



**THE DATASHEET OF  
VS-VSKD91/12**





# AAP Gen 7 (TO-240AA) Power Modules Standard Diodes, 100 A




ADD-A-PAK

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	100 A
Type	Modules - diode, high voltage
Package	AAP Gen 7 (TO-240AA)
Circuit configuration	Two diodes doubler circuit, two diodes common cathode, two diodes common anode, single diode

## MECHANICAL DESCRIPTION

The AAP Gen 7 (TO-240AA), 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.

## 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](http://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

## 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
$I_{F(AV)}$		100	A
	$T_C$	112	°C
$I_{F(RMS)}$		157	A
$I_{FSM}$	50 Hz	2020	
	60 Hz	2115	
$I^2t$	50 Hz	20.41	kA <sup>2</sup> s
	60 Hz	18.63	
$I^2\sqrt{t}$		204.1	kA <sup>2</sup> √s
$V_{RRM}$	Range	400 to 1600	V
$T_{Stg}$		-40 to +150	°C
$T_J$		-40 to +150	°C



**ELECTRICAL SPECIFICATIONS**

<b>VOLTAGE RATINGS</b>				
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> = 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	

<b>FORWARD CONDUCTION</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current at case temperature	I <sub>F(AV)</sub>	180° conduction, half sine wave		100	A
				112	°C
Maximum RMS forward current	I <sub>F(RMS)</sub>			157	
Maximum peak, one-cycle forward, non-repetitive surge current	I <sub>FSM</sub>	t = 10 ms	No voltage reappplied	Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum	A
		t = 8.3 ms			
		t = 10 ms	100 % V <sub>RRM</sub> reappplied		
		t = 8.3 ms			
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reappplied		kA <sup>2</sup> s
		t = 8.3 ms			
		t = 10 ms	100 % V <sub>RRM</sub> reappplied		
		t = 8.3 ms			
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reappplied		204.1	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		0.76	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		0.89	
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		2.4	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		2.05	
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>FM</sub> = π × I <sub>F(AV)</sub> , T <sub>J</sub> = 25 °C, t <sub>p</sub> = 400 μs square wave		1.55	V

<b>BLOCKING</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak reverse leakage current	I <sub>RRM</sub>	T <sub>J</sub> = 150 °C		10	mA
Maximum RMS insulation voltage	V <sub>INS</sub>	50 Hz		3000 (1 min) 3600 (1 s)	V



THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-40 to +150	°C
Maximum internal thermal resistance, junction to case per leg	R <sub>thJC</sub>	DC operation	0.22	°C/W
Typical thermal resistance, case to heatsink per module	R <sub>thCS</sub>	Mounting surface flat, smooth, and greased	0.1	
Mounting torque ± 10 % to heatsink busbar		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
			3	
Approximate weight			75	g
			2.7	oz.
Case style		JEDEC®	AAP Gen 7 (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<sub>thJC</sub> when devices operate at different conduction angles than DC

