

# FFM201-BF Thru FFM207-BF

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# FFM201-BF Thru FFM207-BF

## 2.0A Surface Mount Fast Recovery Rectifiers : 50V-1000V

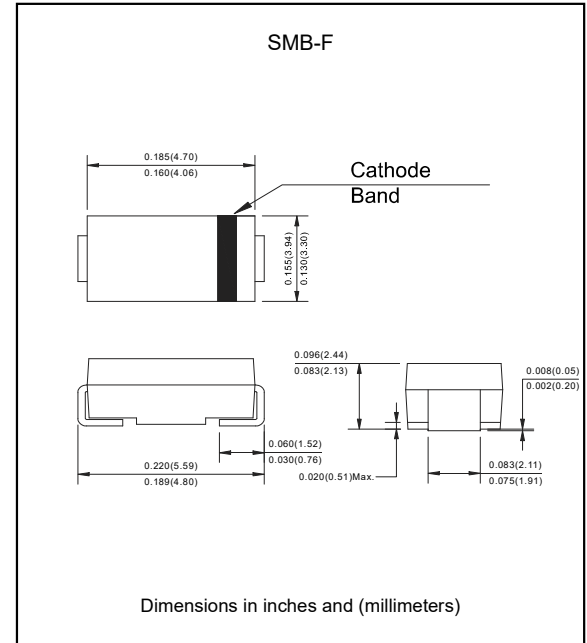
### Features

- Fast switching for high efficiency.
- Low leakage current.
- High forward surge capability.
- Solder dip 260°C/40sec.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free parts, ex. FFM201-BF-H.

### Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, DO-214AA / SMB-F.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Polarity : Indicated by cathode band.
- Mounting Position : Any.
- Weight : Approximated 0.098gram.

### Package outline



### Maximum ratings and electrical characteristics (At $T_A=25^\circ\text{C}$ unless otherwise noted)

Rating at  $25^\circ\text{C}$  ambient temperature unless otherwise specified.

Single phase half-wave 60Hz, resistive of inductive load, for capacitive load current derate by 20%.

| Parameter                                                                                        | Symbol            | FFM 201-BF  | FFM 202-BF | FFM 203-BF | FFM 204-BF | FFM 205-BF | FFM 206-BF | FFM 207-BF | Unit |
|--------------------------------------------------------------------------------------------------|-------------------|-------------|------------|------------|------------|------------|------------|------------|------|
| Maximum repetitive peak reverse voltage                                                          | V <sub>RRM</sub>  | 50          | 100        | 200        | 400        | 600        | 800        | 1000       | V    |
| Maximum RMS voltage                                                                              | V <sub>RMS</sub>  | 35          | 70         | 140        | 280        | 420        | 560        | 700        | V    |
| Maximum DC blocking voltage                                                                      | V <sub>DC</sub>   | 50          | 100        | 200        | 400        | 600        | 800        | 1000       | V    |
| Maximum average forward rectified current at T <sub>A</sub> =90°C                                | I <sub>(AV)</sub> | 2.0         |            |            |            |            |            |            | A    |
| Peak forward surge current 8.3ms single half sine wave superimposed on rated load (JEDEC Method) | I <sub>FSM</sub>  | 50.0        |            |            |            |            |            |            | A    |
| Maximum instantaneous forward voltage at 2.0A                                                    | V <sub>F</sub>    | 1.3         |            |            |            |            |            |            | V    |
| Maximum DC reverse current T <sub>A</sub> =25°C                                                  | I <sub>R</sub>    | 5.0         |            |            |            |            |            |            | μA   |
| At rated DC blocking voltage T <sub>A</sub> =100°C                                               |                   | 50          |            |            |            |            |            |            |      |
| Maximum reverse recovery time (Note 1)                                                           | t <sub>rr</sub>   | 150         |            |            |            | 250        | 500        |            | ns   |
| Typical junction capacitance (Note 2)                                                            | C <sub>J</sub>    | 50.0        |            |            |            |            |            |            | pF   |
| Typical thermal resistance (Note 3)                                                              | R <sub>θJA</sub>  | 55.0        |            |            |            |            |            |            | °C/W |
| Operating junction temperature                                                                   | T <sub>J</sub>    | +150        |            |            |            |            |            |            | °C   |
| Storage temperature range                                                                        | T <sub>STG</sub>  | -65 to +150 |            |            |            |            |            |            | °C   |

Note:

- 1.Reverse recovery condition  $I_F=0.5\text{A}$ ,  $I_R=1.0\text{A}$ ,  $t_{rr}=0.25\text{A}$ .
- 2.Measured at 1MHz and applied reverse voltage of 4.0V D.C.
- 3.Thermal resistance from junction to ambient at 0.375"(9.5mm)lead length, P.C.B. mounted.

