

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



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

PRIMARY CHARACTERISTICS

| | |
|-----------------------|-------------------------------|
| $I_{F(AV)}$ | 600 A |
| Type | Modules - diode, high voltage |
| Package | Super MAGN-A-PAK |
| Circuit configuration | Two diodes 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^2t | 50 Hz | 1805 | kA ² s |
| | 60 Hz | 1683 | |
| $I^2\sqrt{t}$ | | 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 | No voltage reappplied | 20.1 | |
| | | t = 10 ms | 100 % V_{RRM} reappplied | 16.2 | |
| | | t = 8.3 ms | 100 % V_{RRM} reappplied | 17.2 | |
| Maximum I^2t for fusing | I^2t | t = 10 ms | No voltage reappplied | 1805 | kA ² s |
| | | t = 8.3 ms | No voltage reappplied | 1683 | |
| | | t = 10 ms | 100 % V_{RRM} reappplied | 1319 | |
| | | t = 8.3 ms | 100 % V_{RRM} reappplied | 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 % | Super MAGN-A-PAK to heatsink busbar to Super MAGN-A-PAK | 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 |
| Approximate weight | | | | 12 to 15 | |
| Case style | | See dimensions - link at the end of datasheet | | 1500 | g |
| | | | | 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

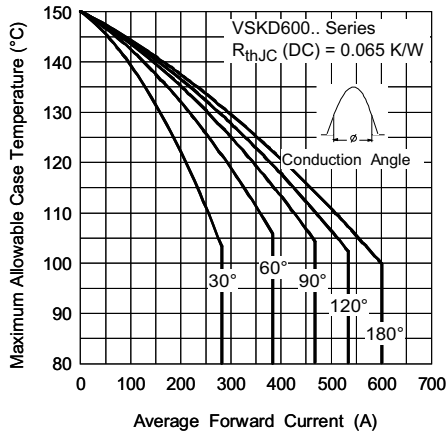


Fig. 1 - Current Ratings Characteristics

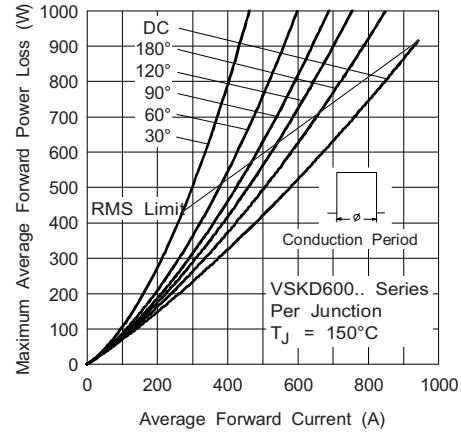


Fig. 4 - Forward Power Loss Characteristics

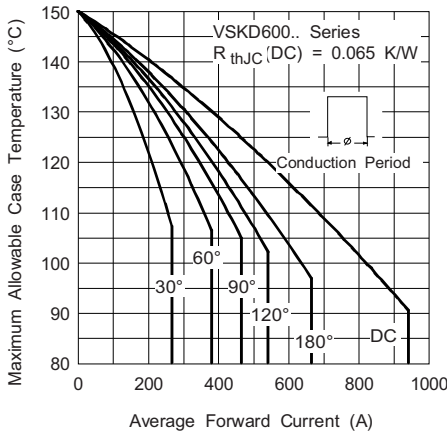


Fig. 2 - Current Ratings Characteristics

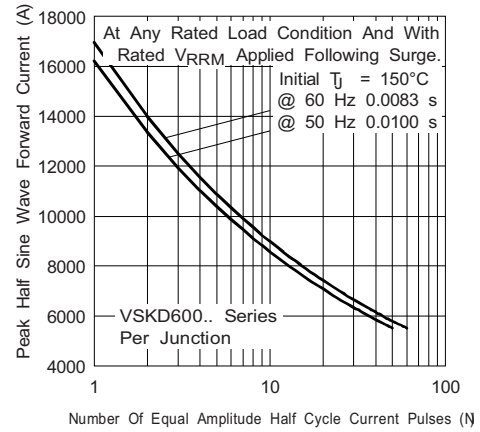


Fig. 5 - Maximum Non-Repetitive Surge Current

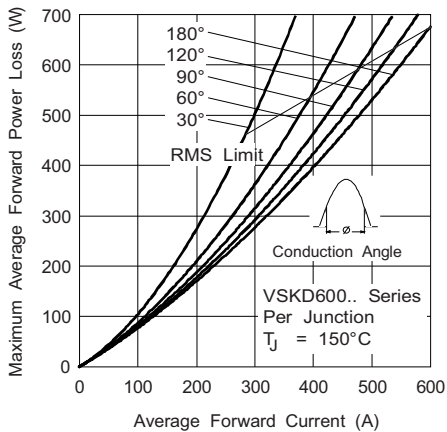


Fig. 3 - Forward Power Loss Characteristics

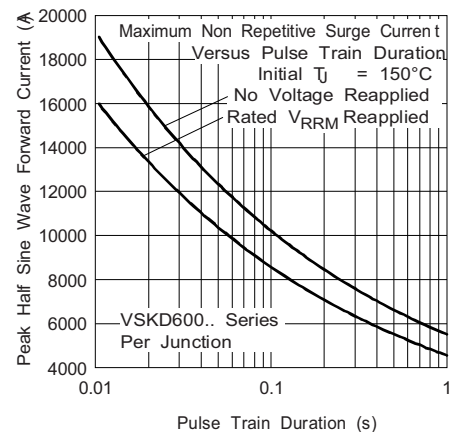


