


## ADD-A-PAK Gen 7

### Power Modules Schottky Rectifier, 200 A



ADD-A-PAK

#### FEATURES

- 175 °C  $T_J$  operation
- Low forward voltage drop
- High frequency operation
- 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
- High surge capability
- Easy mounting on heatsink

#### ELECTRICAL DESCRIPTION

The VS-VSKDS409/150 Schottky rectifier doubler module has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °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.

#### PRODUCT SUMMARY

$I_{F(AV)}$	200 A
$V_R$	150 V
Package	ADD-A-PAK Gen 7
Circuit	Two diodes doubler circuit

#### 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.

#### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	200	A
$V_{RRM}$		150	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	20 000	A
$V_F$	200 A <sub>pk</sub> , $T_J = 125^\circ C$	0.85	V
$T_J$	Range	-55 to +175	°C

#### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-VSKDS409/150	UNITS
Maximum DC reverse voltage	$V_R$	150	V
Maximum static peak reverse voltage	$V_{RRM}$		

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	50 % duty cycle at $T_C = 105\text{ }^{\circ}\text{C}$ , rectangular waveform	200	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse	20 000	
		10 ms sine or 6 ms rect. pulse	2300	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_{AS} = 1.8\text{ A}$ , $L = 10\text{ mH}$	15	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	1	A
Maximum dynamic peak reverse voltage	$V_{AV}$	$T_J = 25\text{ }^{\circ}\text{C}$ , $I_{AS} = 1.8\text{ A}$ , $L = 10\text{ mH}$	170	V

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	200 A	1.03	V
		400 A	1.33	
		200 A	0.85	
		400 A	1.13	
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^{\circ}\text{C}$	6	mA
		$T_J = 125\text{ }^{\circ}\text{C}$	85	
Maximum junction capacitance	$C_T$	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$	6000	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 +175	°C
Maximum thermal resistance, junction to case per leg	R <sub>thJC</sub>	DC operation	0.32	°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 % <div>to heatsink</div> <div>busbar</div>		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
			3	
Case style		JEDEC®	TO-240AA compatible	

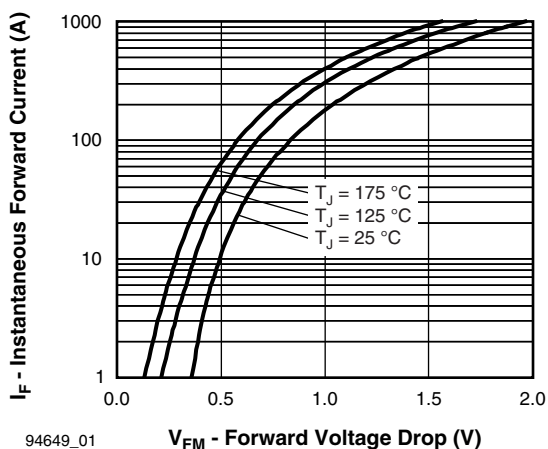


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

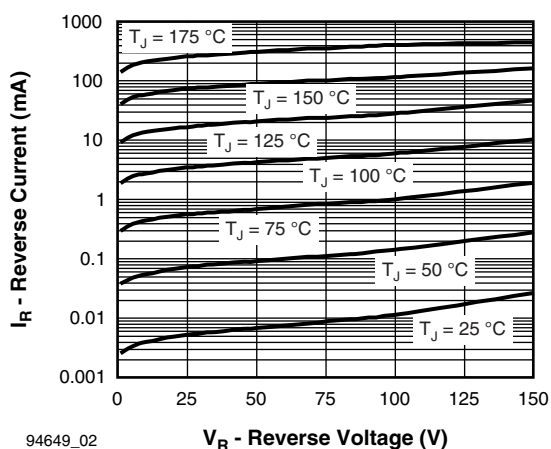


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

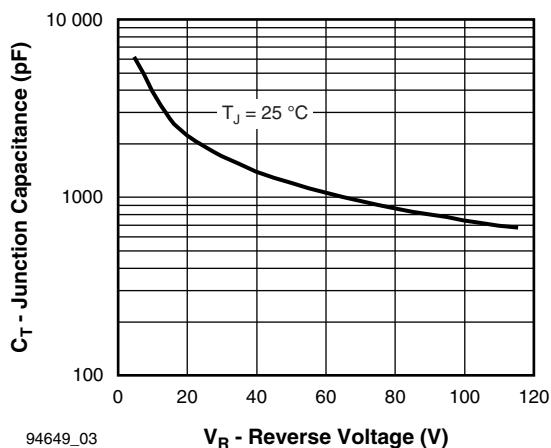
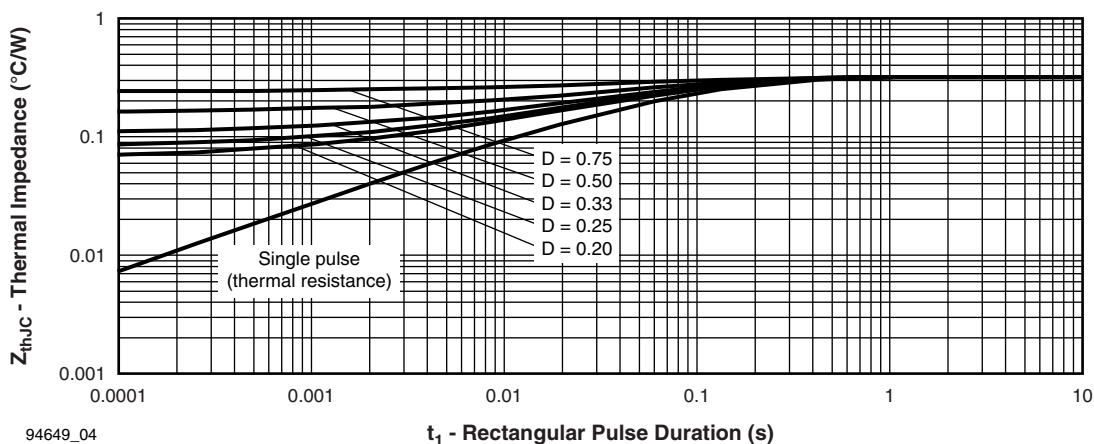


