

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


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 ⁽¹⁾ | 12 ⁽¹⁾ | A |
| | T_C maximum | 100 | 100 | °C |
| $I_{F(RMS)}$ | | 9.5 | 19 | A |
| I_{FSM} | 50 Hz | 72 | 145 | A |
| | 60 Hz | 75 ⁽¹⁾ | 150 ⁽¹⁾ | |
| I^2t | 50 Hz | 26 | 103 | A ² s |
| | 60 Hz | 23 | 94 | |
| $I^2\sqrt{t}$ | | 363 | 856 | $I^2\sqrt{s}$ |
| V_{RRM} | Range | 50 to 400 ⁽¹⁾ | 50 to 400 ⁽¹⁾ | V |
| t_{rr} | | See Recovery Characteristics table | See Recovery Characteristics table | ns |
| T_J | Range | -65 to +150 | -65 to +150 | °C |

Note
⁽¹⁾ JEDEC® registered values



ELECTRICAL SPECIFICATIONS

| VOLTAGE RATINGS | | | | | | |
|-----------------|--------------|---|---|--|---|---|
| TYPE NUMBER | VOLTAGE CODE | V _{RRM} , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V | V _{RSM} , MAXIMUM NON-REPETITIVE PEAK VOLTAGE V | I _{RRM} MAXIMUM AT T _J = 25 °C µA | I _{RRM} MAXIMUM AT T _J = 100 °C mA | I _{RRM} MAXIMUM AT T _J = 150 °C mA |
| 1N3879(R) | - | 50 | 75 | 15 ⁽¹⁾ | 1.0 ⁽¹⁾ | 3.0 ⁽¹⁾ |
| 1N3880(R) | | 100 | 150 | | | |
| 1N3881(R) | | 200 | 250 | | | |
| 1N3882(R) | | 300 | 350 | | | |
| 1N3883(R) | | 400 | 450 | | | |
| 1N3889(R) | - | 50 | 75 | 25 ⁽¹⁾ | 3.0 ⁽¹⁾ | 5.0 ⁽¹⁾ |
| 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 _{F(AV)} | 180° conduction, half sine wave DC | | | 6 ⁽¹⁾ | 12 ⁽¹⁾ | A |
| | | | | | 100 | 100 | °C |
| Maximum RMS current | I _{F(RMS)} | | | | 9.5 | 19 | A |
| Maximum peak, one-cycle non-repetitive forward current | I _{FSM} | t = 10 ms | No voltage reapplied | Sinusoidal half wave, initial T _J = 150 °C | 85 | 170 | |
| | | t = 8.3 ms | | | 90 | 180 | |
| | | t = 10 ms | 100 % V _{RRM} reapplied | | 72 | 145 | |
| | | t = 8.3 ms | | | 75 ⁽¹⁾ | 150 ⁽¹⁾ | |
| Maximum I ² t for fusing | I ² t | t = 10 ms | No voltage reapplied | | 36 | 145 | A ² s |
| | | t = 8.3 ms | | | 33 | 130 | |
| | | t = 10 ms | 100 % V _{RRM} reapplied | | 26 | 103 | |
| | | t = 8.3 ms | | | 23 | 94 | |
| Maximum I ² √t for fusing | I ² √t | t = 0.1 ms to 10 ms, no voltage reapplied | | | 363 | 1452 | A ² √s |
| Maximum forward voltage drop | V _{FM} | T _J = 25 °C; I _F = Rated I _{F(AV)} (DC) | | | 1.4 ⁽¹⁾ | 1.4 ⁽¹⁾ | V |
| | | T _C = 100 °C; I _{FM} = π × rated I _{F(AV)} | | | 1.5 ⁽¹⁾ | 1.5 ⁽¹⁾ | |

Note

(1) JEDEC® registered values



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



Note

⁽¹⁾ JEDEC® registered values

| THERMAL AND MECHANICAL SPECIFICATIONS | | | | | |
|--|------------|--|---------------------------|---------------------------|---------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | 1N3879(R) TO 1N3883(R) | 1N3889(R) 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 % (13) | | N · m (lbf · in) |
| | | Lubricated threads | 1.2 +0 - 10 % (10) | | |
| Approximate weight | | | 7 | | g |
| | | | 0.25 | | oz. |
| Case style | | JEDEC® | DO-203AA (DO-4) | | |

| ΔR_{thJC} CONDUCTION | | | | | | |
|------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-----------------------------------|-------|
| CONDUCTION ANGLE | 1N3879(R) TO 1N3883(R) | 1N3889(R) TO 1N3893(R) | 1N3879(R) TO 1N3883(R) | 1N3889(R) 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

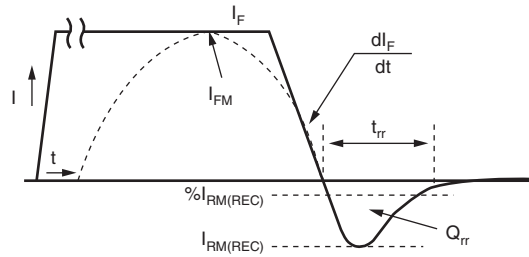
• The table above shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC



