

## Fast Recovery Diodes (Stud Version), 6 A, 12 A



DO-203AA (DO-4)

### FEATURES

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC® types
- Stud cathode and stud anode versions
- Fully characterized reverse recovery conditions
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

- DC power supplies
- Inverters
- Converters
- Choppers
- Ultrasonic systems
- Freewheeling diodes

### PRODUCT SUMMARY

|                       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 6 A, 12 A       |
| Package               | DO-203AA (DO-4) |
| Circuit configuration | Single diode    |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL        | TEST CONDITIONS | 1N3879(R) TO 1N3883(R)             | 1N3889(R) TO 1N3893(R)             | UNITS             |
|---------------|-----------------|------------------------------------|------------------------------------|-------------------|
| $I_{F(AV)}$   |                 | 6 <sup>(1)</sup>                   | 12 <sup>(1)</sup>                  | A                 |
|               | $T_C$ maximum   | 100                                | 100                                | °C                |
| $I_{F(RMS)}$  |                 | 9.5                                | 19                                 | A                 |
| $I_{FSM}$     | 50 Hz           | 72                                 | 145                                | A                 |
|               | 60 Hz           | 75 <sup>(1)</sup>                  | 150 <sup>(1)</sup>                 |                   |
| $I^2t$        | 50 Hz           | 26                                 | 103                                | A <sup>2</sup> s  |
|               | 60 Hz           | 23                                 | 94                                 |                   |
| $I^2\sqrt{t}$ |                 | 363                                | 856                                | I <sup>2</sup> √s |
| $V_{RRM}$     | Range           | 50 to 400 <sup>(1)</sup>           | 50 to 400 <sup>(1)</sup>           | V                 |
| $t_r$         |                 | See Recovery Characteristics table | See Recovery Characteristics table | ns                |
| $T_J$         | Range           | -65 to +150                        | -65 to +150                        | °C                |

**Note**
<sup>(1)</sup> JEDEC® registered values



**ELECTRICAL SPECIFICATIONS**

| VOLTAGE RATINGS |              |   |   |  |   |   |
|-----------------|--------------|---|---|--|---|---|
| TYPE NUMBER     | VOLTAGE CODE | V <sub>RRM</sub> , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE<br>V | V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK VOLTAGE<br>V | I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 25 °C<br>µA | I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 100 °C<br>mA | I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 150 °C<br>mA |
| 1N3879(R)       | -            | 50  | 75  | 15 <sup>(1)</sup>  | 1.0 <sup>(1)</sup>  | 3.0 <sup>(1)</sup>  |
| 1N3880(R)       |              | 100   | 150   |  |   |   |
| 1N3881(R)       |              | 200   | 250   |  |   |   |
| 1N3882(R)       |              | 300   | 350   |  |   |   |
| 1N3883(R)       |              | 400   | 450   |  |   |   |
| 1N3889(R)       | -            | 50  | 75  | 25 <sup>(1)</sup>  | 3.0 <sup>(1)</sup>  | 5.0 <sup>(1)</sup>  |
| 1N3890(R)       |              | 100   | 150   |  |   |   |
| 1N3891(R)       |              | 200   | 250   |  |   |   |
| 1N3892(R)       |              | 300   | 350   |  |   |   |
| 1N3893(R)       |              | 400   | 450   |  |   |   |

