




Standard Diodes, 600 A (SUPER MAGN-A-PAK Power Modules)



SUPER MAGN-A-PAK

FEATURES

- High current capability
- High surge capability
- High voltage ratings up to 2000 V
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- Industrial standard package
- UL approved file E78996 
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

TYPICAL APPLICATIONS

- Rectifying bridge for large motor drives
- Rectifying bridge for large UPS

| PRODUCT SUMMARY | |
|--------------------|-------------------------------|
| I _{F(AV)} | 600 A |
| Type | Modules - Diode, High Voltage |
| Package | SMAP |
| Circuit | Two SCRs doubler circuit |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|-----------------|-------------|--------------------|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| I _{F(AV)} | | 600 | A |
| | T _C | 100 | °C |
| I _{F(RMS)} | | 942 | A |
| | T _C | 100 | °C |
| I _{FSM} | 50 Hz | 19 000 | A |
| | 60 Hz | 20 100 | |
| I ² t | 50 Hz | 1805 | kA ² s |
| | 60 Hz | 1683 | |
| I ² √t | | 18 050 | kA ² √s |
| V _{RRM} | Range | 800 to 2000 | V |
| T _{Stg} , T _J | Range | -40 to +150 | °C |

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 MAXIMUM mA |
| VS-VSKD600.. | 08 | 800 | 900 | 50 |
| | 12 | 1200 | 1300 | |
| | 16 | 1600 | 1700 | |
| | 20 | 2000 | 2100 | |



| FORWARD CONDUCTION | | | | | | |
|---|---------------|---|----------------------------|---|--------|--------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS | |
| Maximum average forward current at case temperature | $I_{F(AV)}$ | 180° conduction, half sine wave | | 600 | A | |
| | | | | 100 | °C | |
| Maximum RMS forward current | $I_{F(RMS)}$ | 180° conduction, half sine wave at $T_C = 100\text{ °C}$ | | 942 | A | |
| Maximum peak, one-cycle forward, non-repetitive surge current | I_{FSM} | t = 10 ms | No voltage reappplied | 19.0 | kA | |
| | | t = 8.3 ms | | Sinusoidal half wave, initial $T_J = T_J$ maximum | | 20.1 |
| | | t = 10 ms | 100 % V_{RRM} reappplied | | | 16.2 |
| | | t = 8.3 ms | | | | 17.2 |
| Maximum I^2t for fusing | I^2t | t = 10 ms | No voltage reappplied | | 1805 | kA ² s |
| | | t = 8.3 ms | | 100 % V_{RRM} reappplied | 1683 | |
| | | t = 10 ms | 1319 | | | |
| | | t = 8.3 ms | 1230 | | | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reappplied | | | 18 050 | kA ² √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) | | 0.70 | V | |
| High level value of threshold voltage | $V_{F(TO)2}$ | (I $> \pi \times I_{F(AV)}$, $T_J = T_J$ maximum) | | 0.77 | | |
| 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) | | 0.28 | mΩ | |
| High level value of forward slope resistance | r_{f2} | (I $> \pi \times I_{F(AV)}$, $T_J = T_J$ maximum) | | 0.25 | | |
| Maximum forward voltage drop | V_{FM} | $I_{pk} = 1800\text{ A}$, $T_J = 25\text{ °C}$, $t_p = 10\text{ ms}$ sine pulse | | 1.45 | V | |

| BLOCKING | | | | | |
|--|-----------|--|--|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| RMS insulation voltage | V_{INS} | t = 1 s | | 3000 | V |
| Maximum peak reverse and off-state leakage current | I_{RRM} | $T_J = T_J$ maximum, rated V_{RRM} applied | | 50 | mA |

| THERMAL AND MECHANICAL SPECIFICATIONS | | | | | |
|---|------------------|--|--|------------------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum junction operating and storage temperature range | T_J, T_{Stg} | | | -40 to 150 | °C |
| Maximum thermal resistance, junction to case per junction | R_{thJC} | DC operation | | 0.065 | K/W |
| Maximum thermal resistance, case to heatsink per module | R_{thC-hs} | Mounting surface smooth, flat and greased | | 0.02 | |
| Mounting torque ± 10 % | SMAP 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. | | 6 to 8 | Nm |
| | busbar to SMAP | | | 12 to 15 | |
| Approximate weight | | | | 1500 | g |
| Case style | | See dimensions - link at the end of datasheet | | SUPER MAGN-A-PAK | |

| ΔR_{thJC} CONDUCTION | | | | |
|--|-----------------------|------------------------|---------------------|-------|
| CONDUCTION ANGLE | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS | UNITS |
| 180° | 0.009 | 0.006 | $T_J = T_J$ maximum | K/W |
| 120° | 0.011 | 0.011 | | |
| 90° | 0.014 | 0.015 | | |
| 60° | 0.021 | 0.022 | | |
| 30° | 0.037 | 0.038 | | |