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## Rating and characteristic curves

FIG. 1- FORWARD CURRENT DERATING CURVE

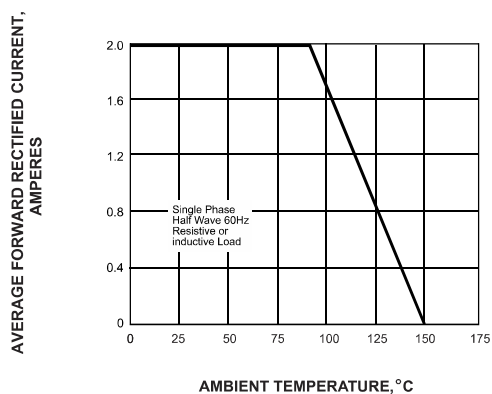


FIG. 2-MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT

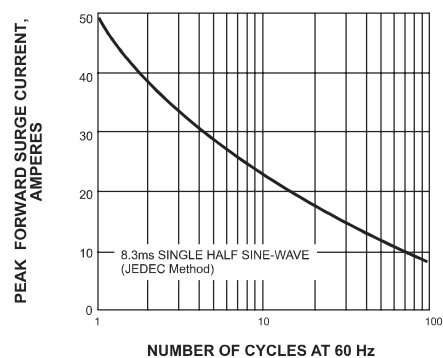


FIG. 3-TYPICAL INSTANTANEOUS FORWARD CHARACTERISTICS

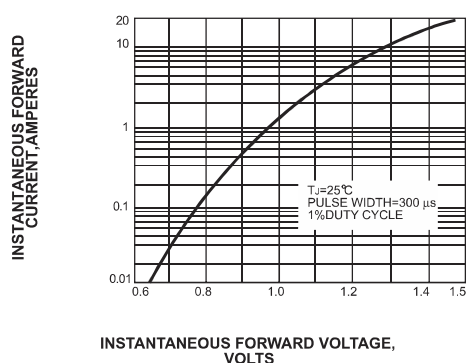
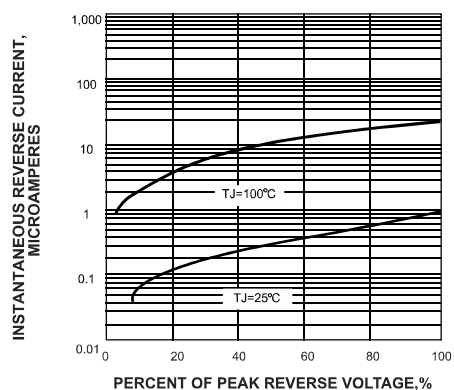
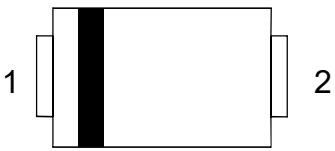


FIG. 4-TYPICAL REVERSE CHARACTERISTICS



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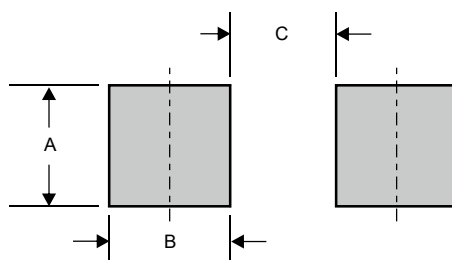
## Pinning information

| Pin                        | Simplified outline                                                                | Symbol                                                                              |
|----------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin1 cathode<br>Pin2 anode |  |  |

## Marking

| Type number | Marking code |
|-------------|--------------|
| FFM201-BF   | RS2A         |
| FFM202-BF   | RS2B         |
| FFM203-BF   | RS2D         |
| FFM204-BF   | RS2G         |
| FFM205-BF   | RS2J         |
| FFM206-BF   | RS2K         |
| FFM207-BF   | RS2M         |

