

## ADD-A-PAK Generation VII Power Modules Thyristor/Diode and Thyristor/Thyristor, 95 A



ADD-A-PAK

### FEATURES

- High voltage
- Industrial standard package
- UL pending
- 3500 V<sub>RMS</sub> isolating voltage
- Low thermal resistance
- Totally lead (Pb)-free
- Designed and qualified for industrial level



**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

$I_{T(AV)}$ or $I_{F(AV)}$	95 A
----------------------------	------

### 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.

### 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
$I_{T(AV)}$ or $I_{F(AV)}$	85 °C	95	A
$I_{O(RMS)}$	As AC switch	210	
$I_{TSM}$ , $I_{FSM}$	50 Hz	2000	
	60 Hz	2094	
$I^2t$	50 Hz	20	kA <sup>2</sup> s
	60 Hz	18.26	
$I^2\sqrt{t}$		200	kA <sup>2</sup> √s
$V_{RRM}$	Range	400 to 1600	V
$T_{Stg}$		- 40 to 125	°C
$T_J$			

## 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	V <sub>DRM</sub> , MAXIMUM REPETITIVE PEAK OFF-STATE VOLTAGE, GATE OPEN CIRCUIT V	I <sub>RRM</sub> , I <sub>DRM</sub> AT 125 °C mA
VSK.91	04	400	500	400	15
	06	600	700	600	
	08	800	900	800	
	10	1000	1100	1000	
	12	1200	1300	1200	
	14	1400	1500	1400	
	16	1600	1700	1600	

ON-STATE CONDUCTION					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current (thyristors)	I <sub>T(AV)</sub>	180° conduction, half sine wave, T <sub>C</sub> = 85 °C		95	A
Maximum average forward current (diodes)	I <sub>F(AV)</sub>				
Maximum continuous RMS on-state current, as AC switch	I <sub>O(RMS)</sub>			210	
Maximum peak, one-cycle non-repetitive on-state or forward current	I <sub>TSM</sub> or I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	2000	Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum
		t = 8.3 ms		2094	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied	1682	
		t = 8.3 ms		1760	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied	20	Initial T <sub>J</sub> = T <sub>J</sub> maximum
		t = 8.3 ms		18.26	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied	14.14	
		t = 8.3 ms		12.91	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t (1)	t = 0.1 ms to 10 ms, no voltage reapplied T <sub>J</sub> = T <sub>J</sub> maximum		200	kA <sup>2</sup> √s
Maximum value or threshold voltage	V <sub>T(TO)</sub> (2)	Low level (3)	T <sub>J</sub> = T <sub>J</sub> maximum	0.97	V
		High level (4)		1.1	
Maximum value of on-state slope resistance	r <sub>t</sub> (2)	Low level (3)	T <sub>J</sub> = T <sub>J</sub> maximum	2.76	mΩ
		High level (4)		2.38	
Maximum peak on-state or forward voltage	V <sub>TM</sub>	I <sub>TM</sub> = π × I <sub>T(AV)</sub>	T <sub>J</sub> = 25 °C	1.73	V
	V <sub>FM</sub>	I <sub>FM</sub> = π × I <sub>F(AV)</sub>			
Maximum non-repetitive rate of rise of turned on current	di/dt	T <sub>J</sub> = 25 °C, from 0.67 V <sub>DRM</sub> , I <sub>TM</sub> = π × I <sub>T(AV)</sub> , I <sub>g</sub> = 500 mA, t <sub>r</sub> < 0.5 μs, t <sub>p</sub> > 6 μs		150	A/μs
Maximum holding current	I <sub>H</sub>	T <sub>J</sub> = 25 °C, anode supply = 6 V, resistive load, gate open circuit		250	mA
Maximum latching current	I <sub>L</sub>	T <sub>J</sub> = 25 °C, anode supply = 6 V, resistive load		400	

### Notes

- (1) I<sup>2</sup>t for time t<sub>x</sub> = I<sup>2</sup>√t × √t<sub>x</sub>
- (2) Average power = V<sub>T(TO)</sub> × I<sub>T(AV)</sub> + r<sub>t</sub> × (I<sub>T(RMS)</sub>)<sup>2</sup>
- (3) 16.7 % × π × I<sub>AV</sub> < I < π × I<sub>AV</sub>
- (4) I > π × I<sub>AV</sub>



TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	$P_{GM}$			12	W
Maximum average gate power	$P_{G(AV)}$			3.0	
Maximum peak gate current	$I_{GM}$			3.0	A
Maximum peak negative gate voltage	$-V_{GM}$			10	V
Maximum gate voltage required to trigger	$V_{GT}$	$T_J = -40\text{ °C}$	Anode supply = 6 V resistive load	4.0	
		$T_J = 25\text{ °C}$		2.5	
		$T_J = 125\text{ °C}$		1.7	
Maximum gate current required to trigger	$I_{GT}$	$T_J = -40\text{ °C}$	Anode supply = 6 V resistive load	270	mA
		$T_J = 25\text{ °C}$		150	
		$T_J = 125\text{ °C}$		80	
Maximum gate voltage that will not trigger	$V_{GD}$	$T_J = 125\text{ °C}$ , rated $V_{DRM}$ applied		0.25	V
Maximum gate current that will not trigger	$I_{GD}$	$T_J = 125\text{ °C}$ , rated $V_{DRM}$ applied		6	mA