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Diode)

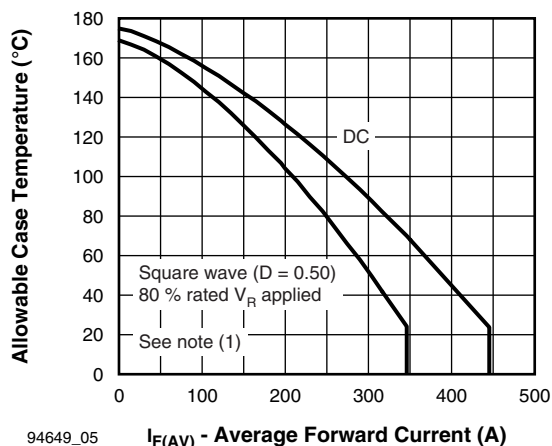


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

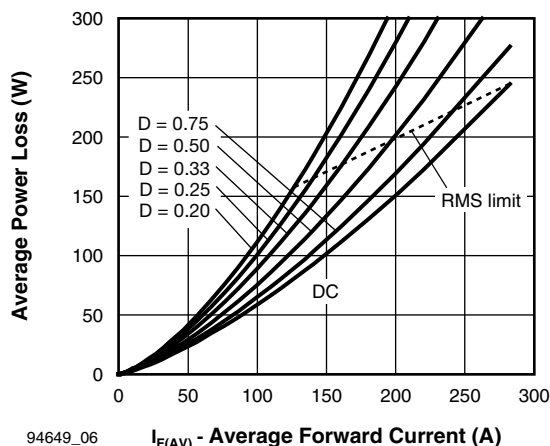


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

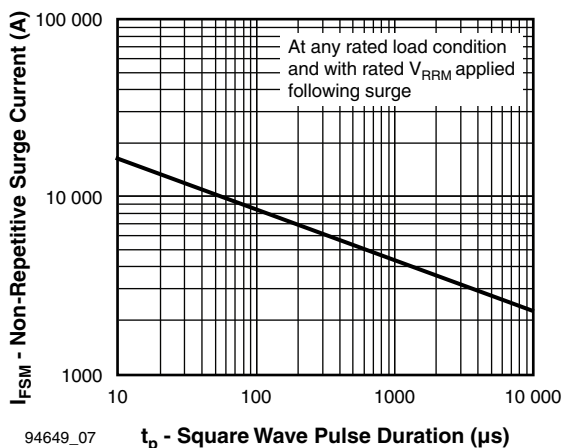


Fig. 7 - Maximum Non-Repetitive Surge Current

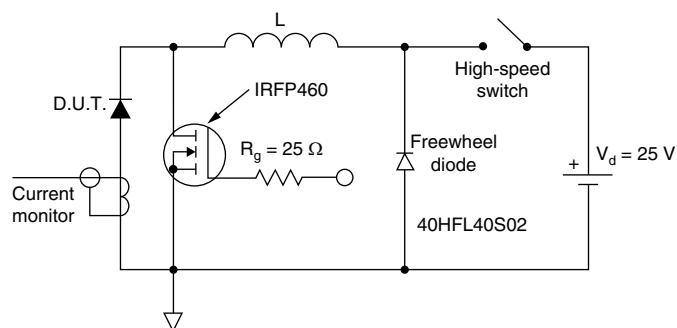


Fig. 8 - Unclamped Inductive Test Circuit

#### 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

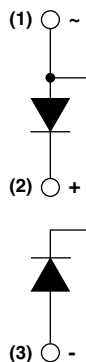
Device code	VS-VS	KD	S	40	9	/	150
	1	2	3	4	5		6

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration:  
KD = ADD-A-PAK - 2 diodes in series
- 3** - S = Schottky diode
- 4** - Average current rating (40 = 400 A) <sup>(1)</sup>
- 5** - Product silicon identification
- 6** - Voltage rating (150 = 150 V)

### Note

<sup>(1)</sup> For KD configuration average current rating per module is 200 A

## 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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