

## AAP Gen 7 (TO-240AA)

### Power Modules Schottky Rectifier, 100 A



AAP Gen 7 (TO-240AA)

#### PRIMARY CHARACTERISTICS

|                       |                            |
|-----------------------|----------------------------|
| $I_{F(AV)}$           | 100 A                      |
| $V_R$                 | 150 V                      |
| Package               | AAP Gen 7 (TO-240AA)       |
| Circuit configuration | Two diodes doubler circuit |

#### MECHANICAL DESCRIPTION

The AAP Gen 7, 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

- 175 °C  $T_J$  operation
- Low forward voltage drop
- High frequency operation
- Low thermal resistance
- UL approved file E78996 
- 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 / APPLICATIONS

The VS-VSKDS209.. 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.

#### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                      | VALUES      | UNITS |
|-------------|--------------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform                 | 100         | A     |
| $V_{RRM}$   |                                      | 150         | V     |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                 | 11 300      | A     |
| $V_F$       | 100 A <sub>pk</sub> , $T_J = 125$ °C | 0.85        | V     |
| $T_J$       | Range                                | -55 to +175 | °C    |

#### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | VS-VSKDS209/150 | UNITS |
|--------------------------------------|-----------|-----------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 150             | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |                 |       |

**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER                                           | SYMBOL      | TEST CONDITIONS                                                                                                           | VALUES | UNITS |
|-----------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current per leg             | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 113\text{ }^{\circ}\text{C}$ , rectangular waveform                                             | 100    | A     |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$   | 5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse                                                                       | 11 300 |       |
|                                                     |             | 10 ms sine or 6 ms rect. pulse                                                                                            | 1600   |       |
| 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 $\mu\text{s}$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical | 1      | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                       | SYMBOL    | TEST CONDITIONS                                                                            | VALUES       | UNITS            |
|---------------------------------|-----------|--------------------------------------------------------------------------------------------|--------------|------------------|
| Maximum forward voltage drop    | $V_{FM}$  | 100 A                                                                                      | 1.01         | V                |
|                                 |           | 200 A                                                                                      | 1.35         |                  |
|                                 |           | 100 A                                                                                      | 0.85         |                  |
|                                 |           | 200 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), $25\text{ }^{\circ}\text{C}$ | 3000         | pF               |
| Typical series inductance       | $L_S$     | Measured lead to lead 5 mm from package body                                               | 7.0          | 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) | V                |
|                                 |           |                                                                                            | 3600 (1 s)   |                  |

**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                                                                                                                             | 0.52                | °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 %<br>to heatsink<br>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                   |       |
| Case style                                              |                                   | JEDEC®                                                                                                                                   | TO-240AA compatible |       |

