ADD-A-PAK Generation VII
Power Modules Standard Diodes, 100 A

ADD-A-PAK

PRODUCT SUMMARY	
$I_{F(AV)}$	100 A
Type	Modules - Diode, High Voltage

FEATURES

- High voltage
- Industrial standard package
- UL approved file E78996
- Low thermal resistance
- Designed and qualified for industrial level
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

BENEFITS

- Excellent thermal performances obtained by the usage of exposed direct bonded copper substrate
- Up to 1600 V
- High surge capability
- Easy mounting on heatsink

MECHANICAL DESCRIPTION

The ADD-A-PAK generation VII, new generation of ADD-A-PAK module, combines the excellent thermal performances obtained by the usage of exposed direct bonded copper substrate, with advanced compact simple package solution and simplified internal structure with minimized number of interfaces.

ELECTRICAL DESCRIPTION

These modules are intended for general purpose high voltage applications such as high voltage regulated power supplies, lighting circuits, temperature and motor speed control circuits, UPS and battery charger.

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	112 °C	100	A
$I_{F(RMS)}$		157	
I_{FSM}	50 Hz	2020	
	60 Hz	2115	
I^2t	50 Hz	20.41	kA^2s
	60 Hz	18.63	
$I^2\sqrt{t}$		204.1	$kA^2\sqrt{s}$
V_{RRM}	Range	400 to 1600	V
T_J		- 40 to 150	°C
T_{Stg}			

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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 = 150 °C mA
VS-VSK.91	04	400	500	10
	06	600	700	
	08	800	900	
	10	1000	1100	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

FORWARD CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave			100	A
					112	°C
Maximum RMS forward current	$I_{F(RMS)}$	DC at 90 °C case temperature			157	A
Maximum peak, one-cycle forward, non-repetitive surge current	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, intitial $T_J = T_J$ maximum	2020	A
		t = 8.3 ms			2115	
		t = 10 ms	100 % V_{RRM} reapplied		1700	
		t = 8.3 ms			1780	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		20.41	kA^2s
		t = 8.3 ms			18.63	
		t = 10 ms	100 % V_{RRM} reapplied		14.44	
		t = 8.3 ms			13.18	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			204.1	$kA^2\sqrt{s}$
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			0.76	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.89	
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			2.4	mΩ
High level value of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			2.05	
Maximum forward voltage drop	V_{FM}	I_{FM} = π x $I_{F(AV)}$, T_J = 25 °C, t_p = 400 µs square wave			1.55	V

BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse leakage current	I_{RRM}	T_J = 150 °C	10	mA
Maximum RMS insulation voltage	V_{INS}	50 Hz	3000 (1 min) 3600 (1 s)	V

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THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Junction and storage temperature range	T_J, T_{Stg}		- 40 to 150	°C
Maximum internal thermal resistance, junction to case per leg	R_{thJC}	DC operation	0.22	°C/W
Typical thermal resistance, case to heatsink per module	R_{thCS}	Mounting surface flat, smooth and greased	0.1	°C/W
Mounting torque ± 10 % 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.	4	Nm
Mounting torque ± 10 % busbar			3	Nm
Approximate weight			75	g
			2.7	oz.
Case style		JEDEC®	ADD-A-PAK Gen. VII (TO-240AA)	

ΔR CONDUCTION PER JUNCTION											
DEVICES	**SINE HALF WAVE CONDUCTION**					**RECTANGULAR WAVE CONDUCTION**					**UNITS**
	180°	**120°**	**90°**	**60°**	**30°**	**180°**	**120°**	**90°**	**60°**	**30°**	
VSK.91	0.057	0.068	0.087	0.12	0.177	0.045	0.073	0.093	0.123	0.178	°C/W

Note

- Table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC

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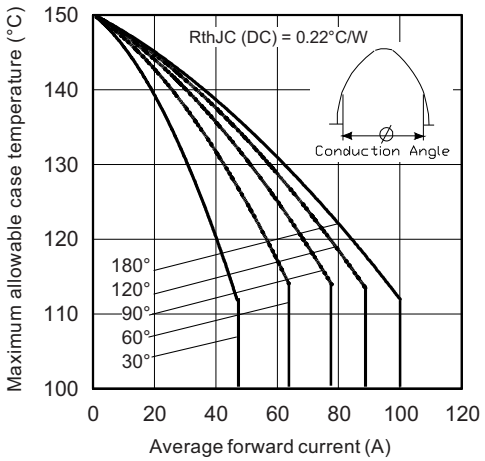

