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_{RMS} 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

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^2s
	60 Hz	1683	
$I^2\sqrt{t}$		18 050	$kA^2\sqrt{s}$
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	$I_{F(AV)}$	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 °C			942	A
Maximum peak, one-cycle forward, non-repetitive surge current	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	19.0	kA
		t = 8.3 ms			20.1	
		t = 10 ms	100 % V_{RRM} reapplied		16.2	
		t = 8.3 ms			17.2	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		1805	kA^2s
		t = 8.3 ms			1683	
		t = 10 ms	100 % V_{RRM} reapplied		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 reapplied			18 050	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.70	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.77	
Low level value of forward slope resistance	r_{f1}	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.28	mΩ
High level value of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.25	
Maximum forward voltage drop	V_{FM}	I_{pk} = 1800 A, T_J = 25 °C, t_p = 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		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 Super MAGN-A-PAK			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

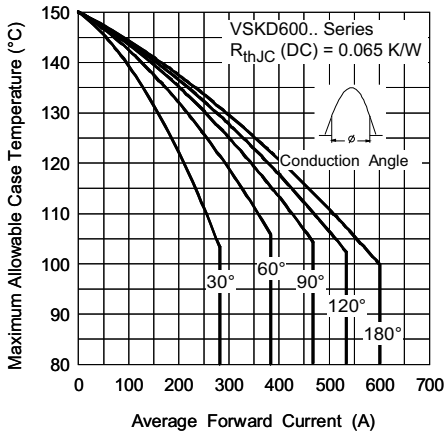


Fig. 1 - Current Ratings Characteristics

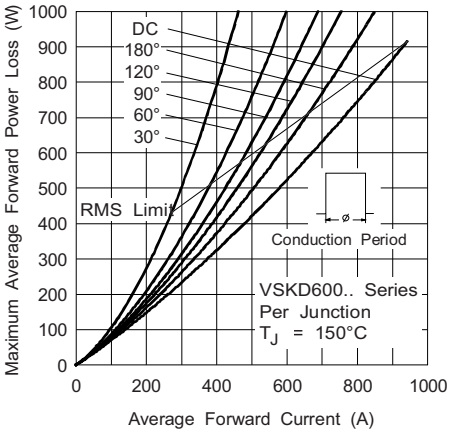


Fig. 4 - Forward Power Loss Characteristics

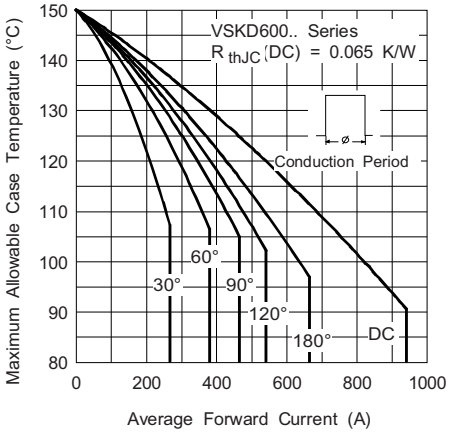


Fig. 2 - Current Ratings Characteristics

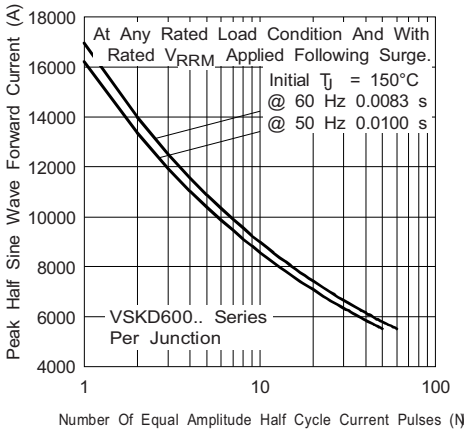


Fig. 5 - Maximum Non-Repetitive Surge Current

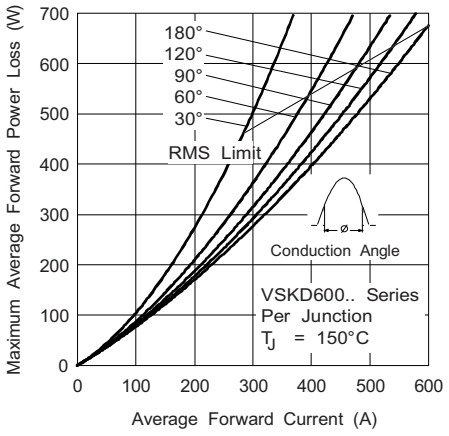