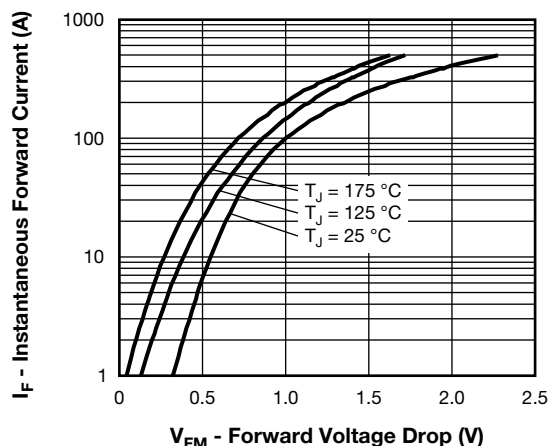


Fig. 1 - Maximum Forward Voltage Drop Characteristics

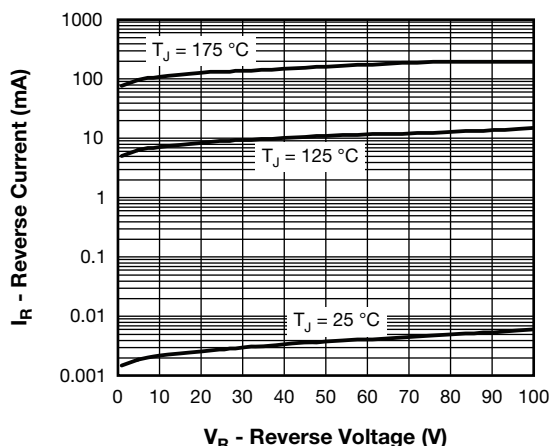


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

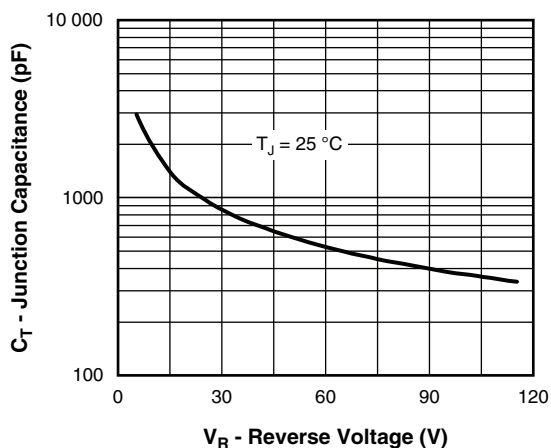
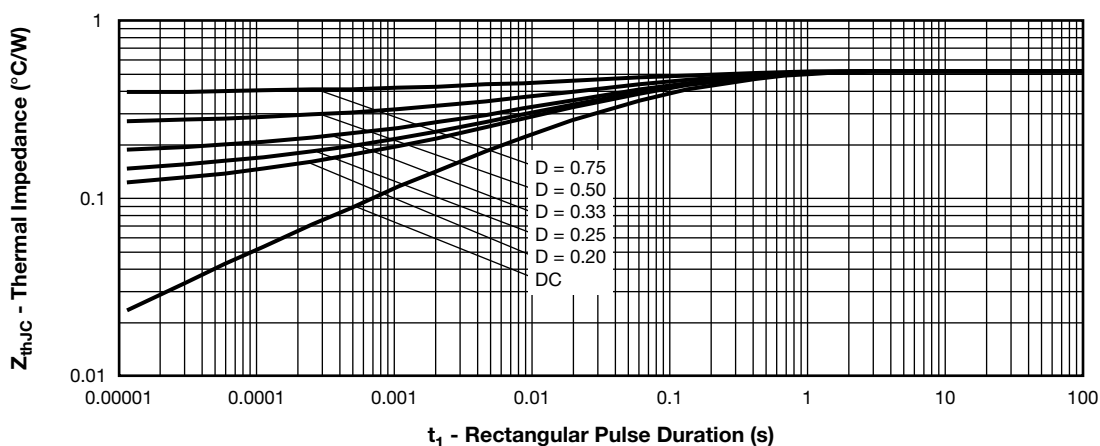


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

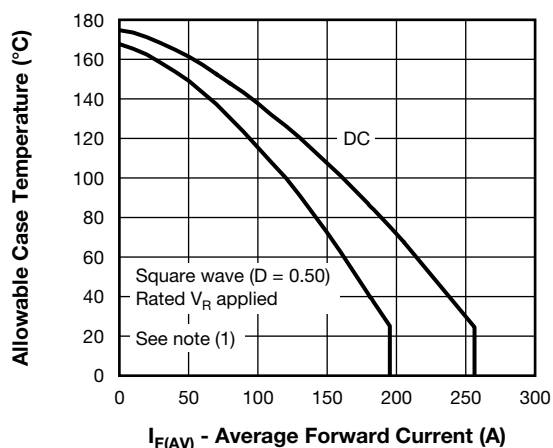


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

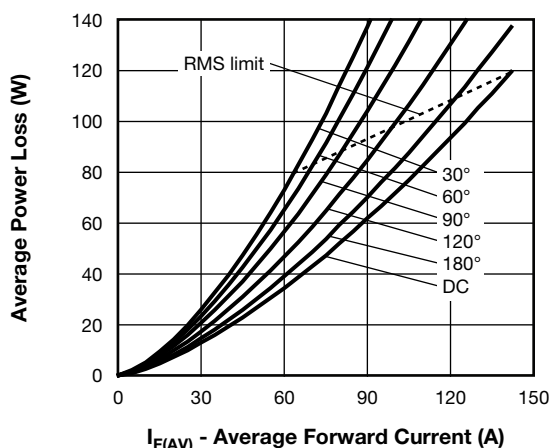


Fig. 6 - Forward Power Loss Characteristics

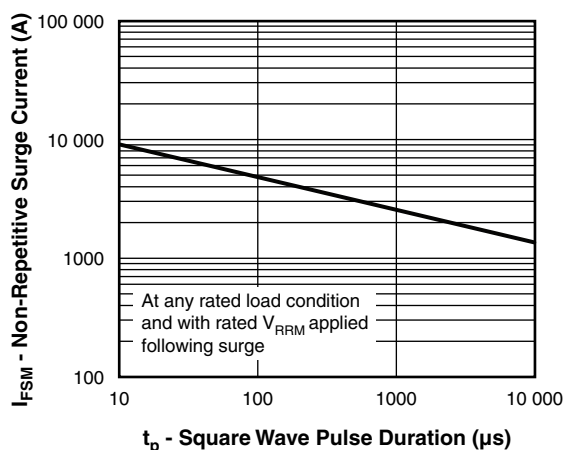


Fig. 7 - Maximum Non-Repetitive Surge Current

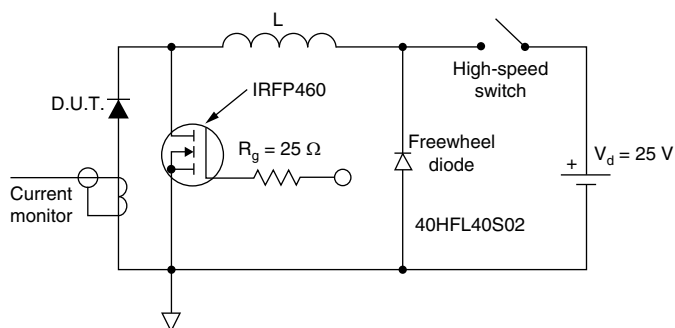


Fig. 8 - Unclamped Inductive Test Circuit

#### 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  $V_R$

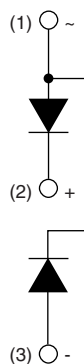


## ORDERING INFORMATION TABLE

|             |       |    |   |    |   |   |     |
|-------------|-------|----|---|----|---|---|-----|
| Device code | VS-VS | KD | S | 20 | 9 | / | 150 |
|             | 1     | 2  | 3 | 4  | 5 |   | 6   |

- 1** - VS-VS = Vishay Semiconductors product
- 2** - Circuit configuration:  
KD = ADD-A-PAK - 2 diodes doubler circuit
- 3** - S = Schottky diode
- 4** - Average current rating (20 = 200 A)
- 5** - Product silicon identification
- 6** - Voltage rating (150 = 150 V)

## CIRCUIT CONFIGURATION



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



## 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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

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. 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.