

**SFM31-CF THRU SFM38-CF****List**

|                                                         |   |
|---------------------------------------------------------|---|
| List.....                                               | 1 |
| Package outline.....                                    | 2 |
| Features.....                                           | 2 |
| Mechanical data.....                                    | 2 |
| Maximum ratings .....                                   | 2 |
| Electrical characteristics.....                         | 2 |
| Rating and characteristic curves.....                   | 3 |
| Pinning information.....                                | 4 |
| Marking.....                                            | 4 |
| Suggested solder pad layout.....                        | 4 |
| Packing information.....                                | 5 |
| Reel packing.....                                       | 6 |
| Suggested thermal profiles for soldering processes..... | 6 |
| High reliability test capabilities.....                 | 7 |

# SFM31-CF THRU SFM38-CF

## 3.0A Surface Mount Super Fast Rectifiers 50-600V

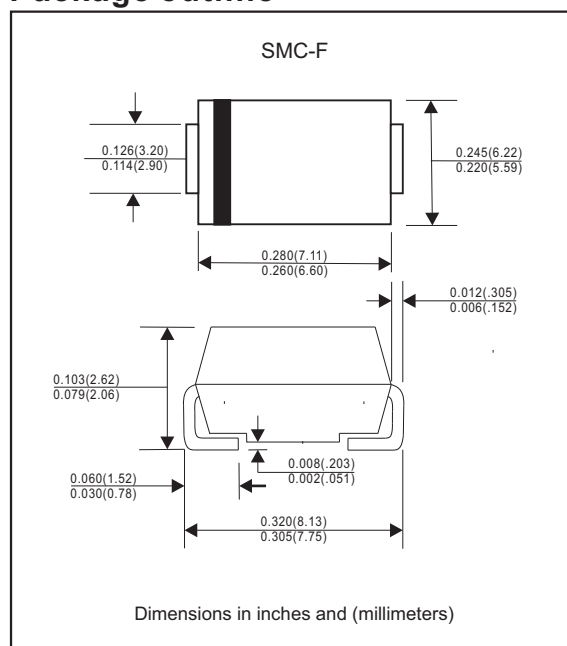
### Features

- Super fast switching for high efficiency.
- Low leakage current.
- High surge current capability.
- Glass passivated chip junction.
- Lead free parts, RoHS requirements.
- Suffix "-H" indicates Halogen free parts, ex. SFM31-CF-H.

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AB / SMC-F
- Terminals: Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight:0.23 grams(approx.)

### Package outline



### Maximum ratings (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER                                                            | SYMBOLS   | SFM31-CF    | SFM32-CF | SFM33-CF | SFM34-CF | SFM35-CF | SFM36-CF | SFM38-CF | UNIT               |
|----------------------------------------------------------------------|-----------|-------------|----------|----------|----------|----------|----------|----------|--------------------|
| Repetitive peak reverse voltage                                      | $V_{RRM}$ | 50          | 100      | 150      | 200      | 300      | 400      | 600      | V                  |
| RMS voltage                                                          | $V_{RMS}$ | 35          | 70       | 105      | 140      | 210      | 280      | 420      | V                  |
| Continuous reverse voltage                                           | $V_R$     | 50          | 100      | 150      | 200      | 300      | 400      | 600      | V                  |
| Average forward rectified current                                    | $I_o$     | 3           |          |          |          |          |          |          | A                  |
| Peak forward surge current 8.3ms single half sine-wave(JEDEC method) | $I_{FSM}$ | 100         |          |          |          |          |          |          | A                  |
| Typical Junction capacitance (Note 1)                                | $C_J$     | 65.0        |          |          |          |          |          |          | pF                 |
| Operating junction temperature range                                 | $T_J$     | -55 to +150 |          |          |          |          |          |          | $^{\circ}\text{C}$ |
| Storage temperature range                                            | $T_{STG}$ | -55 to +150 |          |          |          |          |          |          | $^{\circ}\text{C}$ |

