

## ADD-A-PAK Generation VII Power Modules Standard Diodes, 60 A




ADD-A-PAK

PRODUCT SUMMARY	
$I_{F(AV)}$	60 A
Type	Modules - Diode, High Voltage

### 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.

### FEATURES

- High voltage
- Industrial standard package
- Low thermal resistance
- UL approved file E78996 
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified for industrial level



**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
$I_{F(AV)}$	114 °C	60	A
$I_{F(RMS)}$		94	
$I_{FSM}$	50 Hz	1300	
	60 Hz	1360	
$I^2t$	50 Hz	8.44	kA <sup>2</sup> s
	60 Hz	7.68	
$I^2\sqrt{t}$		84.5	kA <sup>2</sup> √s
$V_{RRM}$	Range	400 to 1600	V
$T_J$		- 40 to 150	°C
$T_{Stg}$			

# VSKD56.., VSKE56.., VSKJ56.., VSKC56.. Series



Vishay Semiconductors

ADD-A-PAK Generation VII  
Power Modules Standard Diodes, 60 A

## 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 $T_J = 150\text{ }^\circ\text{C}$ mA
VSK.56	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		60	A
				114	°C
Maximum RMS forward current	$I_{F(RMS)}$	DC at 90 °C case temperature		94	
Maximum peak, one-cycle forward, non-repetitive surge current	$I_{FSM}$	t = 10 ms	No voltage reappplied	1300	A
		t = 8.3 ms		1360	
		t = 10 ms	100 % $V_{RRM}$ reappplied	1090	
		t = 8.3 ms		1140	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reappplied	8.44	kA <sup>2</sup> s
		t = 8.3 ms		7.68	
		t = 10 ms	100 % $V_{RRM}$ reappplied	5.97	
		t = 8.3 ms		5.43	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reappplied		84.5	kA <sup>2</sup> √s
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.74	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.86	
Low level value of forward slope resistance	$r_{f1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		3.94	mΩ
High level value of forward slope resistance	$r_{f2}$	(I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		3.43	
Maximum forward voltage drop	$V_{FM}$	$I_{FM} = \pi \times I_{F(AV)}$ , $T_J = 25\text{ }^\circ\text{C}$ , $t_p = 400\text{ }\mu\text{s}$ square wave		1.6	V

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



# VSKD56.., VSKE56.., VSKJ56.., VSKC56.. Series

ADD-A-PAK Generation VII  
Power Modules Standard Diodes, 60 A

Vishay Semiconductors

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	0.33	°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 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	ADD-A-PAK Gen. VII (TO-240AA)	

$\Delta R$ CONDUCTION PER JUNCTION											
DEVICES	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VSK.56	0.115	0.136	0.173	0.236	0.346	0.09	0.145	0.185	0.243	0.349	°C/W

