



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

**FAST RECOVERY DIODES**

**Stud Version**

## Major Ratings and Characteristics

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

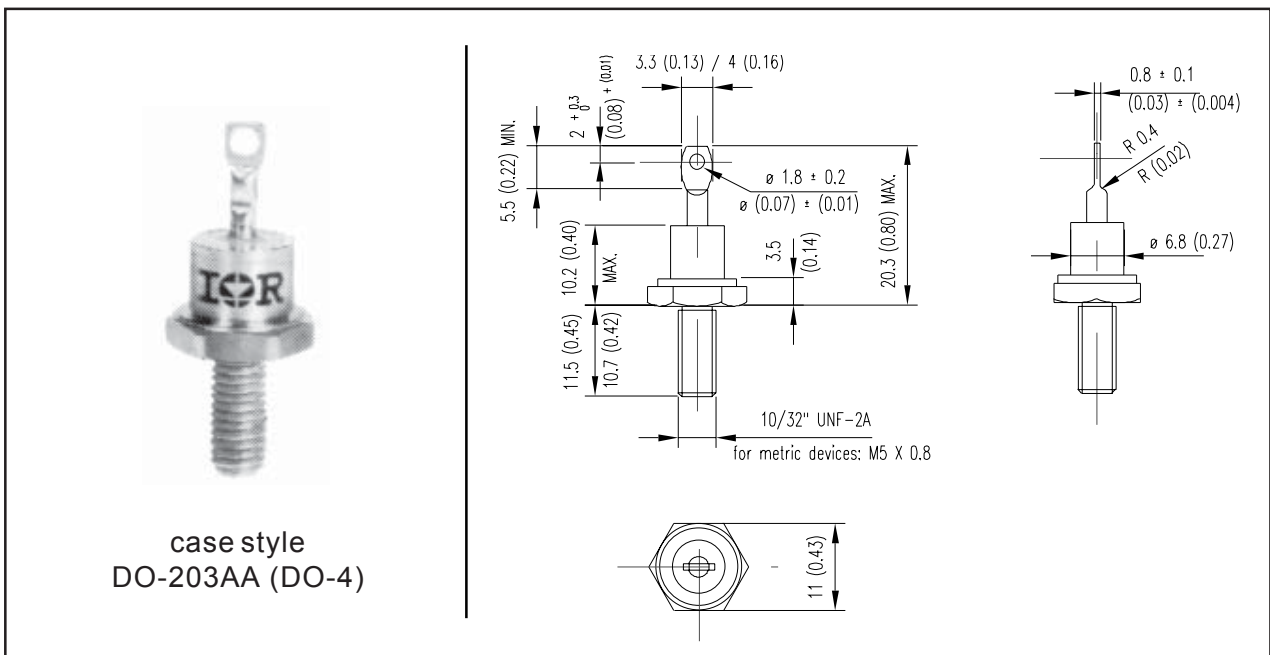
## Description

This range of fast recovery diodes is designed for applications in DC power supplies, inverters, converters, choppers, ultrasonic systems and for use as a free wheeling diode.

## Features

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC types
- Stud cathode and stud anode versions
- Fully characterised reverse recovery conditions

\* JEDEC registered values.



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

## ELECTRICAL SPECIFICATIONS

### Voltage Ratings

| Type number               | Voltage Code | $V_{RRM}$ max. repetitive peak and off-state voltage<br>V | $V_{RSM}$ maximum non-repetitive peak voltage<br>V | $I_{RRM}$ max.<br>$T_J = 25^\circ\text{C}$<br>$\mu\text{A}$ | $I_{RRM}$ max.<br>$T_J = 100^\circ\text{C}$<br>mA | $I_{RRM}$ max.<br>$T_J = 150^\circ\text{C}$<br>mA |
|---------------------------|--------------|---|--|---|---|---|
| 1N3879.                   | -            | 50  | 75   | 15 *  | 1.0 *   | 3.0 *   |
| 1N3880.                   |              | 100   | 150  |   |   |   |
| 1N3881.                   |              | 200   | 250  |   |   |   |
| 1N3882.                   |              | 300   | 350  |   |   |   |
| 1N3883.                   |              | 400   | 450  |   |   |   |
| 1N3889.                   | -            | 50  | 75   | 25 *  | 3.0 *   | 5.0 *   |
| 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   |   |   |   |

