

## Standard Recovery Diodes (Stud Version), 6 A



DO-203AA (DO-4)

### FEATURES

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


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### TYPICAL APPLICATIONS

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

### PRODUCT SUMMARY

|                       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 6 A             |
| Package               | DO-203AA (DO-4) |
| Circuit configuration | Single diode    |

### MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER    | TEST CONDITIONS | VALUES      | UNITS            |
|--------------|-----------------|-------------|------------------|
| $I_{F(AV)}$  |                 | 6           | A                |
|              | $T_C$           | 160         | °C               |
| $I_{F(RMS)}$ |                 | 9.5         | A                |
| $I_{FSM}$    | 50 Hz           | 159         | A                |
|              | 60 Hz           | 167         |                  |
| $I^2t$       | 50 Hz           | 134         | A <sup>2</sup> s |
|              | 60 Hz           | 141         |                  |
| $V_{RRM}$    | Range           | 100 to 1200 | V                |
| $T_J$        |                 | -65 to 175  | °C               |

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM<br>REPETITIVE PEAK<br>REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM<br>NON-REPETITIVE PEAK<br>REVERSE VOLTAGE<br>V | $V_{R(BR)}$ , MINIMUM<br>AVALANCHE VOLTAGE<br>V <sup>(1)</sup> | $I_{RRM}$ MAXIMUM<br>AT $T_J = 175\text{ °C}$<br>mA |
|-------------|--------------|----------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------|
| VS-6F(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                                                        |                           | 6                                                 | A                 |   |                  |
|                                                               |               |                                                                                        |                           | 160                                               | °C                |   |                  |
| Maximum RMS forward current                                   | $I_{F(RMS)}$  |                                                                                        |                           | 9.5                                               | A                 |   |                  |
| Maximum non-repetitive peak reverse power                     | $P_R^{(1)}$   | 10 μs square pulse, $T_J = T_J$ maximum                                                |                           | 4                                                 | K/W               |   |                  |
| Maximum peak, one cycle forward, non-repetitive surge current | $I_{FSM}$     | t = 10 ms                                                                              | No voltage reapplied      | Sinusoidal half wave, initial $T_J = T_J$ maximum | 159               | A |                  |
|                                                               |               | t = 8.3 ms                                                                             |                           |                                                   | 167               |   |                  |
|                                                               |               | t = 10 ms                                                                              | 100 % $V_{RRM}$ reapplied |                                                   | 134               |   | A <sup>2</sup> s |
|                                                               |               | t = 8.3 ms                                                                             |                           |                                                   | 141               |   |                  |
| Maximum $I^2t$ for fusing                                     | $I^2t$        | t = 10 ms                                                                              | No voltage reapplied      |                                                   | 127               |   |                  |
|                                                               |               | t = 8.3 ms                                                                             |                           |                                                   | 116               |   |                  |
|                                                               |               | t = 10 ms                                                                              | 100 % $V_{RRM}$ reapplied |                                                   | 90                |   |                  |
|                                                               |               | t = 8.3 ms                                                                             |                           |                                                   | 82                |   |                  |
| Maximum $I^2\sqrt{t}$ for fusing                              | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reapplied                                              |                           | 1270                                              | A <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 |                           | 0.63                                              | V                 |   |                  |
| High level value of threshold voltage                         | $V_{F(TO)2}$  | (I $> \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum                                      |                           | 0.86                                              |                   |   |                  |
| 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 |                           | 15.7                                              | mΩ                |   |                  |
| High level value of forward slope resistance                  | $r_{f2}$      | (I $> \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum                                      |                           | 5.6                                               |                   |   |                  |
| Maximum forward voltage drop                                  | $V_{FM}$      | $I_{pk} = 19$ A, $T_J = 25$ °C, $t_p = 400$ μs rectangular wave                        |                           | 1.10                                              | V                 |   |                  |

