

## ADD-A-PAK Generation VII Power Modules Schottky Rectifier, 400 A



ADD-A-PAK


### PRODUCT SUMMARY

$I_{F(AV)}$	400 A
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### 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

- 150 °C  $T_J$  operation
- Low forward voltage drop
- High frequency operation
- 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
- High surge capability
- Easy mounting on heatsink

### ELECTRICAL DESCRIPTION

The VSKCS400/045 Schottky rectifier common cathode has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in high current switching power supplies, plating power supplies, UPS systems, converters, freewheeling diodes, welding, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	400	A
$V_{RRM}$		45	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	29 000	A
$V_F$	200 Apk, $T_J = 125^\circ C$	0.73	V
$T_J$	Range	- 55 to 150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VSKCS400/045	UNITS
Maximum DC reverse voltage	$V_R$	45	V
Maximum working peak reverse voltage	$V_{RWM}$		

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per module per leg	$I_{F(AV)}$	50 % duty cycle at $T_C = 91^\circ\text{C}$ , rectangular waveform	400 200	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse	29 000	
		10 ms sine or 6 ms rect. pulse	3400	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25^\circ\text{C}$ , $I_{AS} = 19\text{ A}$ , $L = 1\text{ mH}$	180	mJ
Repetitive avalanche current	$I_{AR}$	Current decaying linearly to zero in 1 $\mu\text{s}$ Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical	40	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	200 A	0.67	V
		400 A	0.92	
		200 A	0.73	
		400 A	1.14	
Maximum reverse leakage current	$I_{RM}$	$T_J = 25^\circ\text{C}$	20	mA
		$T_J = 125^\circ\text{C}$	1.2	A
Maximum junction capacitance	$C_T$	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25^\circ\text{C}$	10 300	pF
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body	5.0	nH
Maximum voltage rate of change	$dV/dt$	Rated $V_R$	10 000	V/ $\mu\text{s}$
Maximum RMS insulation voltage	$V_{INS}$	50 Hz	3000 (1 min) 3600 (1 s)	V

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		- 55 to 150	°C
Maximum thermal resistance, junction to case per leg	R <sub>thJC</sub>	DC operation	0.26	°C/W
Typical thermal resistance, case to heatsink per module	R <sub>thCS</sub>		0.1	
Approximate weight			75	g
			2.7	oz.
Mounting torque ± 10 %	to heatsink	A mounting compound is recommended and the torque should be rechecked after a period of 3 h to allow for the spread of the compound.	4	Nm
	busbar		3	
Case style		JEDEC	TO-240AA compatible	