### Forward Conduction

| Parameter   | 1N3879.<br>1N3883. | 6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | Units   | Conditions  |
|---|--------------------|-------|------------------------------|--------|---------|---|
| $I_{F(AV)}$ Max. average forward current<br>@ $T_C = 100^\circ\text{C}$ | 6*                 | 6     | 12 *                         | 16     | A       | 180° conduction, half sine wave.<br>DC                                    |
| $I_{F(RMS)}$ Max. RMS current   | 9.5                | 9.5   | 19                           | 25     | A       |   |
| $I_{FSM}$ Max. peak, one-cycle<br>non-repetitive forward current        | 85                 | 130   | 170                          | 215    | A       | t = 10ms No voltage   |
|   | 90                 | 135   | 180                          | 225    |         | t = 8.3ms reappplied  |
|   | 72                 | 110   | 145                          | 180    |         | t = 10ms 100% $V_{RRM}$   |
|   | 75 *               | 115   | 150 *                        | 190    |         | t = 8.3ms reappplied  |
| $I^2t$ Maximum $I^2t$ for fusing  | 36                 | 86    | 145                          | 230    | $A^2s$  | t = 10ms No voltage   |
|   | 33                 | 78    | 130                          | 210    |         | t = 8.3ms reappplied  |
|   | 26                 | 60    | 103                          | 160    |         | t = 10ms 100% $V_{RRM}$   |
|   | 23                 | 55    | 94                           | 150    |         | t = 8.3ms reappplied  |
| $I^2vt$ Maximum $I^2vt$ for fusing                                      | 363                | 856   | 1452                         | 2290   | $A^2vs$ | t = 0.1 to 10ms, no voltage reappplied                                    |
| $V_{FM}$ Max. forward voltage   | 1.4 *              | 1.4   | 1.4 *                        | 1.4    | V       | $T_J = 25^\circ\text{C}$ , $I_F = \text{rated } I_{F(AV)}$ (D.C.)         |
|   | 1.5 *              | 1.5   | 1.5 *                        | 1.5    |         | $T_C = 100^\circ\text{C}$ , $I_{FM} = \pi \times \text{rated } I_{F(AV)}$ |

\* JEDEC registered value

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

### Recovery Characteristics

| Parameter                                | 1N3879.<br>1N3883. | 1N3889.<br>1N3893. | 6FL..<br>12FL..<br>16FL..<br>S02   S05 | Units | Conditions   |
|--|--------------------|--------------------|--|-------|--|
| $t_{rr}$ Max. reverse recovery time      | 150<br>300 *       | 150<br>300 *       | ...<br>200   500                       | ns    | $T_J = 25^\circ\text{C}, I_F = 1\text{A to } V_R = 30\text{V}, dI_F/dt = 100\text{A}/\mu\text{s}$<br>$T_J = 25^\circ\text{C}, dI_F/dt = 25\text{A}/\mu\text{s}, I_{FM} = p \times \text{rated } I_{F(AV)}$ |
| $I_{RM(REC)}$ Max. peak recovery current | 4 *                | 5 *                | ...                                    |       | ---  |
| $Q_{RR}$ Max. reverse recovered charge   | 400<br>400         | 350<br>400         | ...<br>...                             | nC    | $T_J = 25^\circ\text{C}, I_F = 1\text{A to } V_R = 30\text{V}, dI_F/dt = 100\text{A}/\mu\text{s}$<br>$T_J = 25^\circ\text{C}, dI_F/dt = 25\text{A}/\mu\text{s}, I_{FM} = p \times \text{rated } I_{F(AV)}$ |

\* JEDEC registered value

### Thermal and Mechanical Specification

| Parameter  | 1N3879.<br>1N3883.<br>6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | Units  | Conditions                                 |
|--|-----------------------------|------------------------------|--------|--------|--|
| $T_J$ Max. junction operating temperature range      | -65 to 150                  |                              |        | °C     |  |
| $T_{stg}$ Max. storage temperature range             | -65 to 175                  |                              |        |        |  |
| $R_{thJC}$ Max. thermal resistance, junction to case | 2.5                         | 2.0                          | 1.6    | C/W    | DC operation                               |
| $R_{thCS}$ Max. thermal resistance, case to heatsink | 0.5                         |                              |        |        | Mounting surface, smooth, flat and greased |
| T Allowable mounting torque                          | 1.5 <sup>+0-10%</sup>       |                              |        | Nm     | Not lubricated threads                     |
|  | 13                          |                              |        | lbf.in |  |
|  | 1.2 <sup>+0-10%</sup>       |                              |        | Nm     | Lubricated threads                         |
|  | 10                          |                              |        | lbf.in |  |
| wt Approximate weight                                | 7 (0.25)                    |                              |        | g (oz) |  |
| Case style   | DO-203AA(DO-4)              |                              |        | JEDEC  |  |

### $\Delta R_{thJC}$ Conduction

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

| Conduction angle | 1N3879.<br>1N3883.<br>6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | 1N3879.<br>1N3883.<br>6FL.. | 1N3889.<br>1N3893.<br>12FL.. | 16FL.. | Units | Conditions                |
|------------------|-----------------------------|------------------------------|--------|-----------------------------|------------------------------|--------|-------|---------------------------|
|                  | Sinusoidal conduction       |                              |        | Rectangular conduction      |                              |        |       |                           |
| 180°             | 0.58                        | 0.46                         | 0.37   | 0.33                        | 0.26                         | 0.21   | K/W   | $T_J = 150^\circ\text{C}$ |
| 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   |       |                           |