Fig. 6 - Maximum Non-Repetitive Surge Current

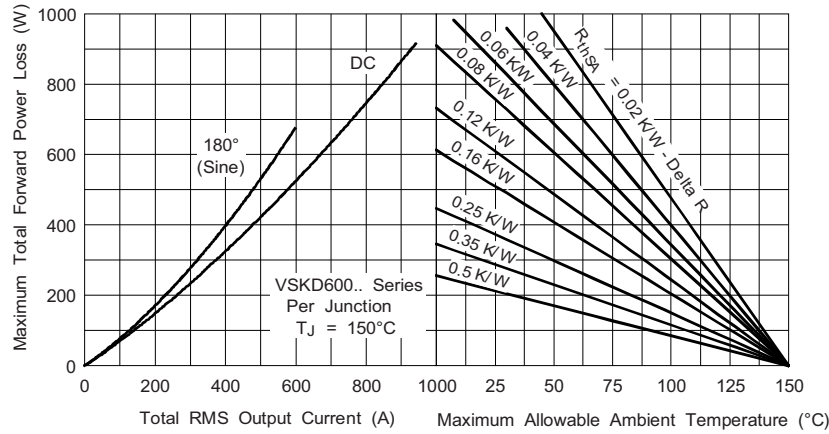


Fig. 7 - Forward Power Loss Characteristics

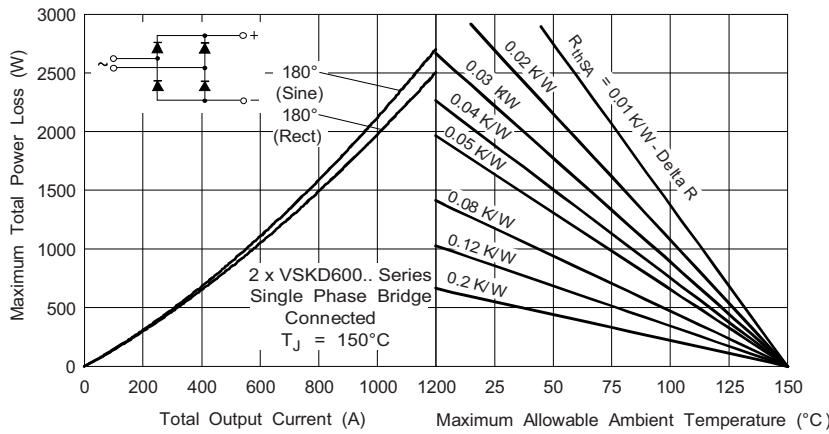


Fig. 8 - Forward Power Loss Characteristics

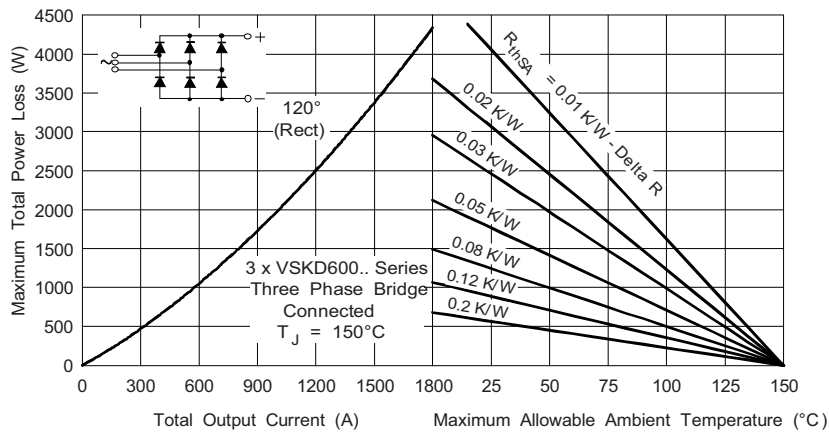
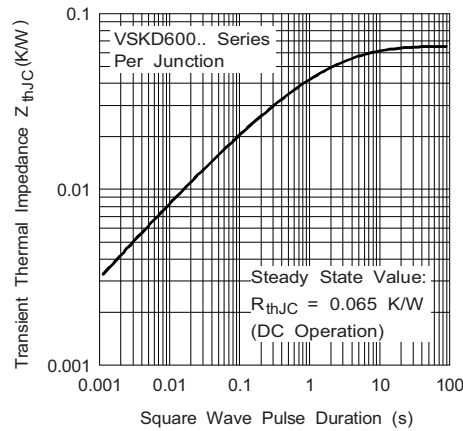


Fig. 9 - Forward Power Loss Characteristics


 Fig. 10 - Thermal Impedance Z_{thJC} Characteristic

ORDERING INFORMATION TABLE

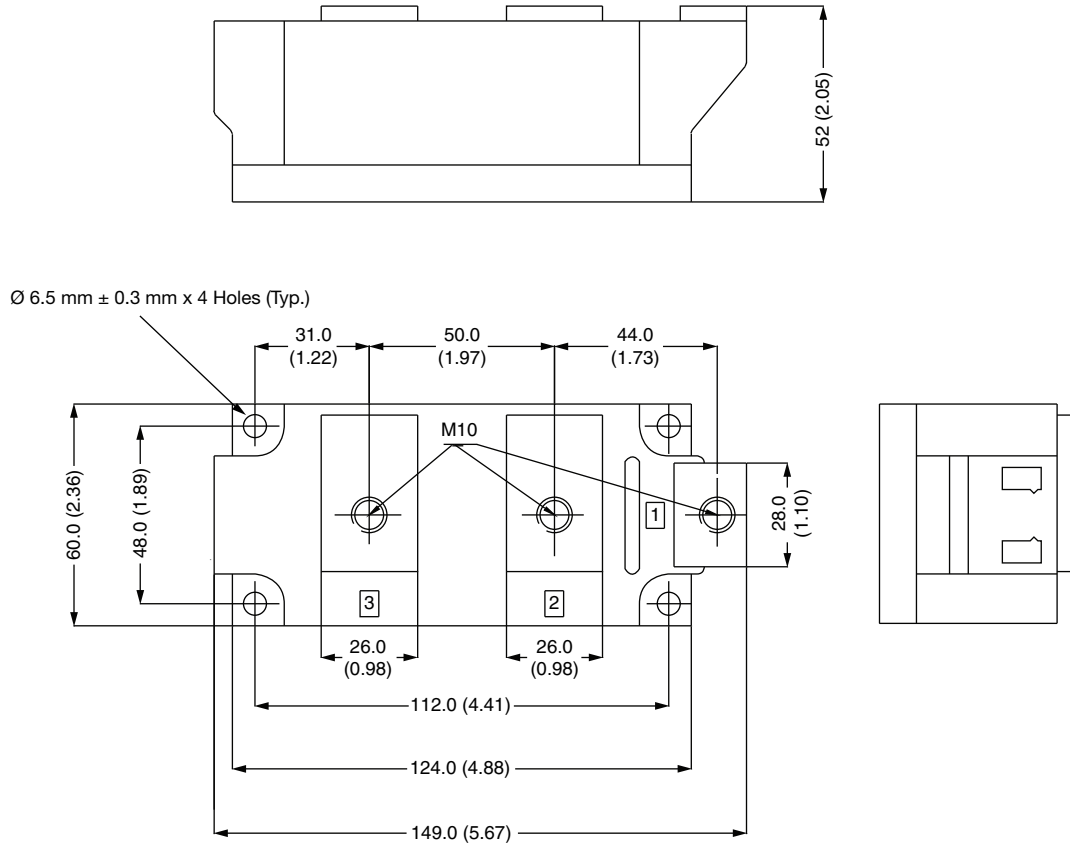
| | | | | | |
|-------------|--------------|-----------|--|----------|-----------|
| Device code | VS-VS | KD | 600 | - | 20 |
| | ① | ② | ③ | | ④ |
| | 1 | - | Vishay Semiconductors product | | |
| | 2 | - | Circuit configuration D = two diodes in series (see circuit configuration table) | | |
| | 3 | - | Current rating | | |
| | 4 | - | Voltage code x 100 = V_{RRM} (see voltage ratings table) | | |