### Maximum Electrical characteristics (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER                                                                               | SYMBOLS  | SFM31-CF   | SFM32-CF | SFM33-CF | SFM34-CF | SFM35-CF | SFM36-CF | SFM38-CF | UNIT          |
|-----------------------------------------------------------------------------------------|----------|------------|----------|----------|----------|----------|----------|----------|---------------|
| Forward voltage at $I_F = 3.0\text{A}$                                                  | $V_F$    | 0.95       |          |          |          | 1.25     |          | 1.7      | V             |
| Reverse current at rated $V_R$<br>$T_A=25^{\circ}\text{C}$<br>$T_A=100^{\circ}\text{C}$ | $I_R$    | 5.0<br>500 |          |          |          |          |          |          | $\mu\text{A}$ |
| Reverse recovery time (Note 2)                                                          | $T_{rr}$ | 35         |          |          |          |          |          |          | ns            |

### Thermal characteristics

| PARAMETER                                      | SYMBOLS         | SFM31-CF | SFM32-CF | SFM33-CF | SFM34-CF | SFM35-CF | SFM36-CF | SFM38-CF | UNIT                 |
|------------------------------------------------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------------------|
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 47.0     |          |          |          |          |          |          | $^{\circ}\text{C/W}$ |

Note : 1. Measured at 1MHz and applied reverse voltage of 4.0V D.C.  
2. Reverse recovery time test condition  $I_F = 0.5\text{A}$ ,  $I_R = 1.0\text{A}$ ,  $I_{rr} = 0.25\text{A}$