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

## Ordering Information Table

| Device Code |    |   |   |   |    |   |     |
|-------------|----|---|---|---|----|---|-----|
| A           | 16 | F | L | R | 60 | M | S02 |
| ①           | ②  | ③ | ④ | ⑤ | ⑥  | ⑦ | ⑧   |

|          |   |
|----------|---|
| <b>1</b> | - Omit = Standard or Fast Recovery Diode<br>A = Avalanche Diode           |
| <b>2</b> | - Current Code $I_{(AVG)}$ = Exact Current Rating                         |
| <b>3</b> | - F = Diode   |
| <b>4</b> | - Omit = Standard Recovery Diode<br>L = Only for Fast Diode               |
| <b>5</b> | - Omit = Stud Forward Polarity<br>R = Stud Reverse Polarity               |
| <b>6</b> | - Voltage code: Code x 10 = $V_{RRM}$ (see Voltage Ratings table)         |
| <b>7</b> | - Outlines:<br>Omit = Stud Base UNF Thread<br>M = Stud Base Metric Thread |
| <b>8</b> | - $t_{rr}$ code only for Fast Diode (see Recovery Characteristics table)  |

## Outline Table

**Conforms to JEDEC DO-203AA (DO-4)**  
 All dimensions in millimeters

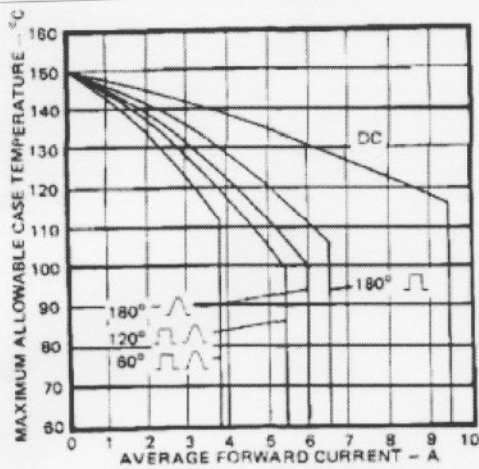


Fig. 1 - Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

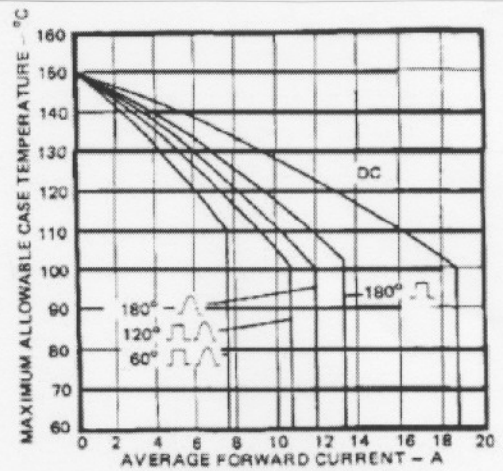


Fig. 2 - Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

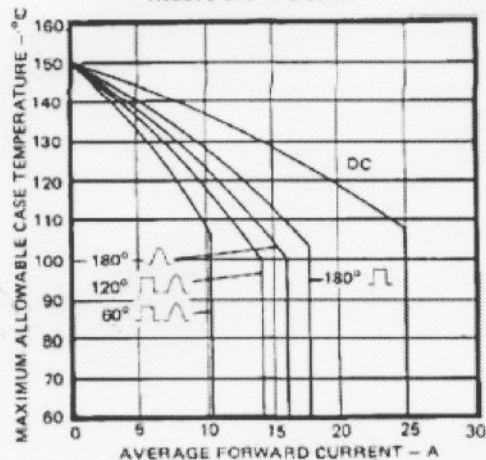
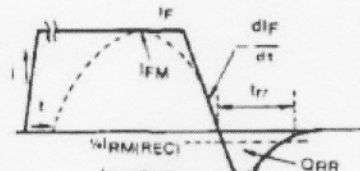
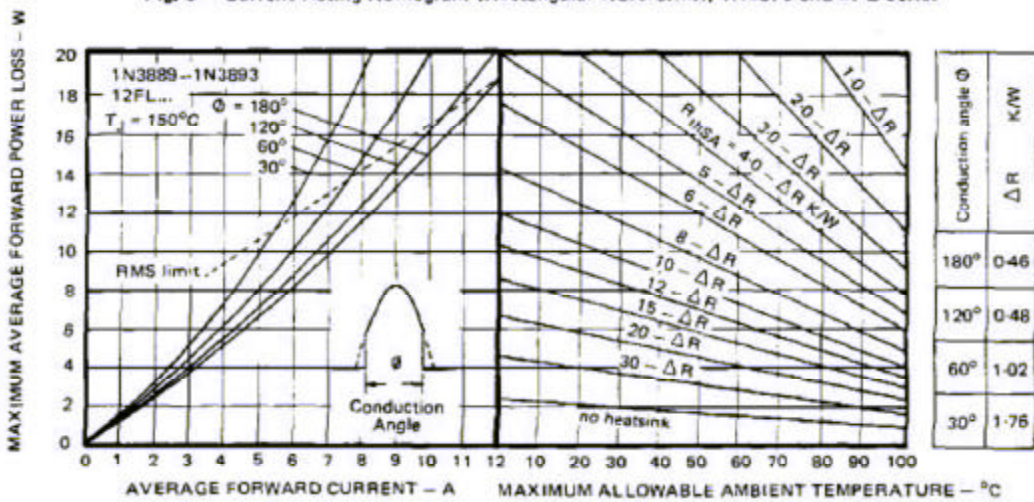
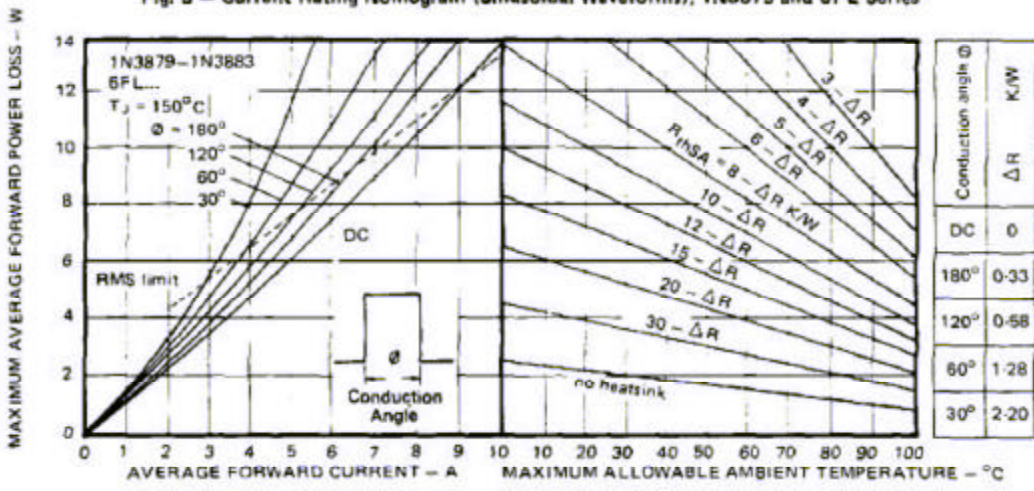
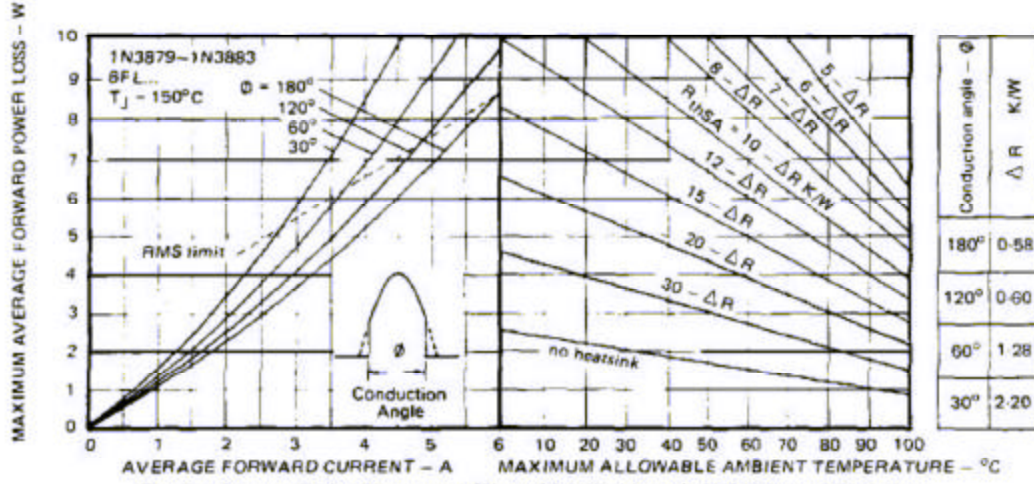


Fig. 3 - Average Forward Current Vs. Maximum Allowable Case Temperature, 16FL Series



- $I_F, I_{FM}$  = 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. 4 - Reverse Recovery Time Test Waveform