Fig. 3 - Forward Power Loss Characteristics

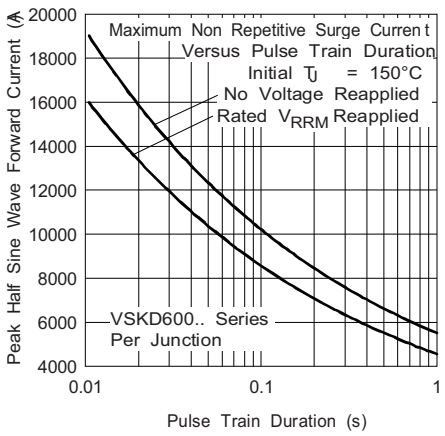


Fig. 6 - Maximum Non-Repetitive Surge Current

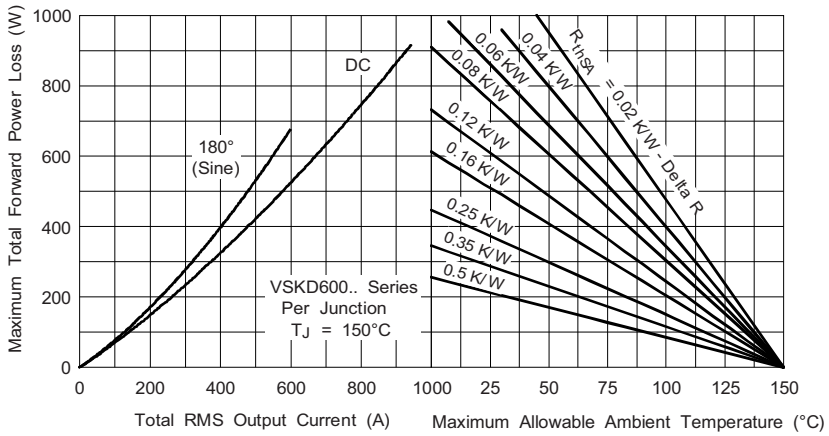


Fig. 7 - Forward Power Loss Characteristics

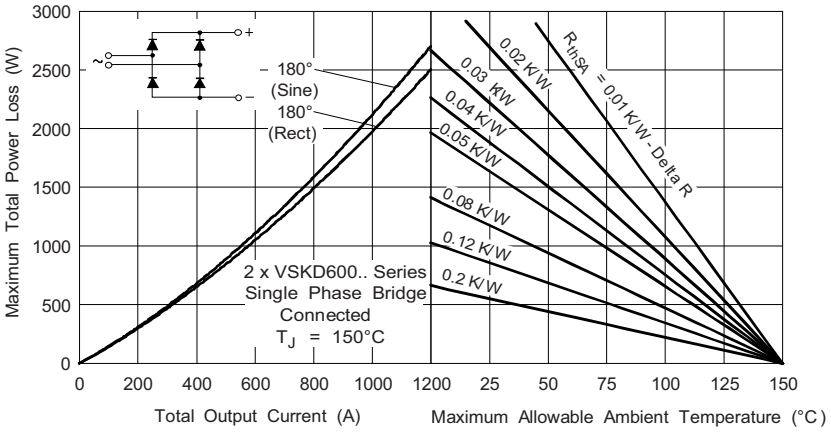


Fig. 8 - Forward Power Loss Characteristics

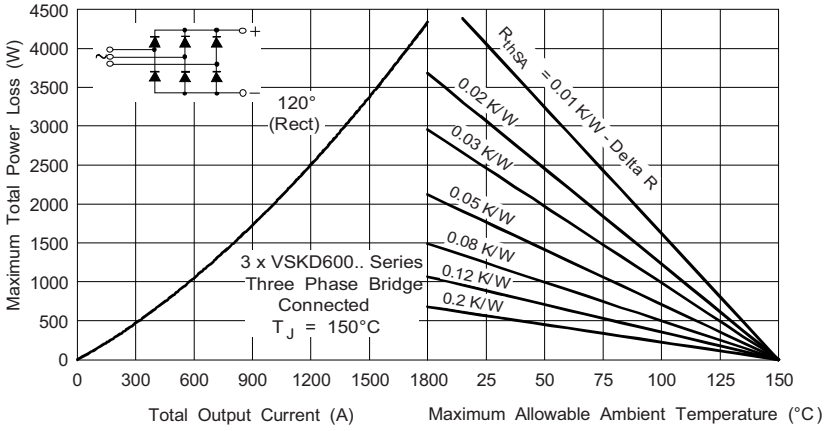


Fig. 9 - Forward Power Loss Characteristics

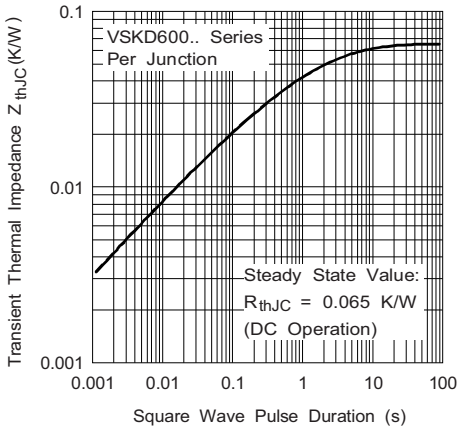


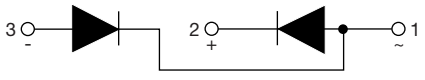
Fig. 10 - Thermal Impedance Z_{thJC} Characteristic

ORDERING INFORMATION TABLE

Device code

VS-VS	KD	600	-	20	PbF
1	2	3		4	5

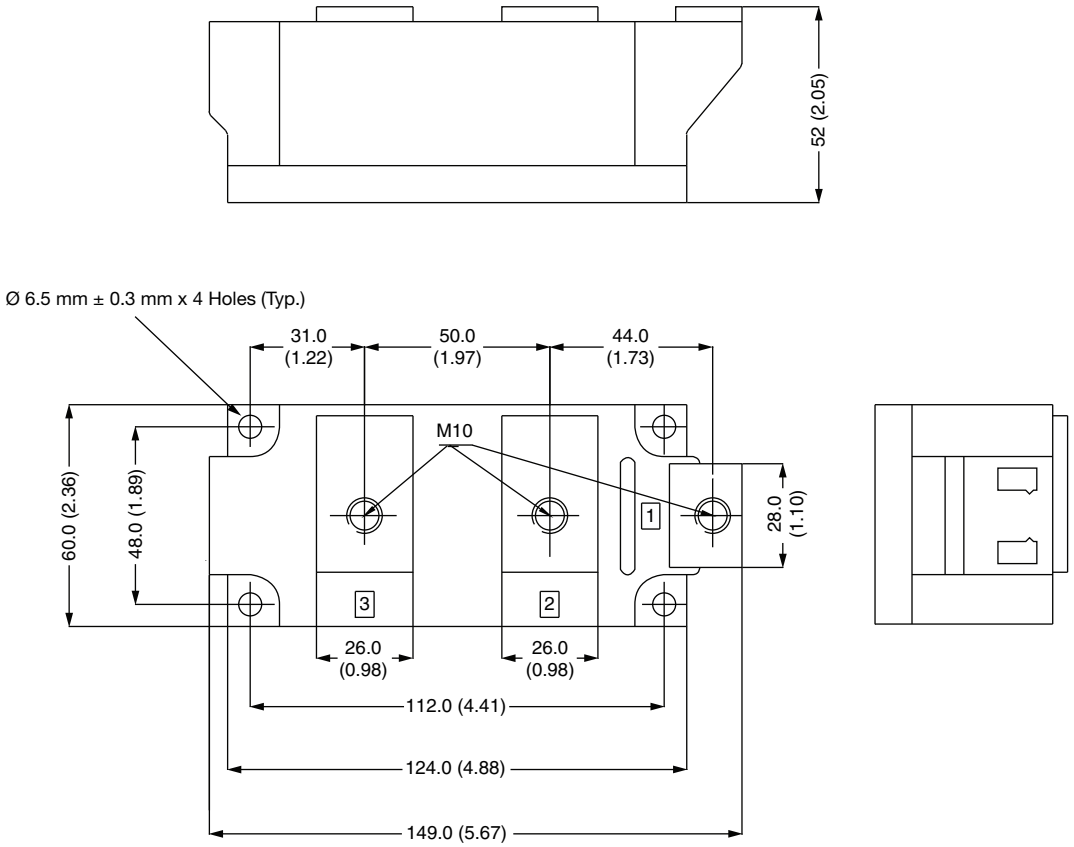
1 - Vishay Semiconductors product
2 - Circuit configuration D = two diodes in series (see circuit configuration table)
3 - Current rating
4 - Voltage code x 100 = V_{RRM} (see voltage ratings table)
5 - Lead (Pb)-free

