



## 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



### 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 <sub>F(AV)</sub>  | T <sub>C</sub> = 100 °C | 6 <sup>(1)</sup>                   | 12 <sup>(1)</sup>     | 6          | 12     | 16     | A                 |
| I <sub>F(RMS)</sub> |                         | 9.5                                | 19                    | 9.5        | 19     | 25     | A                 |
| I <sub>FSM</sub>    | 50 Hz                   | 72                                 | 145                   | 110        | 145    | 180    | A                 |
|                     | 60 Hz                   | 75 <sup>(1)</sup>                  | 150 <sup>(1)</sup>    | 115        | 150    | 190    |                   |
| I <sup>2</sup> t    | 50 Hz                   | 26                                 | 103                   | 60         | 103    | 160    | A <sup>2</sup> s  |
|                     | 60 Hz                   | 23                                 | 94                    | 55         | 94     | 150    |                   |
| I <sup>2</sup> √t   |                         | 363                                | 856                   | 1452       | 1452   | 2290   | I <sup>2</sup> √s |
| V <sub>RRM</sub>    | Range                   | 50 to 400 <sup>(1)</sup>           |                       | 50 to 1000 |        |        | V                 |
| t <sub>rr</sub>     |                         | See Recovery Characteristics table |                       |            |        |        | ns                |
| T <sub>J</sub>      | Range                   | - 65 to 150                        |                       |            |        |        | °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 | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = 25^\circ\text{C}$<br>$\mu\text{A}$ | $I_{RRM}$ MAXIMUM AT $T_J = 100^\circ\text{C}$<br>mA | $I_{RRM}$ MAXIMUM AT $T_J = 150^\circ\text{C}$<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..<br>12FL..<br>16FL.. | 5            | 50                                                             | 75                                                   | 50                                                             | -                                                    | 6.0                                                  |
|                           | 10           | 100                                                            | 150                                                  |                                                                |                                                      |                                                      |
|                           | 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

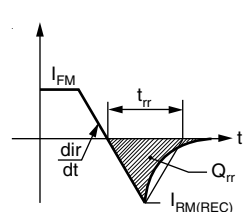


# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

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

## 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 <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 (1)            | 300 (1)            | 200                       | 500 |       |
| Maximum peak recovery current   | I <sub>RM(REC)</sub> | I <sub>FM</sub> = π x rated I <sub>F(AV)</sub>                                                        | 4 (1)              | 5 (1)              | -                         |     | -     |
| 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

<sup>(1)</sup> 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 <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                          | 1.6    | °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-203AA (DO-4)             |                              |        |                     |

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

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



| $\Delta R_{thJC}$ 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 <sub>J</sub> = 150 °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

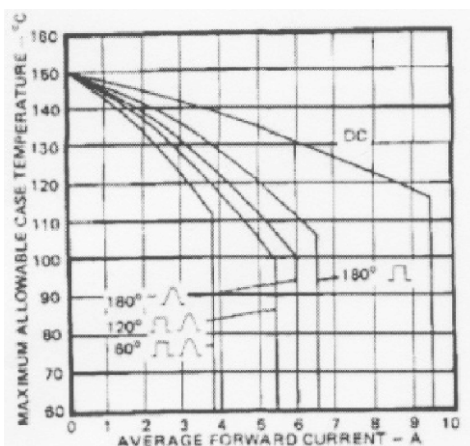


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

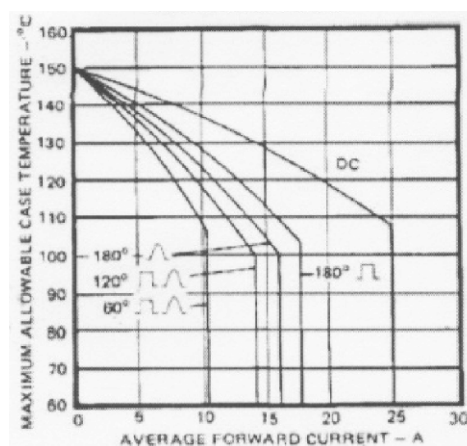


Fig. 3 - Average Forward Current vs. Maximum Allowable Case Temperature, 16FL Series