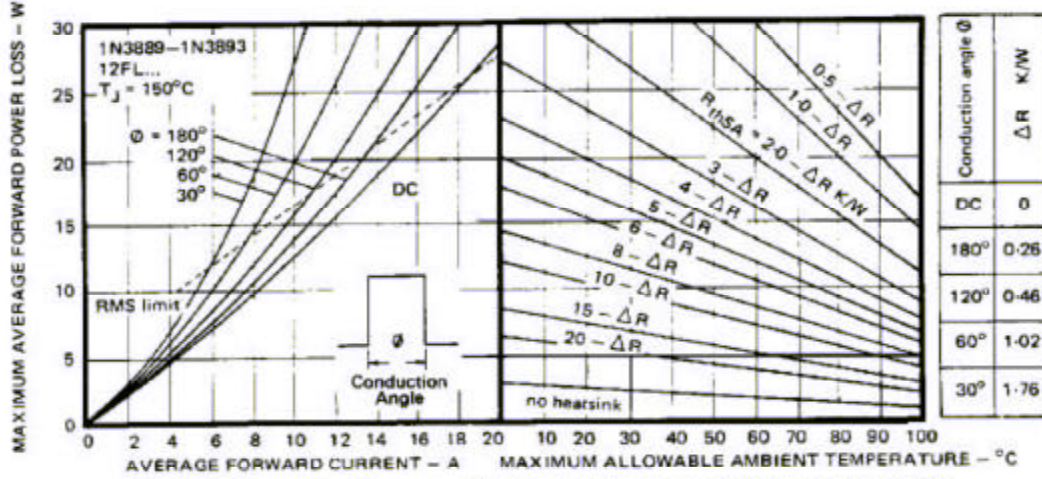


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

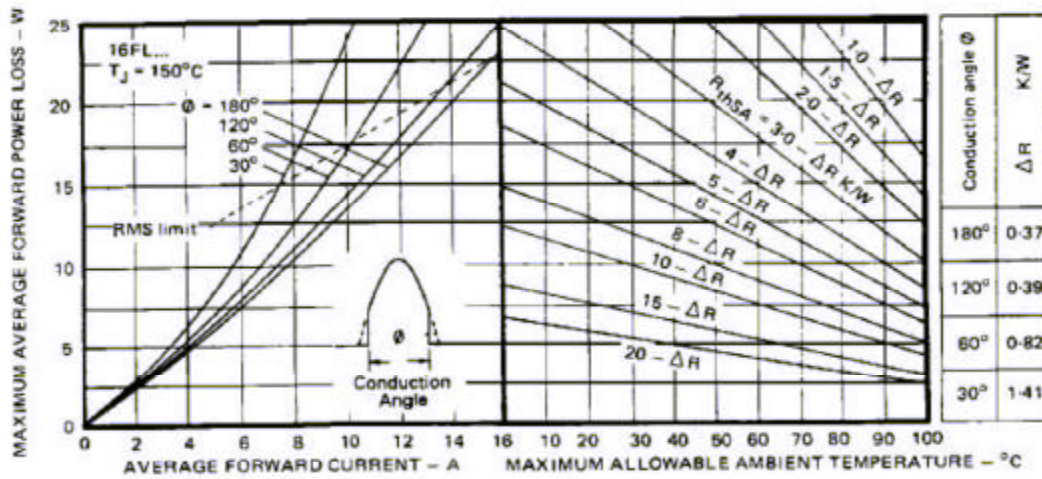


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

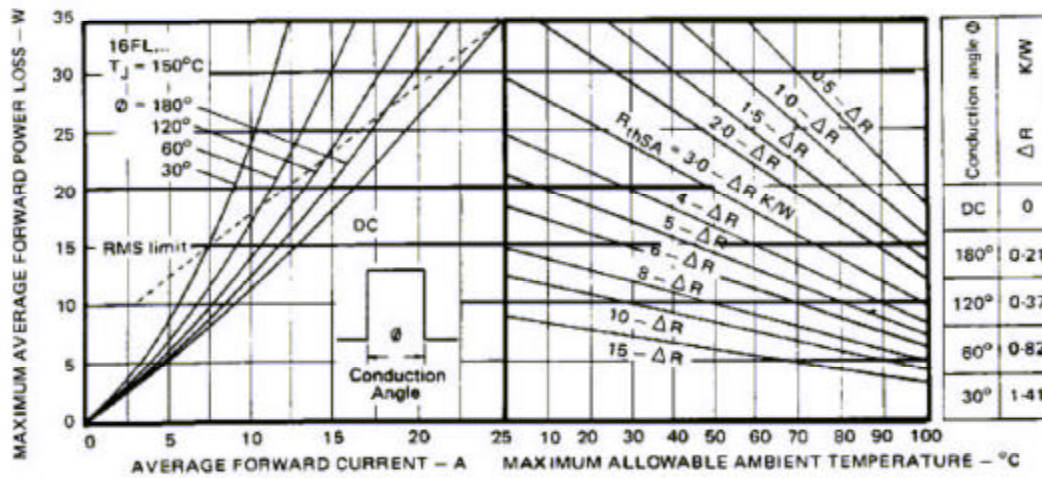


Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series

1N3879, 1N3889, 6FL, 12FL, 16FL Series

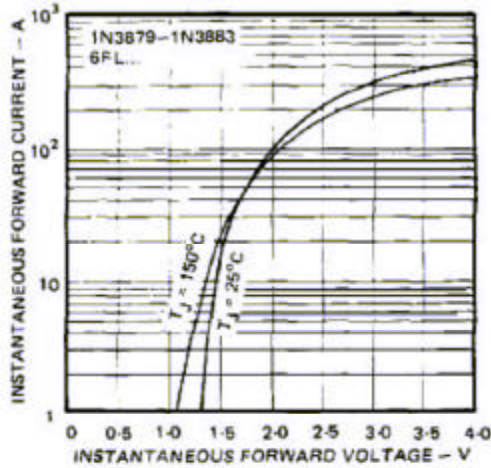


