



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 1N3883. | 1N3889. TO 1N3893. | 6FL.. | 12FL.. | 16FL.. | UNITS |
|---------------|-----------------------------------|------------------------------------|-----------------------|------------|--------|--------|------------------|
| $I_{F(AV)}$ | $T_C = 100\text{ }^\circ\text{C}$ | 6 ⁽¹⁾ | 12 ⁽¹⁾ | 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 ⁽¹⁾ | 150 ⁽¹⁾ | 115 | 150 | 190 | |
| I^2t | 50 Hz | 26 | 103 | 60 | 103 | 160 | A ² 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 ⁽¹⁾ | | 50 to 1000 | | | V |
| t_{rr} | | See Recovery Characteristics table | | | | | ns |
| T_J | Range | - 65 to 150 | | | | | $^\circ\text{C}$ |

Note

⁽¹⁾ JEDEC registered values

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



Vishay High Power Products Fast Recovery Diodes
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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. | - | 50 | 75 | 15 ⁽¹⁾ | 1.0 ⁽¹⁾ | 3.0 ⁽¹⁾ |
| 1N3880. | | 100 | 150 | | | |
| 1N3881. | | 200 | 250 | | | |
| 1N3882. | | 300 | 350 | | | |
| 1N3883. | | 400 | 450 | | | |
| 1N3889. | - | 50 | 75 | 25 ⁽¹⁾ | 3.0 ⁽¹⁾ | 5.0 ⁽¹⁾ |
| 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. 1N3883. | 6FL.. | 1N3889. 1N3893. 12FL.. | 16FL.. | UNITS |
| Maximum average forward current at case temperature | I _{F(AV)} | 180° conduction, half sine wave DC | | | 6 ⁽¹⁾ | 6 | 12 ⁽¹⁾ | 16 | A |
| | | | | | 100 | 100 | 100 | 100 | °C |
| Maximum RMS current | I _{F(RMS)} | | | | 9.5 | 9.5 | 19 | 25 | A |
| Maximum peak, one-cycle non-repetitive forward current | I _{FSM} | t = 10 ms | No voltage reappplied | Sinusoidal half wave, initial T _J = 150 °C | 85 | 130 | 170 | 215 | |
| | | t = 8.3 ms | | | 90 | 135 | 180 | 225 | |
| | | t = 10 ms | 100 % V _{RRM} reappplied | | 72 | 110 | 145 | 180 | |
| | | t = 8.3 ms | | | 75 ⁽¹⁾ | 115 | 150 ⁽¹⁾ | 190 | |
| Maximum I ² t for fusing | I ² t | t = 10 ms | No voltage reappplied | | 36 | 86 | 145 | 230 | A ² s |
| | | t = 8.3 ms | | | 33 | 78 | 130 | 210 | |
| | | t = 10 ms | 100 % V _{RRM} reappplied | | 26 | 60 | 103 | 160 | |
| | | t = 8.3 ms | | | 23 | 55 | 94 | 150 | |
| Maximum I ² √t for fusing | I ² √t | t = 0.1 to 10 ms, no voltage reappplied | | | 363 | 856 | 1452 | 2290 | 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 | 1.4 ⁽¹⁾ | 1.4 | V |
| | | T _C = 100 °C; I _{FM} = π x rated I _{F(AV)} | | | 1.5 ⁽¹⁾ | 1.5 | 1.5 ⁽¹⁾ | 1.5 | V |

Note

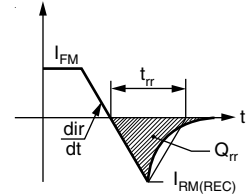
(1) JEDEC registered values



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. 1N3883. | 1N3889. 1N3893. | 6FL.. 12FL.. 16FL.. | | UNITS |
| | | | | | S02 | S05 | |
| Maximum reverse recovery time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}$, $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 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) | 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 $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 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. 1N3883. 6FL.. | 1N3889. 1N3893. 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 % (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) | | | |

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



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| ΔR_{thJC} CONDUCTION | | | | | | | | |
|------------------------------|-----------------------------|------------------------------|--------|-----------------------------|------------------------------|--------|---------------------|-------|
| CONDUCTION ANGLE | 1N3879. 1N3883. 6FL.. | 1N3889. 1N3893. 12FL.. | 16FL.. | 1N3879. 1N3883. 6FL.. | 1N3889. 1N3893. 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