Fig. 1 - Current Ratings Characteristics

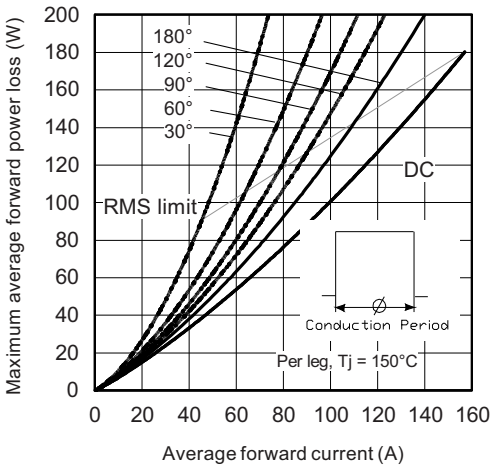

Fig. 4 - On-State Power Loss Characteristics

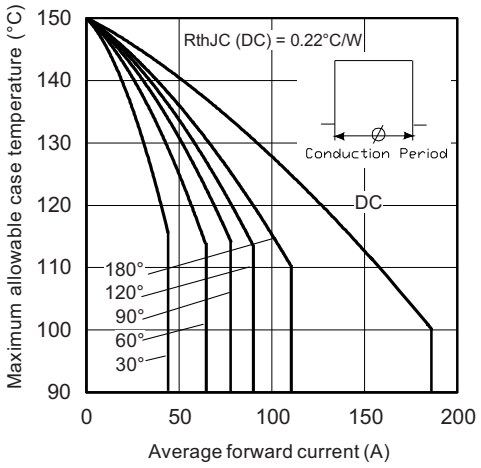

Fig. 2 - Current Ratings Characteristics

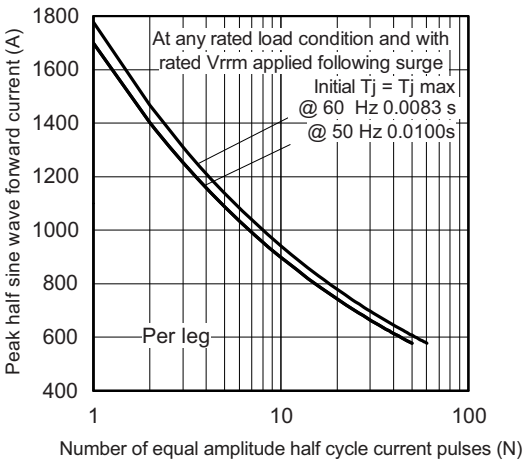

Fig. 5 - Maximum Non-Repetitive Surge Current

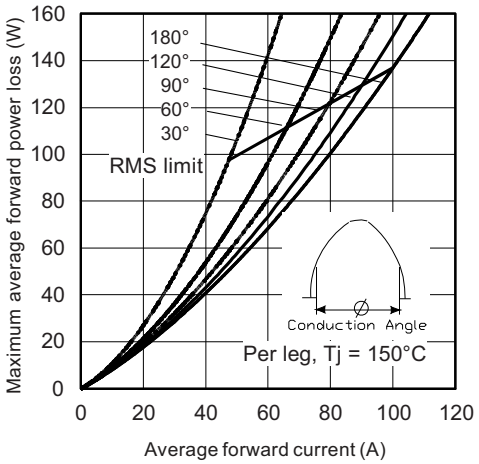

Fig. 3 - Forward Power Loss Characteristics

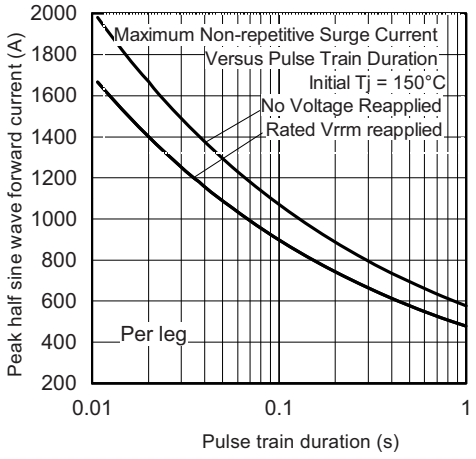

Fig. 6 - Maximum Non-Repetitive Surge Current

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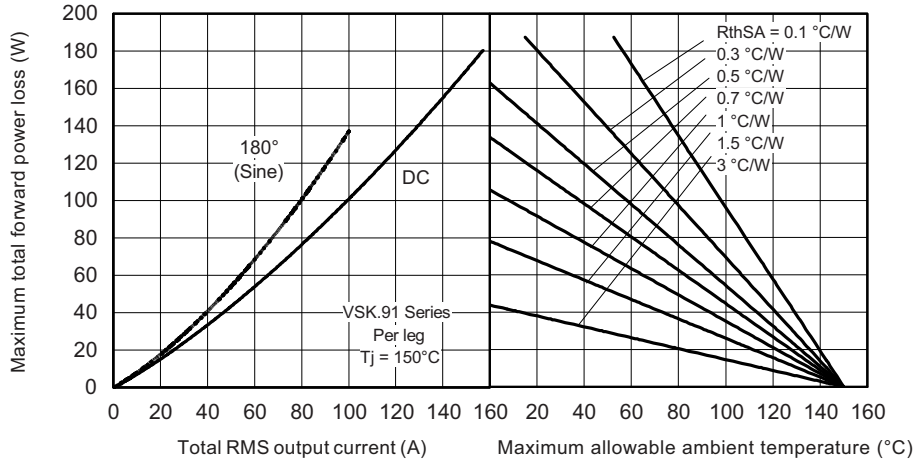