Fig. 11 - Maximum Forward Voltage Vs. Forward Current, 1N3879 and 6FL Series

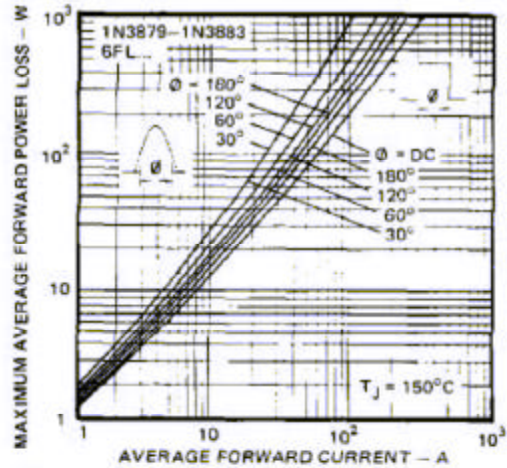


Fig. 12 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3879 and 6FL Series

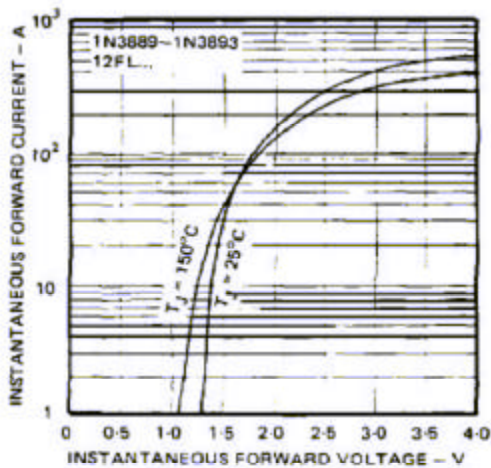


Fig. 13 - Maximum Forward Voltage Vs. Forward Current, 1N3889 and 12FL Series

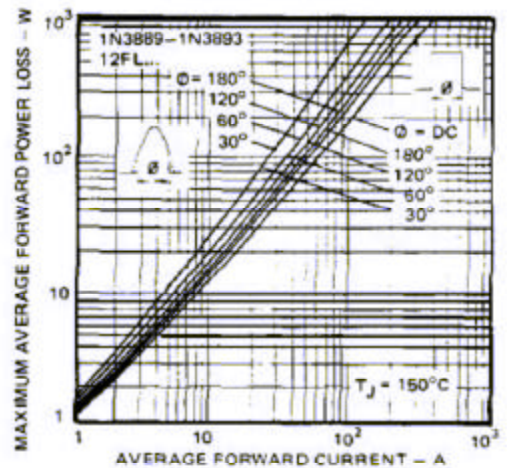


Fig. 14 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3889 and 12FL Series