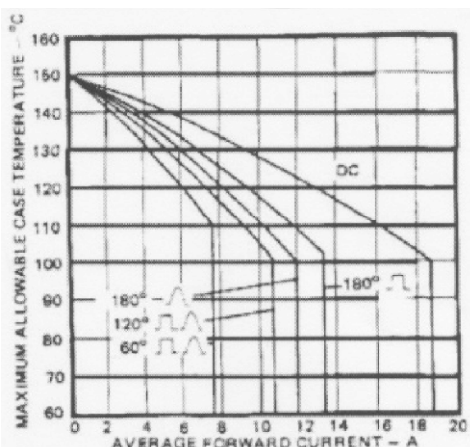


Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

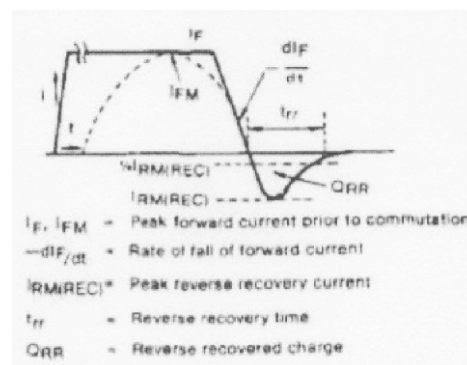


Fig. 4 - Reverse Recovery Time Test Waveform



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

Fast Recovery Diodes      Vishay High Power Products  
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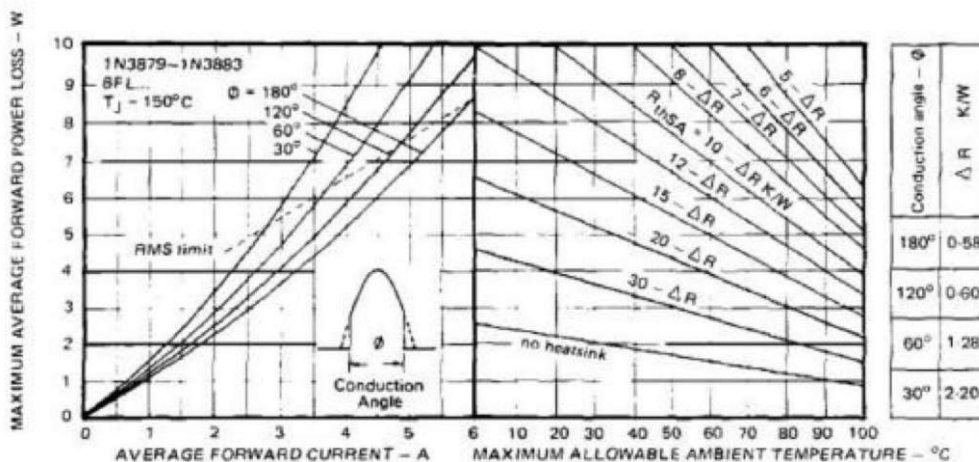