## Rating and characteristic curves (SFM31-CF THRU SFM38-CF)

FIG.1-TYPICAL FORWARD CURRENT DERATING CURVE

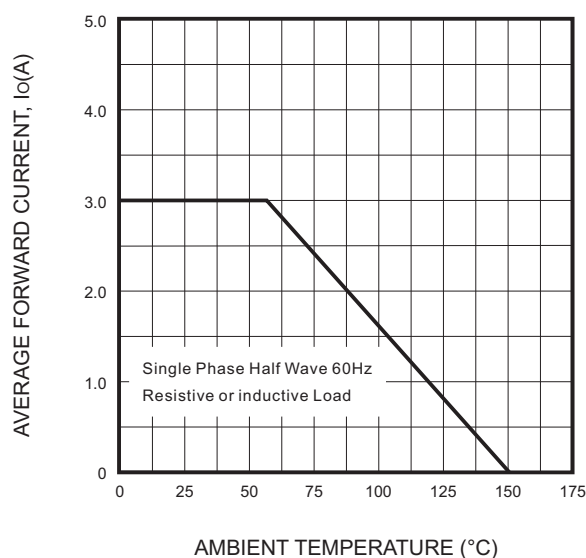


FIG.2-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

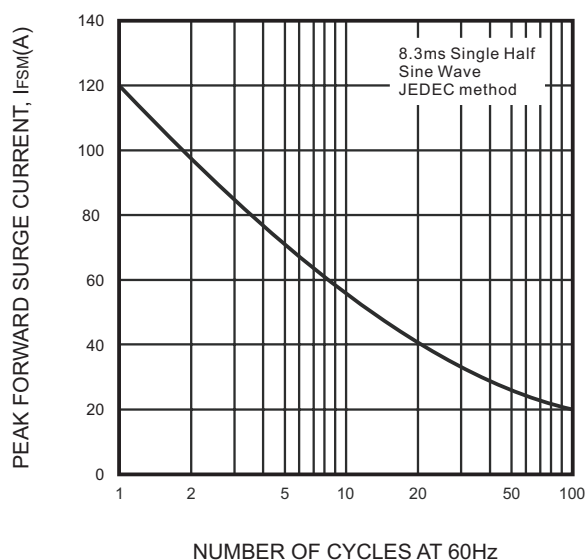


FIG.3-TYPICAL FORWARD CHARACTERISTICS

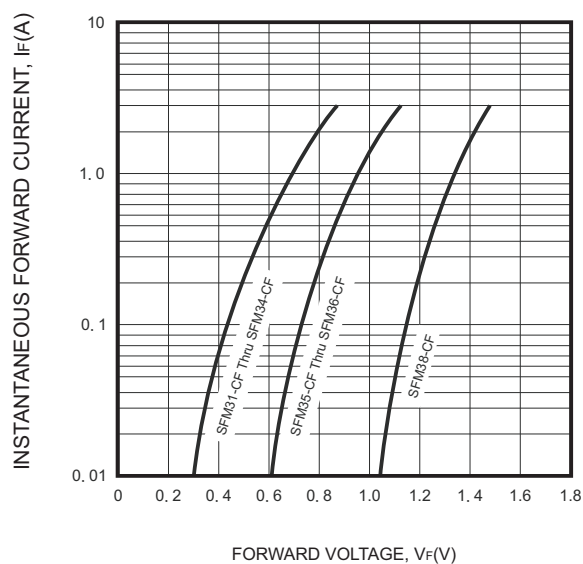
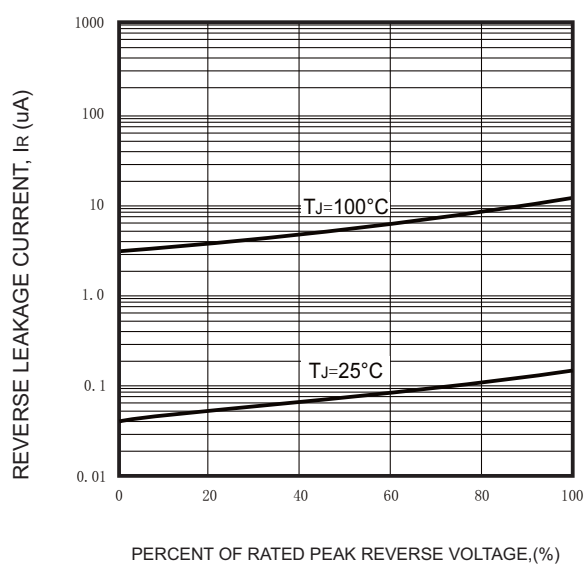


FIG.4 - TYPICAL REVERSE CHARACTERISTICS



## SFM31-CF THRU SFM38-CF

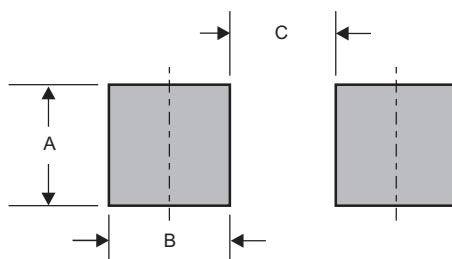
## Pinning information

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

## Marking

| Type number | Marking code |
|-------------|--------------|
| SFM31-CF    | ES3A         |
| SFM32-CF    | ES3B         |
| SFM33-CF    | ES3C         |
| SFM34-CF    | ES3D         |
| SFM35-CF    | ES3E         |
| SFM36-CF    | ES3G         |
| SFM38-CF    | ES3J         |