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



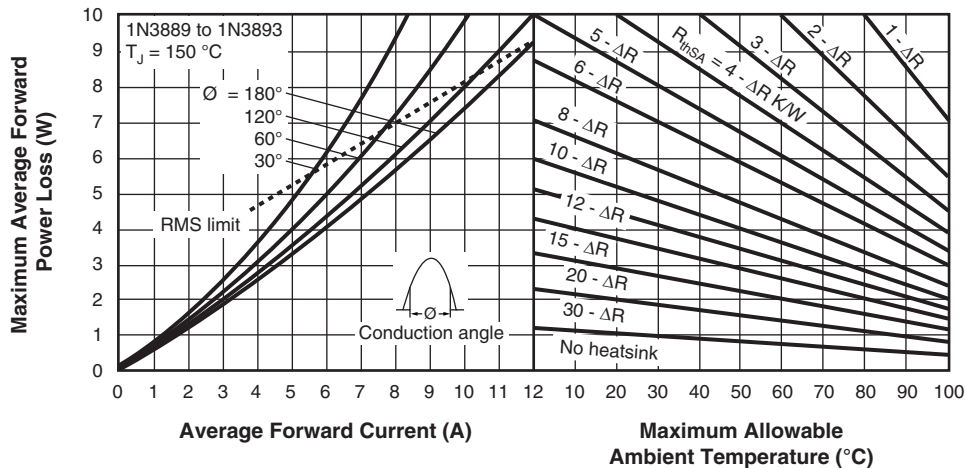
| Conduction angle - ϕ | ΔR - K/W |
|---------------------------|------------------|
| 180° | 0.58 |
| 120° | 0.60 |
| 60° | 1.28 |
| 30° | 2.20 |

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



| Conduction angle - ϕ | ΔR - K/W |
|---------------------------|------------------|
| 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 - ϕ | ΔR - K/W |
|---------------------------|------------------|
| 180° | 0.46 |
| 120° | 0.48 |
| 60° | 1.02 |
| 30° | 1.76 |

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



| Conduction angle - ϕ | ΔR - K/W |
|---------------------------|------------------|
| 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

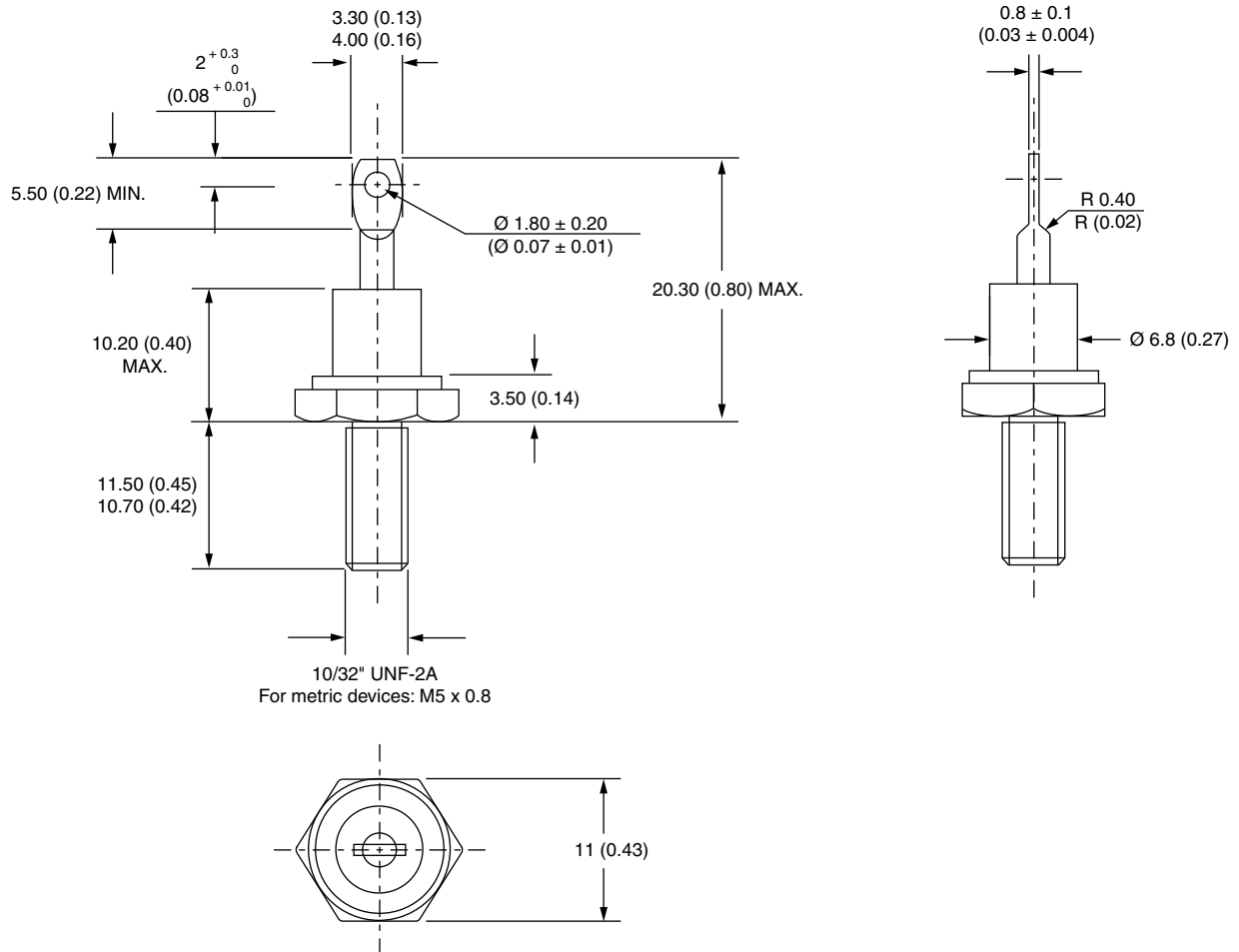


Fig. 14 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95311 |

DO-203AA (DO-4)

DIMENSIONS in millimeters (inches)





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