Fig. 5 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

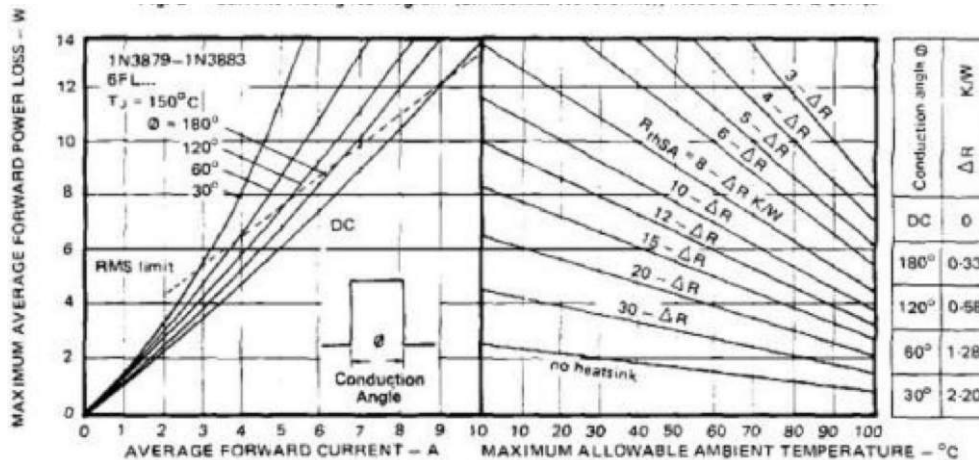


Fig. 6 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

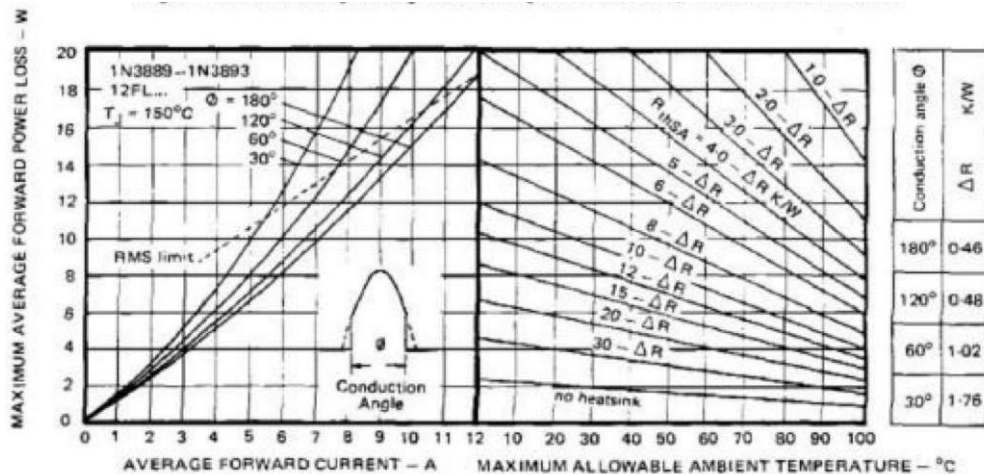


Fig. 7 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

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

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

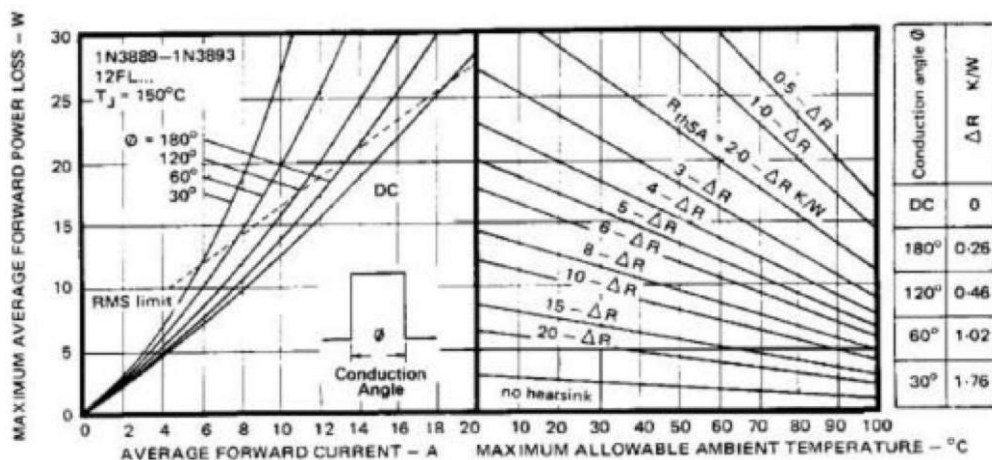


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

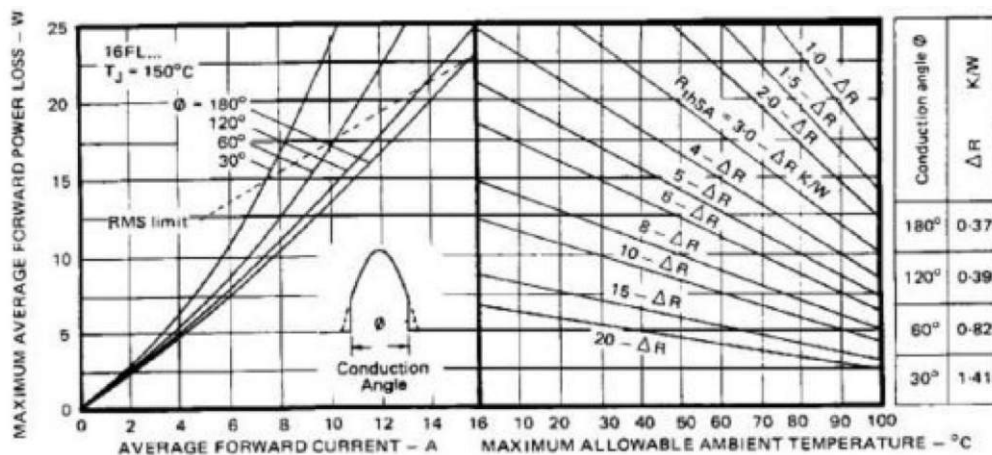