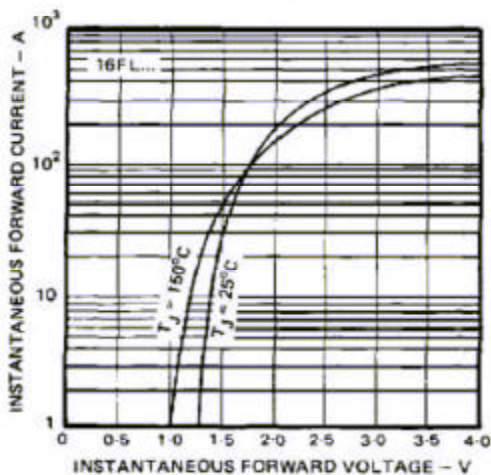


Fig. 15 - Maximum Forward Voltage Vs. Forward Current, 16FL Series

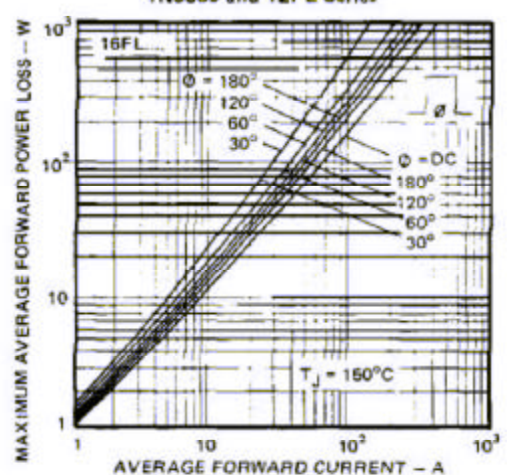


Fig. 16 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 16FL Series



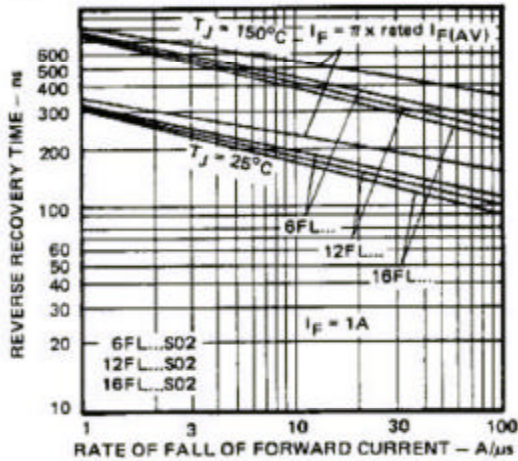


Fig. 17A — Typical Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series \_\_\_S02

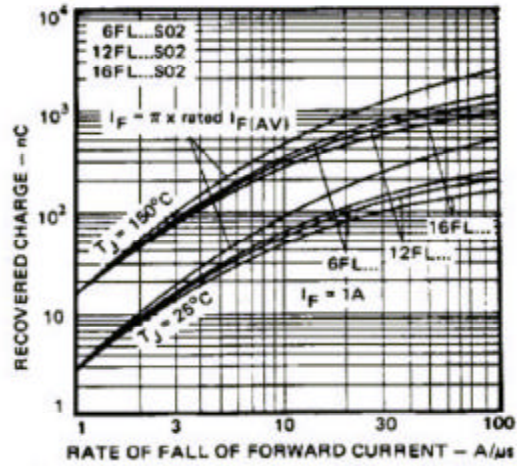


Fig. 17B — Typical Recovered Charge Vs. Rate of Fall of Forward Current, All Series \_\_\_S02

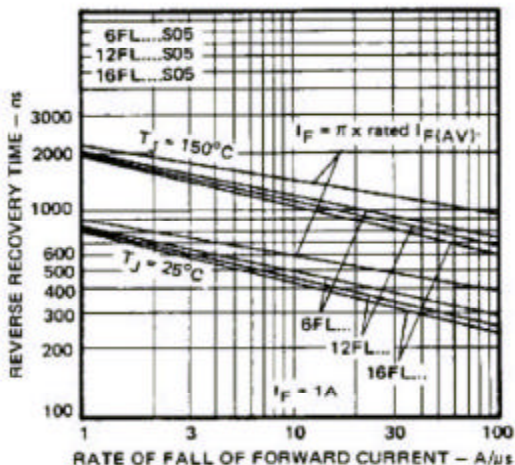


Fig. 18A — Typical Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series \_\_\_S05

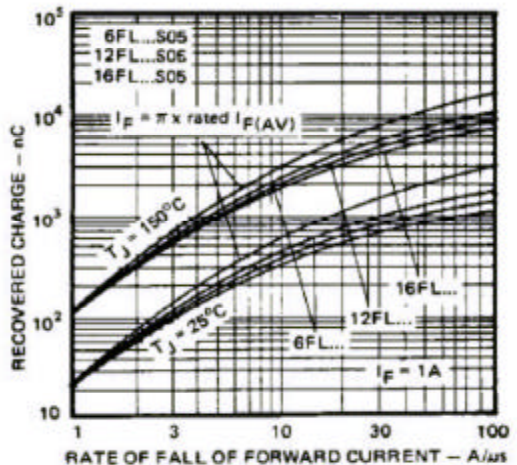


Fig. 18B — Typical Recovered Charge Vs. Rate of Fall of Forward Current, All Series \_\_\_S05

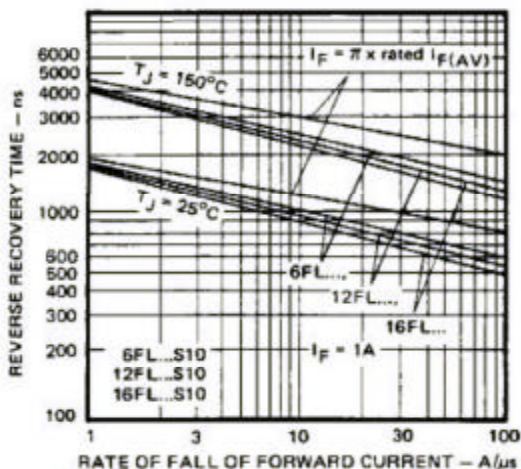


Fig. 19A — Typical Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series \_\_\_S10