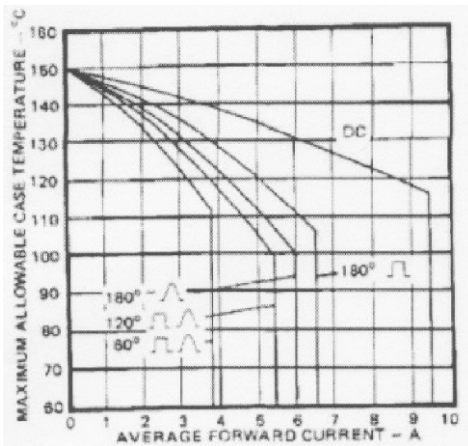


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

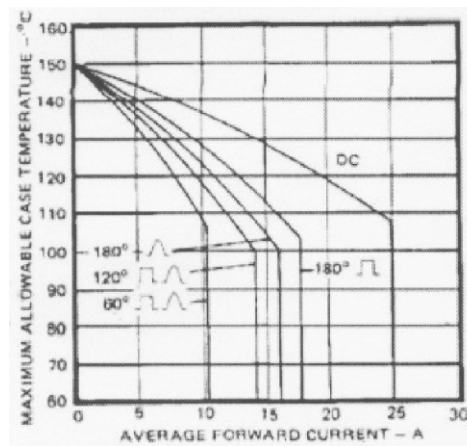


Fig. 3 - Average Forward Current vs. Maximum Allowable Case Temperature, 16FL Series

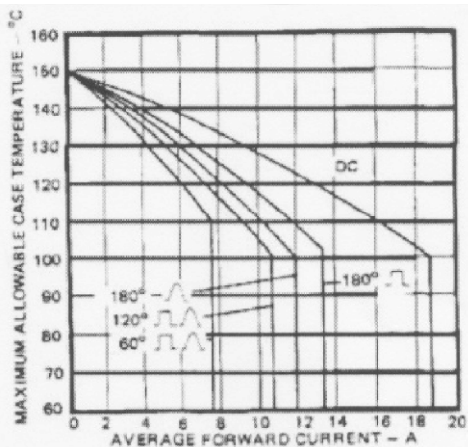


Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

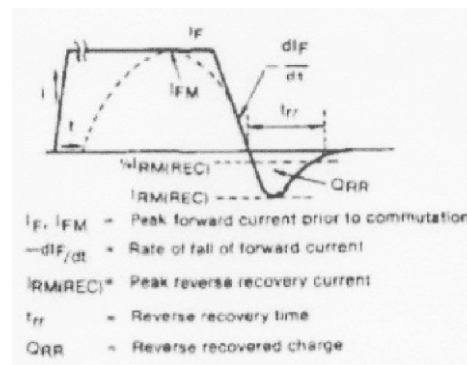


Fig. 4 - Reverse Recovery Time Test Waveform



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

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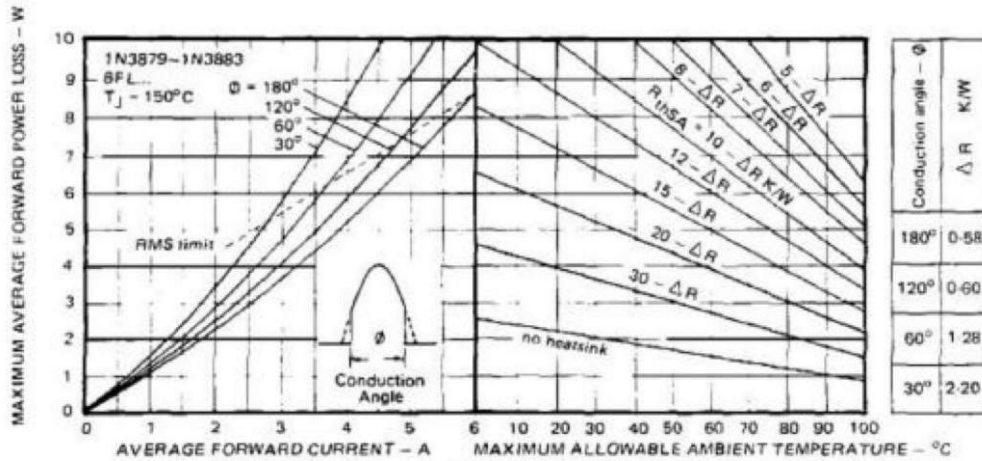


