



## Fast Recovery Diodes (Stud Version), 6/12/16 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
- RoHS compliant



RoHS  
COMPLIANT

### TYPICAL APPLICATIONS

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

### PRODUCT SUMMARY

|             |           |
|-------------|-----------|
| $I_{F(AV)}$ | 6/12/16 A |
|-------------|-----------|

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL        | CHARACTERISTICS                   | 1N3879. TO<br>1N3883.              | 1N3889. TO<br>1N3893. | 6FL..      | 12FL.. | 16FL.. | UNITS            |
|---------------|-----------------------------------|------------------------------------|-----------------------|------------|--------|--------|------------------|
| $I_{F(AV)}$   | $T_C = 100\text{ }^\circ\text{C}$ | 6 <sup>(1)</sup>                   | 12 <sup>(1)</sup>     | 6          | 12     | 16     | A                |
| $I_{F(RMS)}$  |                                   | 9.5                                | 19                    | 9.5        | 19     | 25     | A                |
| $I_{FSM}$     | 50 Hz                             | 72                                 | 145                   | 110        | 145    | 180    | A                |
|               | 60 Hz                             | 75 <sup>(1)</sup>                  | 150 <sup>(1)</sup>    | 115        | 150    | 190    |                  |
| $I^2t$        | 50 Hz                             | 26                                 | 103                   | 60         | 103    | 160    | A <sup>2</sup> s |
|               | 60 Hz                             | 23                                 | 94                    | 55         | 94     | 150    |                  |
| $I^2\sqrt{t}$ |                                   | 363                                | 856                   | 1452       | 1452   | 2290   | $I^2\sqrt{s}$    |
| $V_{RRM}$     | Range                             | 50 to 400 <sup>(1)</sup>           |                       | 50 to 1000 |        |        | V                |
| $t_{rr}$      |                                   | See Recovery Characteristics table |                       |            |        |        | ns               |
| $T_J$         | Range                             | - 65 to 150                        |                       |            |        |        | $^\circ\text{C}$ |

#### Note

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

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
(Stud Version), 6/12/16 A

## 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.         | -            | 50  | 75  | 15 <sup>(1)</sup>  | 1.0 <sup>(1)</sup>  | 3.0 <sup>(1)</sup>  |
| 1N3880.         |              | 100   | 150   |  |   |   |
| 1N3881.         |              | 200   | 250   |  |   |   |
| 1N3882.         |              | 300   | 350   |  |   |   |
| 1N3883.         |              | 400   | 450   |  |   |   |
| 1N3889.         | -            | 50  | 75  | 25 <sup>(1)</sup>  | 3.0 <sup>(1)</sup>  | 5.0 <sup>(1)</sup>  |
| 1N3890.         |              | 100   | 150   |  |   |   |
| 1N3891.         |              | 200   | 250   |  |   |   |
| 1N3892.         |              | 300   | 350   |  |   |   |
| 1N3893.         |              | 400   | 450   |  |   |   |
| 6FL..           | 5            | 50  | 75  | 50   | -   | 6.0   |
| 12FL..          | 10           | 100   | 150   |  |   |   |
| 16FL..          | 20           | 200   | 275   |  |   |   |
|                 | 40           | 400   | 500   |  |   |   |
|                 | 60           | 600   | 725   |  |   |   |
|                 | 80           | 800   | 950   |  |   |   |
|                 | 100          | 1000  | 1250  |  |   |   |