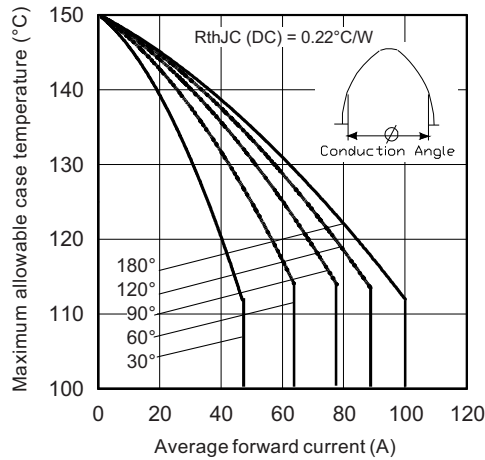


Fig. 1 - Current Ratings Characteristics

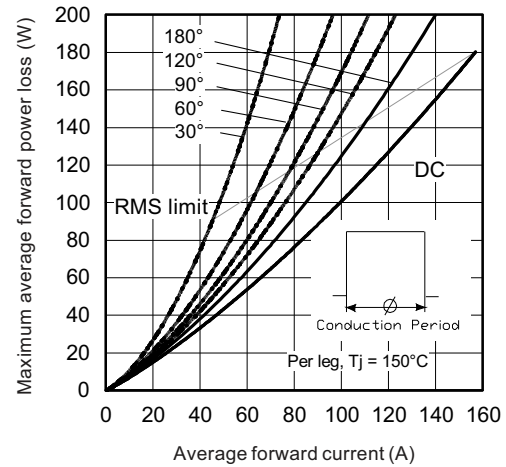


Fig. 4 - On-State Power Loss Characteristics

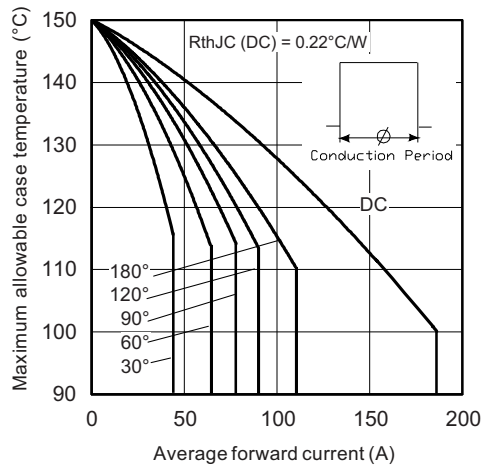


Fig. 2 - Current Ratings Characteristics

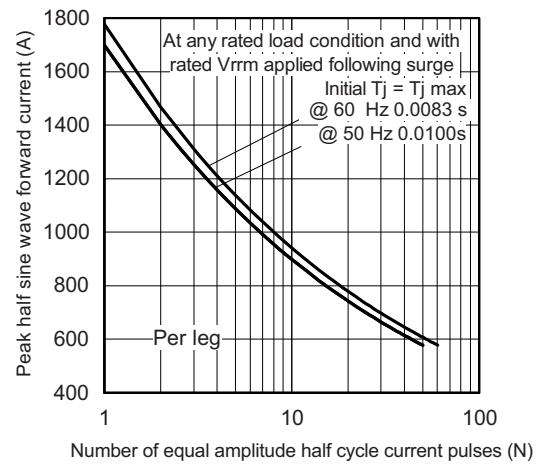


Fig. 5 - Maximum Non-Repetitive Surge Current

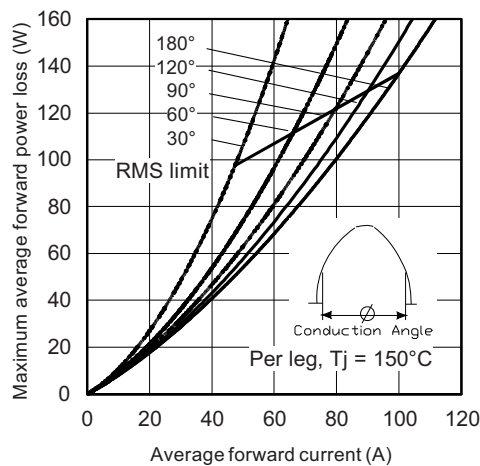


Fig. 3 - Forward Power Loss Characteristics

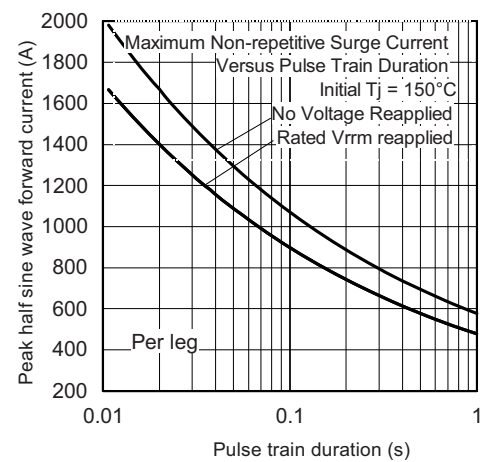


Fig. 6 - Maximum Non-Repetitive Surge Current

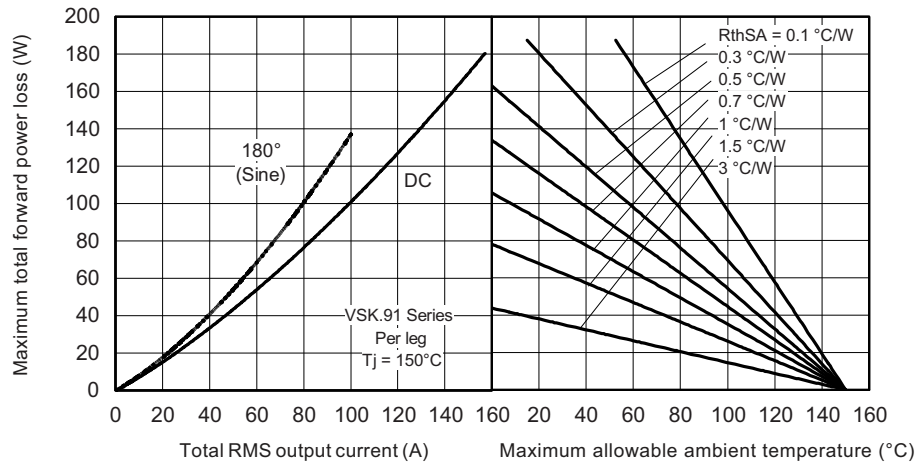


Fig. 7 - Forward Power Loss Characteristics

