

## Standard Recovery Diodes (Stud Version), 12 A



DO-203AA (DO-4)

### FEATURES

- High surge current capability
- Stud cathode and stud anode version
- Wide current range
- Types up to 1200 V  $V_{RRM}$
- Designed and qualified for industrial and consumer level
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

| PRODUCT SUMMARY       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 12 A            |
| Package               | DO-203AA (DO-4) |
| Circuit configuration | Single diode    |

### TYPICAL APPLICATIONS

- Battery charges
- Converters
- Power supplies
- Machine tool controls

| MAJOR RATINGS AND CHARACTERISTICS |                 |             |                  |
|-----------------------------------|-----------------|-------------|------------------|
| PARAMETER                         | TEST CONDITIONS | VALUES      | UNITS            |
| $I_{F(AV)}$                       |                 | 12          | A                |
|                                   | $T_C$           | 144         | °C               |
| $I_{F(RMS)}$                      |                 | 19          | A                |
| $I_{FSM}$                         | 50 Hz           | 265         | A                |
|                                   | 60 Hz           | 280         |                  |
| $I^2t$                            | 50 Hz           | 351         | A <sup>2</sup> s |
|                                   | 60 Hz           | 320         |                  |
| $V_{RRM}$                         | Range           | 100 to 1200 | V                |
| $T_J$                             |                 | -65 to 175  | °C               |

### ELECTRICAL SPECIFICATIONS

| VOLTAGE RATINGS |              |  |  |   |  |
|-----------------|--------------|--|--|---|--|
| TYPE NUMBER     | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK VOLTAGE<br>V | $V_{R(BR)}$ , MINIMUM AVALANCHE VOLTAGE<br>V <sup>(1)</sup> | $I_{RRM}$ MAXIMUM AT $T_J = 175^\circ\text{C}$<br>mA |
| VS-12F(R)       | 10           | 100  | 150  | -   | 12   |
|                 | 20           | 200  | 275  | -   |  |
|                 | 40           | 400  | 500  | 500   |  |
|                 | 60           | 600  | 725  | 750   |  |
|                 | 80           | 800  | 950  | 950   |  |
|                 | 100          | 1000   | 1200   | 1150  |  |
|                 | 120          | 1200   | 1400   | 1350  |  |

**Note**

<sup>(1)</sup> Avalanche version only available from  $V_{RRM}$  400 V to 1200 V



| FORWARD CONDUCTION  |               |   |                           |        |                           |
|---|---------------|---|---------------------------|--------|---------------------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS   |                           | VALUES | UNITS                     |
| Maximum average forward current at case temperature           | $I_{F(AV)}$   | 180° conduction, half sine wave   |                           | 12     | A                         |
|   |               |   |                           | 144    | °C                        |
| Maximum RMS forward current                                   | $I_{F(RMS)}$  |   |                           | 19     | A                         |
| Maximum on-repetitive peak reverse power                      | $P_R^{(1)}$   | 10 $\mu$ s square pulse, $T_J = T_J$ maximum  |                           | 7      | K/W                       |
| Maximum peak, one-cycle forward, non-repetitive surge current | $I_{FSM}$     | t = 10 ms   | No voltage reapplied      | 265    | A                         |
|   |               | t = 8.3 ms  |                           | 280    |                           |
|   |               | t = 10 ms   | 100 % $V_{RRM}$ reapplied | 225    |                           |
|   |               | t = 8.3 ms  |                           | 235    |                           |
| Maximum $I^2t$ for fusing                                     | $I^2t$        | t = 10 ms   | No voltage reapplied      | 351    | A <sup>2</sup> s          |
|   |               | t = 8.3 ms  |                           | 320    |                           |
|   |               | t = 10 ms   | 100 % $V_{RRM}$ reapplied | 250    |                           |
|   |               | t = 8.3 ms  |                           | 226    |                           |
| Maximum $I^2\sqrt{t}$ for fusing                              | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied  |                           | 3510   | A <sup>2</sup> $\sqrt{s}$ |
| 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) |                           | 0.77   | V                         |
| High level value of threshold voltage                         | $V_{F(TO)2}$  | (I $> \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)                                      |                           | 0.97   |                           |
| 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) |                           | 10.70  | m $\Omega$                |
| High level value of forward slope resistance                  | $r_{f2}$      | (I $> \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)                                      |                           | 6.20   |                           |
| Maximum forward voltage drop                                  | $V_{FM}$      | $I_{pk} = 38$ A, $T_J = 25$ °C, $t_p = 400$ $\mu$ s rectangular wave                    |                           | 1.26   | V                         |

