

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



DO-4 (DO-203AA)

## 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

## PRIMARY CHARACTERISTICS

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

## 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                 |
| $t_{rr}$      |                 | 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                                                         |                                                          |                                                           |                                                           |

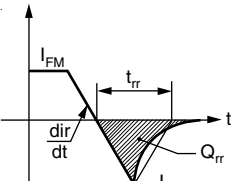
## Note

(1) JEDEC® registered values

| FORWARD CONDUCTION                                        |                     |                                                                         |                                     |                                                                |                           |                           |                   |
|-----------------------------------------------------------|---------------------|-------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------|---------------------------|---------------------------|-------------------|
| PARAMETER                                                 | SYMBOL              | TEST CONDITIONS                                                         |                                     |                                                                | 1N3879(R)<br>TO 1N3883(R) | 1N3889(R)<br>TO 1N3893(R) | UNITS             |
| Maximum average forward current<br>at case temperature    | I <sub>F(AV)</sub>  | 180° conduction, half sine wave<br>DC                                   |                                     |                                                                | 6 <sup>(1)</sup>          | 12 <sup>(1)</sup>         | A                 |
|                                                           |                     |                                                                         |                                     |                                                                | 100                       | 100                       | °C                |
| Maximum RMS current                                       | I <sub>F(RMS)</sub> |                                                                         |                                     |                                                                | 9.5                       | 19                        |                   |
| Maximum peak, one-cycle<br>non-repetitive forward current | I <sub>FSM</sub>    | t = 10 ms                                                               | No voltage<br>reapplied             | Sinusoidal<br>half wave,<br>initial<br>T <sub>J</sub> = 150 °C | 85                        | 170                       | A                 |
|                                                           |                     | t = 8.3 ms                                                              |                                     |                                                                | 90                        | 180                       |                   |
|                                                           |                     | t = 10 ms                                                               | 100 % V <sub>RRM</sub><br>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<br>reapplied             |                                                                | 36                        | 145                       | A <sup>2</sup> s  |
|                                                           |                     | t = 8.3 ms                                                              |                                     |                                                                | 33                        | 130                       |                   |
|                                                           |                     | t = 10 ms                                                               | 100 % V <sub>RRM</sub><br>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 x 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 <sub>rr</sub>      | T <sub>J</sub> = 25 °C, I <sub>F</sub> = 1 A to V <sub>R</sub> = 30 V, dI <sub>F</sub> /dt = 100 A/μs | 150                       | 150                       | ns    |                                                                                       |
|                                 |                      | T <sub>J</sub> = 25 °C, dI <sub>F</sub> /dt = 25 A/μs, I <sub>FM</sub> = π x rated I <sub>F(AV)</sub> | 300 <sup>(1)</sup>        | 300 <sup>(1)</sup>        |       |                                                                                       |
| Maximum peak recovery current   | I <sub>RM(REC)</sub> | I <sub>FM</sub> = π x rated I <sub>F(AV)</sub>                                                        | 4 <sup>(1)</sup>          | 5 <sup>(1)</sup>          | -     |                                                                                       |
| Maximum reverse recovery charge | Q <sub>rr</sub>      | T <sub>J</sub> = 25 °C, I <sub>F</sub> = 1 A to V <sub>R</sub> = 30 V, dI <sub>F</sub> /dt = 100 A/μs | 400                       | 350                       | nC    |                                                                                       |
|                                 |                      | T <sub>J</sub> = 25 °C, dI <sub>F</sub> /dt = 25 A/μs, I <sub>FM</sub> = π x rated I <sub>F(AV)</sub> | 400                       | 400                       |       |                                                                                       |

## Note

(1) 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 <sub>J</sub>    |                                            | -65 to +150               |                           | °C                  |
| Maximum storage temperature range            | T <sub>Stg</sub>  |                                            | -65 to +175               |                           |                     |
| Maximum thermal resistance, junction to case | R <sub>thJC</sub> | DC operation                               | 2.5                       | 2.0                       | °C/W                |
| Maximum thermal resistance, case to heatsink | R <sub>thCS</sub> | 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-4 (DO-203AA)           |                           |                     |

 **$\Delta R_{thJC}$  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                      |                         |       |
| 120°             | 0.60                      | 0.48                      | 0.58                      | 0.46                      | T <sub>J</sub> = 150 °C | K/W   |
| 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