### Note

(1) JEDEC registered values

| FORWARD CONDUCTION                                     |                     |   |                                   |   |                    |       |                              |        |                   |
|--|---------------------|---|-----------------------------------|---|--------------------|-------|------------------------------|--------|-------------------|
| PARAMETER  | SYMBOL              | TEST CONDITIONS   |                                   |   | 1N3879.<br>1N3883. | 6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | UNITS             |
| Maximum average forward current at case temperature    | I <sub>F(AV)</sub>  | 180° conduction, half sine wave DC                                      |                                   |   | 6 <sup>(1)</sup>   | 6     | 12 <sup>(1)</sup>            | 16     | A                 |
|  |                     |   |                                   |   | 100                | 100   | 100                          | 100    | °C                |
| Maximum RMS current                                    | I <sub>F(RMS)</sub> |   |                                   |   | 9.5                | 9.5   | 19                           | 25     | A                 |
| Maximum peak, one-cycle non-repetitive forward current | I <sub>FSM</sub>    | t = 10 ms   | No voltage reappplied             | Sinusoidal half wave, initial T <sub>J</sub> = 150 °C | 85                 | 130   | 170                          | 215    |                   |
|  |                     | t = 8.3 ms  |                                   |   | 90                 | 135   | 180                          | 225    |                   |
|  |                     | t = 10 ms   | 100 % V <sub>RRM</sub> reappplied |   | 72                 | 110   | 145                          | 180    |                   |
|  |                     | t = 8.3 ms  |                                   |   | 75 <sup>(1)</sup>  | 115   | 150 <sup>(1)</sup>           | 190    |                   |
| Maximum I <sup>2</sup> t for fusing                    | I <sup>2</sup> t    | t = 10 ms   | No voltage reappplied             |   | 36                 | 86    | 145                          | 230    | A <sup>2</sup> s  |
|  |                     | t = 8.3 ms  |                                   |   | 33                 | 78    | 130                          | 210    |                   |
|  |                     | t = 10 ms   | 100 % V <sub>RRM</sub> reappplied |   | 26                 | 60    | 103                          | 160    |                   |
|  |                     | t = 8.3 ms  |                                   |   | 23                 | 55    | 94                           | 150    |                   |
| Maximum I <sup>2</sup> √t for fusing                   | I <sup>2</sup> √t   | t = 0.1 to 10 ms, no voltage reappplied                                 |                                   |   | 363                | 856   | 1452                         | 2290   | 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   | 1.4 <sup>(1)</sup>           | 1.4    | 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   | 1.5 <sup>(1)</sup>           | 1.5    | V                 |

### Note

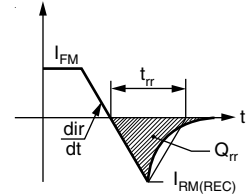
(1) JEDEC registered values



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Fast Recovery Diodes Vishay High Power Products  
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| RECOVERY CHARACTERISTICS        |               |   |                    |                    |                           |     |       |
|---------------------------------|---------------|---|--------------------|--------------------|---------------------------|-----|-------|
| PARAMETER                       | SYMBOL        | TEST CONDITIONS   | 1N3879.<br>1N3883. | 1N3889.<br>1N3893. | 6FL..<br>12FL..<br>16FL.. |     | UNITS |
|                                 |               |   |                    |                    | S02                       | S05 |       |
| 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 (1)            | 300 (1)            | 200                       | 500 |       |
| 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 $V_R = 30\text{ V}$ ,<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**

(1) JEDEC registered values

| THERMAL AND MECHANICAL SPECIFICATIONS        |            |  |                             |                              |        |                           |
|--|------------|--|-----------------------------|------------------------------|--------|---------------------------|
| PARAMETER                                    | SYMBOL     | TEST CONDITIONS                            | 1N3879.<br>1N3883.<br>6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | UNITS                     |
| Maximum junction operating temperature range | $T_J$      |  | - 65 to 150                 |                              |        | $^\circ\text{C}$          |
| Maximum storage temperature range            | $T_{Stg}$  |  | - 65 to 175                 |                              |        |                           |
| Maximum thermal resistance, junction to case | $R_{thJC}$ | DC operation                               | 2.5                         | 2.0                          | 1.6    | $^\circ\text{C}/\text{W}$ |
| 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)             |                              |        |                           |

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



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| $\Delta R_{thJC}$ CONDUCTION |                             |                              |        |                             |                              |        |                     |       |
|------------------------------|-----------------------------|------------------------------|--------|-----------------------------|------------------------------|--------|---------------------|-------|
| CONDUCTION ANGLE             | 1N3879.<br>1N3883.<br>6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | 1N3879.<br>1N3883.<br>6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | TEST CONDITIONS     | UNITS |
|                              | SINUSOIDAL CONDUCTION       |                              |        | RECTANGULAR CONDUCTION      |                              |        |                     |       |
| 180°                         | 0.58                        | 0.46                         | 0.37   | 0.33                        | 0.26                         | 0.21   | $T_J = 150^\circ C$ | K/W   |
| 120°                         | 0.60                        | 0.48                         | 0.39   | 0.58                        | 0.46                         | 0.37   |                     |       |
| 60°                          | 1.28                        | 1.02                         | 0.82   | 1.28                        | 1.02                         | 0.82   |                     |       |
| 30°                          | 2.20                        | 1.76                         | 1.41   | 2.20                        | 1.76                         | 1.41   |                     |       |