**Note**

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

# VSKD56.., VSKE56.., VSKJ56.., VSKC56.. Series



Vishay Semiconductors

ADD-A-PAK Generation VII  
Power Modules Standard Diodes, 60 A

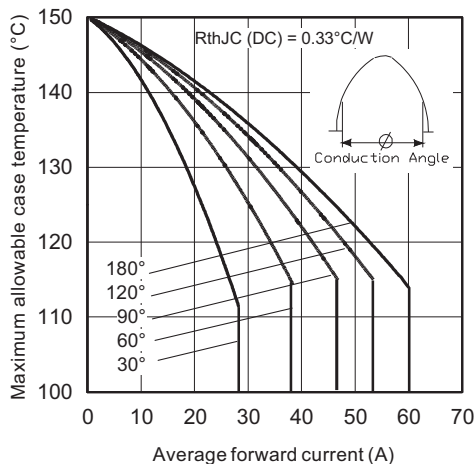


Fig. 1 - Current Ratings Characteristics

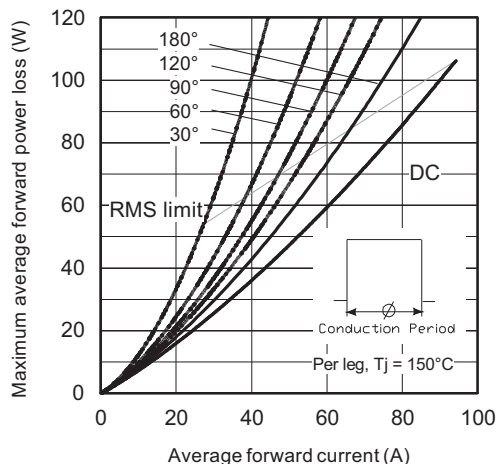


Fig. 4 - Forward Power Loss Characteristics

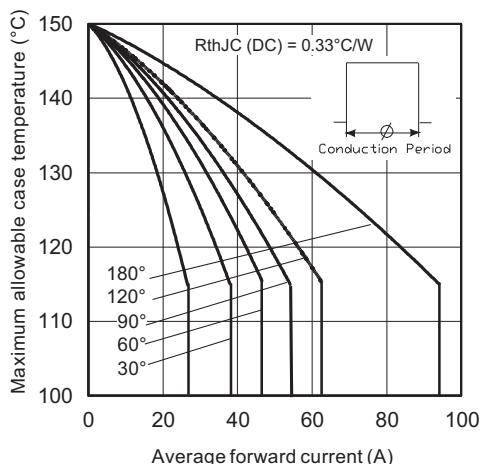


Fig. 2 - Current Ratings Characteristics

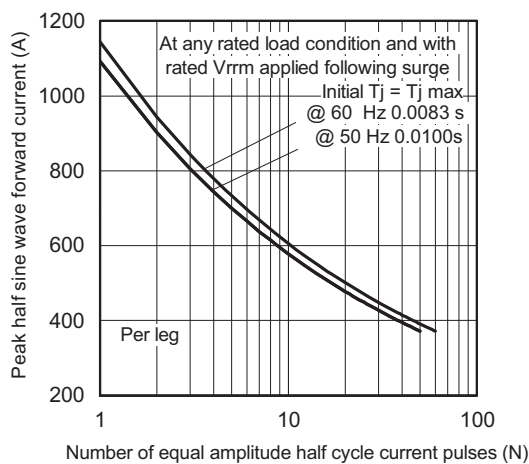


Fig. 5 - Maximum Non-Repetitive Surge Current

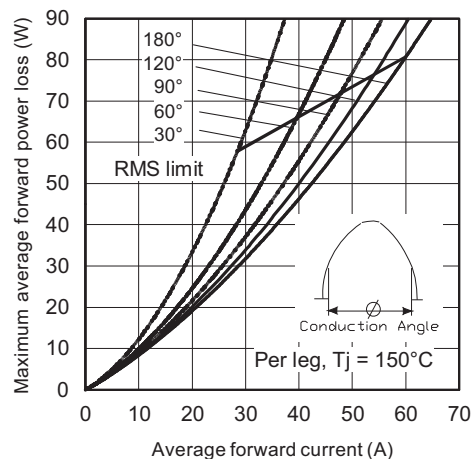


Fig. 3 - Forward Power Loss Characteristics

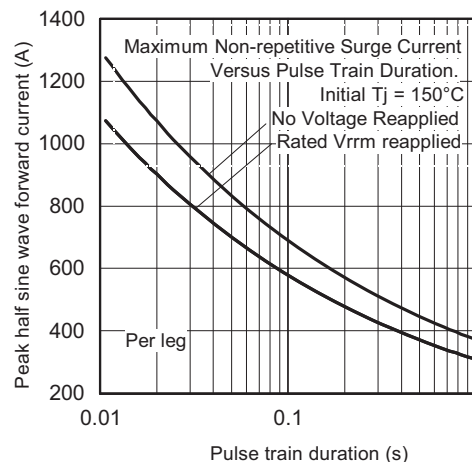


Fig. 6 - Maximum Non-Repetitive Surge Current