## Suggested solder pad layout

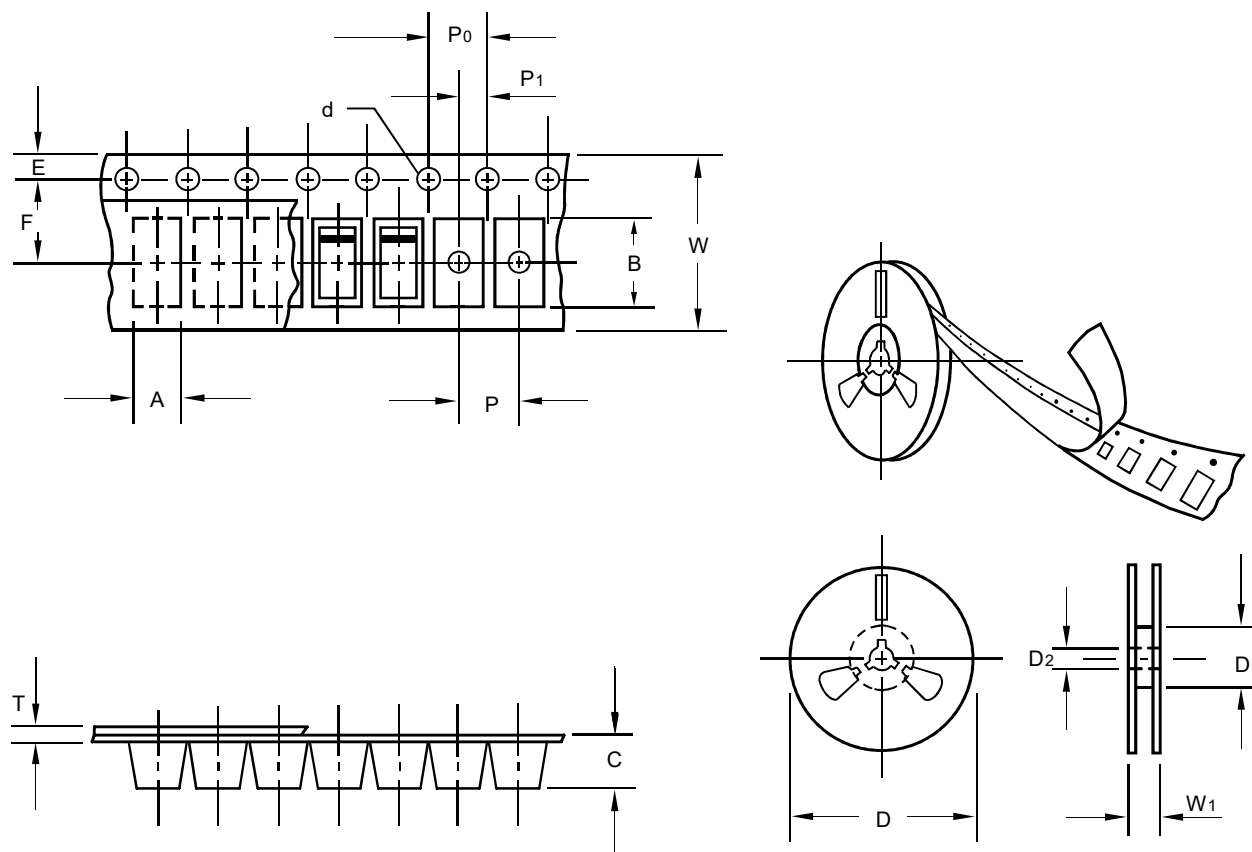


Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SMB-F   | 0.091 (2.30) | 0.098 (2.50) | 0.071 (1.80) |

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## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SMB-F  |
|---------------------------|--------|-----------|--------|
| Carrier width             | A      | 0.1       | 5.25   |
| Carrier length            | B      | 0.1       | 5.72   |
| Carrier depth             | C      | 0.1       | 2.50   |
| Sprocket hole             | d      | 0.1       | 1.55   |
| 13" Reel outside diameter | D      | 2.0       | 330.00 |
| 13" Reel inner diameter   | D1     | min       | 50.00  |
| Feed hole diameter        | D2     | 0.5       | 13.00  |
| Sprocket hole position    | E      | 0.1       | 1.75   |
| Punch hole position       | F      | 0.1       | 5.50   |
| Punch hole pitch          | P      | 0.1       | 8.00   |
| Sprocket hole pitch       | P0     | 0.1       | 4.00   |
| Embossment center         | P1     | 0.1       | 2.00   |
| Overall tape thickness    | T      | 0.015     | 0.40   |
| Tape width                | W      | 0.3       | 12.00  |
| Reel width                | W1     | 1.0       | 18.00  |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

