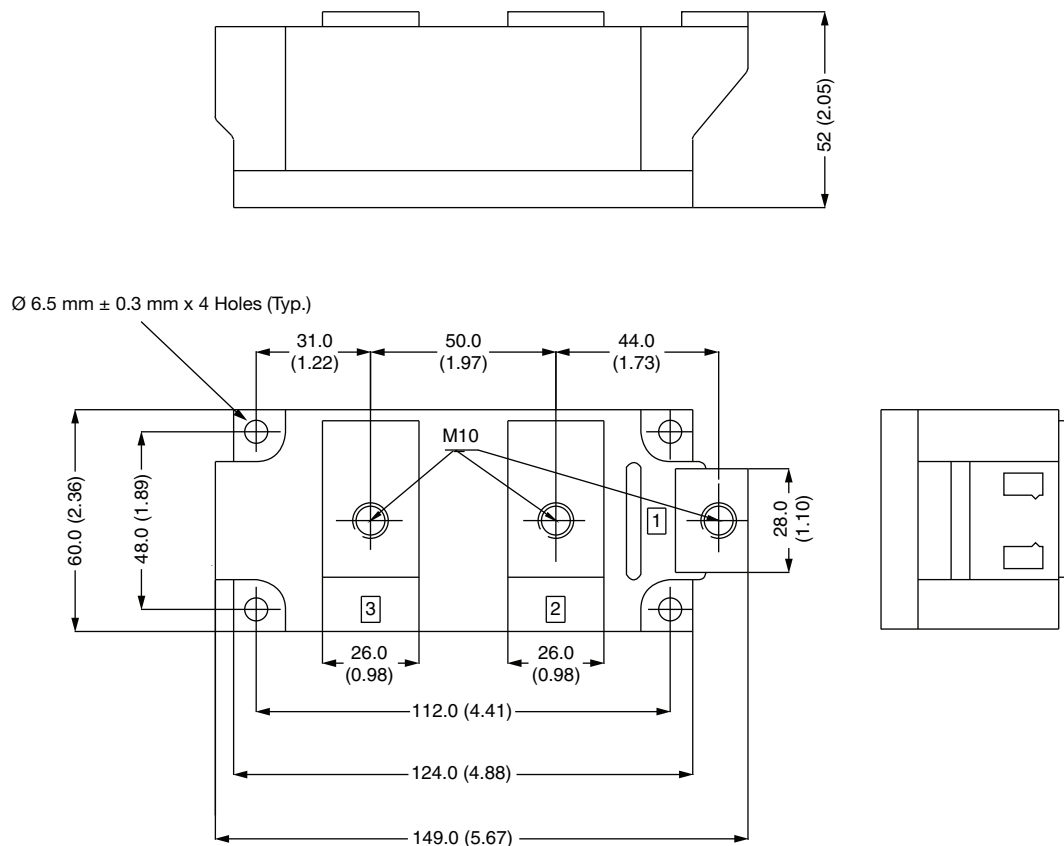
CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes doubler circuit	KD	

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



## Super MAGN-A-PAK Diode

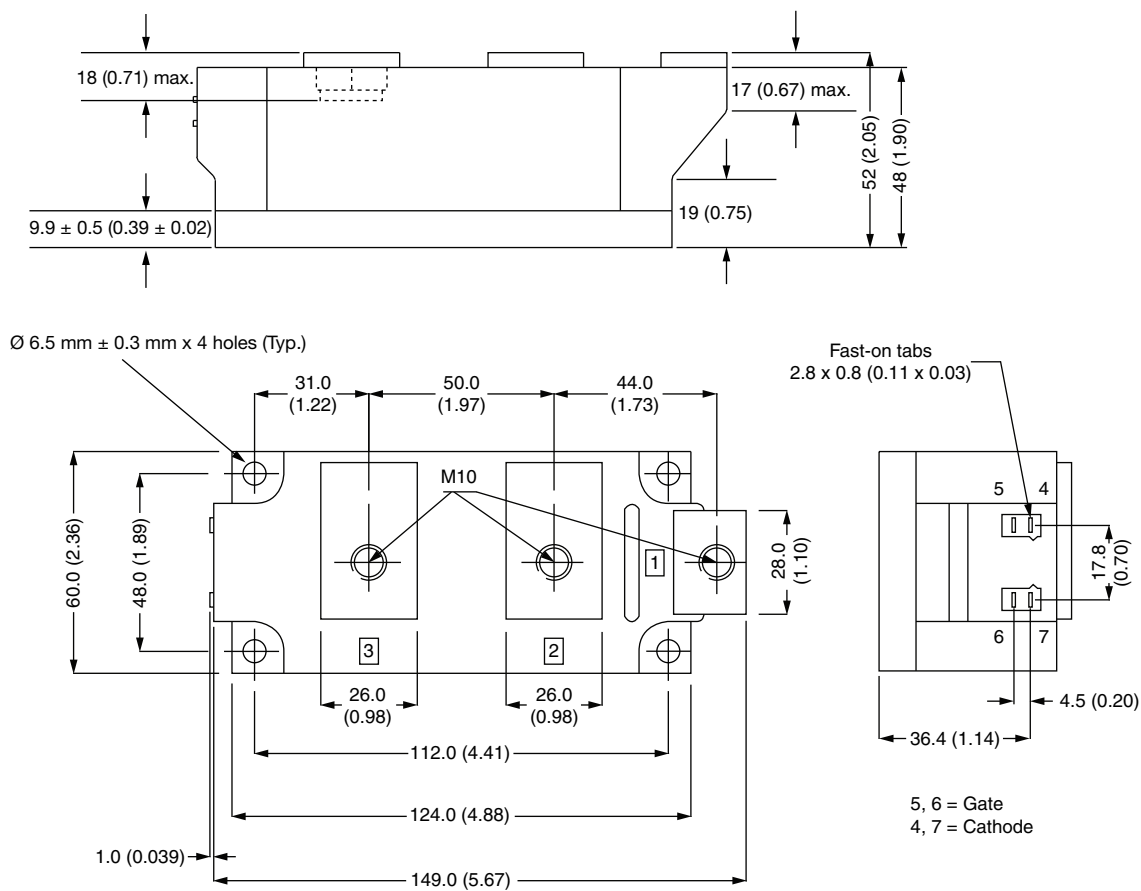
**DIMENSIONS** in millimeters (inches)





## Super MAGN-A-PAK Thyristor/Diode

**DIMENSIONS** in millimeters (inches)





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