**Note**

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

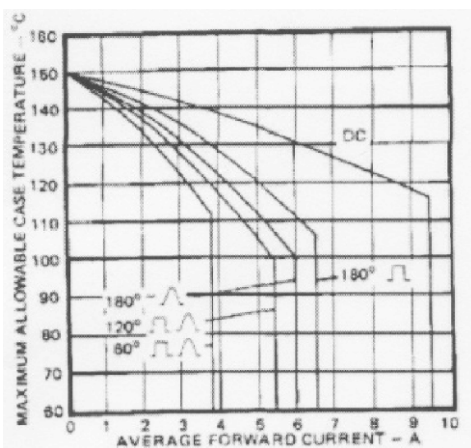


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

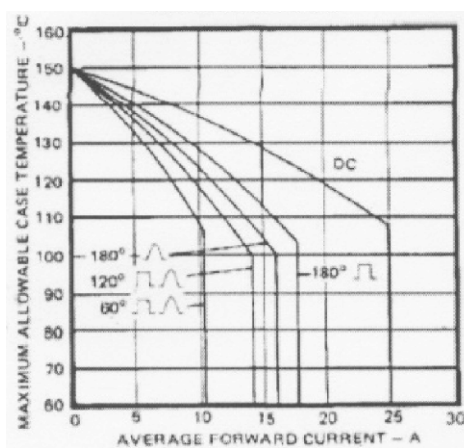


Fig. 3 - Average Forward Current vs. Maximum Allowable Case Temperature, 16FL Series

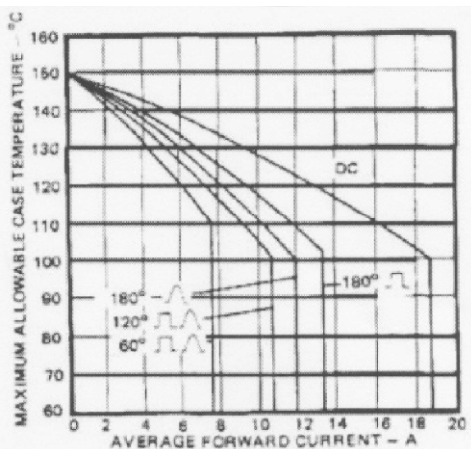


Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

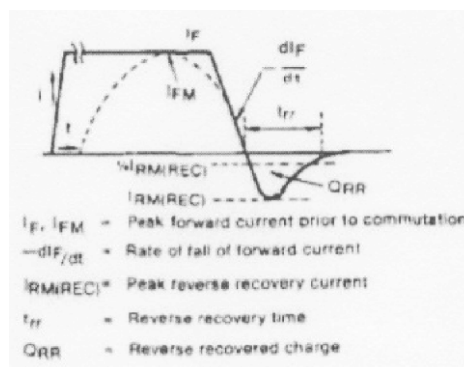


Fig. 4 - Reverse Recovery Time Test Waveform



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

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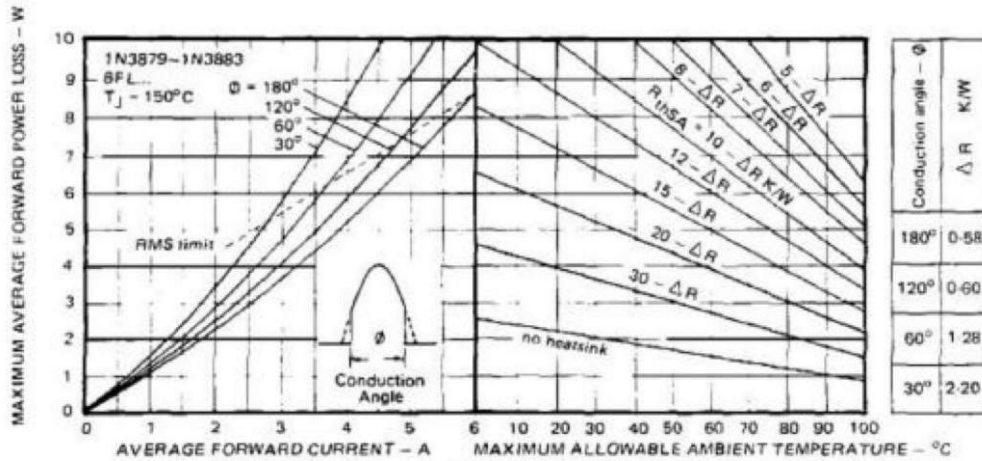


