# ADD-A-PAK Gen 7
# Power Modules Standard Diodes, 100 A

ADD-A-PAK

| PRODUCT SUMMARY | |
|---|---|
| $I_{F(AV)}$ | 100 A |
| Type | Modules - Diode, High Voltage |
| Package | ADD-A-PAK Gen 7 |
| Circuit | Two diodes doubler circuit, two diodes common cathode, two diodes common anode, single diode |

## MECHANICAL DESCRIPTION

The ADD-A-PAK 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

- High voltage
- Industrial standard package
- 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

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 |
| $I_{F(AV)}$ | 112 °C | 100 | A |
| $I_{F(RMS)}$ | | 157 | |
| $I_{FSM}$ | 50 Hz | 2020 | |
| | 60 Hz | 2115 | |
| $I^2t$ | 50 Hz | 20.41 | $kA^2s$ |
| | 60 Hz | 18.63 | |
| $I^2\sqrt{t}$ | | 204.1 | $kA^2\sqrt{s}$ |
| $V_{RRM}$ | Range | 400 to 1600 | V |
| $T_J$ | | -40 to +150 | °C |
| $T_{Stg}$ | | | |


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## 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 °C mA |
|---|---|---|---|---|
| VS-VSK.91 | 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 | | | 100 | A |
| | | | | | 112 | °C |
| Maximum RMS forward current | $I_{F(RMS)}$ | DC at 90 °C case temperature | | | 157 | A |
| Maximum peak, one-cycle forward, non-repetitive surge current | $I_{FSM}$ | t = 10 ms | No voltage reapplied | Sinusoidal half wave, initial $T_J = T_J$ maximum | 2020 | |
| | | t = 8.3 ms | | | 2115 | |
| | | t = 10 ms | 100 % $V_{RRM}$ reapplied | | 1700 | |
| | | t = 8.3 ms | | | 1780 | |
| Maximum $I^2t$ for fusing | $I^2t$ | t = 10 ms | No voltage reapplied | | 20.41 | $kA^2s$ |
| | | t = 8.3 ms | | | 18.63 | |
| | | t = 10 ms | 100 % $V_{RRM}$ reapplied | | 14.44 | |
| | | t = 8.3 ms | | | 13.18 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reapplied | | | 204.1 | $kA^2\sqrt{s}$ |
| Low level value of threshold voltage | $V_{F(TO)1}$ | (16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 0.76 | V |
| High level value of threshold voltage | $V_{F(TO)2}$ | (I > π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 0.89 | |
| Low level value of forward slope resistance | $r_{f1}$ | (16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 2.4 | mΩ |
| High level value of forward slope resistance | $r_{f2}$ | (I > π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 2.05 | |
| Maximum forward voltage drop | $V_{FM}$ | $I_{FM}$ = π x $I_{F(AV)}$, $T_J$ = 25 °C, $t_p$ = 400 µs square wave | | | 1.55 | V |

### BLOCKING

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|
| Maximum peak reverse leakage current | $I_{RRM}$ | $T_J$ = 150 °C | 10 | mA |
| Maximum RMS insulation voltage | $V_{INS}$ | 50 Hz | 3000 (1 min)<br>3600 (1 s) | V |


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| 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 | 0.22 | °C/W |
| Typical thermal resistance, case to heatsink per module | $R_{thCS}$ | Mounting surface flat, smooth and greased | 0.1 | |
| Mounting torque ± 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 |
| Mounting torque ± 10 % busbar | | | 3 | |
| Approximate weight | | | 75 | g |
| | | | 2.7 | oz. |
| Case style | | JEDEC® | ADD-A-PAK Gen 7 (TO-240AA) | |

| ΔR CONDUCTION PER JUNCTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DEVICES** | **SINE HALF WAVE CONDUCTION** | | | | | **RECTANGULAR WAVE CONDUCTION** | | | | | **UNITS** |
| | **180°** | **120°** | **90°** | **60°** | **30°** | **180°** | **120°** | **90°** | **60°** | **30°** | |
| VSK.91 | 0.057 | 0.068 | 0.087 | 0.12 | 0.177 | 0.045 | 0.073 | 0.093 | 0.123 | 0.178 | °C/W |

**Note**

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


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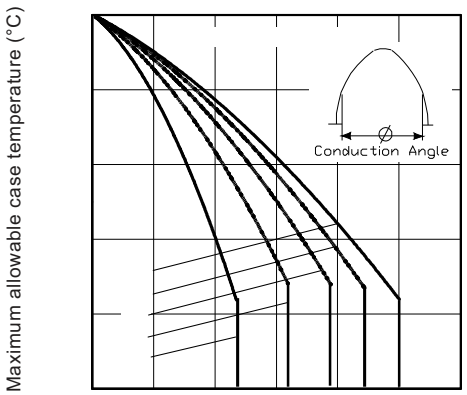