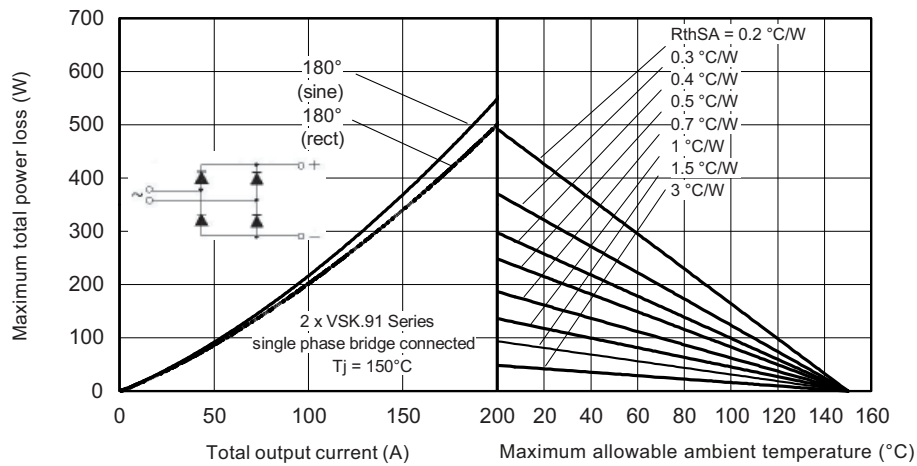


Fig. 8 - Forward Power Loss Characteristics

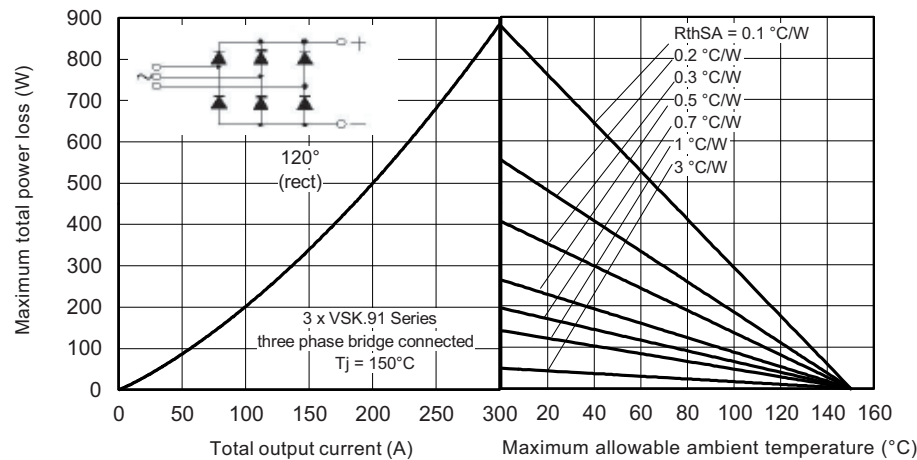


Fig. 9 - Forward Power Loss Characteristics

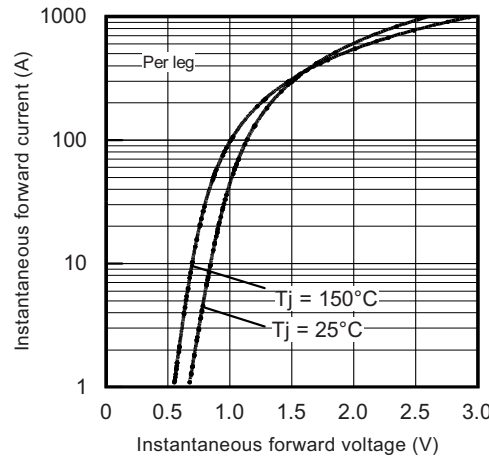


Fig. 10 - Forward Voltage Characteristics

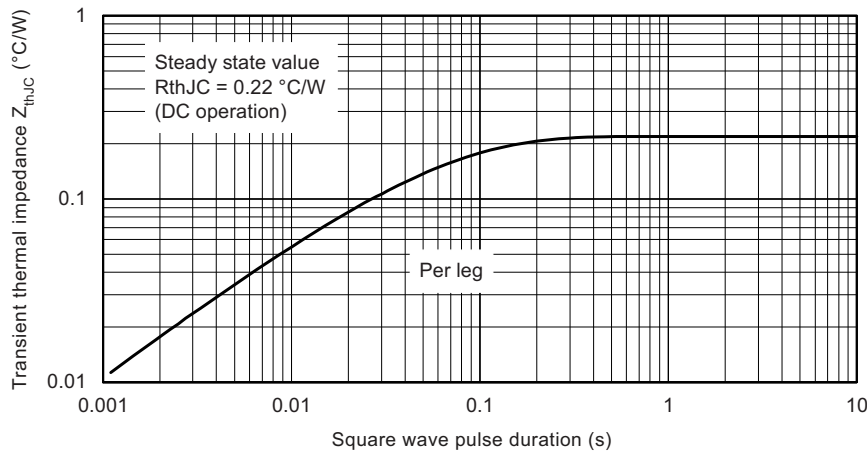


Fig. 11 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-VS</b>	<b>K</b>	<b>D</b>	<b>91</b>	<b>/</b>	<b>16</b>
	①	②	③	④		⑤
	<b>1</b>	-	Vishay Semiconductors product			
	<b>2</b>	-	Module type			
	<b>3</b>	-	Circuit configuration (see Circuit Configuration table)			
	<b>4</b>	-	Current code (100 A)			
	<b>5</b>	-	Voltage code (see Voltage Ratings table)			