**Note**

<sup>(1)</sup> Available only for avalanche version, all other parameters the same as 6F

| THERMAL AND MECHANICAL SPECIFICATIONS        |            |                                                |                 |                     |
|----------------------------------------------|------------|------------------------------------------------|-----------------|---------------------|
| PARAMETER                                    | SYMBOL     | TEST CONDITIONS                                | VALUES          | UNITS               |
| Maximum junction 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                                   | 2.5             | K/W                 |
| Maximum thermal resistance, case to heatsink | $R_{thCS}$ | Mounting surface, smooth, flat and greased     | 0.5             |                     |
| Mounting torque, $\pm 10$ %                  |            | Lubricated threads<br>(Not lubricated threads) | 1.2<br>(1.5)    | N · m<br>(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°                         | 0.34                  | 0.29                   | $T_J = T_J$ maximum | K/W   |
| 120°                         | 0.44                  | 0.48                   |                     |       |
| 90°                          | 0.57                  | 0.63                   |                     |       |
| 60°                          | 0.85                  | 0.88                   |                     |       |
| 30°                          | 1.37                  | 1.39                   |                     |       |

**Note**

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

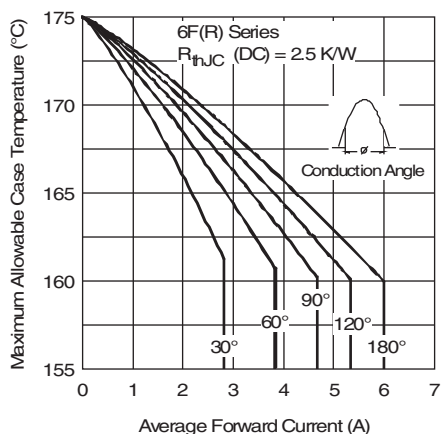


Fig. 1 - Current Ratings Characteristics

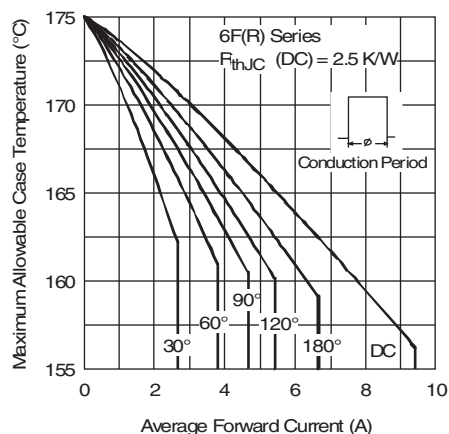


Fig. 2 - Current Ratings Characteristics