Fig. 5 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

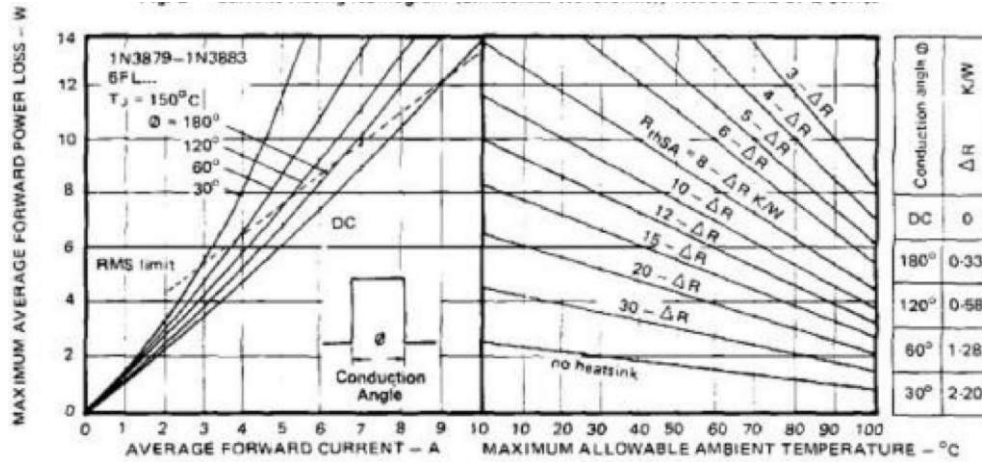


Fig. 6 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

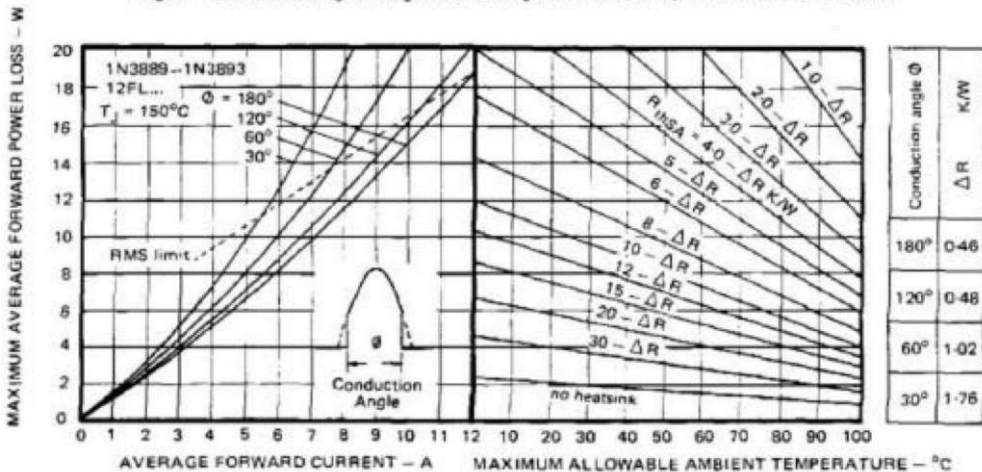


Fig. 7 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Vishay High Power Products Fast Recovery Diodes  
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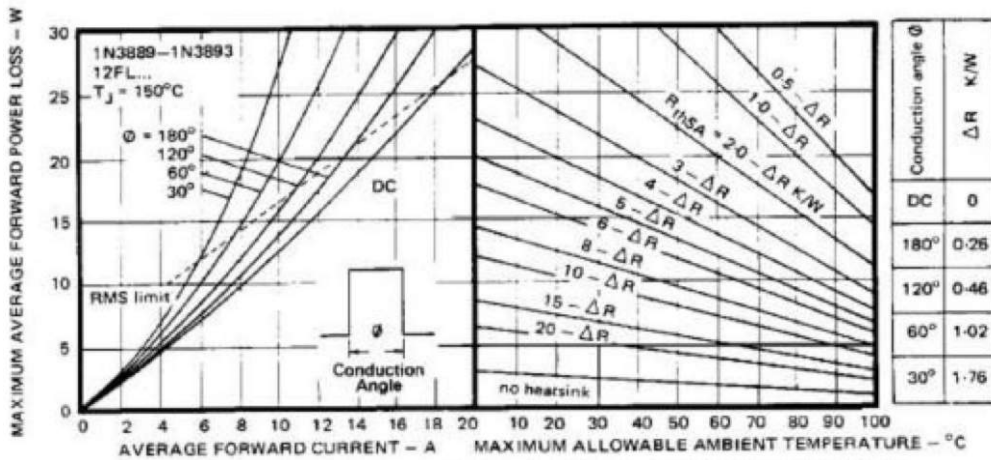


