

## Standard Recovery Diodes (Stud Version), 600 A


**B-8**
**FEATURES**

- Wide current range
- High voltage ratings up to 3200 V
- High surge current capabilities
- Stud cathode and stud anode version
- Standard JEDEC® types
- Compression bonded encapsulations
- 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**
**PRODUCT SUMMARY**

|                       |              |
|-----------------------|--------------|
| $I_{F(AV)}$           | 600 A        |
| Package               | B-8          |
| Circuit configuration | Single Diode |

**TYPICAL APPLICATIONS**

- Converters
- Power supplies
- Machine tool controls
- High power drives
- Medium traction applications

**MAJOR RATINGS AND CHARACTERISTICS**

| PARAMETER    | TEST CONDITIONS | SD600N/R    |              | UNITS             |
|--------------|-----------------|-------------|--------------|-------------------|
|              |                 | 04 to 20    | 22 to 32     |                   |
| $I_{F(AV)}$  |                 | 600         | 600          | A                 |
|              | $T_C$           | 92          | 54           | °C                |
| $I_{F(RMS)}$ |                 | 940         | 940          | A                 |
| $I_{FSM}$    | 50 Hz           | 13 000      | 10 500       |                   |
|              | 60 Hz           | 13 600      | 11 000       |                   |
| $I^2t$       | 50 Hz           | 845         | 551          | kA <sup>2</sup> s |
|              | 60 Hz           | 772         | 503          |                   |
| $V_{RRM}$    | Range           | 400 to 2000 | 2200 to 3200 | V                 |
| $T_J$        |                 | - 40 to 180 | - 40 to 150  | °C                |

**ELECTRICAL SPECIFICATIONS**
**VOLTAGE RATINGS**

| TYPE NUMBER | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM<br>mA |
|-------------|--------------|--|--|--|
| VS-SD600N/R | 04           | 400  | 500  | 35   |
|             | 08           | 800  | 900  |  |
|             | 12           | 1200   | 1300   |  |
|             | 16           | 1600   | 1700   |  |
|             | 20           | 2000   | 2100   |  |
|             | 22           | 2200   | 2300   |  |
|             | 28           | 2800   | 2900   |  |
|             | 32           | 3200   | 3300   |  |



| FORWARD CONDUCTION  |               |  |            |                           |                    |        |                   |
|---|---------------|--|------------|---------------------------|--------------------|--------|-------------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS  | SD600N/R   |                           | UNITS              |        |                   |
|   |               |  | 04 to 20   | 22 to 32                  |                    |        |                   |
| Maximum average forward current at case temperature           | $I_{F(AV)}$   | 180° conduction, half sine wave  | 600        |                           | A                  |        |                   |
|   |               |  | 92         | 54                        | °C                 |        |                   |
|   |               |  | 570        | 375                       | A                  |        |                   |
|   |               |  | 100        |                           | °C                 |        |                   |
| Maximum RMS forward current                                   | $I_{F(RMS)}$  | DC at $T_C = 75\text{ °C}$ (04 to 20), $T_C = 36\text{ °C}$ (25 to 32)                   | 940        |                           |                    |        |                   |
| Maximum peak, one-cycle forward, non-repetitive surge current | $I_{FSM}$     | Sinusoidal half wave, initial $T_J = T_J$ maximum  | t = 10 ms  | No voltage reapplied      | 13 000             | 10 500 | A                 |
|   |               |  | t = 8.3 ms |                           | 13 600             | 11 000 |                   |
|   |               |  | t = 10 ms  | 100 % $V_{RRM}$ reapplied | 10 900             | 8830   |                   |
|   |               |  | t = 8.3 ms |                           | 11 450             | 9250   |                   |
| Maximum $I^2t$ for fusing                                     | $I^2t$        |  | t = 10 ms  | No voltage reapplied      | 845                | 551    | kA <sup>2</sup> s |
|   |               |  | t = 8.3 ms |                           | 772                | 503    |                   |
|   |               |  | t = 10 ms  | 100 % $V_{RRM}$ reapplied | 598                | 390    |                   |
|   |               |  | t = 8.3 ms |                           | 546                | 356    |                   |
| Maximum $I^2\sqrt{t}$ for fusing                              | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied   | 8450       | 5510                      | kA <sup>2</sup> √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 | 0.78       | 0.84                      | V                  |        |                   |
| High level value of threshold voltage                         | $V_{F(TO)2}$  | ( $I > \pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum                                      | 0.87       | 0.88                      |                    |        |                   |
| 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 | 0.35       | 0.40                      | mW                 |        |                   |
| High level value of forward slope resistance                  | $r_{f2}$      | ( $I > \pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum                                      | 0.31       | 0.38                      |                    |        |                   |
| Maximum forward voltage drop                                  | $V_{FM}$      | $I_{pk} = 1500\text{ A}$ , $T_J = T_J$ maximum, $t_p = 10\text{ ms}$ sinusoidal wave     | 1.31       | 1.44                      | V                  |        |                   |

