

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



DO-4 (DO-203AA)

### 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

### PRIMARY CHARACTERISTICS

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

### 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 | $I_{RRM}$ MAXIMUM AT $T_J = 175\text{ °C}$<br>mA |
|-------------|--------------|----------------------------------------------------------|------------------------------------------------------|--------------------------------------------------|
| VS-12F(R)   | 10           | 100                                                      | 150                                                  | 12                                               |
|             | 20           | 200                                                      | 275                                                  |                                                  |
|             | 40           | 400                                                      | 500                                                  |                                                  |
|             | 60           | 600                                                      | 725                                                  |                                                  |
|             | 80           | 800                                                      | 950                                                  |                                                  |
|             | 100          | 1000                                                     | 1200                                                 |                                                  |
|             | 120          | 1200                                                     | 1400                                                 |                                                  |



| FORWARD CONDUCTION                                            |                     |                                                                                                          |                                  |                                                                       |        |                   |
|---------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------|--------|-------------------|
| PARAMETER                                                     | SYMBOL              | TEST CONDITIONS                                                                                          |                                  |                                                                       | VALUES | UNITS             |
| Maximum average forward current at case temperature           | I <sub>F(AV)</sub>  | 180° conduction, half sine wave                                                                          |                                  |                                                                       | 12     | A                 |
|                                                               |                     |                                                                                                          |                                  |                                                                       | 144    | °C                |
| Maximum RMS forward current                                   | I <sub>F(RMS)</sub> |                                                                                                          |                                  |                                                                       | 19     | A                 |
| Maximum peak, one-cycle forward, non-repetitive surge current | I <sub>FSM</sub>    | t = 10 ms                                                                                                | No voltage reapplied             | Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum | 265    | A                 |
|                                                               |                     | t = 8.3 ms                                                                                               |                                  |                                                                       | 280    |                   |
|                                                               |                     | t = 10 ms                                                                                                | 100 % V <sub>RRM</sub> reapplied |                                                                       | 225    |                   |
|                                                               |                     | t = 8.3 ms                                                                                               |                                  |                                                                       | 235    |                   |
| Maximum I <sup>2</sup> t for fusing                           | I <sup>2</sup> t    | t = 10 ms                                                                                                | No voltage reapplied             |                                                                       | 351    | A <sup>2</sup> s  |
|                                                               |                     | t = 8.3 ms                                                                                               |                                  |                                                                       | 320    |                   |
|                                                               |                     | t = 10 ms                                                                                                | 100 % V <sub>RRM</sub> reapplied |                                                                       | 250    |                   |
|                                                               |                     | t = 8.3 ms                                                                                               |                                  |                                                                       | 226    |                   |
| Maximum I <sup>2</sup> √t for fusing                          | I <sup>2</sup> √t   | t = 0.1 to 10 ms, no voltage reapplied                                                                   |                                  |                                                                       | 3510   | A <sup>2</sup> √s |
| Low level value of threshold voltage                          | V <sub>F(TO)1</sub> | (16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum |                                  |                                                                       | 0.77   | V                 |
| High level value of threshold voltage                         | V <sub>F(TO)2</sub> | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum                                   |                                  |                                                                       | 0.97   |                   |
| Low level value of forward slope resistance                   | r <sub>f1</sub>     | (16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum |                                  |                                                                       | 10.70  | mΩ                |
| High level value of forward slope resistance                  | r <sub>f2</sub>     | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum                                   |                                  |                                                                       | 6.20   |                   |
| Maximum forward voltage drop                                  | V <sub>FM</sub>     | I <sub>pk</sub> = 38 A, T <sub>J</sub> = 25 °C, t <sub>p</sub> = 400 μs rectangular wave                 |                                  |                                                                       | 1.26   | V                 |

| 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-4 (DO-203AA) |          |