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

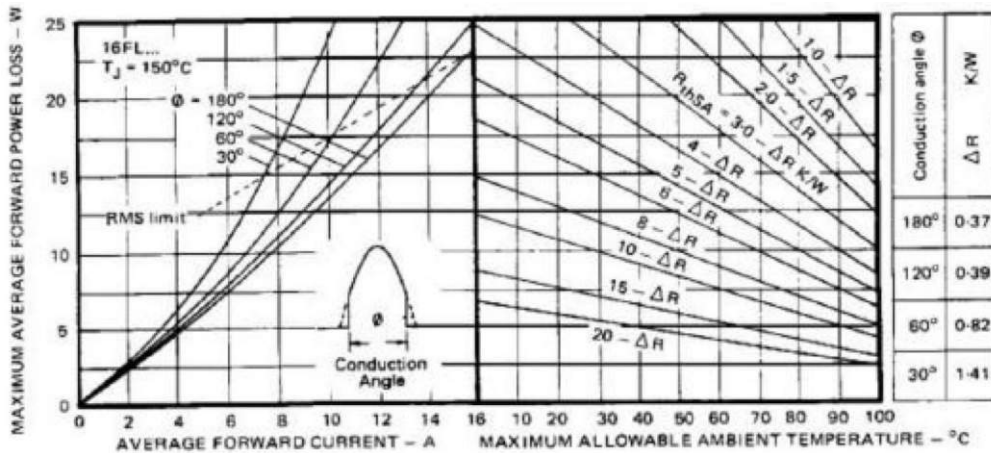


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

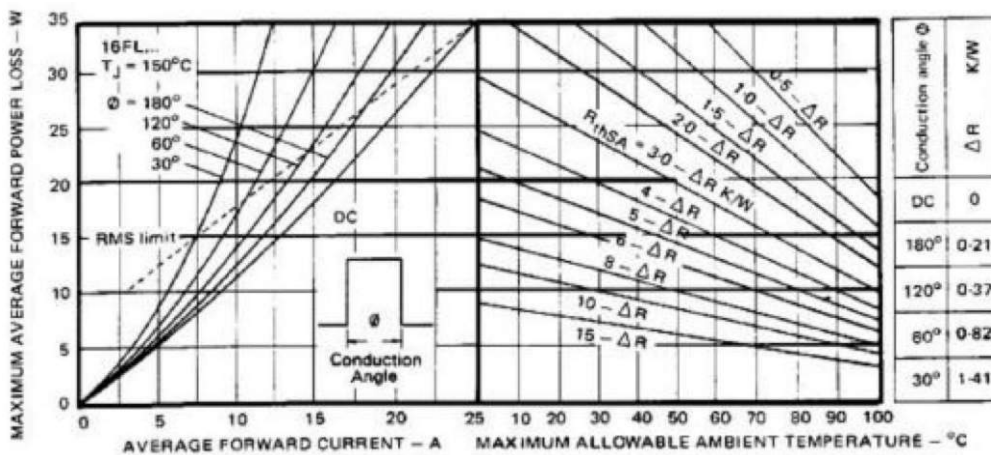


Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Fast Recovery Diodes  
(Stud Version), 6/12/16 A

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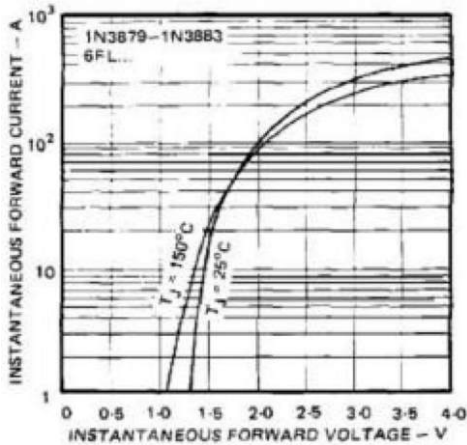