**Note**

(1) JEDEC® registered values

| FORWARD CONDUCTION                                     |                     |   |                                  |   |                        |                        |                   |
|--|---------------------|---|----------------------------------|---|------------------------|------------------------|-------------------|
| PARAMETER  | SYMBOL              | TEST CONDITIONS   |                                  |   | 1N3879(R) TO 1N3883(R) | 1N3889(R) TO 1N3893(R) | UNITS             |
| Maximum average forward current at case temperature    | I <sub>F(AV)</sub>  | 180° conduction, half sine wave DC                                      |                                  |   | 6 <sup>(1)</sup>       | 12 <sup>(1)</sup>      | A                 |
|  |                     |   |                                  |   | 100                    | 100                    | °C                |
| Maximum RMS current                                    | I <sub>F(RMS)</sub> |   |                                  |   | 9.5                    | 19                     | A                 |
| Maximum peak, one-cycle non-repetitive forward current | I <sub>FSM</sub>    | t = 10 ms   | No voltage reapplied             | Sinusoidal half wave, initial T <sub>J</sub> = 150 °C | 85                     | 170                    |                   |
|  |                     | t = 8.3 ms  |                                  |   | 90                     | 180                    |                   |
|  |                     | t = 10 ms   | 100 % V <sub>RRM</sub> reapplied |   | 72                     | 145                    |                   |
|  |                     | t = 8.3 ms  |                                  |   | 75 <sup>(1)</sup>      | 150 <sup>(1)</sup>     |                   |
| Maximum I <sup>2</sup> t for fusing                    | I <sup>2</sup> t    | t = 10 ms   | No voltage reapplied             |   | 36                     | 145                    | A <sup>2</sup> s  |
|  |                     | t = 8.3 ms  |                                  |   | 33                     | 130                    |                   |
|  |                     | t = 10 ms   | 100 % V <sub>RRM</sub> reapplied |   | 26                     | 103                    |                   |
|  |                     | t = 8.3 ms  |                                  |   | 23                     | 94                     |                   |
| Maximum I <sup>2</sup> √t for fusing                   | I <sup>2</sup> √t   | t = 0.1 ms to 10 ms, no voltage reapplied                               |                                  |   | 363                    | 1452                   | A <sup>2</sup> √s |
| Maximum forward voltage drop                           | V <sub>FM</sub>     | T <sub>J</sub> = 25 °C; I <sub>F</sub> = Rated I <sub>F(AV)</sub> (DC)  |                                  |   | 1.4 <sup>(1)</sup>     | 1.4 <sup>(1)</sup>     | V                 |
|  |                     | T <sub>C</sub> = 100 °C; I <sub>FM</sub> = π × rated I <sub>F(AV)</sub> |                                  |   | 1.5 <sup>(1)</sup>     | 1.5 <sup>(1)</sup>     |                   |

**Note**

(1) JEDEC® registered values



| RECOVERY CHARACTERISTICS        |               |   |                           |                           |       |
|---------------------------------|---------------|---|---------------------------|---------------------------|-------|
| PARAMETER                       | SYMBOL        | TEST CONDITIONS   | 1N3879(R)<br>TO 1N3883(R) | 1N3889(R)<br>TO 1N3893(R) | UNITS |
| Maximum reverse recovery time   | $t_{rr}$      | $T_J = 25\text{ }^\circ\text{C}$ , $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ ,<br>$di_F/dt = 100\text{ A}/\mu\text{s}$    | 150                       | 150                       | ns    |
|                                 |               | $T_J = 25\text{ }^\circ\text{C}$ , $di_F/dt = 25\text{ A}/\mu\text{s}$ ,<br>$I_{FM} = \pi \times \text{rated } I_{F(AV)}$ | 300 <sup>(1)</sup>        | 300 <sup>(1)</sup>        |       |
| Maximum peak recovery current   | $I_{RM(REC)}$ | $I_{FM} = \pi \times \text{rated } I_{F(AV)}$   | 4 <sup>(1)</sup>          | 5 <sup>(1)</sup>          | -     |
| Maximum reverse recovery charge | $Q_{rr}$      | $T_J = 25\text{ }^\circ\text{C}$ , $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ ,<br>$di_F/dt = 100\text{ A}/\mu\text{s}$    | 400                       | 350                       | nC    |
|                                 |               | $T_J = 25\text{ }^\circ\text{C}$ , $di_F/dt = 25\text{ A}/\mu\text{s}$ ,<br>$I_{FM} = \pi \times \text{rated } I_{F(AV)}$ | 400                       | 400                       |       |