Fig. 1 - Current Ratings Characteristics

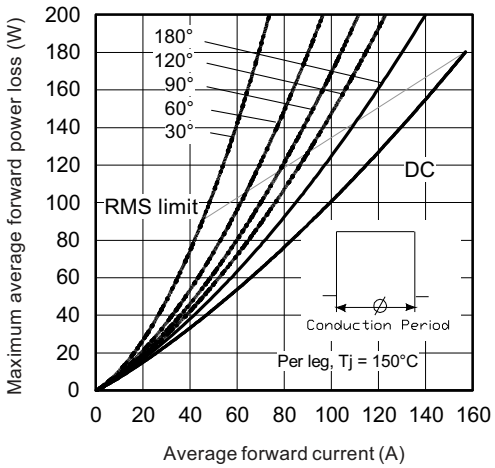


Fig. 4 - On-State Power Loss Characteristics

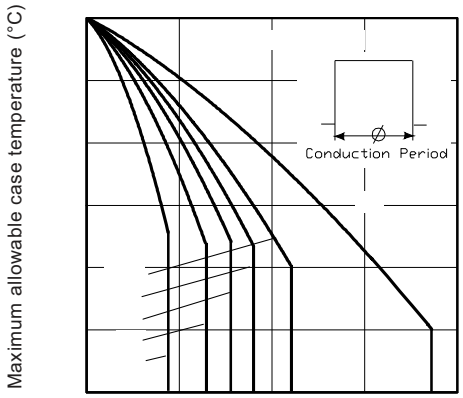


Fig. 2 - Current Ratings Characteristics

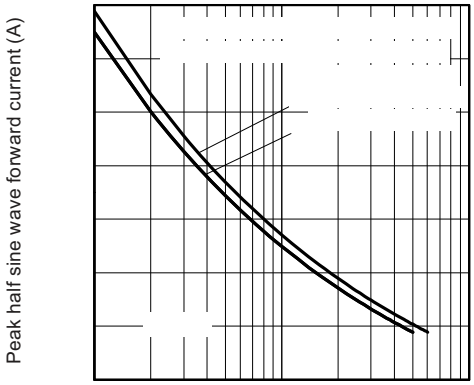


Fig. 5 - Maximum Non-Repetitive Surge Current

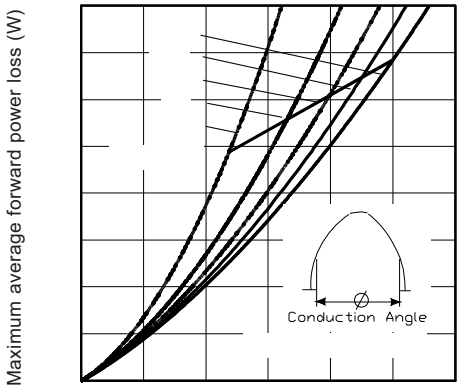


Fig. 3 - Forward Power Loss Characteristics

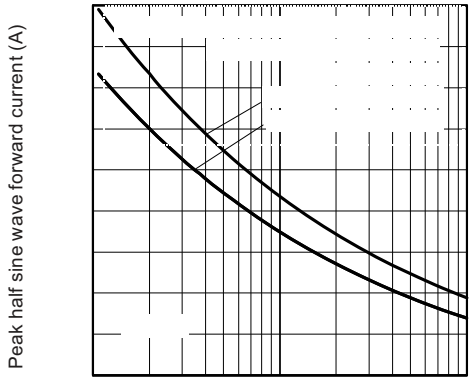


Fig. 6 - Maximum Non-Repetitive Surge Current


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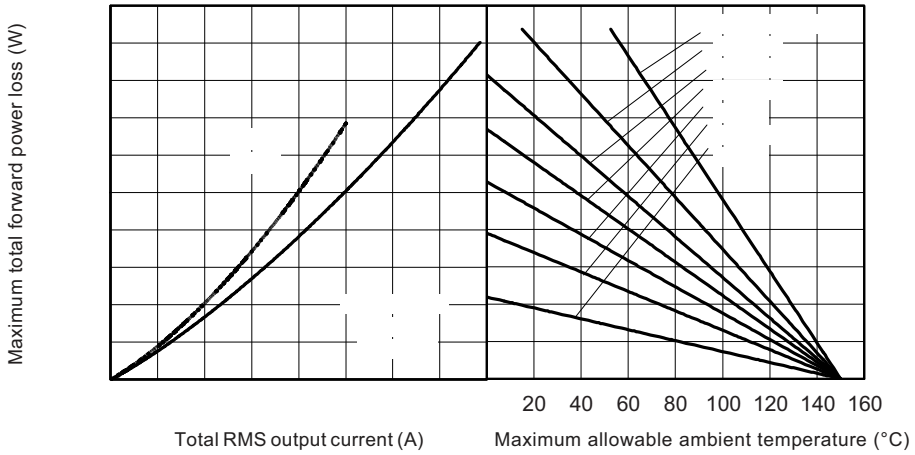