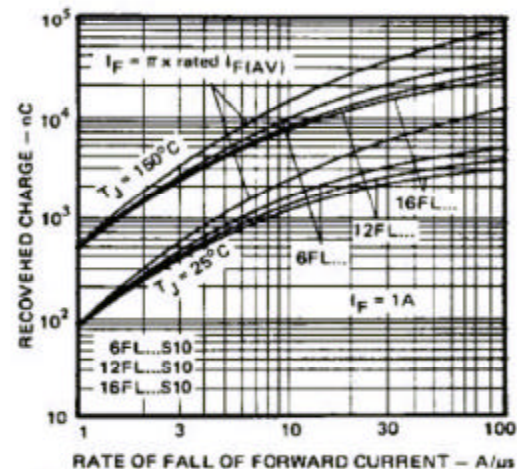


Fig. 19B — Typical Recovered Charge Vs. Rate of Fall of Forward Current, All Series \_\_\_S10

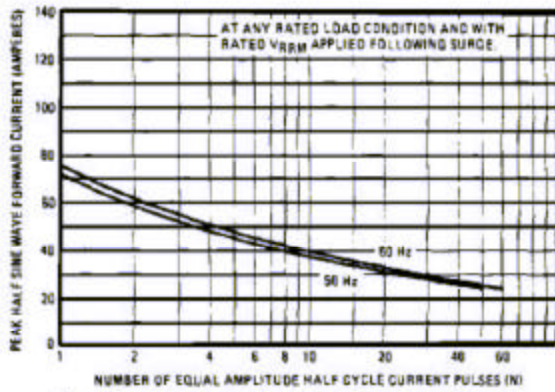


Fig. 20 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3879 Series

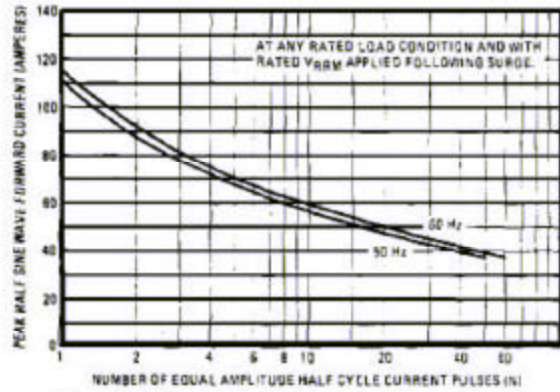


Fig. 21 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 6FL Series

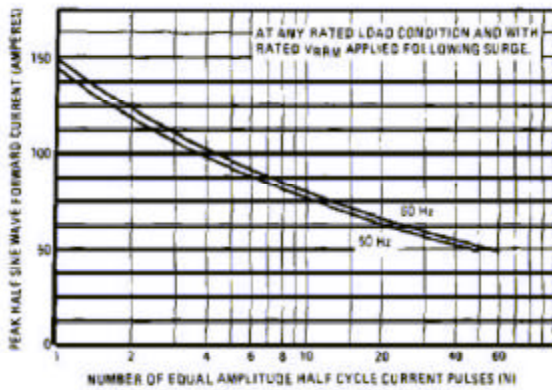


Fig. 22 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3889 and 12FL Series

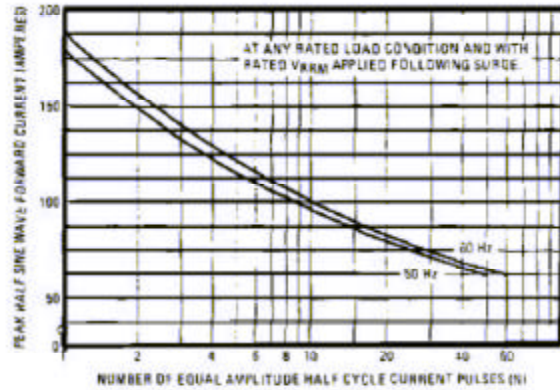


Fig. 23 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 16FL Series

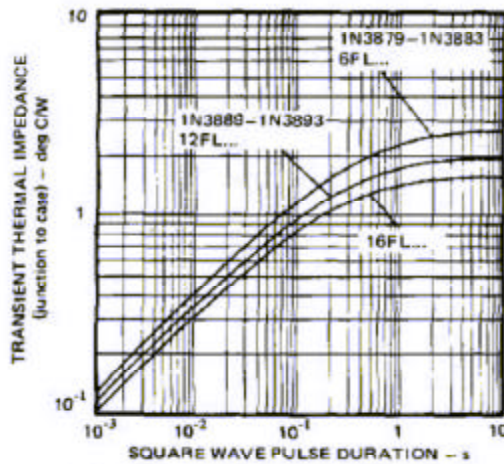


Fig. 24 – Maximum Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration, All Series.