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

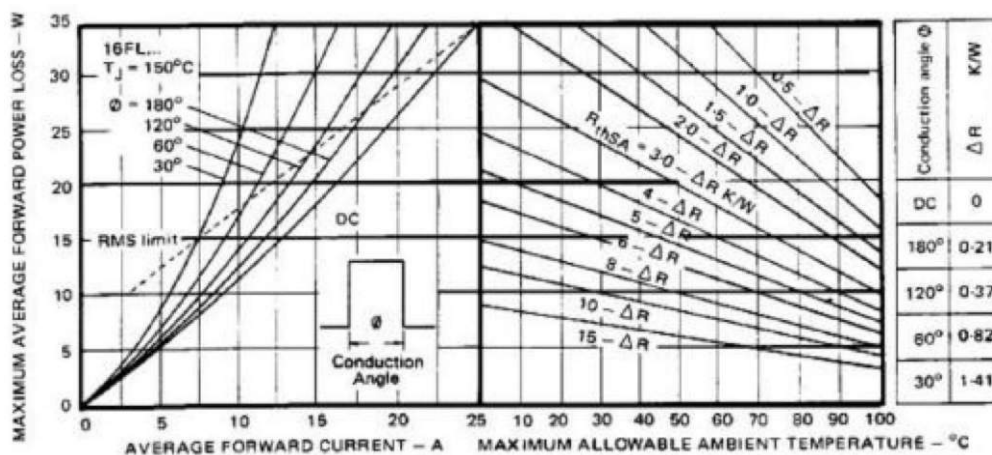


Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series



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

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

Vishay High Power Products

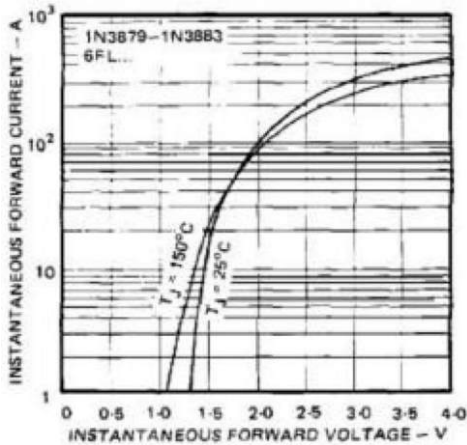


Fig. 11 - Maximum Forward Voltage vs. Forward Current, 1N3879 and 6FL Series

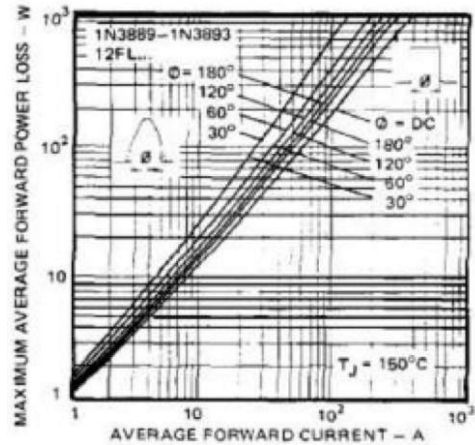


Fig. 14 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 and 12FL Series