Fig. 5 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

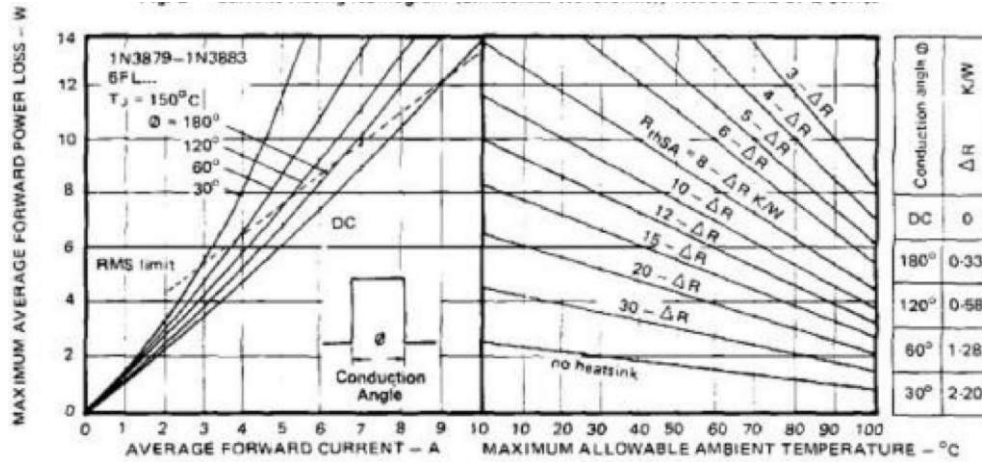


Fig. 6 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

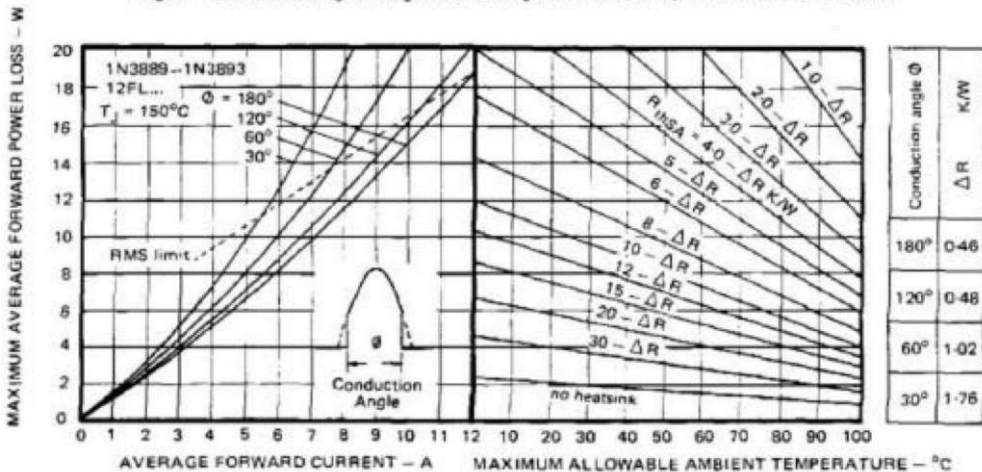


Fig. 7 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

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

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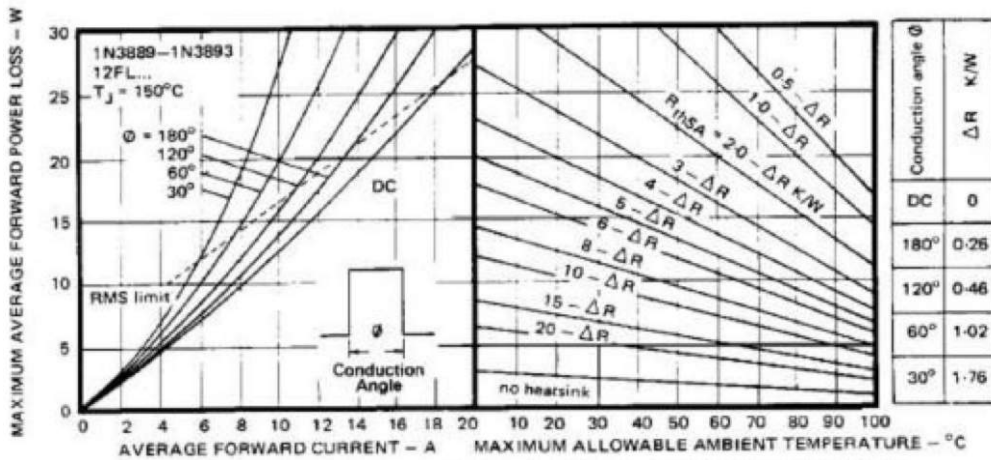