Fig. 11 - Maximum Forward Voltage vs. Forward Current, 1N3879 and 6FL Series

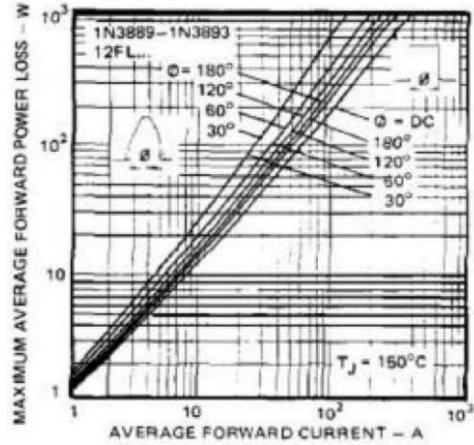


Fig. 14 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 and 12FL Series

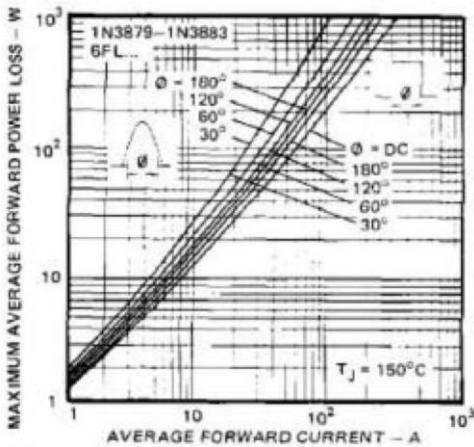


Fig. 12 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 and 6FL Series

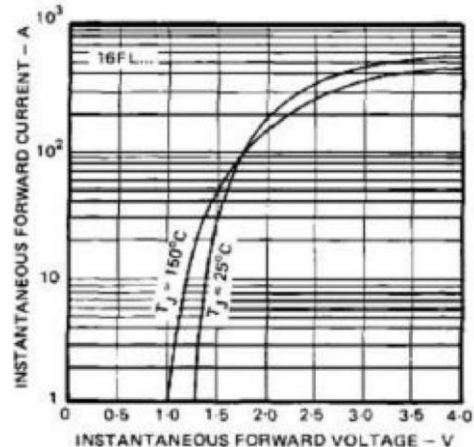


Fig. 15 - Maximum Forward Voltage vs. Forward Current, 16FL Series

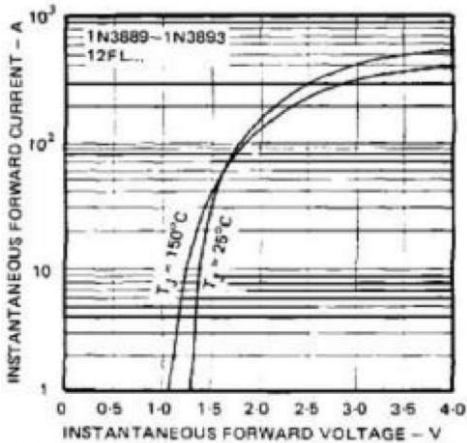


Fig. 13 - Maximum Forward Voltage vs. Forward Current, 1N3889 and 12FL Series

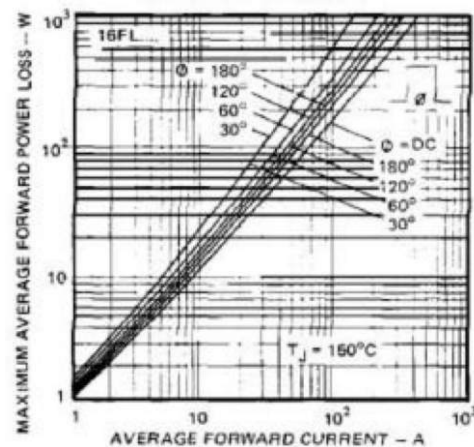


Fig. 16 - Maximum High Level Forward Power Loss vs. Average Forward Current, 16FL Series