**Note**

<sup>(1)</sup> JEDEC® registered values

| THERMAL AND MECHANICAL SPECIFICATIONS        |            |  |                           |                           |                     |
|--|------------|--|---------------------------|---------------------------|---------------------|
| PARAMETER                                    | SYMBOL     | TEST CONDITIONS                            | 1N3879(R)<br>TO 1N3883(R) | 1N3889(R)<br>TO 1N3893(R) | UNITS               |
| Maximum junction operating temperature range | $T_J$      |  | -65 to +150               |                           | °C                  |
| Maximum storage temperature range            | $T_{Stg}$  |  | -65 to +175               |                           |                     |
| Maximum thermal resistance, junction to case | $R_{thJC}$ | DC operation                               | 2.5                       | 2.0                       | °C/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 %<br>(13)     |                           | N · m<br>(lbf · in) |
|  |            | Lubricated threads                         | 1.2 +0 - 10 %<br>(10)     |                           |                     |
| Approximate weight                           |            |  | 7                         |                           | g                   |
|  |            |  | 0.25                      |                           | oz.                 |
| Case style                                   |            | JEDEC®                                     | DO-203AA (DO-4)           |                           |                     |

| $\Delta R_{thJC}$ CONDUCTION |                           |                           |                           |                           |                                   |       |
|------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-----------------------------------|-------|
| CONDUCTION ANGLE             | 1N3879(R)<br>TO 1N3883(R) | 1N3889(R)<br>TO 1N3893(R) | 1N3879(R)<br>TO 1N3883(R) | 1N3889(R)<br>TO 1N3893(R) | TEST CONDITIONS                   | UNITS |
|                              | SINUSOIDAL CONDUCTION     |                           | RECTANGULAR CONDUCTION    |                           |                                   |       |
| 180°                         | 0.58                      | 0.46                      | 0.33                      | 0.26                      | $T_J = 150\text{ }^\circ\text{C}$ | K/W   |
| 120°                         | 0.60                      | 0.48                      | 0.58                      | 0.46                      |                                   |       |
| 60°                          | 1.28                      | 1.02                      | 1.28                      | 1.02                      |                                   |       |
| 30°                          | 2.20                      | 1.76                      | 2.20                      | 1.76                      |                                   |       |

**Note**

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



Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 Series



Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 Series



$I_F, I_{FM}$  - Peak forward current prior to commutation  
 $-di_F/dt$  - Rate of fall of forward current  
 $I_{RM(REC)}$  - Peak reverse recovery current  
 $t_{rr}$  - Reverse recovery time  
 $Q_{rr}$  - Reverse recovered charge

Fig. 3 - Reverse Recovery Time Test Waveform



| Conduction angle - $\phi$ | $\Delta R$ - K/W |
|---------------------------|------------------|
| 180°                      | 0.58             |
| 120°                      | 0.60             |
| 60°                       | 1.28             |
| 30°                       | 2.20             |

Fig. 4 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 Series



| Conduction angle - $\Phi$ | $\Delta R$ - KW |
|---------------------------|-----------------|
| DC                        | 0               |
| 180°                      | 0.33            |
| 120°                      | 0.58            |
| 60°                       | 1.28            |
| 30°                       | 2.20            |

Fig. 5 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 Series



| Conduction angle - $\Phi$ | $\Delta R$ - KW |
|---------------------------|-----------------|
| 180°                      | 0.46            |
| 120°                      | 0.48            |
| 60°                       | 1.02            |
| 30°                       | 1.76            |

Fig. 6 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 Series



| Conduction angle - $\Phi$ | $\Delta R$ - KW |
|---------------------------|-----------------|
| DC                        | 0               |
| 180°                      | 0.26            |
| 120°                      | 0.46            |
| 60°                       | 1.02            |
| 30°                       | 1.76            |