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

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

Super MAGN-A-PAK Diode

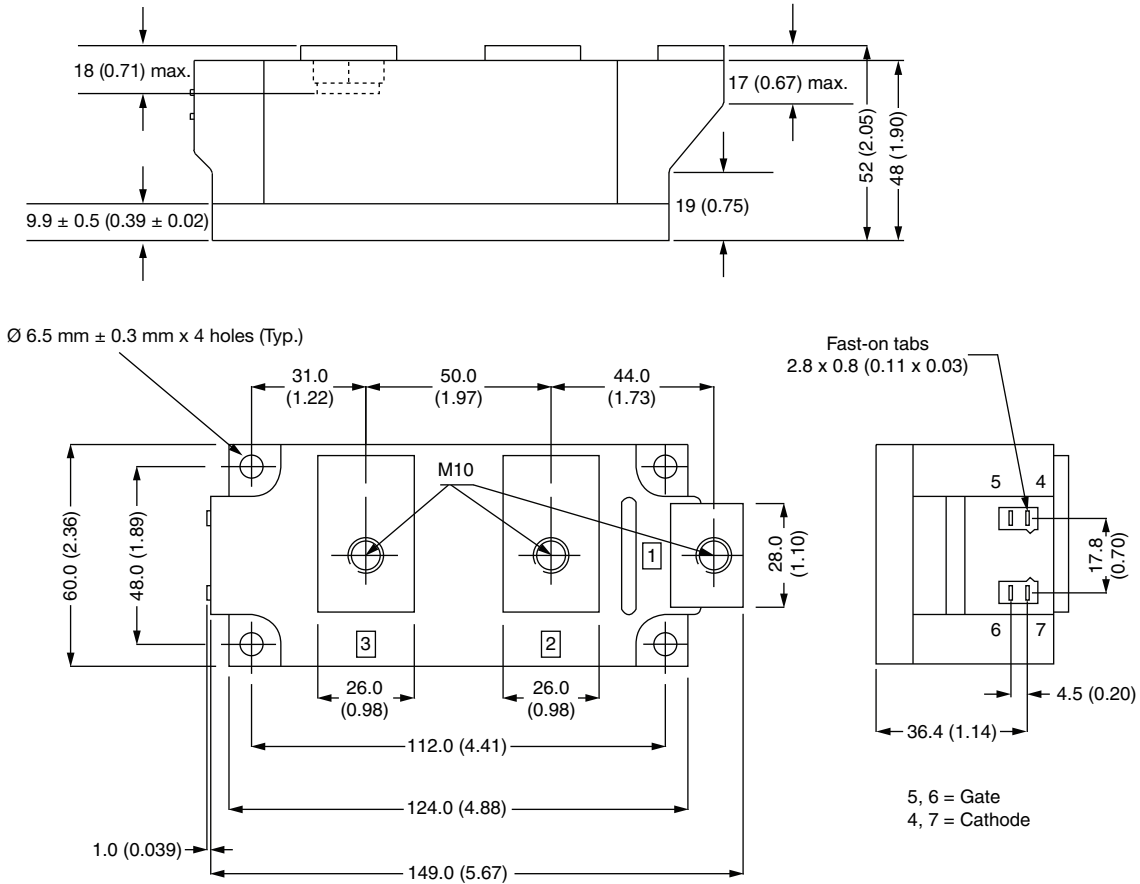
DIMENSIONS in millimeters (inches)





Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)





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