| $\Delta R_{thJC}$ 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

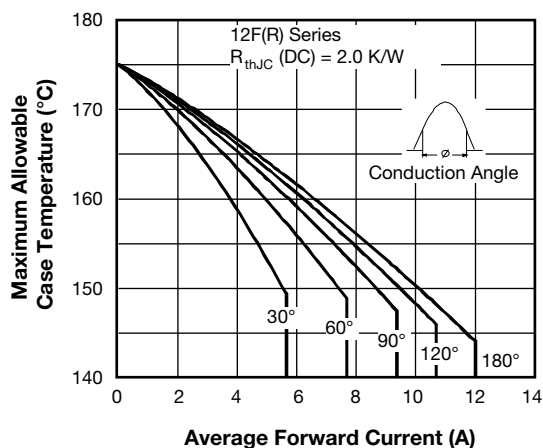


Fig. 1 - Current Ratings Characteristics

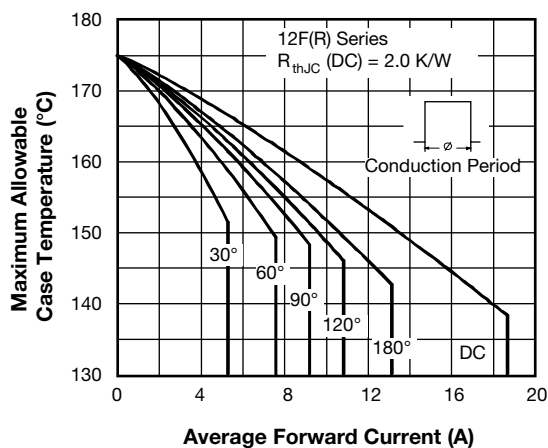


Fig. 2 - Current Ratings Characteristics

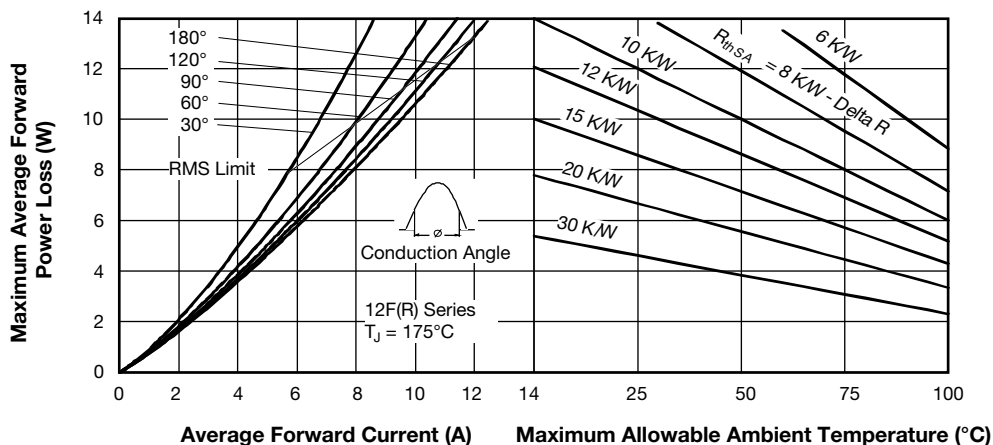


Fig. 3 - Forward Power Loss Characteristics

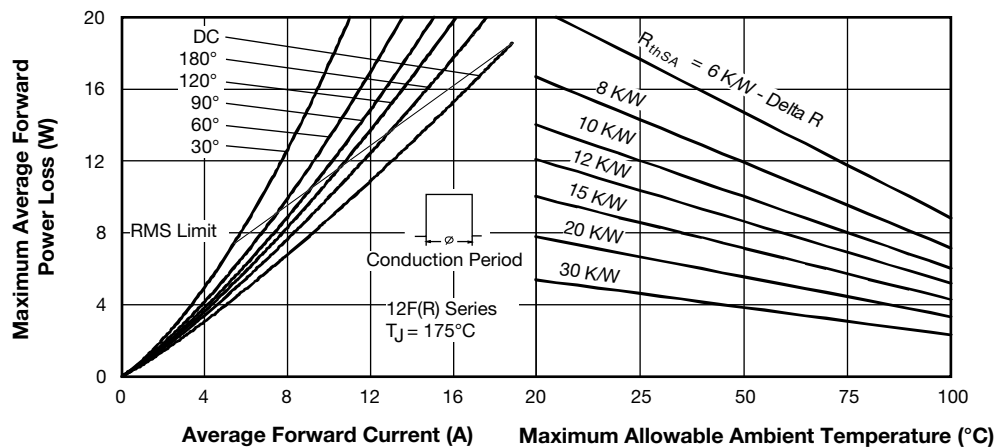


Fig. 4 - Forward Power Loss Characteristics

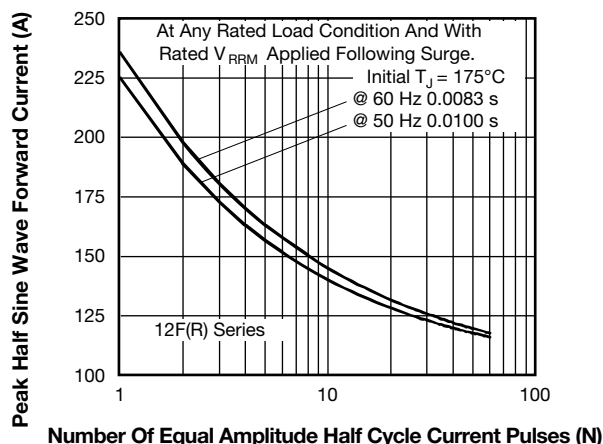


Fig. 5 - Maximum Non-Repetitive Surge Current

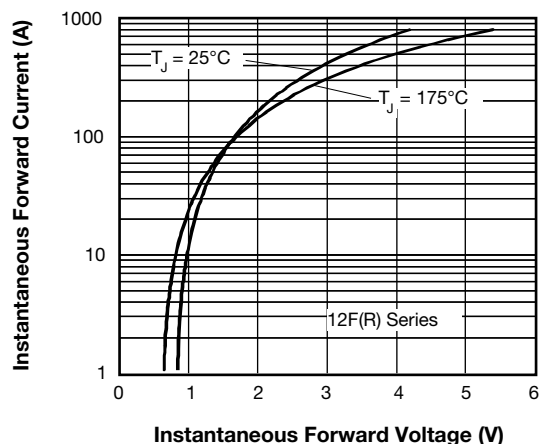


Fig. 7 - Forward Voltage Drop Characteristics