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
(Stud Version), 6/12/16 A

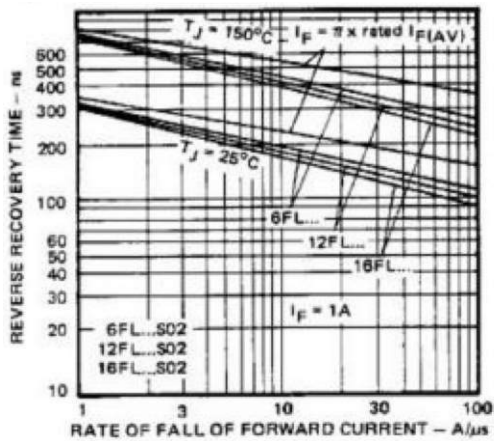


Fig. 17a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S02

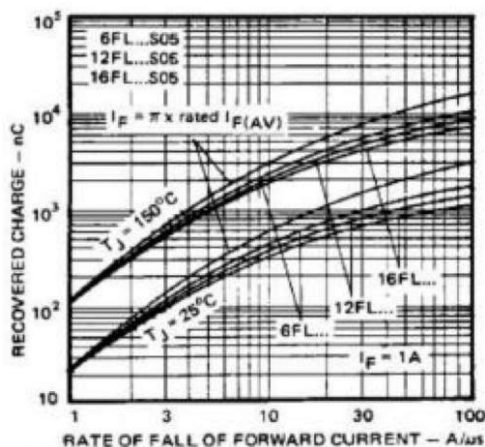


Fig. 18b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S05

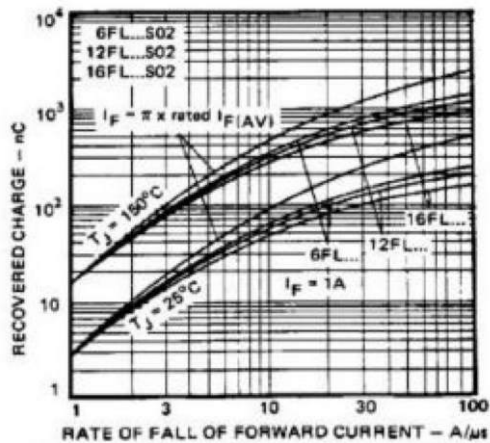


Fig. 17b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S02

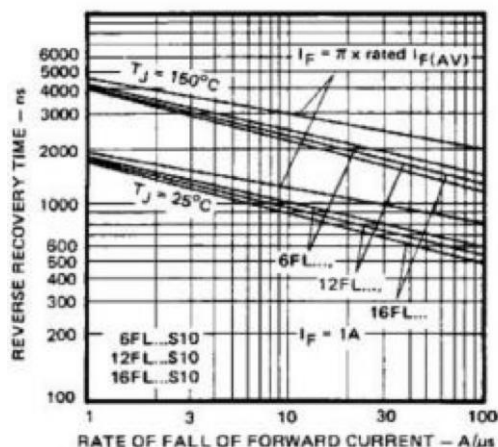


Fig. 19a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S10

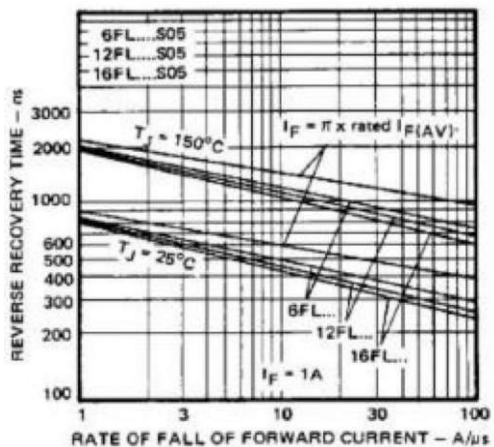


Fig. 18a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S05

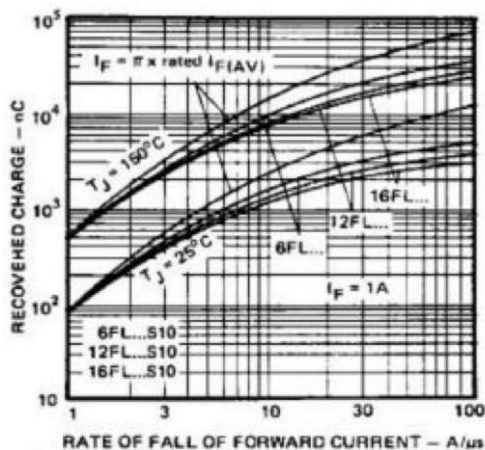


Fig. 19b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S10





# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

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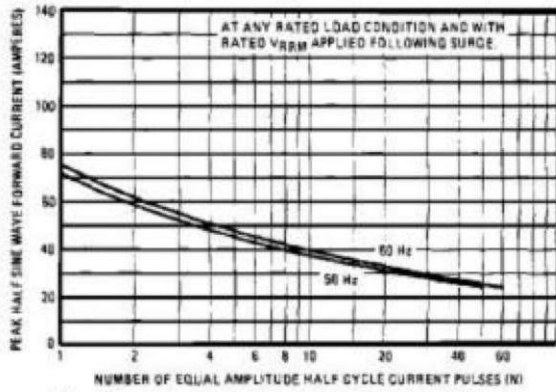