## Suggested solder pad layout

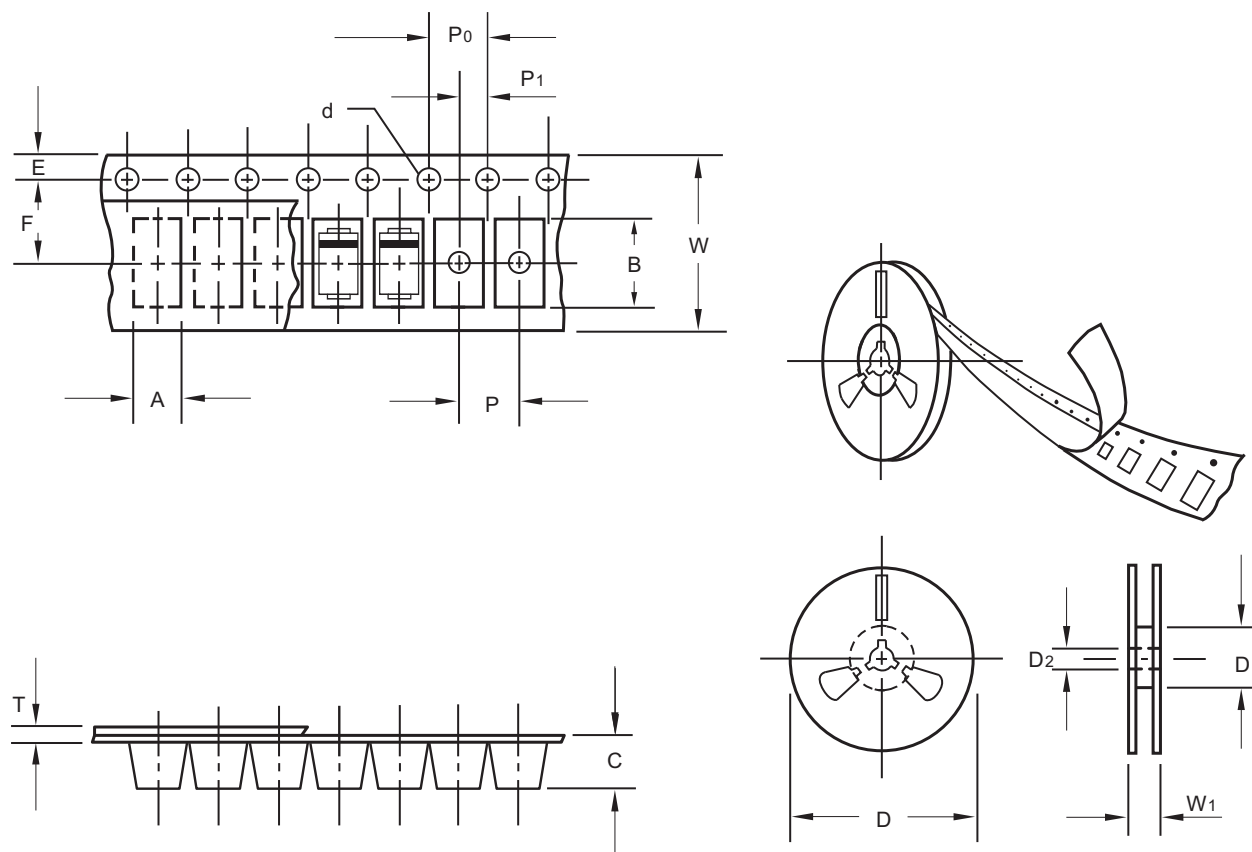


Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C           |
|---------|--------------|--------------|-------------|
| SMC-F   | 0.132 (3.30) | 0.100 (2.50) | 0.176(4.40) |

## SFM31-CF THRU SFM38-CF

## Packing information



unit:mm

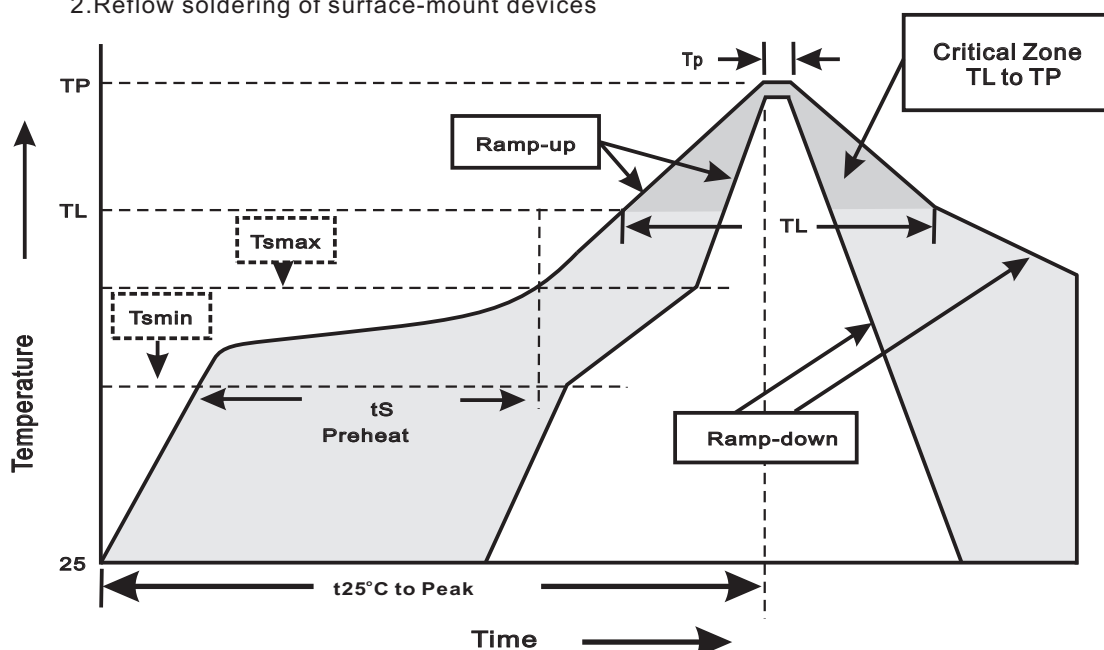
| Item                      | Symbol         | Tolerance | SMC-F  |
|---------------------------|----------------|-----------|--------|
| Carrier width             | A              | 0.15      | 6.00   |
| Carrier length            | B              | 0.2       | 8.25   |
| Carrier depth             | C              | 0.1       | 2.36   |
| Sprocket hole             | d              | 0.1       | 1.50   |
| 13" Reel outside diameter | D              | 2.0       | 330.00 |
| 13" Reel inner diameter   | D <sub>1</sub> | min       | 50.00  |
| 7" Reel outside diameter  | D              | 2.0       | 178.00 |
| 7" Reel inner diameter    | D <sub>1</sub> | min       | 62.00  |
| Feed hole diameter        | D <sub>2</sub> | 0.5       | 13.00  |
| Sprocket hole position    | E              | 0.1       | 1.75   |
| Punch hole position       | F              | 0.1       | 7.50   |
| Punch hole pitch          | P              | 0.1       | 8.00   |
| Sprocket hole pitch       | P <sub>0</sub> | 0.1       | 4.00   |
| Embossment center         | P <sub>1</sub> | 0.1       | 2.00   |
| Overall tape thickness    | T              | 0.1       | 0.23   |
| Tape width                | W              | 0.3       | 16.00  |
| Reel width                | W <sub>1</sub> | 1.0       | 18.00  |