Fig. 7 - Forward Power Loss Characteristics

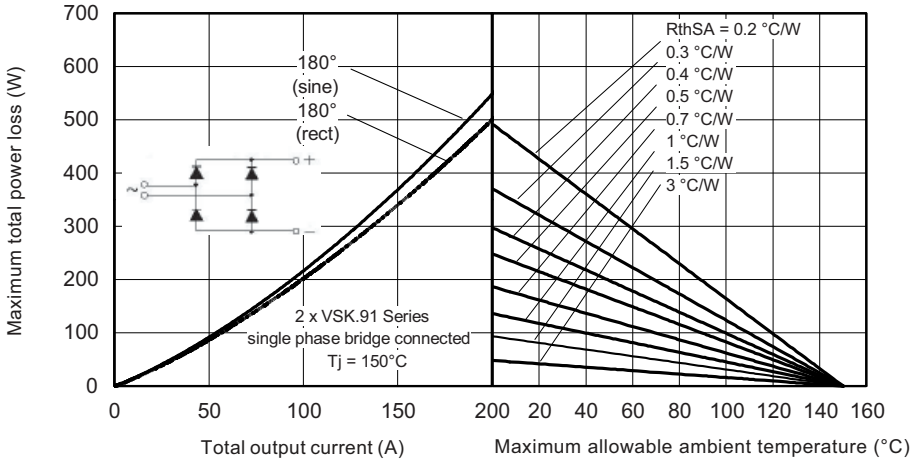

Fig. 8 - Forward Power Loss Characteristics

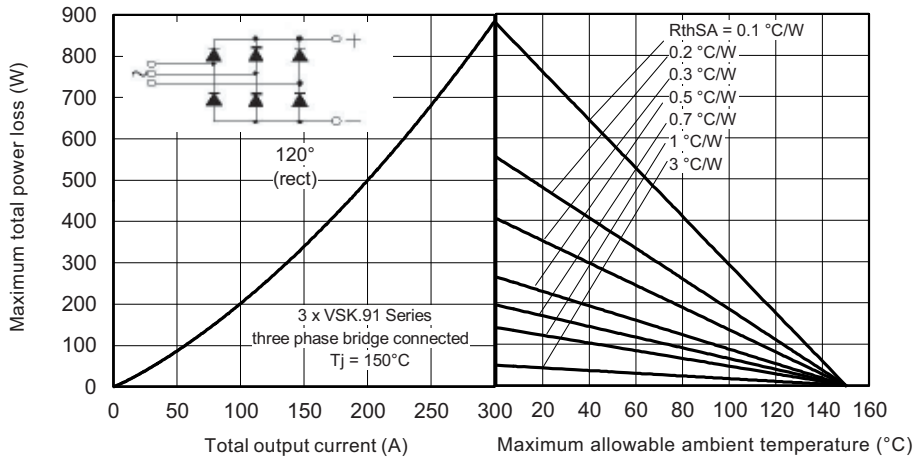

Fig. 9 - Forward Power Loss Characteristics

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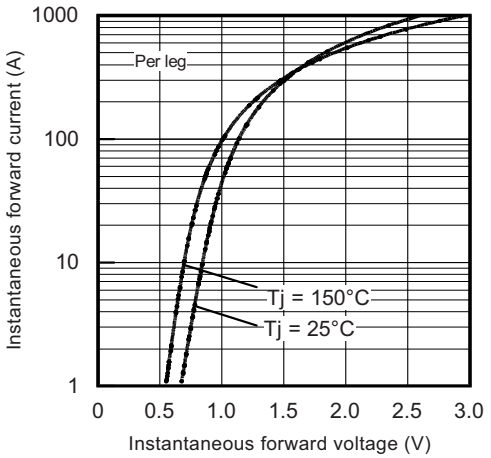