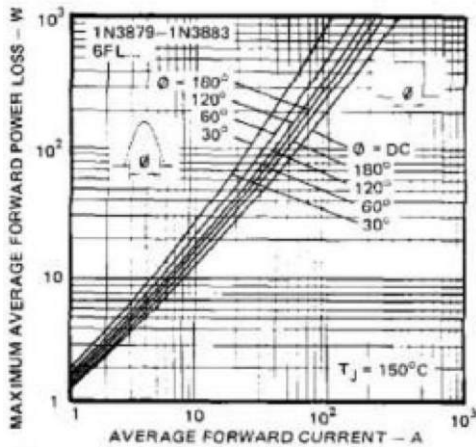


Fig. 12 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 and 6FL Series

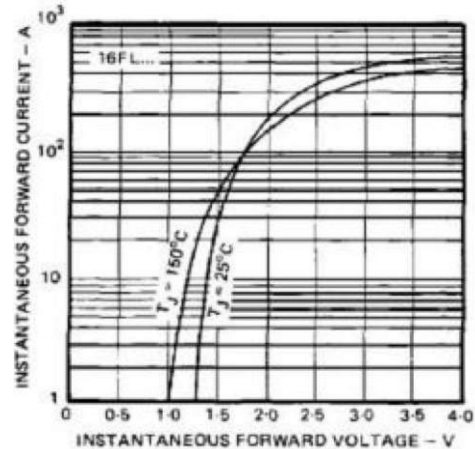


Fig. 15 - Maximum Forward Voltage vs. Forward Current, 16FL Series

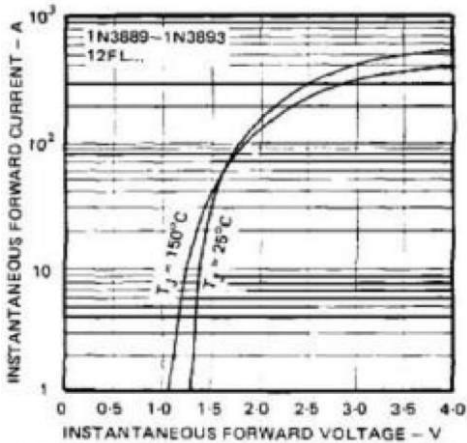


Fig. 13 - Maximum Forward Voltage vs. Forward Current, 1N3889 and 12FL Series

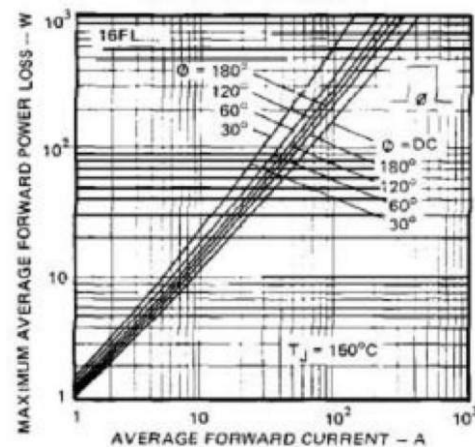


Fig. 16 - Maximum High Level Forward Power Loss vs. Average Forward Current, 16FL Series