Fig. 7 - Forward Power Loss Characteristics

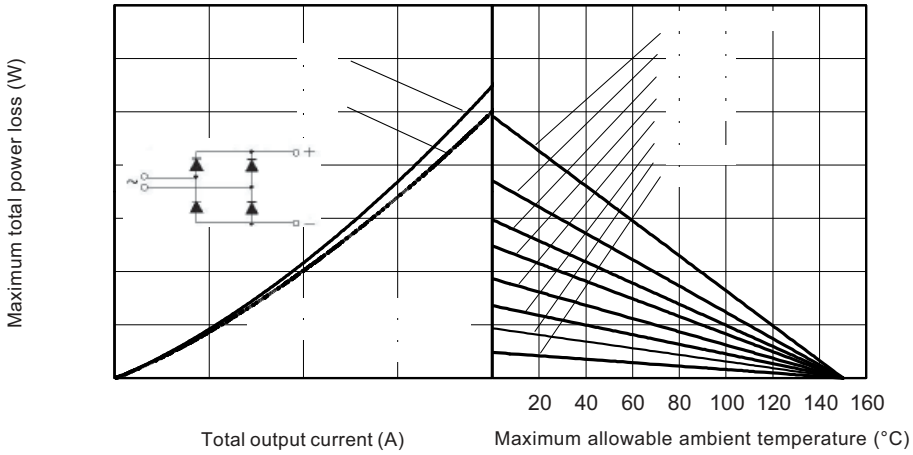


Fig. 8 - Forward Power Loss Characteristics

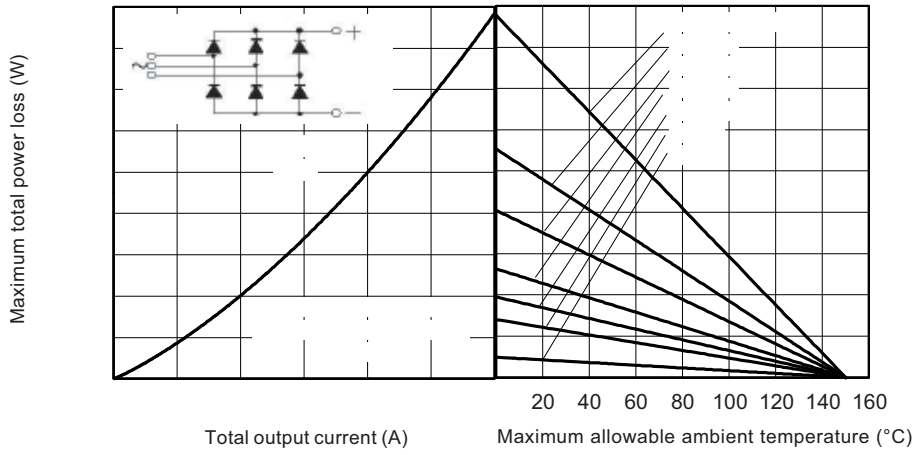


Fig. 9 - Forward Power Loss Characteristics


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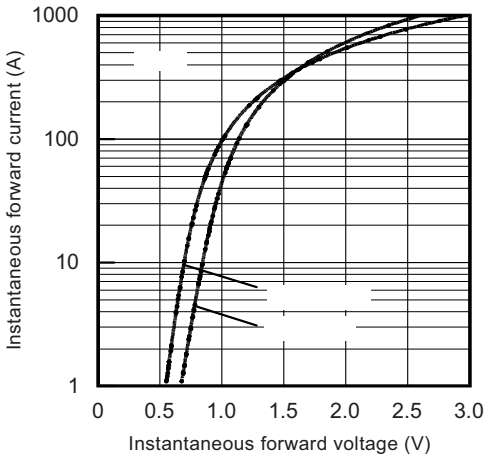