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

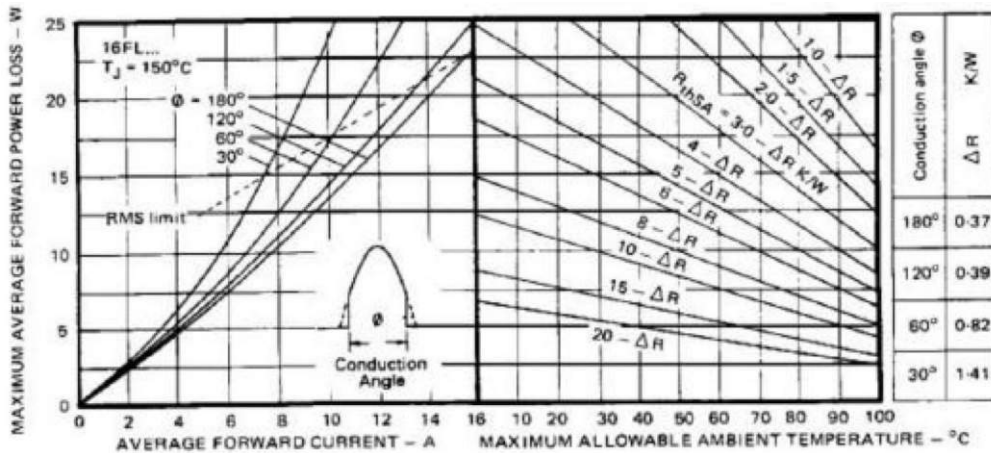


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

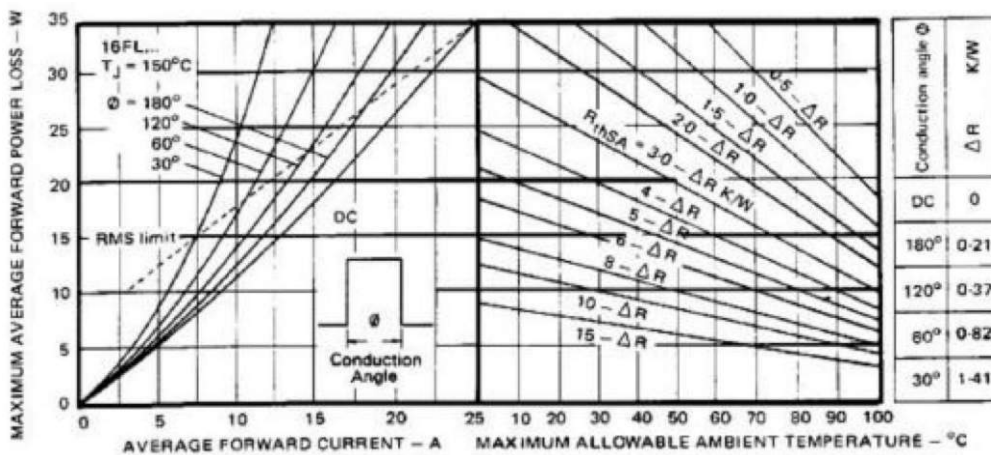


Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series



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

Fast Recovery Diodes
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Vishay High Power Products