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

## Reel packing

| PACKAGE | REEL SIZE | REEL<br>(pcs) | COMPONENT<br>SPACING<br>(m/m) | BOX<br>(pcs) | INNER<br>BOX<br>(m/m) | REEL<br>DIA,<br>(m/m) | CARTON<br>SIZE<br>(m/m) | CARTON<br>(pcs) | APPROX.<br>GROSS WEIGHT<br>(kg) |
|---------|-----------|---------------|-------------------------------|--------------|-----------------------|-----------------------|-------------------------|-----------------|---------------------------------|
| SMC-F   | 13"       | 3,000         | 8.0                           | 6,000        | 338*338*38            | 330                   | 365*365*360             | 48,000          | 18.8                            |

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( $T_L$ to $T_P$ )                                                                                | $<3^{\circ}\text{C}/\text{sec}$                                          |
| Preheat<br>-Temperature Min( $T_{\text{min}}$ )<br>-Temperature Max( $T_{\text{max}}$ )<br>-Time(min to max)( $t_s$ ) | $150^{\circ}\text{C}$<br>$200^{\circ}\text{C}$<br>$60\sim 120\text{sec}$ |
| $T_{\text{max}}$ to $T_L$<br>-Ramp-upRate                                                                             | $<3^{\circ}\text{C}/\text{sec}$                                          |
| Time maintained above:<br>-Temperature( $T_L$ )<br>-Time( $t_L$ )                                                     | $217^{\circ}\text{C}$<br>$60\sim 260\text{sec}$                          |
| Peak Temperature( $T_P$ )                                                                                             | $255^{\circ}\text{C}-0/+5^{\circ}\text{C}$                               |
| Time within $5^{\circ}\text{C}$ of actual Peak Temperature( $t_P$ )                                                   | $10\sim 30\text{sec}$                                                    |
| Ramp-down Rate                                                                                                        | $<6^{\circ}\text{C}/\text{sec}$                                          |
| Time $25^{\circ}\text{C}$ to Peak Temperature                                                                         | $<6\text{minutes}$                                                       |

# SFM31-CF THRU SFM38-CF

## High reliability test capabilities

| Item Test                         | Conditions                                                                                                                                 | Reference                     |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. Solder Resistance              | at $260\pm5^{\circ}\text{C}$ for $10\pm2\text{sec.}$<br>immerse body into solder $1/16''\pm1/32''$                                         | 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 $T_J=125^{\circ}\text{C}$ 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   |