# VSKD56.., VSKE56.., VSKJ56.., VSKC56.. Series

ADD-A-PAK Generation VII  
Power Modules Standard Diodes, 60 A

Vishay Semiconductors

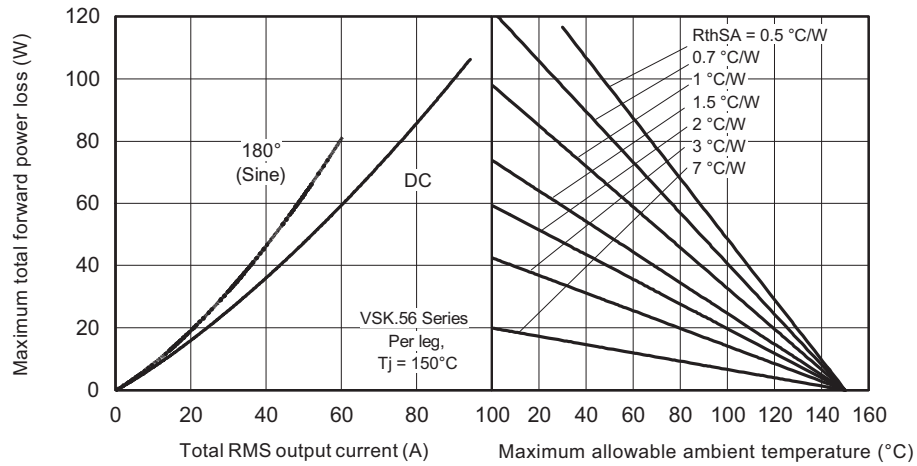


Fig. 7 - Forward Power Loss Characteristics

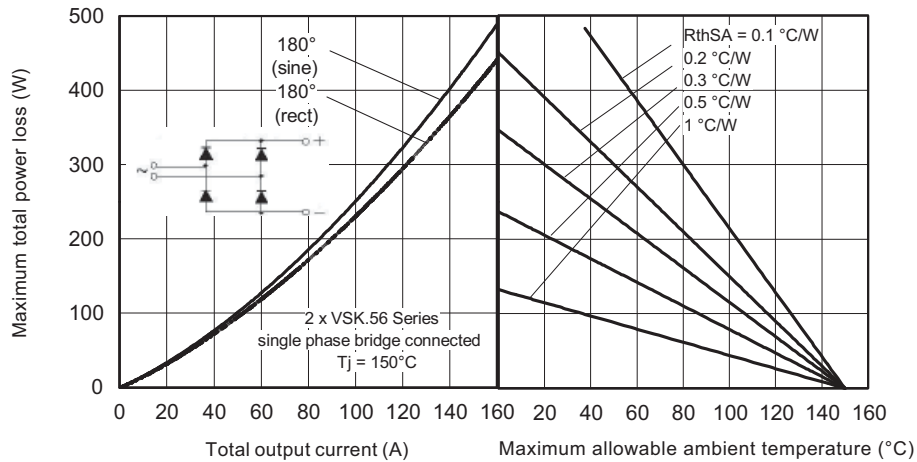


Fig. 8 - Forward Power Loss Characteristics

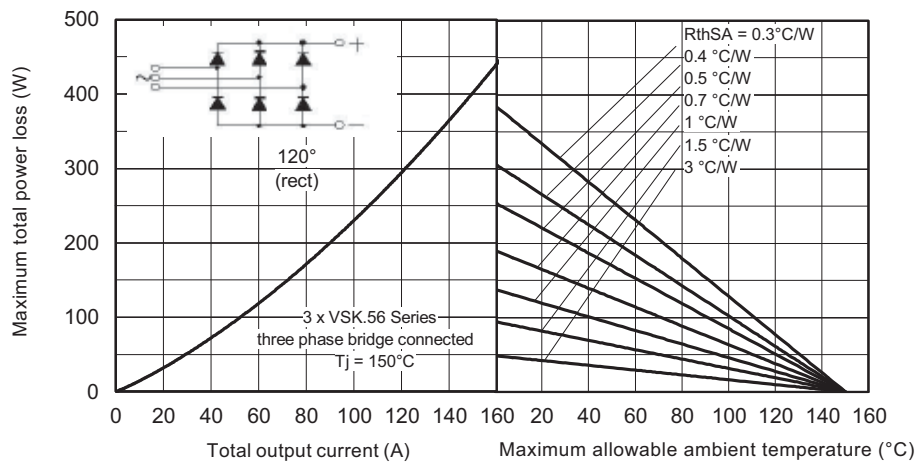


Fig. 9 - Forward Power Loss Characteristics

# VSKD56..., VSKE56..., VSKJ56..., VSKC56.. Series



Vishay Semiconductors

ADD-A-PAK Generation VII  
Power Modules Standard Diodes, 60 A

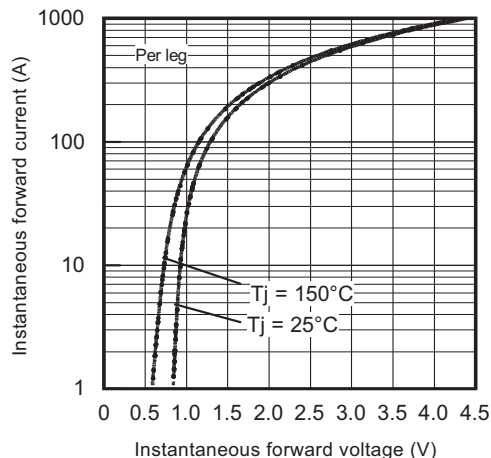


Fig. 10 - Forward Voltage Characteristics

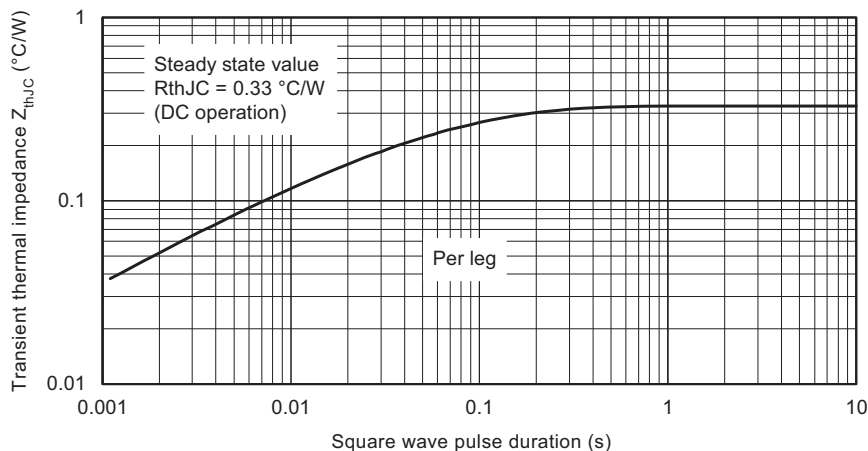


Fig. 11 - Thermal Impedance  $Z_{thJC}$  Characteristics

## ORDERING INFORMATION TABLE

Device code	<b>VSK</b>	<b>D</b>	<b>56</b>	<b>/</b>	<b>16</b>
	①	②	③		④

- 1** - Module type
- 2** - Circuit configuration (see Circuit Configuration table)
- 3** - Current code (60 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)



# VSKD56.., VSKE56.., VSKJ56.., VSKC56.. Series

ADD-A-PAK Generation VII  
Power Modules Standard Diodes, 60 A

Vishay Semiconductors

CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes doubler circuit	D	<p><b>VSKD...</b></p>
Two diodes common cathodes	C	<p><b>VSKC...</b></p>
Two diodes common anodes	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)







## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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