Fig. 7 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 Series



Fig. 8 - Maximum Forward Voltage vs. Forward Current, 1N3879 Series



Fig. 11 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 Series



Fig. 9 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 Series



Fig. 12 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series



Fig. 10 - Maximum Forward Voltage vs. Forward Current, 1N3889 Series



Fig. 13 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 Series

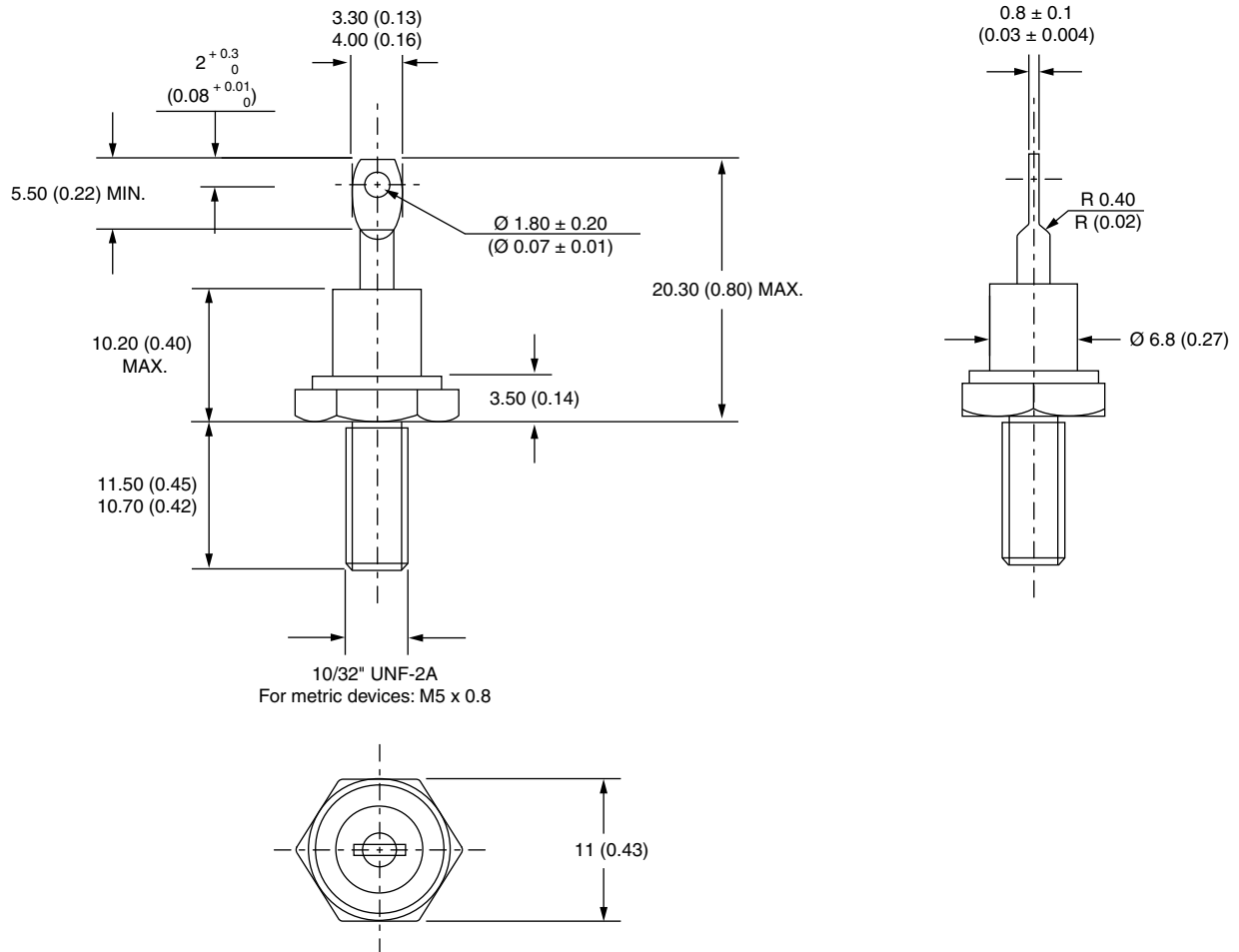


Fig. 14 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

| 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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