| THERMAL AND MECHANICAL SPECIFICATIONS        |            |   |             |             |       |
|--|------------|---|-------------|-------------|-------|
| PARAMETER                                    | SYMBOL     | TEST CONDITIONS                               | SD600N/R    |             | UNITS |
|  |            |   | 04 to 20    | 22 to 32    |       |
| Maximum junction operating temperature range | $T_J$      |   | - 40 to 180 | - 40 to 150 | °C    |
| Maximum storage temperature range            | $T_{Stg}$  |   | - 55 to 200 |             |       |
| Maximum thermal resistance, junction to case | $R_{thJC}$ | DC operation                                  | 0.1         |             | K/W   |
| Maximum thermal resistance, case to heatsink | $R_{thCS}$ | Mounting surface, smooth, flat and greased    | 0.04        |             |       |
| Maximum allowed mounting torque ± 10 %       |            | Not-lubricated threads                        | 50          |             | Nm    |
| Approximate weight                           |            |   | 454         |             | g     |
| Case style                                   |            | See dimensions (link at the end of datasheet) | B-8         |             |       |

| $\Delta R_{thJC}$ CONDUCTION |                       |                        |                     |       |
|------------------------------|-----------------------|------------------------|---------------------|-------|
| CONDUCTION ANGLE             | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS     | UNITS |
| 180°                         | 0.012                 | 0.008                  | $T_J = T_J$ maximum | K/W   |
| 120°                         | 0.014                 | 0.014                  |                     |       |
| 90°                          | 0.017                 | 0.019                  |                     |       |
| 60°                          | 0.025                 | 0.026                  |                     |       |
| 30°                          | 0.042                 | 0.042                  |                     |       |