Note

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

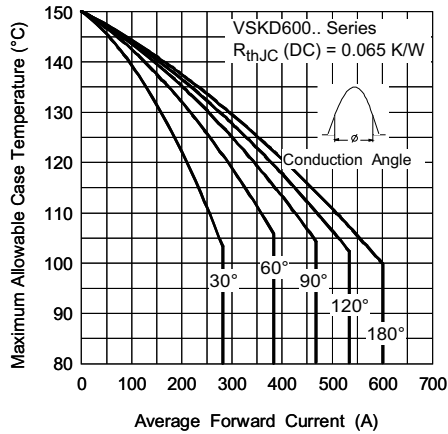


Fig. 1 - Current Ratings Characteristics

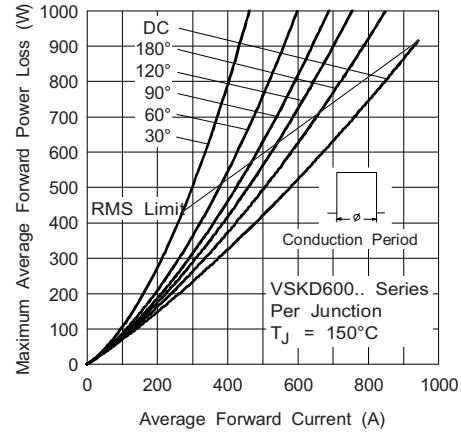


Fig. 4 - Forward Power Loss Characteristics

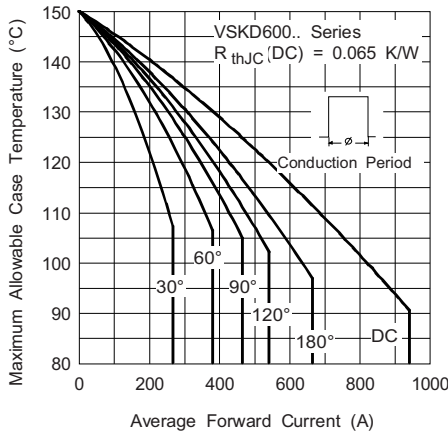


Fig. 2 - Current Ratings Characteristics

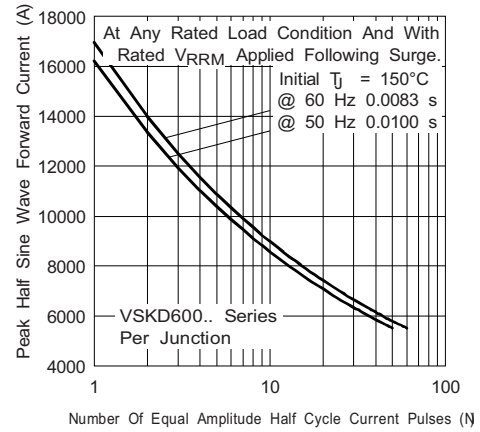


Fig. 5 - Maximum Non-Repetitive Surge Current

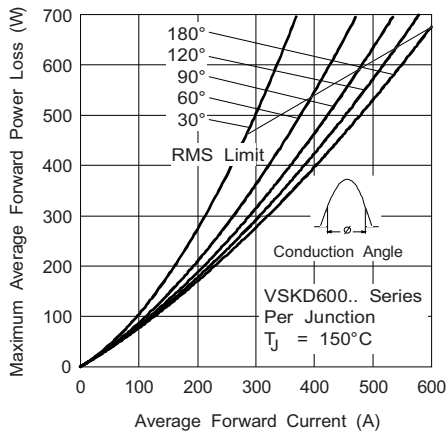


Fig. 3 - Forward Power Loss Characteristics

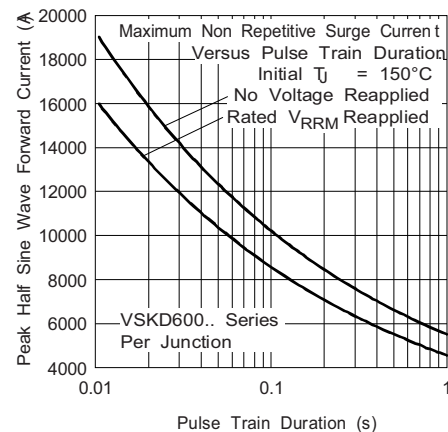


Fig. 6 - Maximum Non-Repetitive Surge Current

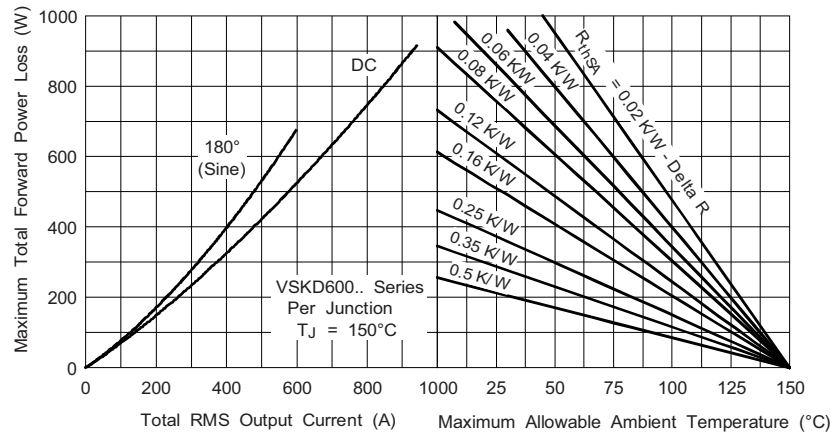