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

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95088

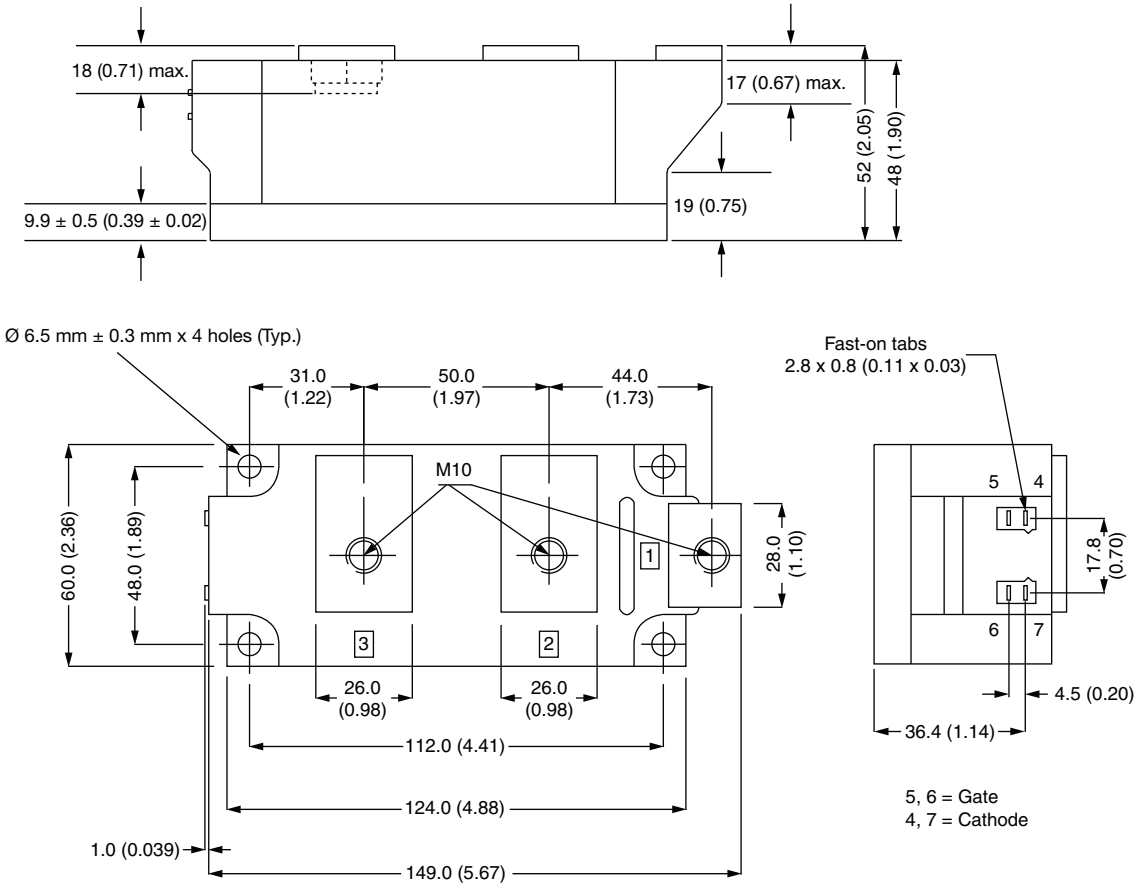
Super MAGN-A-PAK Diode

DIMENSIONS in millimeters (inches)



Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)



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