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak reverse and off-state leakage current at $V_{RRM}$ , $V_{DRM}$	$I_{RRM}$ , $I_{DRM}$	$T_J = 125\text{ °C}$ , gate open circuit		15	mA
RMS insulation voltage	$V_{INS}$	50 Hz, 1 s		3500	V
Maximum critical rate of rise of off-state voltage	$dV/dt$	$T_J = 125\text{ °C}$ , linear to $0.67 V_{DRM}$		1000	V/ $\mu$ s

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Junction operating and storage temperature range	$T_J$ , $T_{Stg}$			- 40 to 125	°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	
Mounting torque $\pm 10\%$	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
	busbar			3	
Approximate weight				75	g
				2.7	oz.
Case style			JEDEC	TO-240AA compatible	

$\Delta R$ CONDUCTION PER JUNCTION											
DEVICES	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VSK.91..	0.04	0.048	0.063	0.085	0.125	0.033	0.052	0.067	0.088	0.127	°C/W

**Note**

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



Fig. 1 - Current Ratings Characteristics

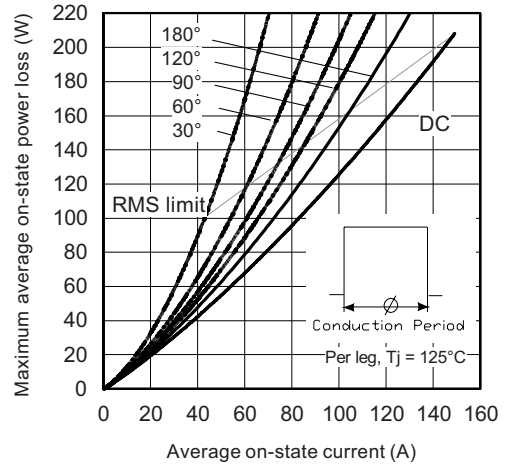


Fig. 4 - On-State Power Loss Characteristics

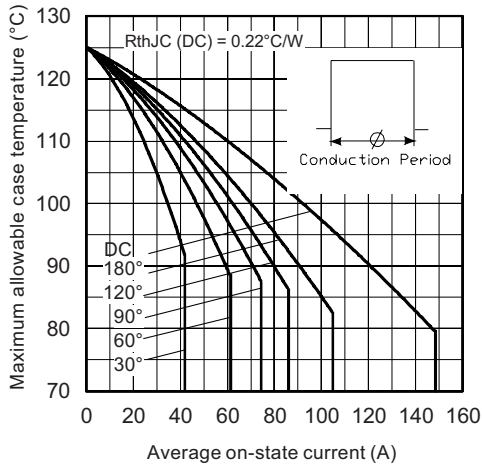


Fig. 2 - Current Ratings Characteristics



Fig. 5 - Maximum Non-Repetitive Surge Current

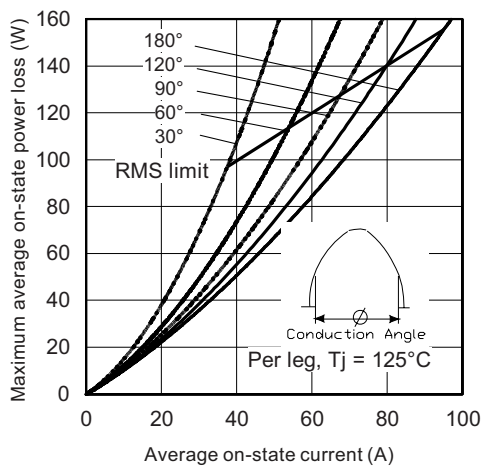


Fig. 3 - On-State Power Loss Characteristics

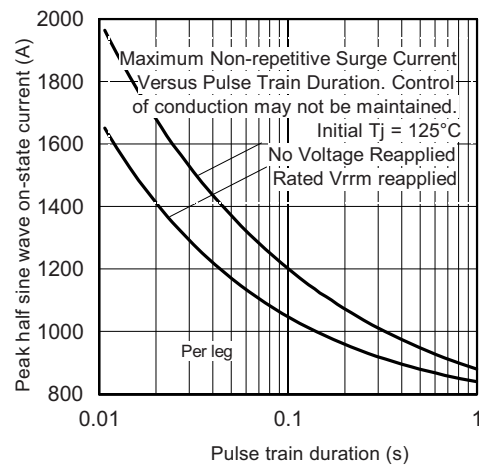


Fig. 6 - Maximum Non-Repetitive Surge Current

## ADD-A-PAK Generation VII Power Modules Vishay High Power Products Thyristor/Diode and Thyristor/Thyristor, 95 A



Fig. 7 - On-State Power Loss Characteristics



Fig. 8 - On-State Power Loss Characteristics



Fig. 9 - On-State Power Loss Characteristics



Fig. 10 - On-State Voltage Drop Characteristics



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



Fig. 12 - Gate Characteristics



### ORDERING INFORMATION TABLE



- 1 - Module type
- 2 - Circuit configuration (see end of datasheet)
- 3 - Current code (95 A)
- 4 - 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



#### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95368">http://www.vishay.com/doc?95368</a>
------------	---



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.



Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)