Fig. 10 - Forward Voltage Characteristics

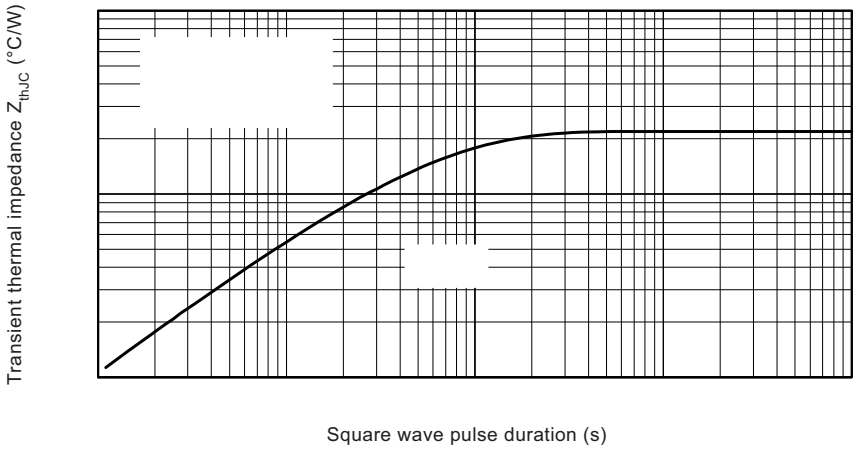


Fig. 11 - Thermal Impedance $Z_{thJC}$ Characteristics

## ORDERING INFORMATION TABLE

| VS-VS | K | D | 91 | / | 16 |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | | 5 |

1 - Vishay Semiconductors product
2
3
4
5

**Note**

- To order the optional hardware go to www.vishay.com/doc?95172


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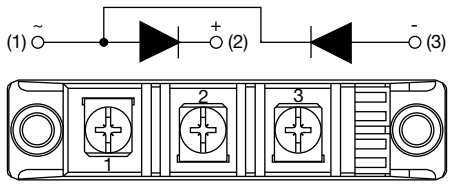
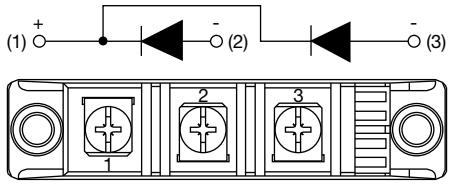
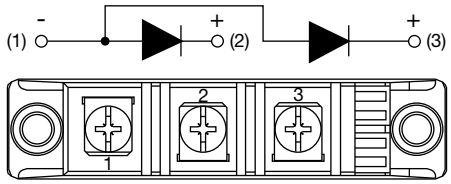
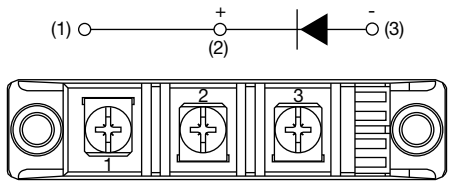
| CIRCUIT CONFIGURATION | | |
|---|---|---|
| **CIRCUIT DESCRIPTION** | **CIRCUIT CONFIGURATION CODE** | **CIRCUIT DRAWING** |
| Two diodes doubler circuit | D | **VSKD...**   |
| Two diodes common cathode | C | **VSKC...**   |
| Two diodes common anode | J | **VSKJ...**   |
| Single diode | E | **VSKE...**   |

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | www.vishay.com/doc?95369 |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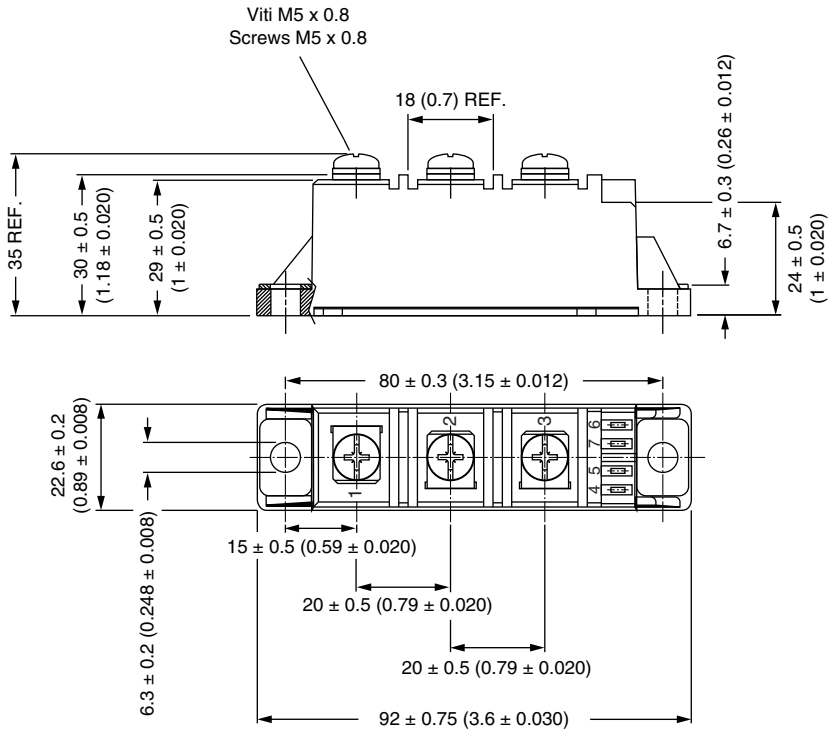
# ADD-A-PAK Generation VII - Diode

**DIMENSIONS** in millimeters (inches)



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