Fig. 10 - Forward Voltage Characteristics

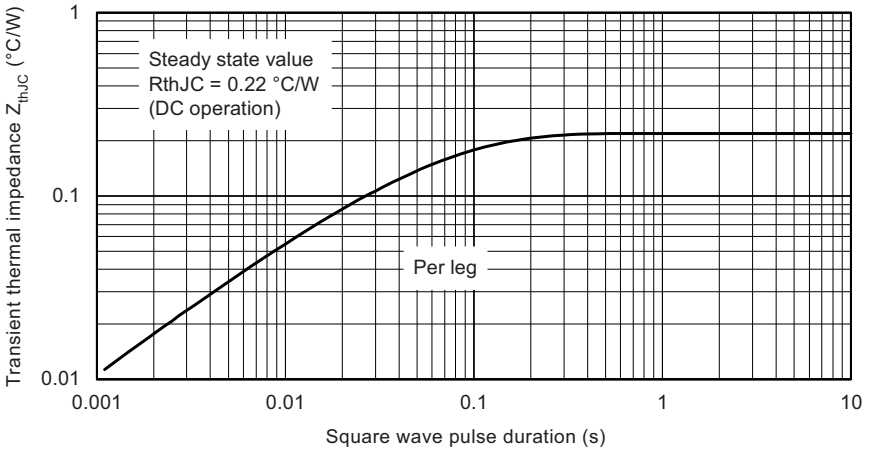

Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VS-VS	K	D	91	/	16
	1	2	3	4		5

- 1 - Vishay Semiconductors product
- 2 - Module type
- 3 - Circuit configuration (see Circuit Configuration table)
- 4 - Current code (100 A)
- 5 - Voltage code (see Voltage Ratings table)

Note

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

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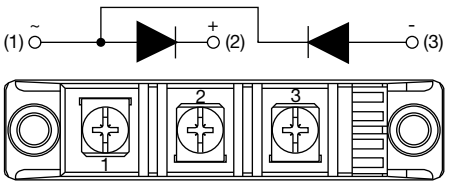
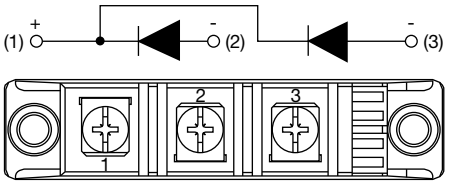
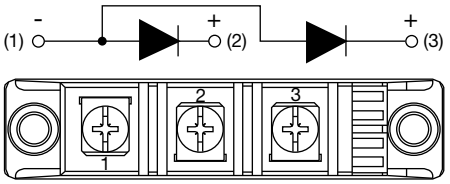
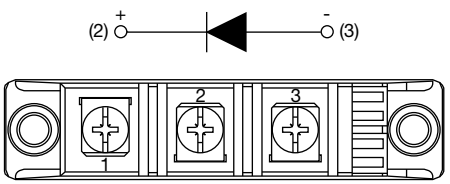
CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Two diodes doubler circuit	D	**VSKD...** 
Two diodes common cathodes	C	**VSKC...** 
Two diodes common anodes	J	**VSKJ...** 
Single diode	E	**VSKE...** 

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95369

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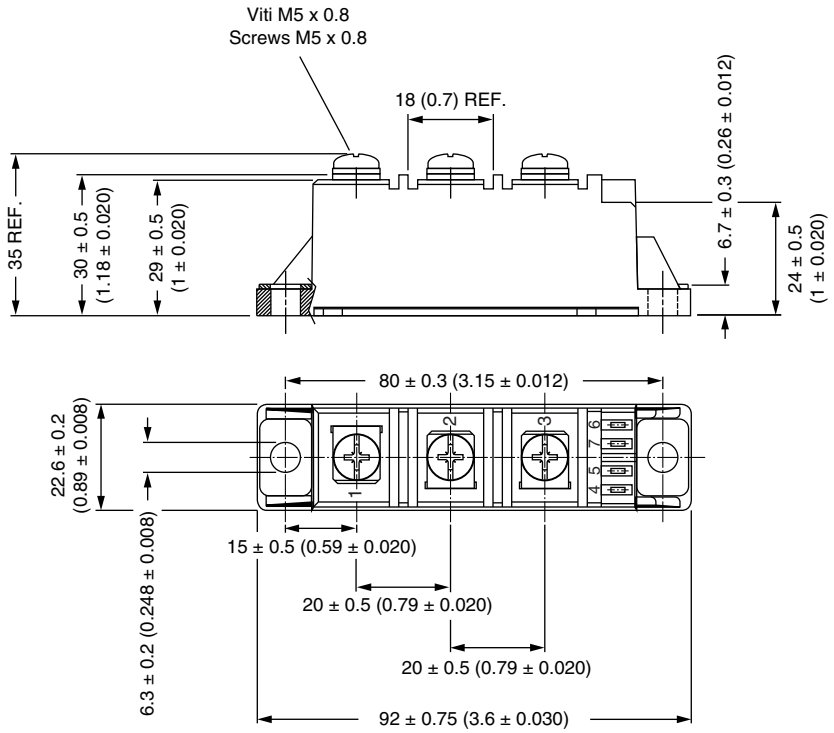
ADD-A-PAK Generation VII - Diode

DIMENSIONS in millimeters (inches)



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