**Note**

(1) Available only for avalanche version, all other parameters the same as 12F

| THERMAL AND MECHANICAL SPECIFICATIONS        |            |   |  |                 |          |
|--|------------|---|--|-----------------|----------|
| PARAMETER                                    | SYMBOL     | TEST CONDITIONS                               |  | VALUES          | UNITS    |
| Maximum junction operating temperature range | $T_J$      |   |  | -65 to 175      | °C       |
| Maximum storage temperature range            | $T_{Stg}$  |   |  | -65 to 200      |          |
| Maximum thermal resistance, junction to case | $R_{thJC}$ | DC operation                                  |  | 2               | K/W      |
| Maximum thermal resistance, case to heatsink | $R_{thCS}$ | Mounting surface, smooth, flat and greased    |  | 0.5             |          |
| Allowable mounting torque                    |            | Not lubricated threads                        |  | 1.5 + 0 - 10 %  | N · m    |
|  |            |   |  | 13              | lbf · in |
|  |            | Lubricated threads                            |  | 1.2 + 0 - 10 %  | N · m    |
|  |            |   |  | 10              | lbf · in |
| Approximate weight                           |            |   |  | 7               | g        |
|  |            |   |  | 0.25            | oz.      |
| Case style                                   |            | See dimensions - link at the end of datasheet |  | DO-203AA (DO-4) |          |

| $\Delta R_{thJC}$ CONDUCTION |                       |                        |                     |       |
|------------------------------|-----------------------|------------------------|---------------------|-------|
| CONDUCTION ANGLE             | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS     | UNITS |
| 180°                         | 0.33                  | 0.26                   | $T_J = T_J$ maximum | K/W   |
| 120°                         | 0.41                  | 0.44                   |                     |       |
| 90°                          | 0.53                  | 0.58                   |                     |       |
| 60°                          | 0.78                  | 0.81                   |                     |       |
| 30°                          | 1.28                  | 1.29                   |                     |       |