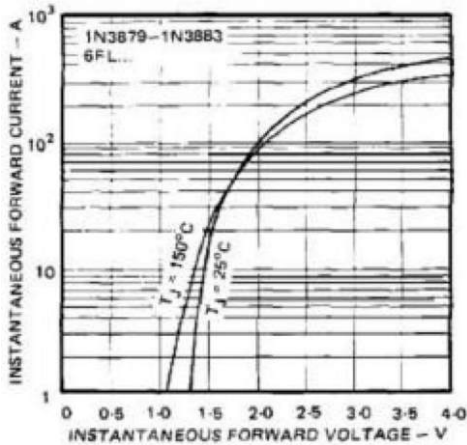


Fig. 11 - Maximum Forward Voltage vs. Forward Current, 1N3879 and 6FL Series

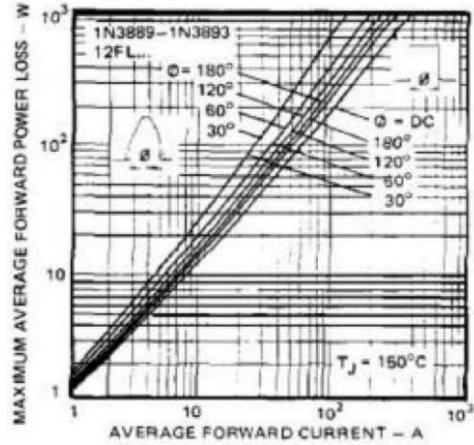


Fig. 14 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 and 12FL Series

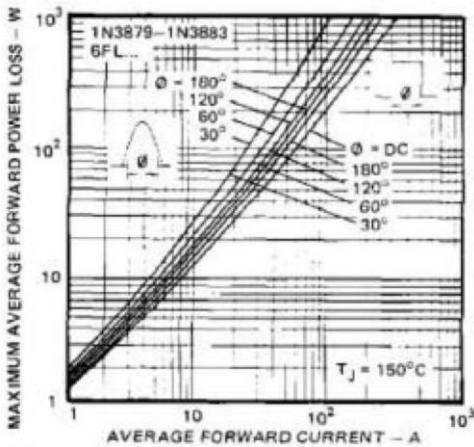


Fig. 12 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 and 6FL Series

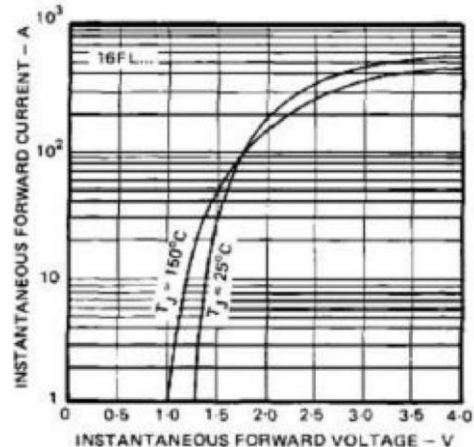


Fig. 15 - Maximum Forward Voltage vs. Forward Current, 16FL Series

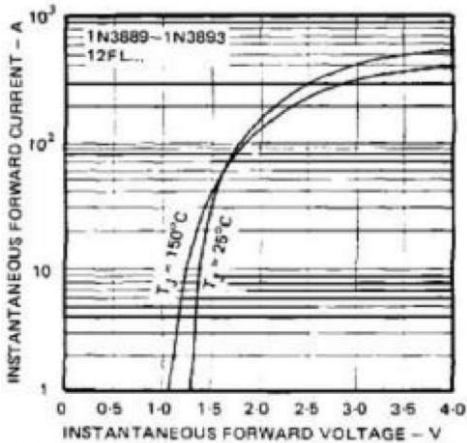


Fig. 13 - Maximum Forward Voltage vs. Forward Current, 1N3889 and 12FL Series

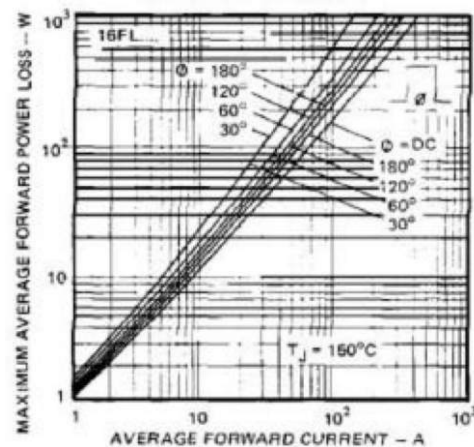


Fig. 16 - Maximum High Level Forward Power Loss vs. Average Forward Current, 16FL Series