**Note**

- To order the optional hardware go to [www.vishay.com/doc?95172](http://www.vishay.com/doc?95172)

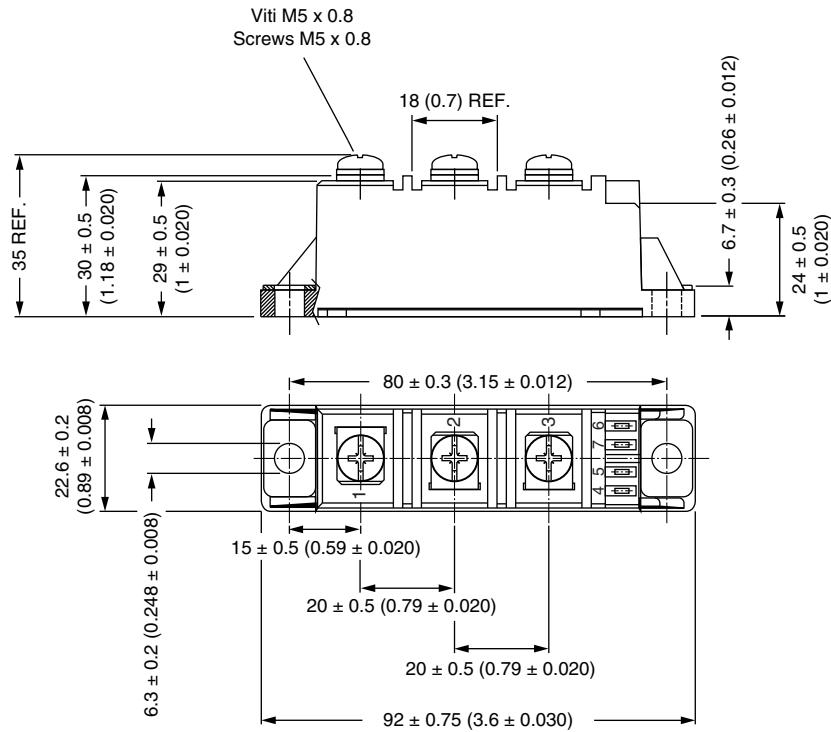


CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes doubler circuit	D	<p><b>VSKD...</b></p>
Two diodes common cathode	C	<p><b>VSKC...</b></p>
Two diodes common anode	J	<p><b>VSKJ...</b></p>
Single diode	E	<p><b>VSKE...</b></p>

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95369">www.vishay.com/doc?95369</a>

## ADD-A-PAK Generation VII - Diode

**DIMENSIONS** in millimeters (inches)





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