Fig. 7 - Forward Power Loss Characteristics

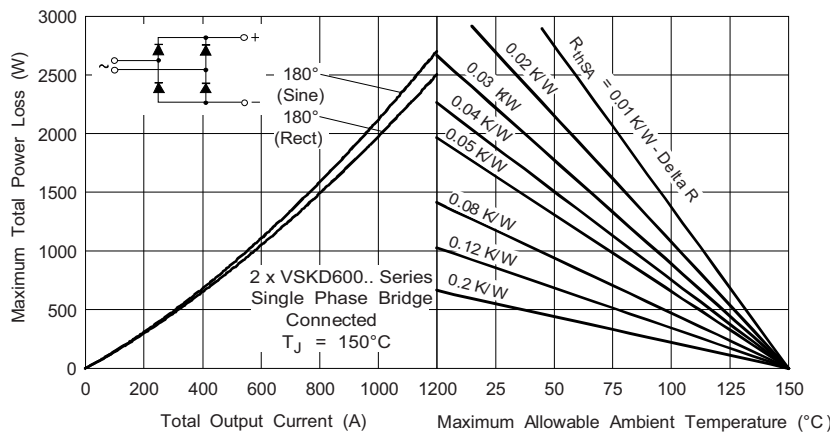


Fig. 8 - Forward Power Loss Characteristics

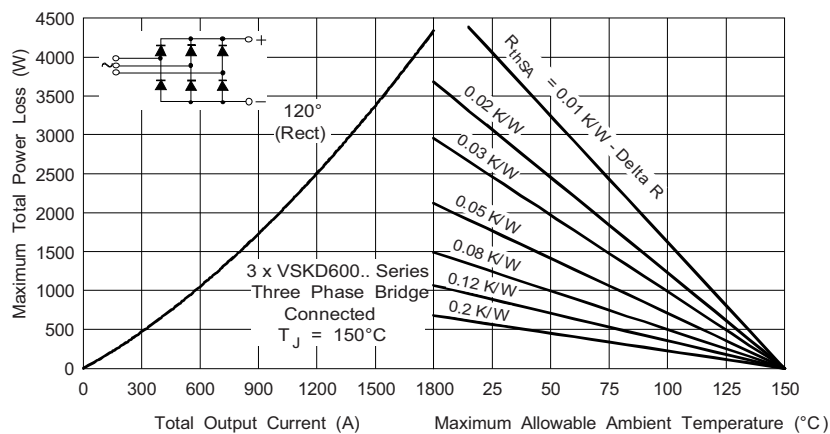


Fig. 9 - Forward Power Loss Characteristics

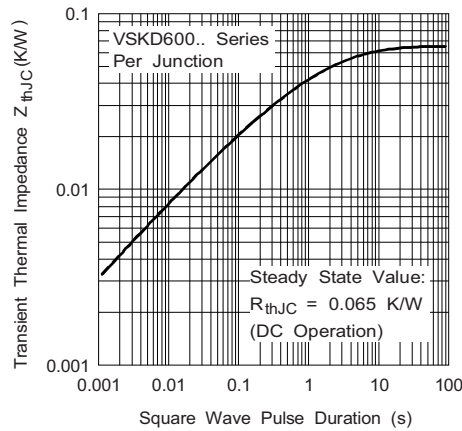


Fig. 10 - Thermal Impedance Z_{thJC} Characteristic

ORDERING INFORMATION TABLE

| | | | | | | |
|-------------|------------|------------|---|------------|----------|-----------|
| Device code | VS- | VSK | D | 600 | - | 20 |
| | ① | ② | ③ | ④ | | ⑤ |
| | 1 | - | Vishay Semiconductors product | | | |
| | 2 | - | Module type | | | |
| | 3 | - | Circuit configuration D = 2 diodes in series (see Circuit Configuration table) | | | |