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



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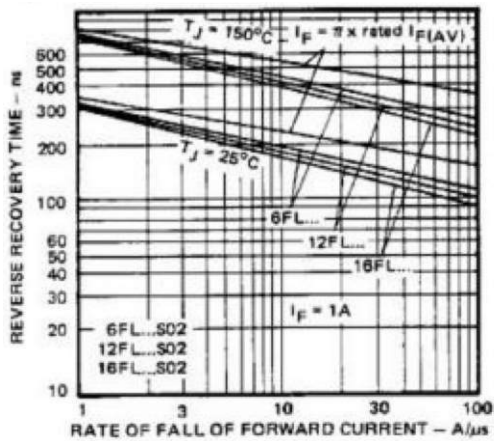


Fig. 17a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S02

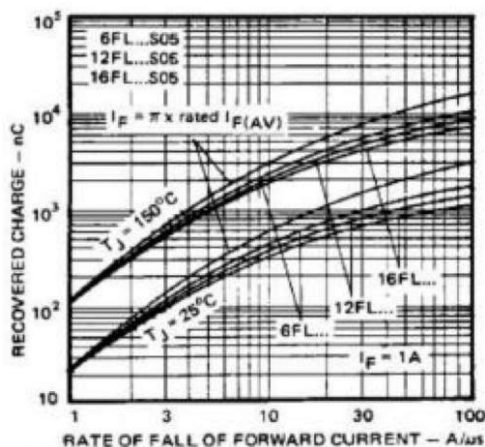


Fig. 18b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S05

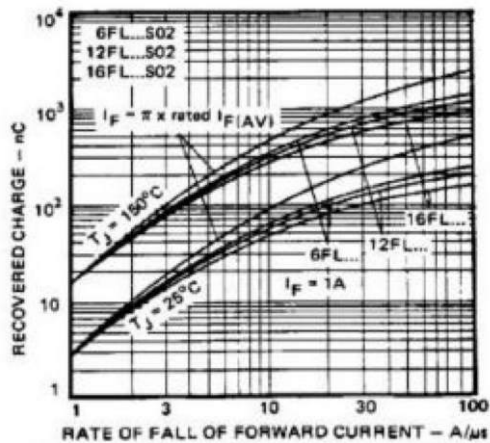


Fig. 17b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S02

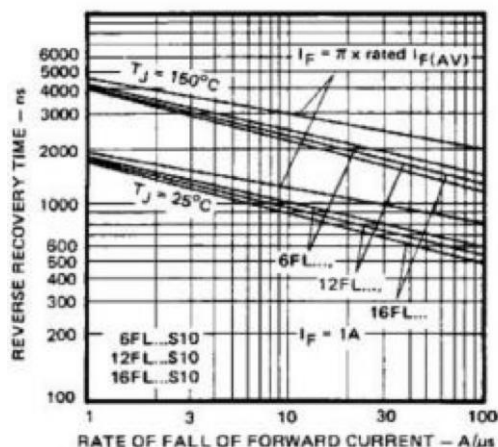


Fig. 19a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S10

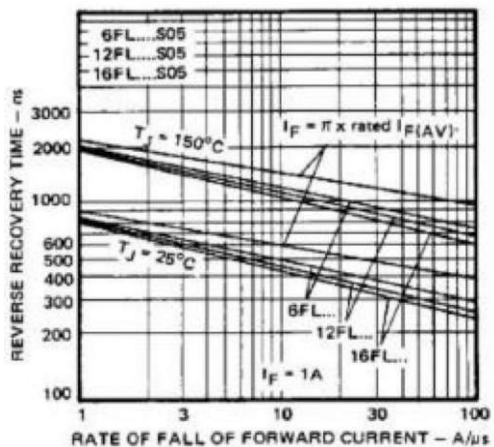


Fig. 18a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S05

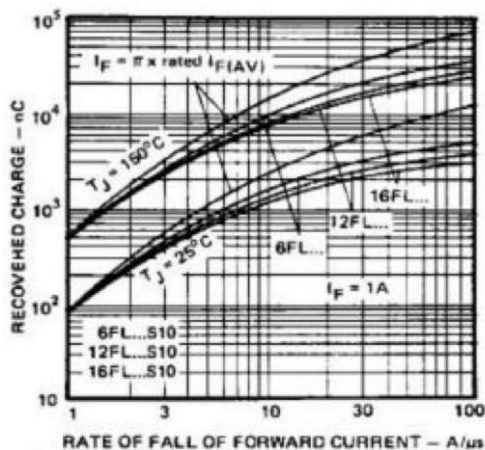


Fig. 19b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S10



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

Fast Recovery Diodes Vishay High Power Products