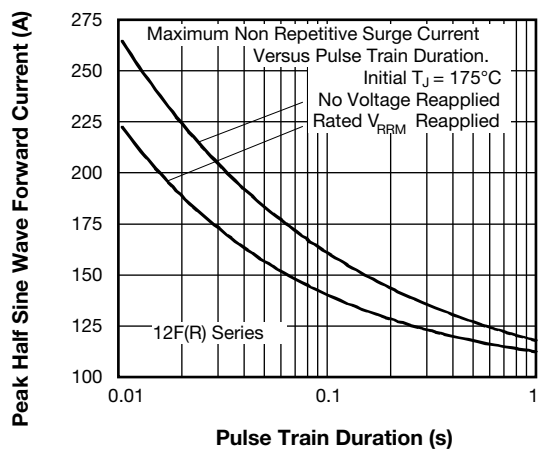


Fig. 6 - Maximum Non-Repetitive Surge Current

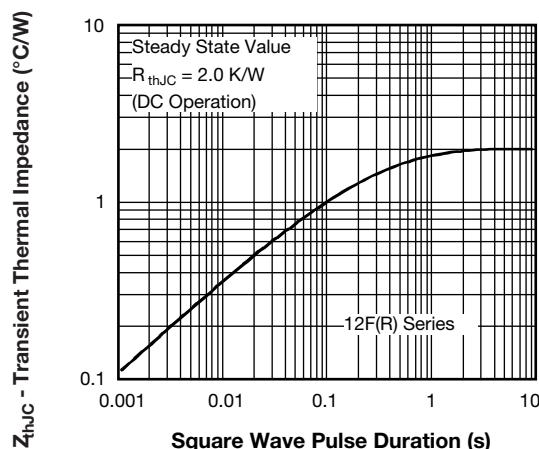


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

## 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  $\times 10 = V_{RRM}$  (see Voltage Ratings table)
- 6** - None = stud base DO-4 (DO-203AA) 10-32UNF-2A  
M = stud base DO-4 (DO-203AA) M5  $\times$  0.8

## LINKS TO RELATED DOCUMENTS

Dimensions

[www.vishay.com/doc?95311](http://www.vishay.com/doc?95311)

## DO-203AA (DO-4)

**DIMENSIONS** in millimeters (inches)





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