Fig. 20 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

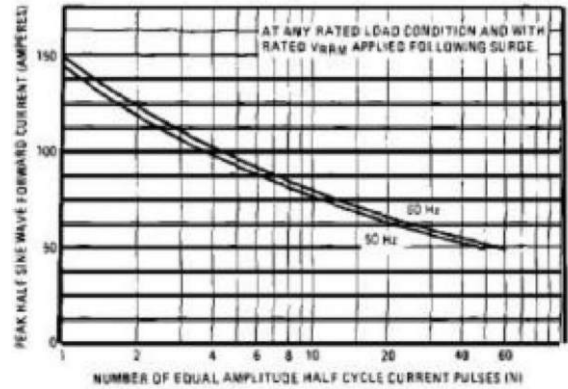


Fig. 22 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 and 12FL Series

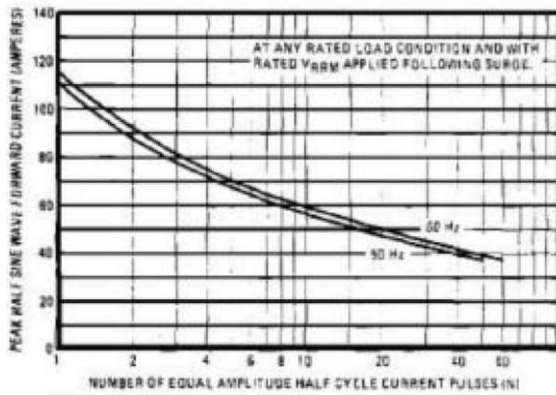


Fig. 21 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 6FL Series

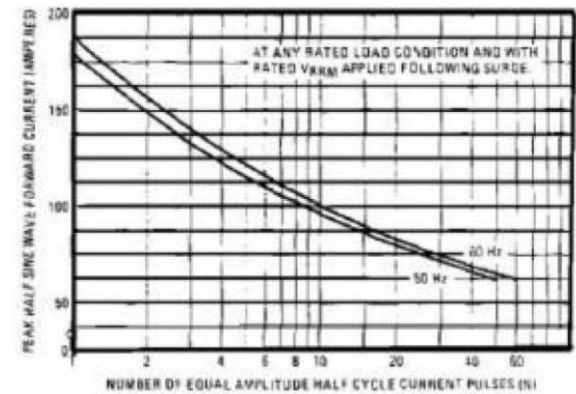


Fig. 23 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 16FL Series

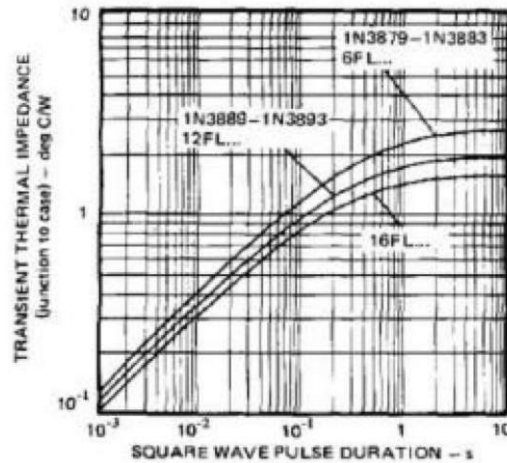


Fig. 24 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
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## ORDERING INFORMATION TABLE

|             |    |   |   |   |    |   |     |
|-------------|----|---|---|---|----|---|-----|
| Device code | 16 | F | L | R | 60 | M | S02 |
|             | ①  | ② | ③ | ④ | ⑤  | ⑥ | ⑦   |

- 1** - Current code  $I_{(AVG)}$  = Exact current rating
- 2** - F = Diode
- 3** - Omit = Standard recovery diode  
L = Only for fast diode
- 4** - Omit = Stud forward polarity  
R = Stud reverse polarity
- 5** - Voltage code x 10 =  $V_{RRM}$  (see Voltage Ratings table)
- 6** - Outlines:  
Omit = Stud base UNF thread  
M = Stud base metric thread
- 7** -  $t_{rr}$  code only for fast diode (see Recovery Characteristics table)

### LINKS TO RELATED DOCUMENTS

|            |   |
|------------|---|
| Dimensions | <a href="http://www.vishay.com/doc?95311">http://www.vishay.com/doc?95311</a> |
|------------|---|



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