**Note**

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

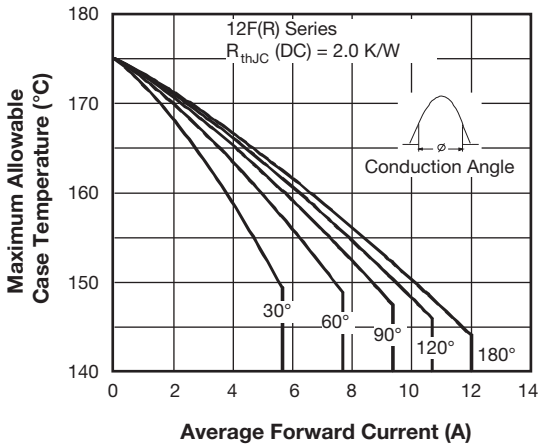


Fig. 1 - Current Ratings Characteristics

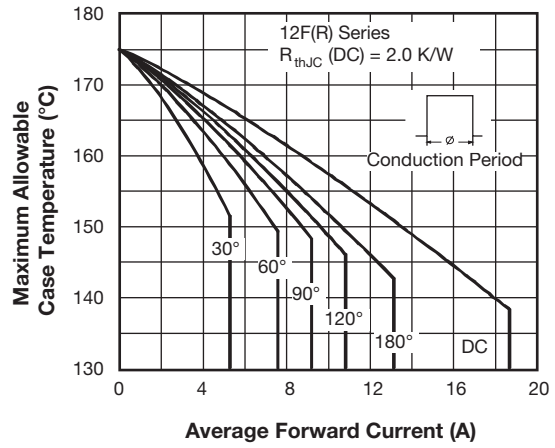


Fig. 2 - Current Ratings Characteristics



Fig. 3 - Forward Power Loss Characteristics



Fig. 4 - Forward Power Loss Characteristics

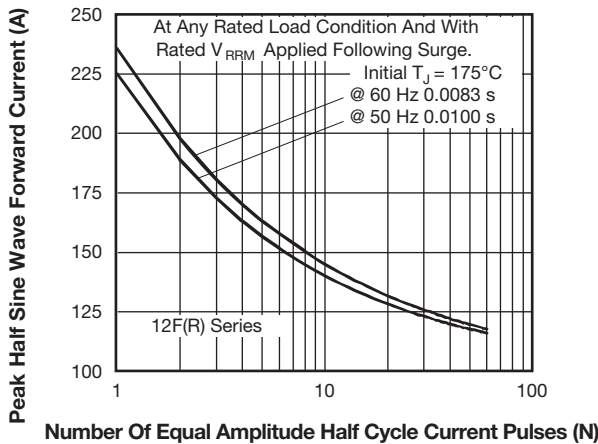


Fig. 5 - Maximum Non-Repetitive Surge Current



Fig. 7 - Forward Voltage Drop Characteristics

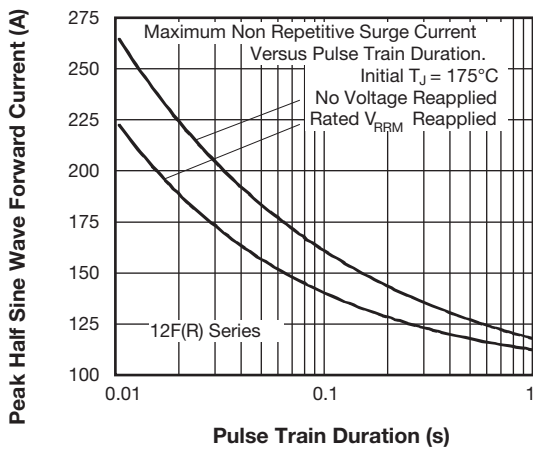


Fig. 6 - Maximum Non-Repetitive Surge Current

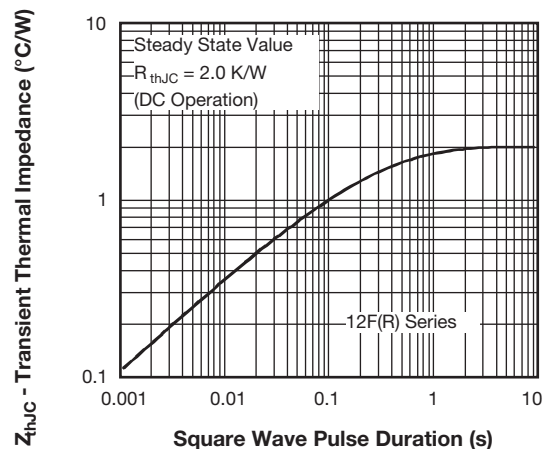


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

|             |            |           |          |          |            |          |
|-------------|------------|-----------|----------|----------|------------|----------|
| Device code | <b>VS-</b> | <b>12</b> | <b>F</b> | <b>R</b> | <b>120</b> | <b>M</b> |
|             | ①          | ②         | ③        | ④        | ⑤          | ⑥        |