| | 4 | - | Current rating | | | |
| | 5 | - | Voltage code x 100 = V_{RRM} (see Voltage Ratings table) | | | |

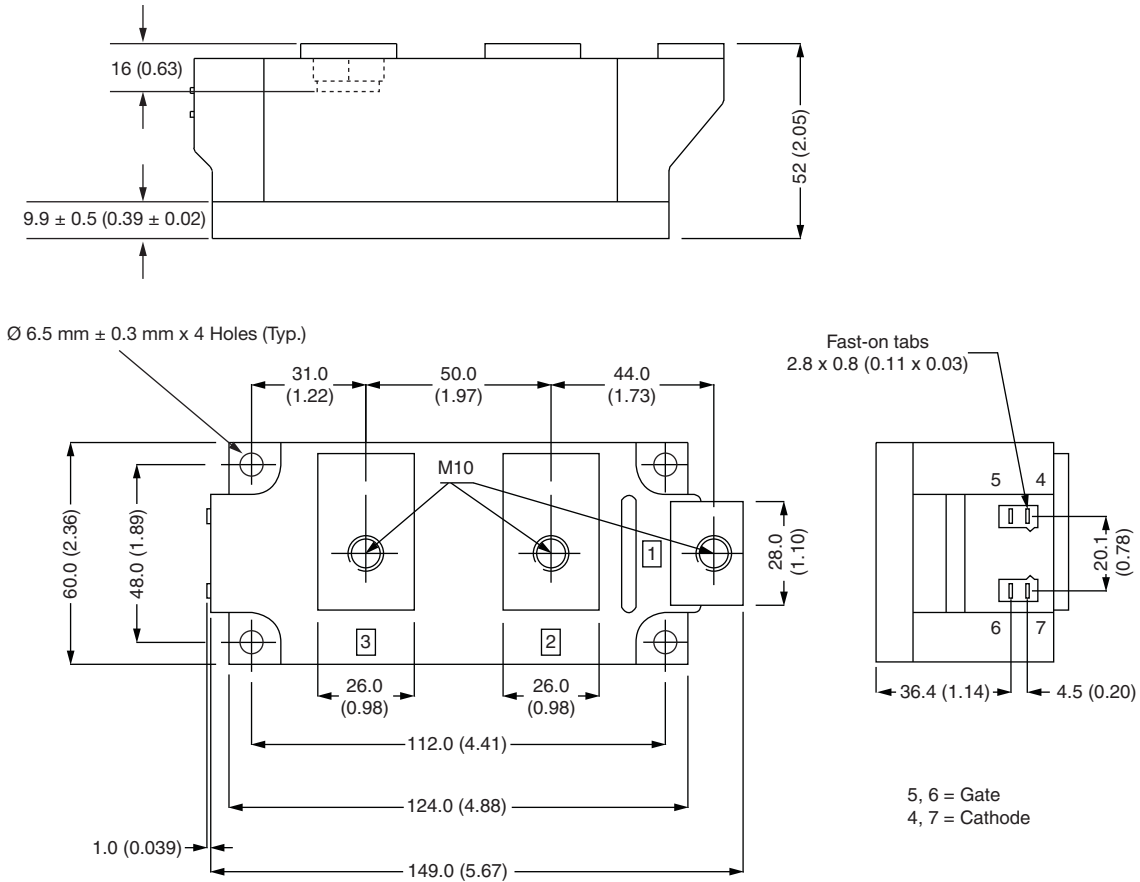
| CIRCUIT CONFIGURATION | | |
|------------------------------|-----------------------------------|------------------------|
| CIRCUIT DESCRIPTION | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| Two diodes doubler circuit | D | |

| LINKS TO RELATED DOCUMENTS | |
|-----------------------------------|--|
| Dimensions | www.vishay.com/doc?95088 |



Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)





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