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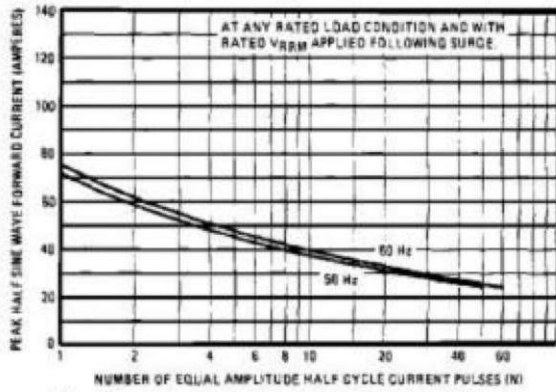


Fig. 20 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

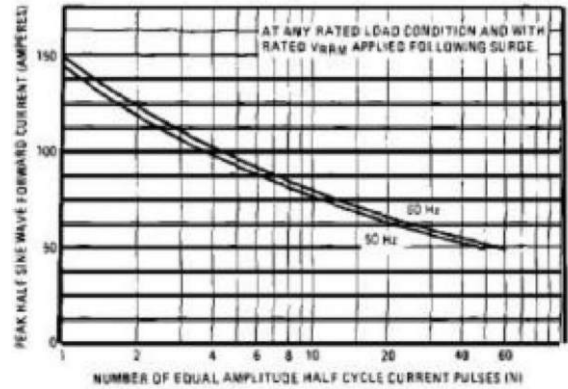


Fig. 22 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 and 12FL Series

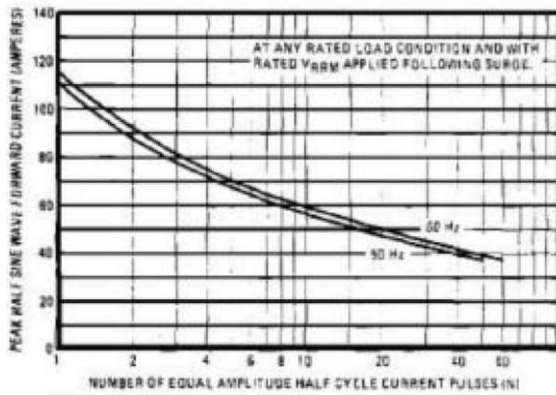


Fig. 21 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 6FL Series

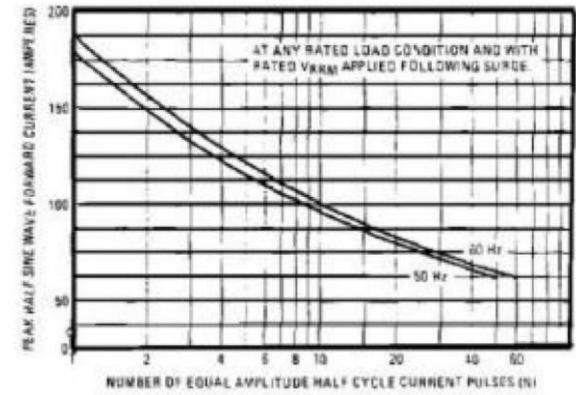


Fig. 23 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 16FL Series

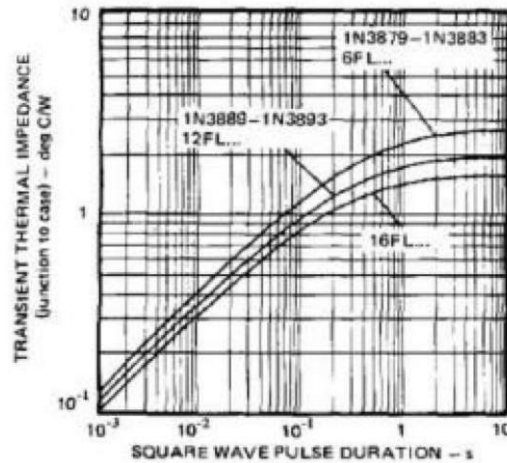


Fig. 24 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

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



Vishay High Power Products Fast Recovery Diodes
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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 | http://www.vishay.com/doc?95311 |
|------------|---|



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