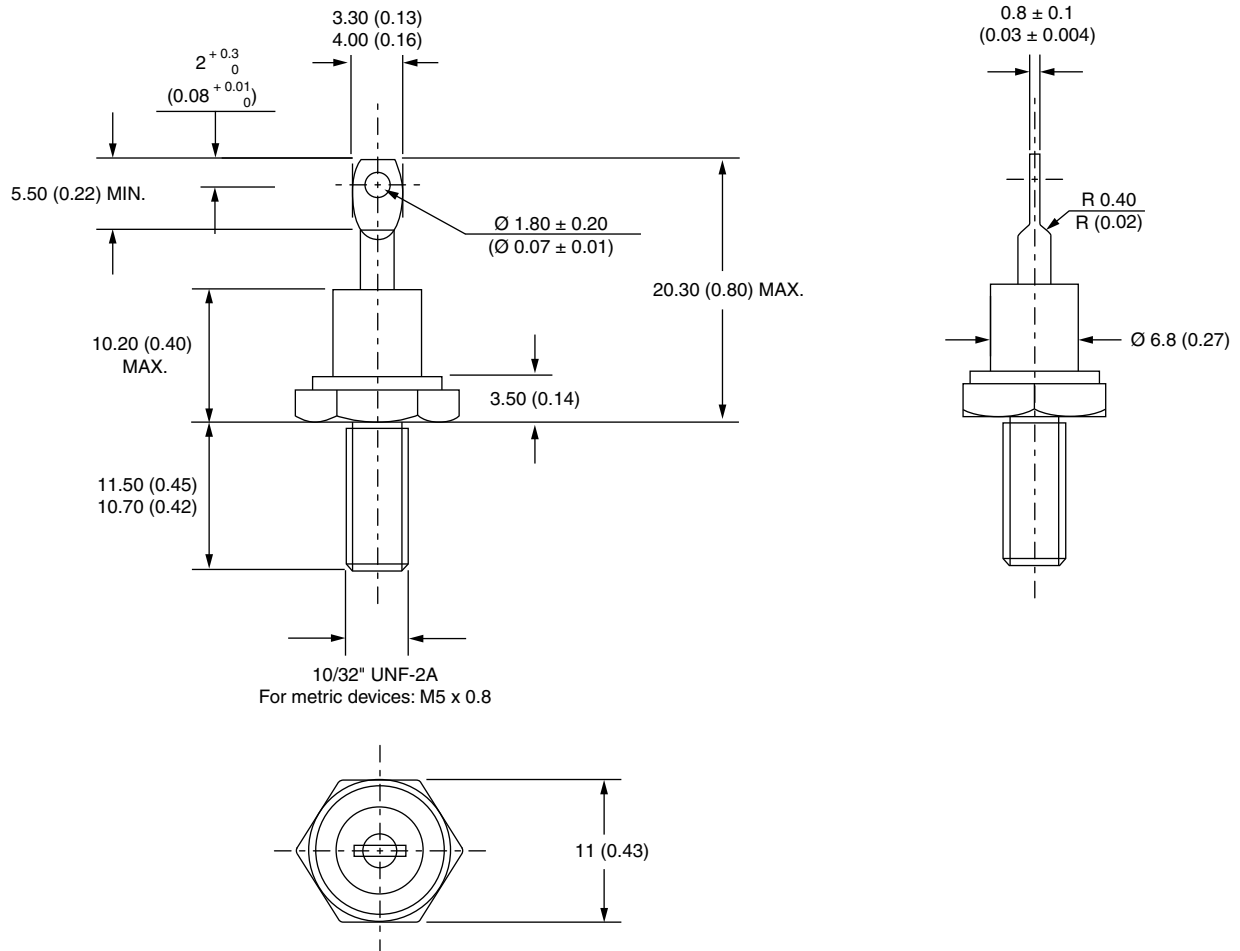
- 1** - Vishay Semiconductors product
- 2** - Current rating: Code =  $I_{F(AV)}$
- 3** - F = Standard device
- 4** - None = Stud normal polarity (cathode to stud)  
R = Stud reverse polarity (anode to stud)
- 5** - Voltage code x 10 =  $V_{RRM}$  (see Voltage Ratings table)
- 6** - None = Stud base DO-203AA (DO-4) 10-32UNF-2A  
M = Stud base DO-203AA (DO-4) M5 x 0.8  
(not available for avalanche diodes)

**LINKS TO RELATED DOCUMENTS**

|            |  |
|------------|--|
| Dimensions | <a href="http://www.vishay.com/doc?95311">www.vishay.com/doc?95311</a> |
|------------|--|

## DO-203AA (DO-4)

**DIMENSIONS** in millimeters (inches)





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