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

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

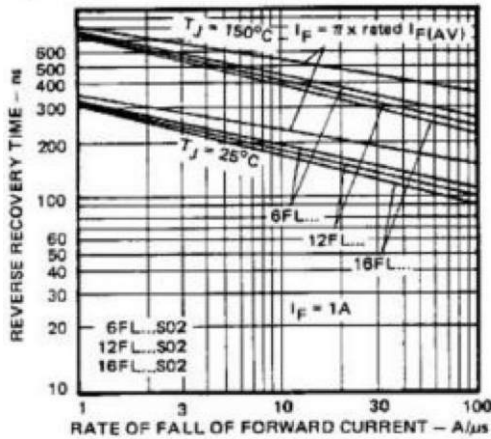


Fig. 17a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S02

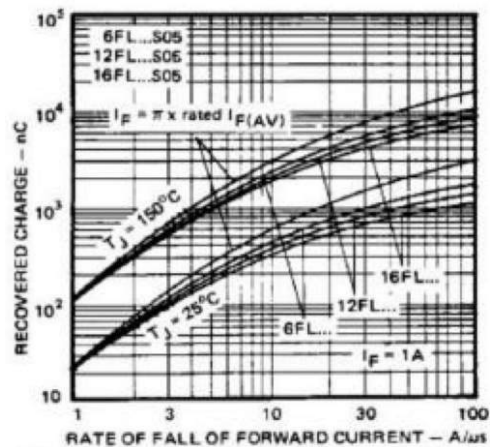


Fig. 18b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S05

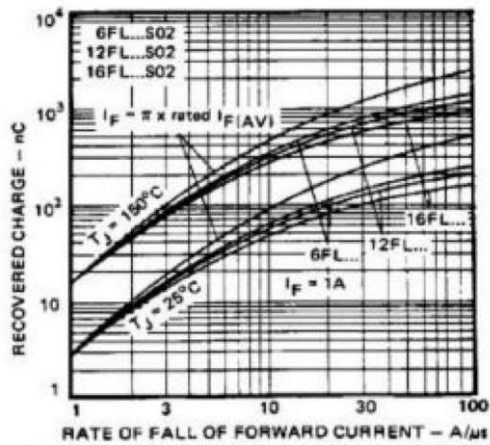


Fig. 17b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S02

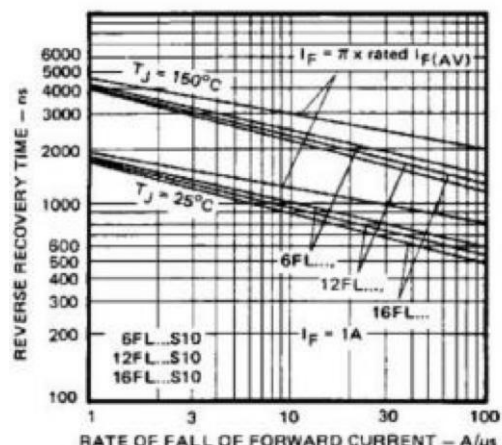


Fig. 19a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S10

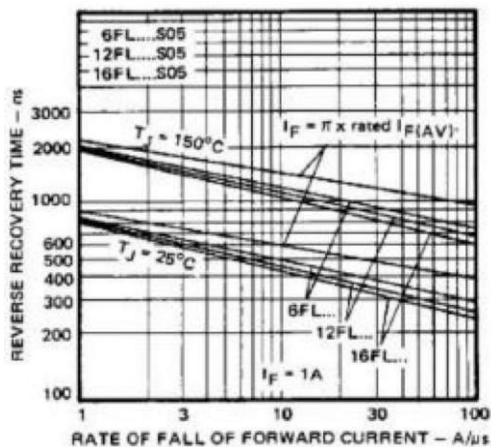


Fig. 18a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S05

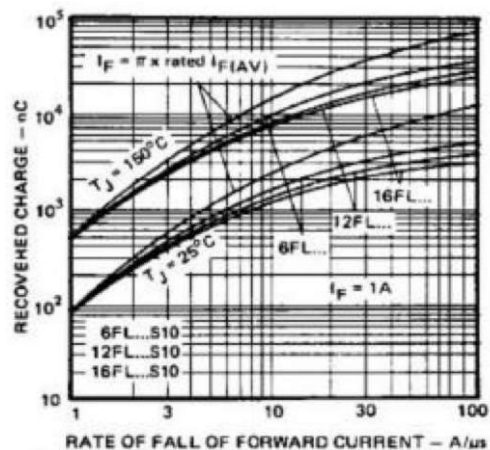


Fig. 19b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S10



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

Fast Recovery Diodes      Vishay High Power Products  
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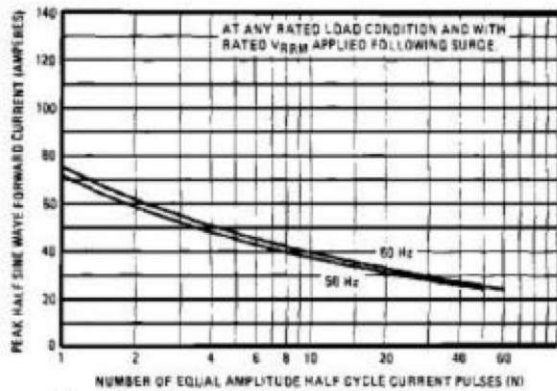