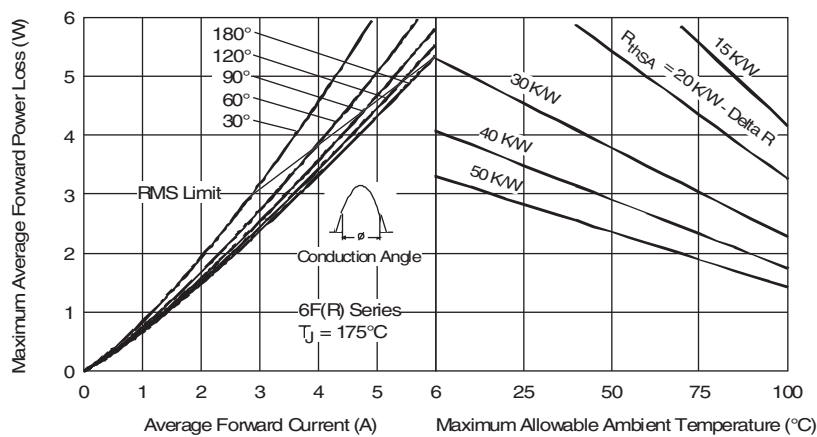


Fig. 3 - Forward Power Loss Characteristics

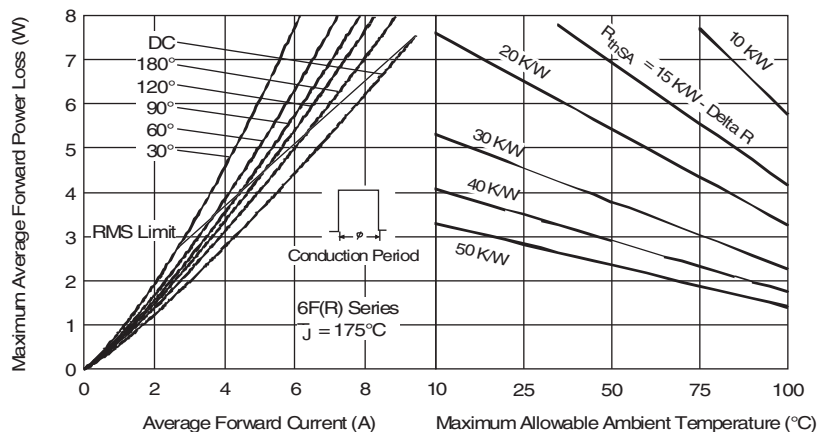


Fig. 4 - Forward Power Loss Characteristics

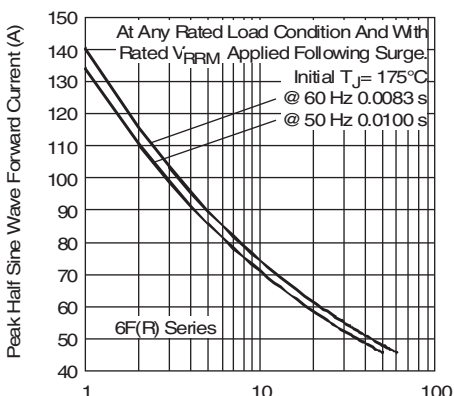


Fig. 5 - Maximum Non-Repetitive Surge Current

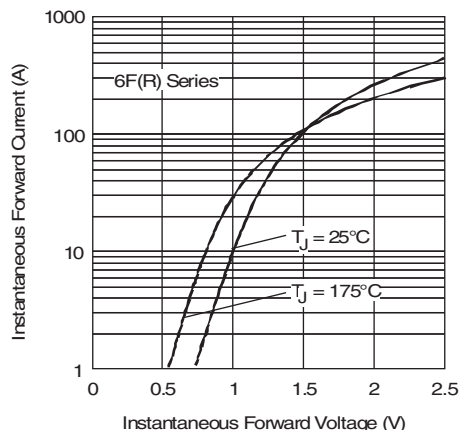


Fig. 7 - Forward Voltage Drop Characteristics

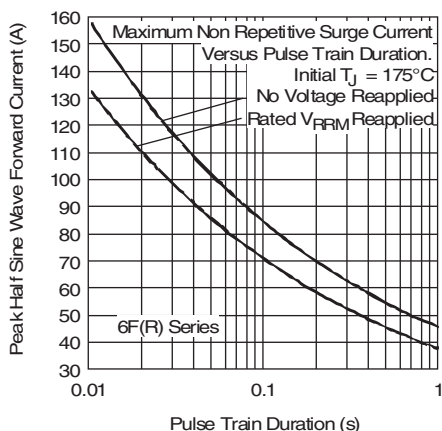


Fig. 6 - Maximum Non-Repetitive Surge Current

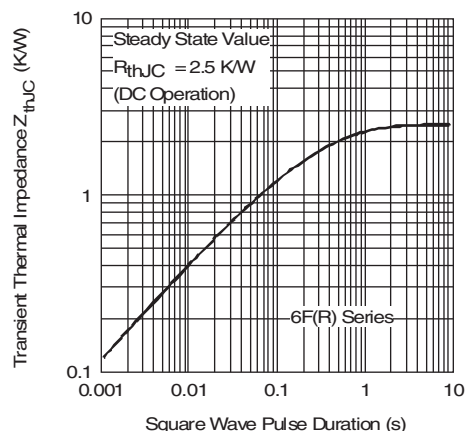


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

## ORDERING INFORMATION TABLE

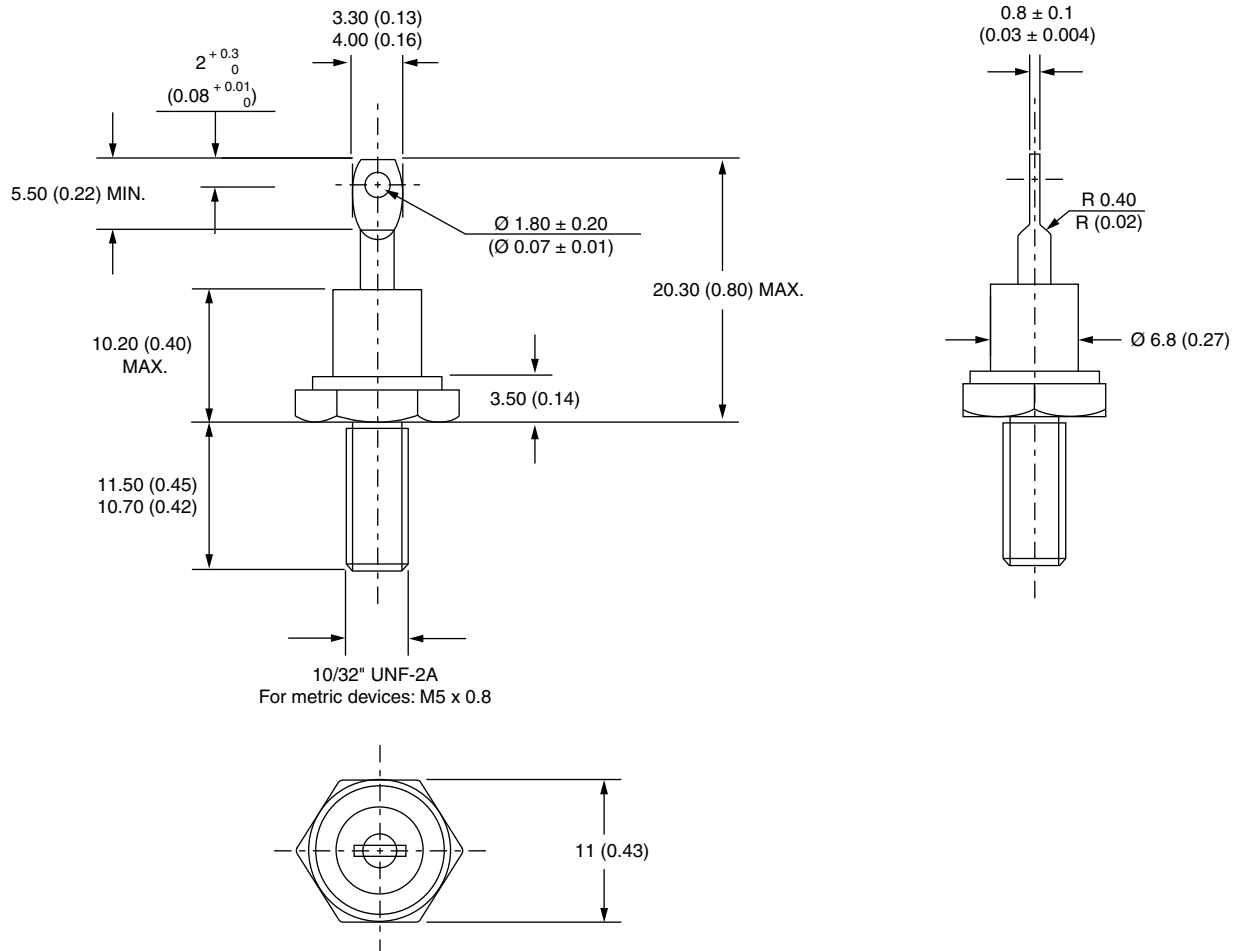
| Device code | VS- | 6 | F | R | 120 | M |
|-------------|-----|---|---|---|-----|---|
|             | 1   | 2 | 3 | 4 | 5   | 6 |

- 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 diode)

| 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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