**Note**

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

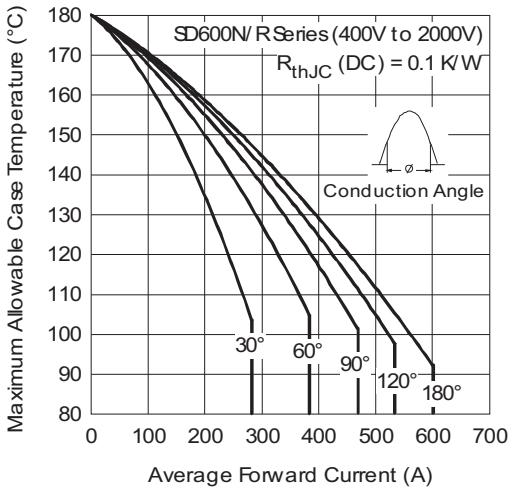


Fig. 1 - Current Ratings Characteristics

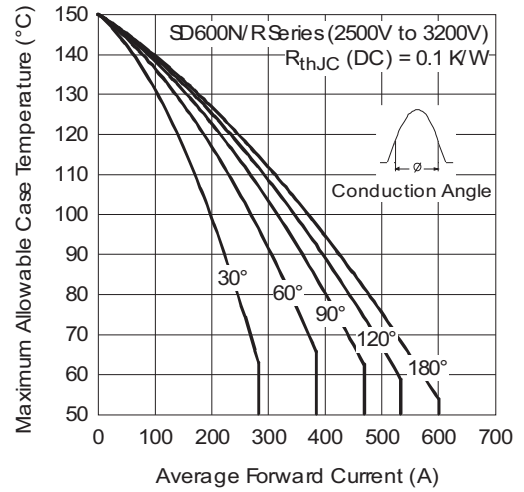


Fig. 3 - Current Ratings Characteristics



Fig. 2 - Current Ratings Characteristics



Fig. 4 - Current Ratings Characteristics



Fig. 5 - Forward Power Loss Characteristics



Fig. 6 - Forward Power Loss Characteristics



Fig. 7 - Forward Power Loss Characteristics



Fig. 8 - Forward Power Loss Characteristics



Fig. 9 - Maximum Non-Repetitive Surge Current

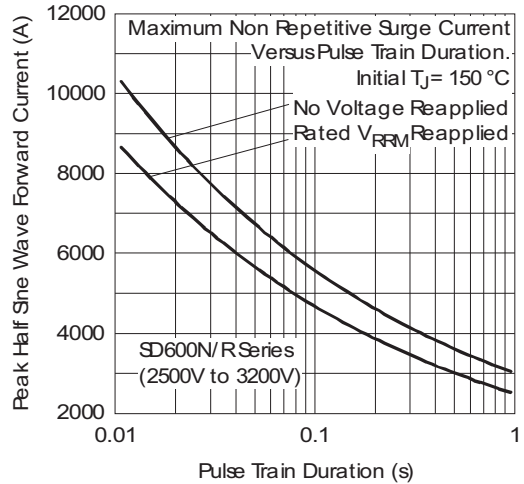


Fig. 12 - Maximum Non-Repetitive Surge Current



Fig. 10 - Maximum Non-Repetitive Surge Current

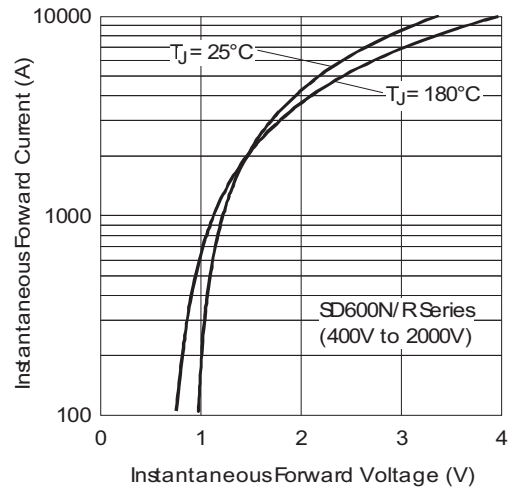


Fig. 13 - Forward Voltage Drop Characteristics



Fig. 11 - Maximum Non-Repetitive Surge Current

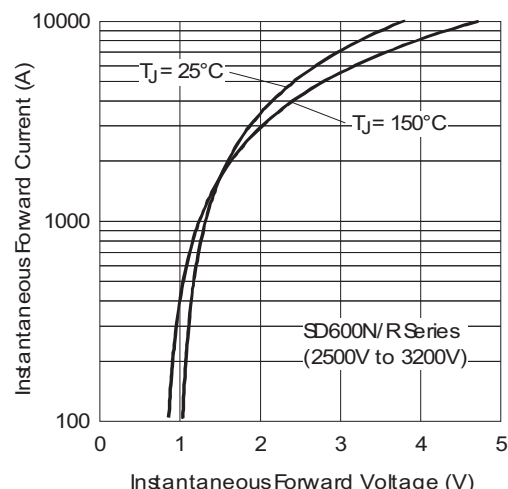


Fig. 14 - Forward Voltage Drop Characteristics



Fig. 15 - Thermal Impedance  $Z_{thJC}$  Characteristics

### ORDERING INFORMATION TABLE

|             |            |           |           |          |          |           |          |          |