Fig. 20 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

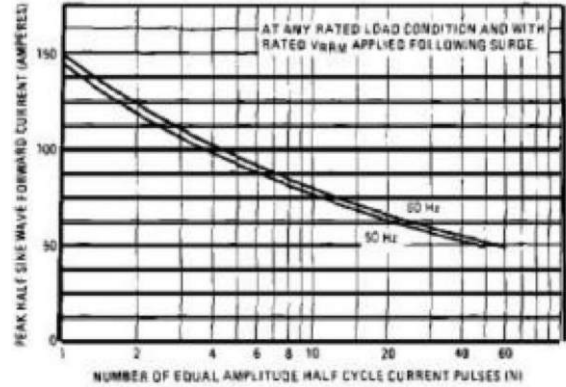


Fig. 22 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 and 12FL Series

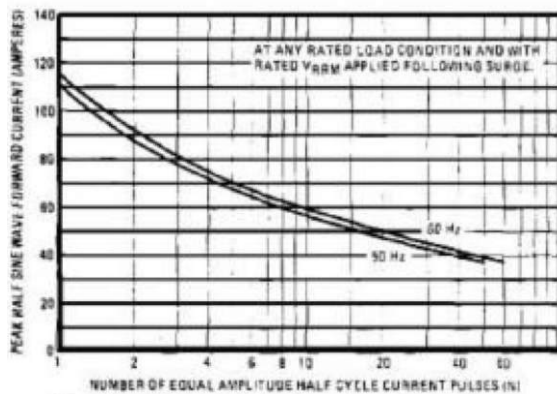


Fig. 21 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 6FL Series

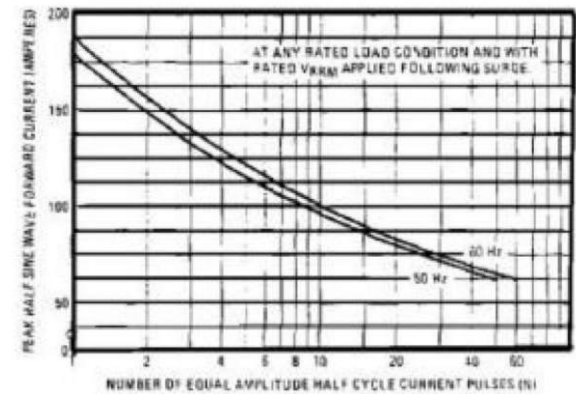


Fig. 23 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 16FL Series

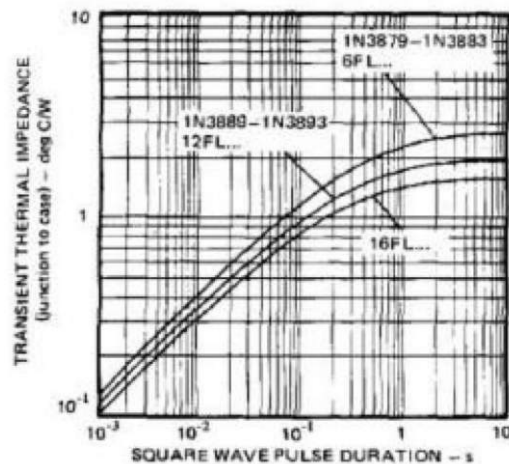


Fig. 24 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

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

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



## ORDERING INFORMATION TABLE

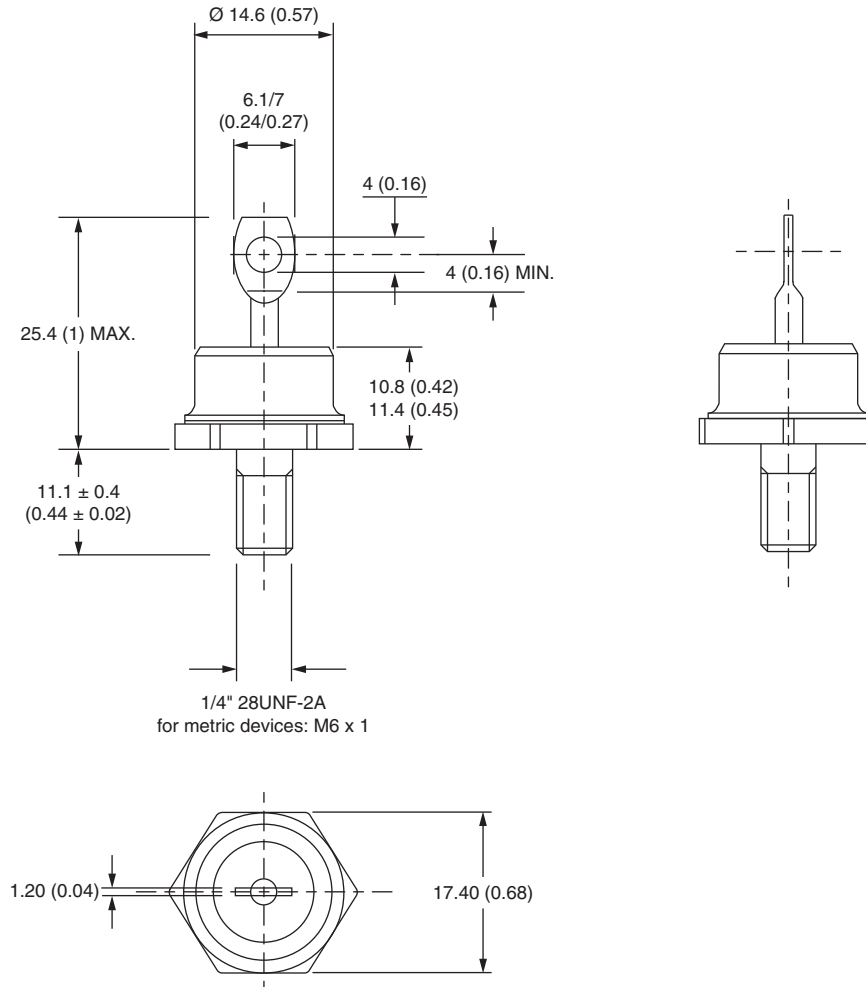
|             |    |   |   |   |    |   |     |
|-------------|----|---|---|---|----|---|-----|
| Device code | 16 | F | L | R | 60 | M | S02 |
|             | ①  | ② | ③ | ④ | ⑤  | ⑥ | ⑦   |