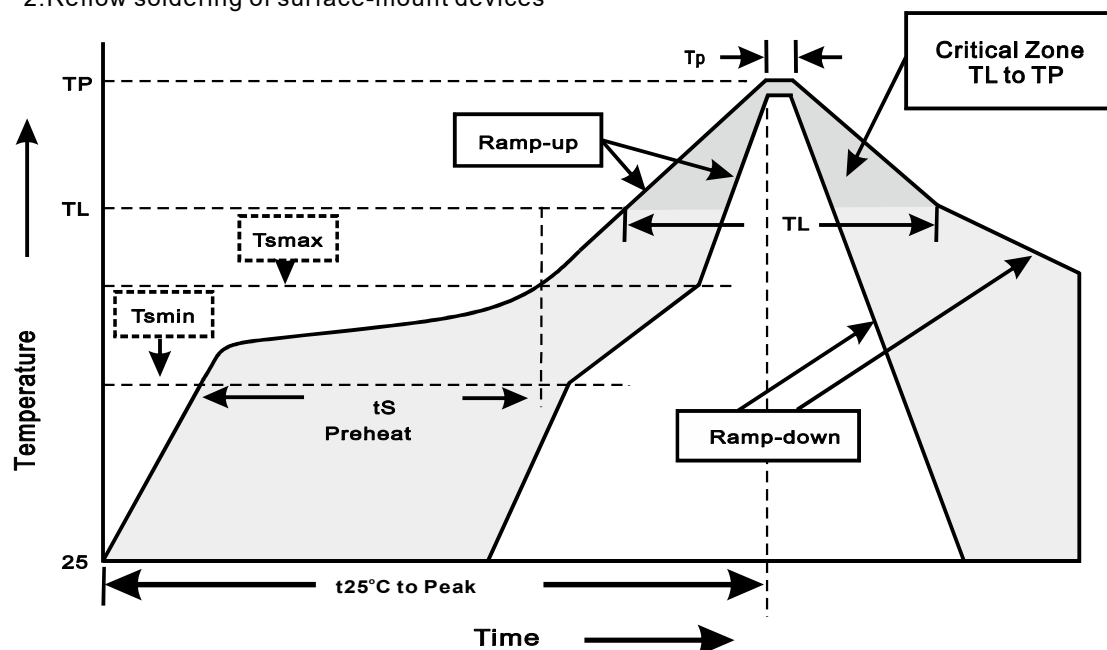
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## Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SMB-F   | 13"       | 3,000      | 8.0                     | 6,000     | 335*335*38      | 330             | 350*330*360       | 48,000       | 12.40                     |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



## 3.Reflow soldering

| Profile Feature                                                                        | Soldering Condition         |
|----------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate(TL to TP)                                                         | <3°C/sec                    |
| Preheat<br>-Temperature Min(Tsmin)<br>-Temperature Max(Tsmax)<br>-Time(min to max)(ts) | 150°C<br>200°C<br>60~120sec |
| Tsmax to TL<br>-Ramp-upRate                                                            | <3°C/sec                    |
| Time maintained above:<br>-Temperature(TL)<br>-Time(tL)                                | 217°C<br>60~260sec          |
| Peak Temperature(TP)                                                                   | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(tp)                                         | 10~30sec                    |
| Ramp-down Rate                                                                         | <6°C/sec                    |
| Time 25°C to Peak Temperature                                                          | <6minutes                   |

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## High reliability test capabilities

| Item Test                         | Conditions                                                                                                                                 | Reference                     |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. Solder Resistance              | at $260\pm5^{\circ}\text{C}$ for $10\pm2\text{sec.}$                                                                                       | MIL-STD-750D<br>METHOD-2031   |
| 2. Solderability                  | at $245\pm5^{\circ}\text{C}$ for 5 sec.                                                                                                    | MIL-STD-202F<br>METHOD-208    |
| 3. High Temperature Reverse Bias  | $V_R=80\%$ rate at $T_J=150^{\circ}\text{C}$ for 168 hrs.                                                                                  | MIL-STD-750D<br>METHOD-1038   |
| 4. Forward Operation Life         | Rated average rectifier current at $T_A=25^{\circ}\text{C}$ for 500hrs.                                                                    | MIL-STD-750D<br>METHOD-1027   |
| 5. Intermittent Operation Life    | $T_A = 25^{\circ}\text{C}$ , $I_F = I_O$<br>On state: power on for 5 min.<br>off state: power off for 5 min.<br>on and off for 500 cycles. | MIL-STD-750D<br>METHOD-1036   |
| 6. Pressure Cooker                | $15P_{SIG}$ at $T_A=121^{\circ}\text{C}$ for 4 hrs.                                                                                        | JESD22-A102                   |
| 7. Temperature Cycling            | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ dwelled for 30 min.<br>and transferred for 5min. total 10 cycles.                          | MIL-STD-750D<br>METHOD-1051   |
| 8. Forward Surge                  | 8.3ms single half sine-wave , one surge.                                                                                                   | MIL-STD-750D<br>METHOD-4066-2 |
| 9. Humidity                       | at $T_A=85^{\circ}\text{C}$ , RH=85% for 1000hrs.                                                                                          | MIL-STD-750D<br>METHOD-1021   |
| 10. High Temperature Storage Life | at $150^{\circ}\text{C}$ for 1000 hrs.                                                                                                     | MIL-STD-750D<br>METHOD-1031   |