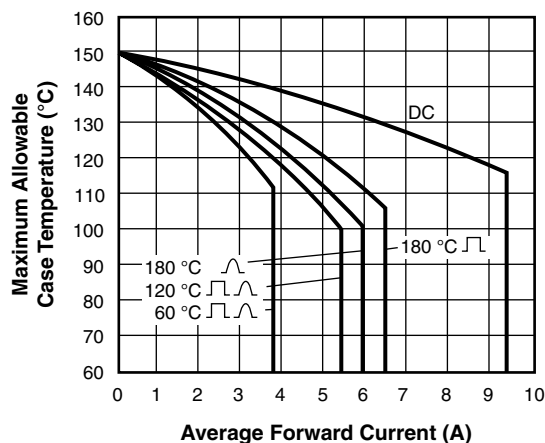


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 Series

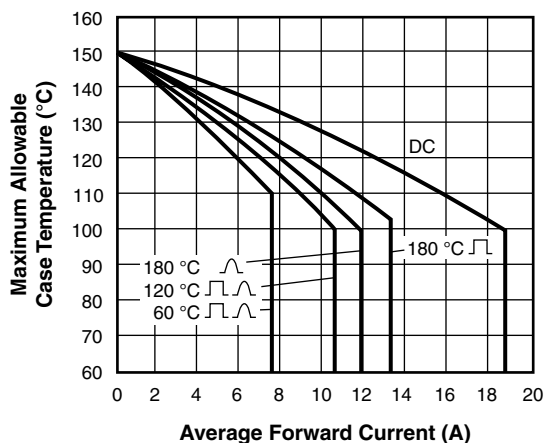
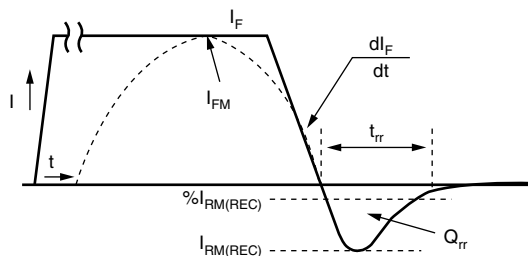


Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 Series



$I_F$ ,  $I_{FM}$  - 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

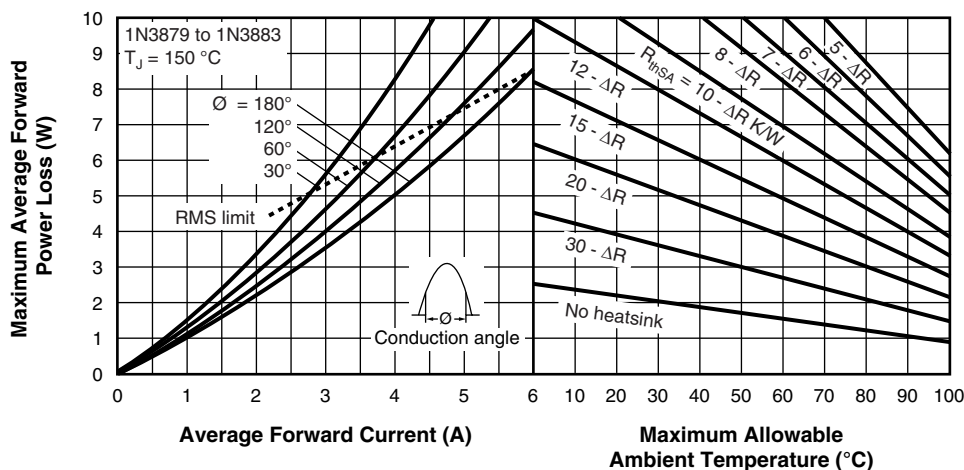


Fig. 4 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 Series

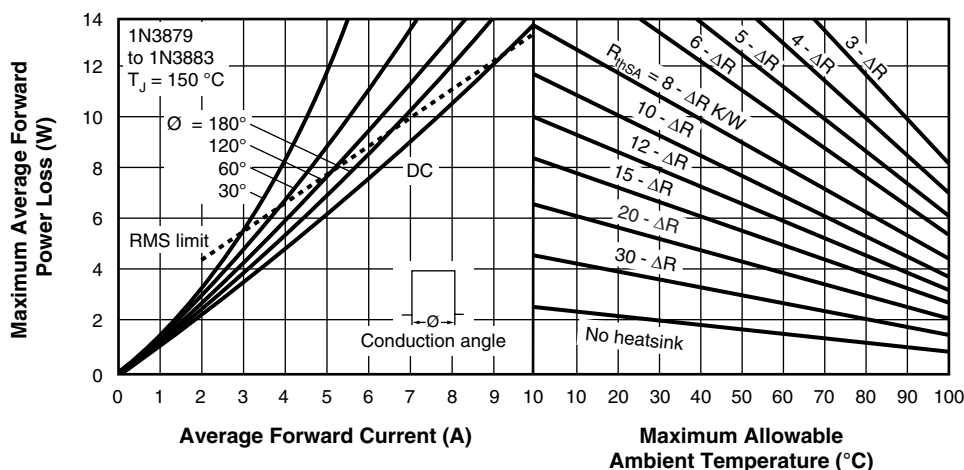


Fig. 5 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 Series

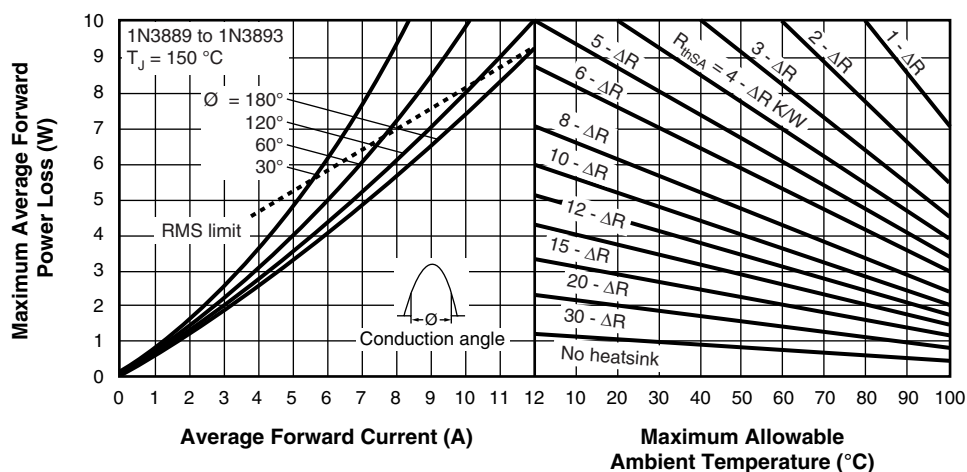


Fig. 6 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 Series

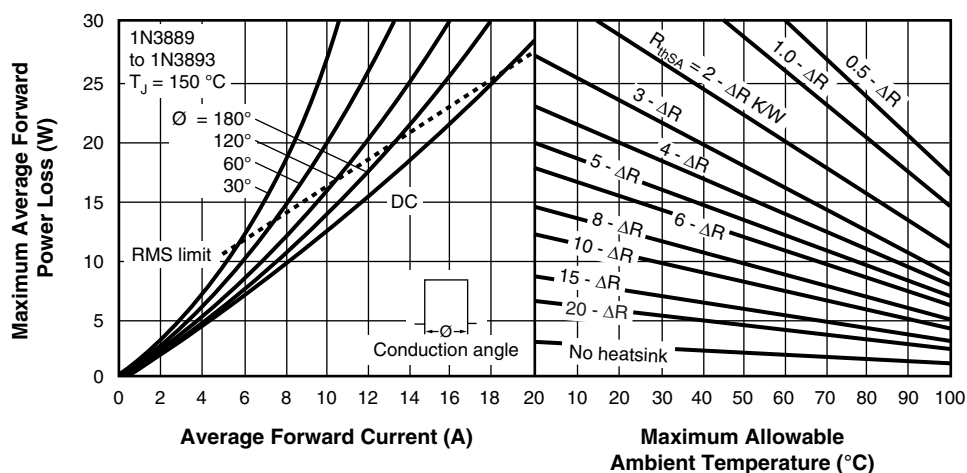


Fig. 7 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 Series

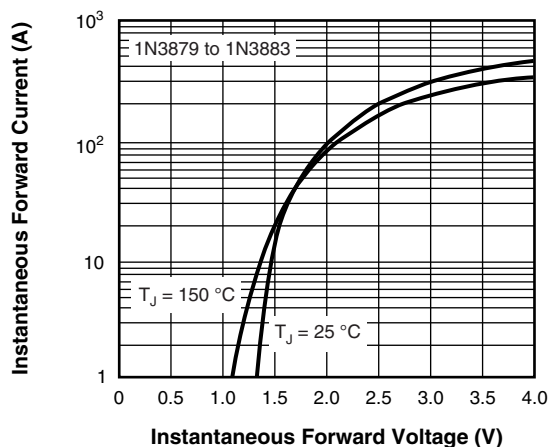


Fig. 8 - Maximum Forward Voltage vs. Forward Current, 1N3879 Series

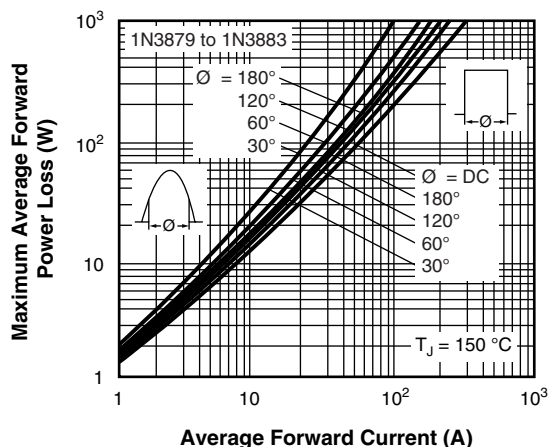


Fig. 9 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 Series