- 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  $\times 10 = V_{RRM}$  (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> |

## DO-203AB (DO-5) for 40HFL, 70HFL and 85HFL

### DIMENSIONS FOR 40HFL/70HFL in millimeters (inches)



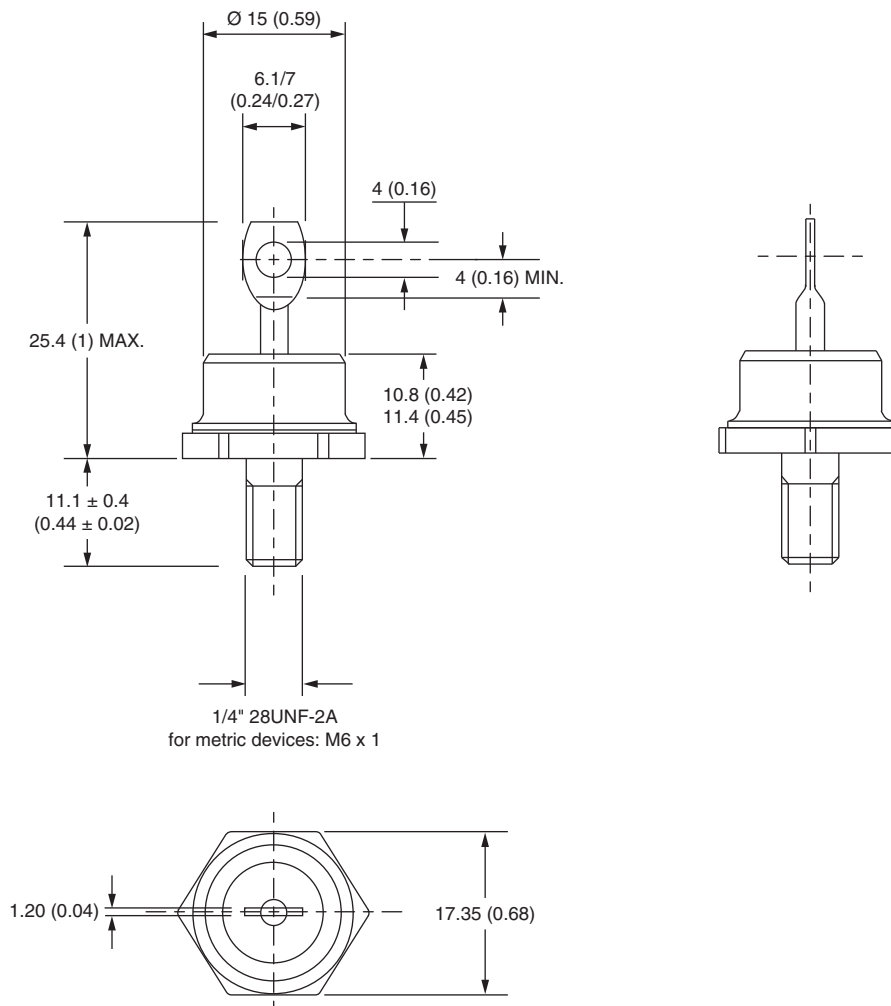
# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for  
40HFL, 70HFL and 85HFL



## DIMENSIONS FOR 85HFL in millimeters (inches)





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