|-------------|------------|-----------|-----------|----------|----------|-----------|----------|----------|
| Device code | <b>VS-</b> | <b>SD</b> | <b>60</b> | <b>0</b> | <b>N</b> | <b>32</b> | <b>P</b> | <b>C</b> |
|             | ①          | ②         | ③         | ④        | ⑤        | ⑥         | ⑦        | ⑧        |

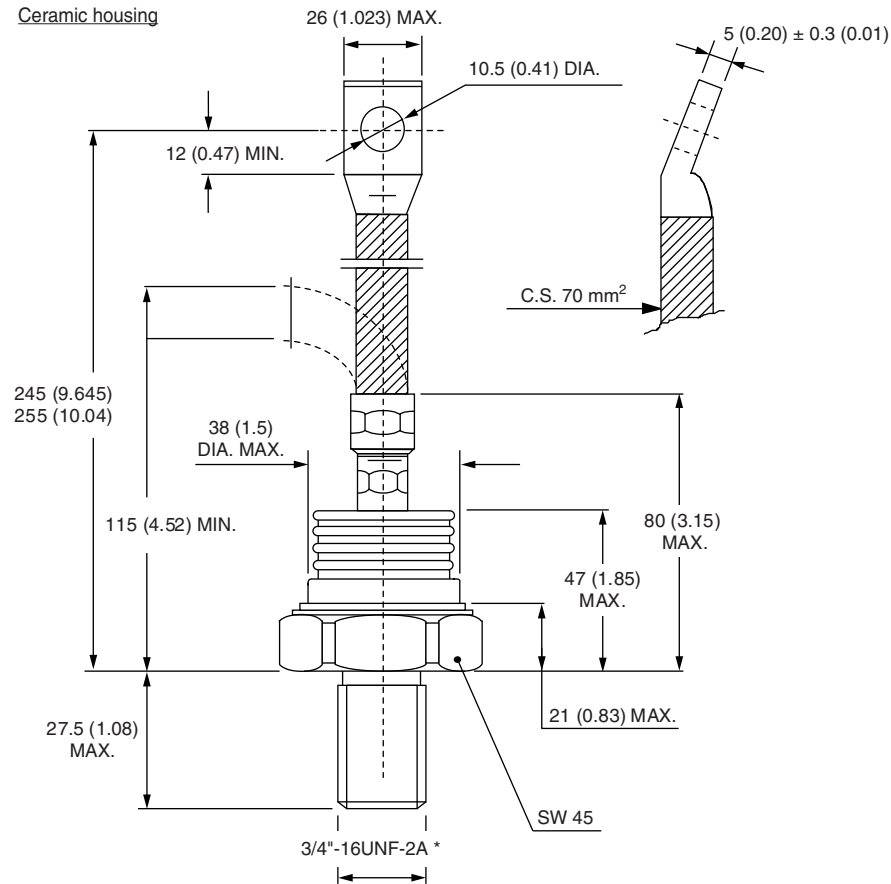
- 1** - Vishay Semiconductors product
- 2** - Diode
- 3** - Essential part number
- 4** - 0 = Standard recovery
- 5** - • N = Stud normal polarity (cathode to stud)  
• R = Stud reverse polarity (anode to stud)
- 6** - Voltage code x 100 =  $V_{RRM}$  (see Voltage Ratings table)
- 7** - P = Stud base B-8 3/4" 16UNF-2A
- 8** - C = Ceramic cap

For metric device M24 x 1.5 contact factory

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95303">www.vishay.com/doc?95303</a> |

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**DIMENSIONS** in millimeters (inches)



\*For metric device: M24 x 1.5 - length 21 (0.83) MAX.  
contact factory



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