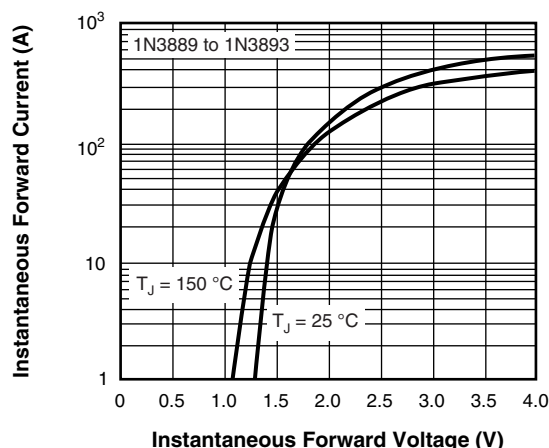


Fig. 10 - Maximum Forward Voltage vs. Forward Current, 1N3889 Series

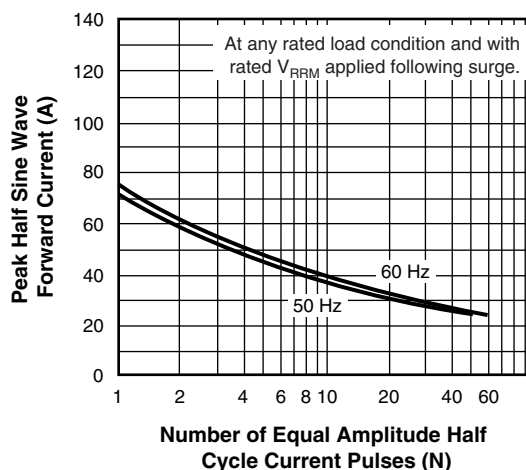


Fig. 12 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

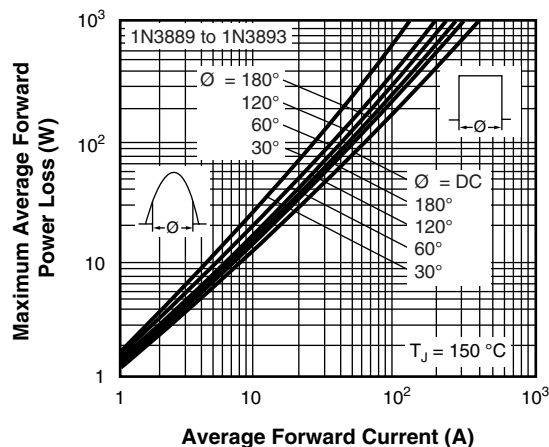


Fig. 11 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 Series

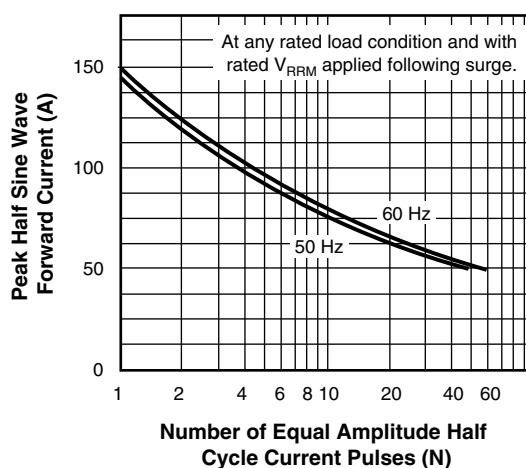


Fig. 13 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 Series

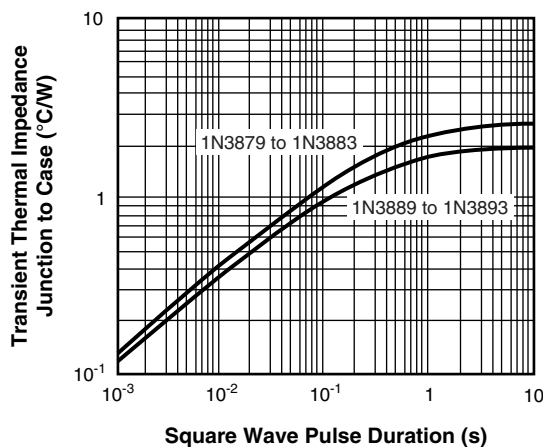


Fig. 14 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

## LINKS TO RELATED DOCUMENTS

Dimensions

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

**DIMENSIONS** in millimeters (inches)





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