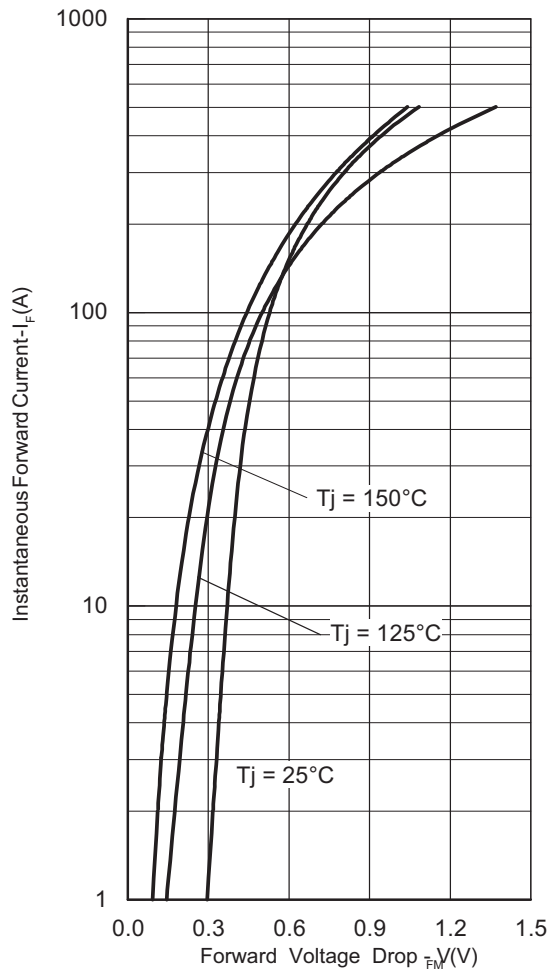


Fig. 1 - Maximum Forward Voltage Drop Characteristics

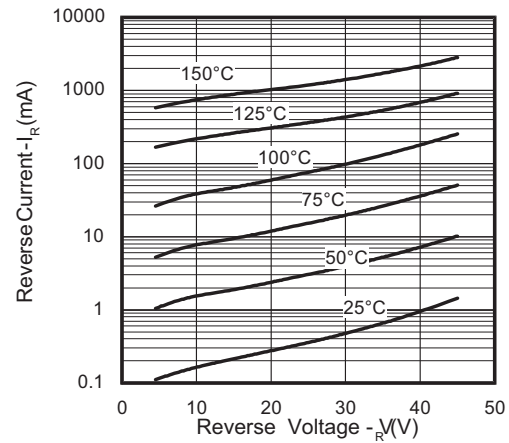


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

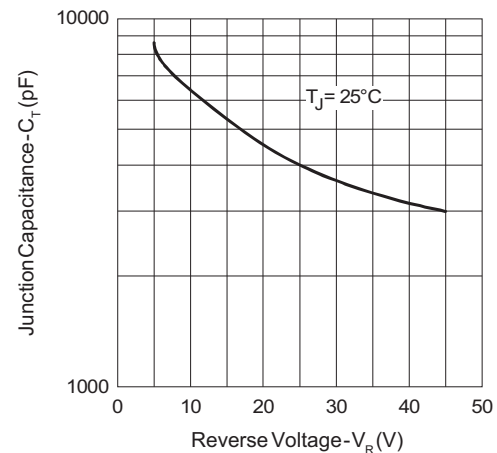


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

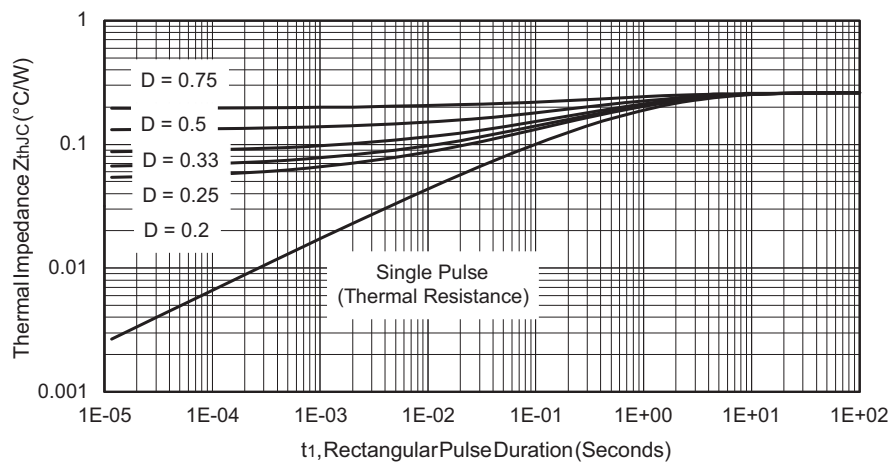


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

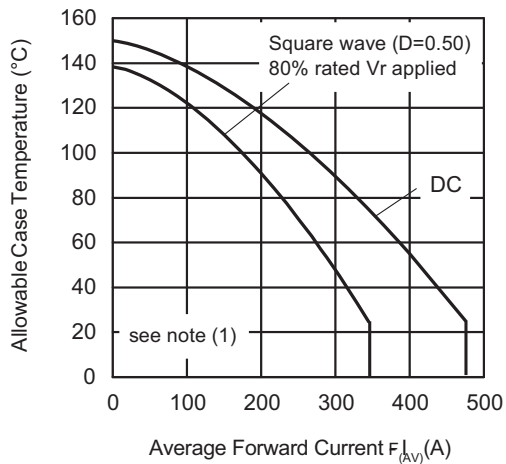


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

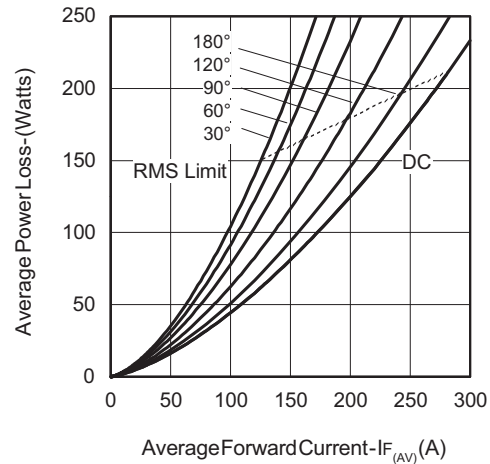


Fig. 6 - Forward Power Loss Characteristics

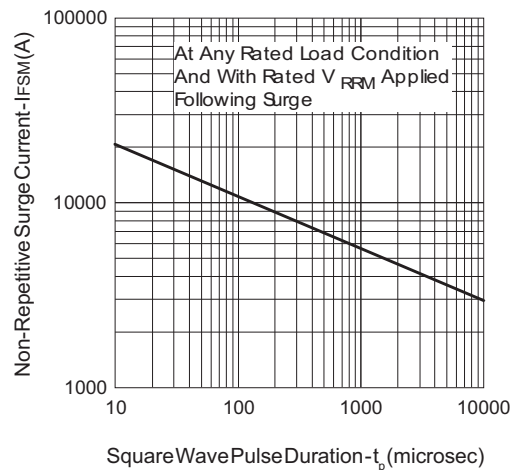


Fig. 7 - Maximum Non-Repetitive Surge Current

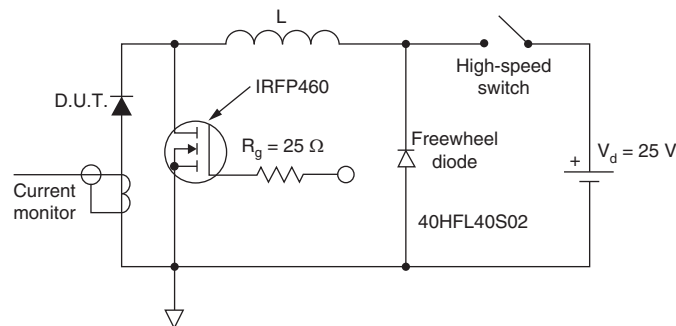


Fig. 8 - Unclamped Inductive Test Circuit

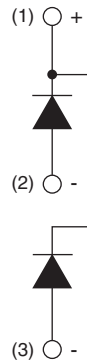
**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

Device code	<b>VS</b>	<b>KC</b>	<b>S</b>	<b>40</b>	<b>0</b>	<b>/</b>	<b>045</b>
	①	②	③	④	⑤		⑥

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration:  
KC = ADD-A-PAK - 2 diodes/common cathode
- 3** - S = Schottky diode
- 4** - Average rating (x 10)
- 5** - Product silicon identification
- 6** - Voltage rating (045 = 45 V)

**CIRCUIT CONFIGURATION**

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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