

# SFM11-MS THRU SFM18-MS

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# SFM11-MS THRU SFM18-MS

## 1.0A Surface Mount Super Fast Rectifiers-50-600V

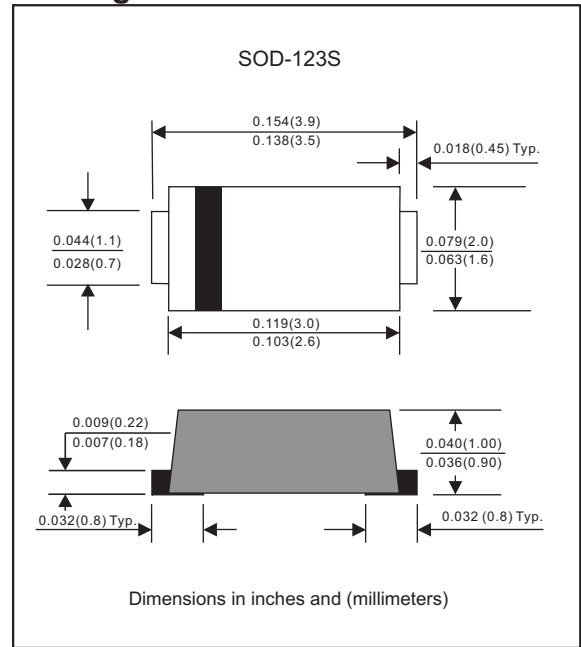
### Features

- Batch process design, excellent power dissipation offers better reverse leakage current and thermal resistance.
- Low profile surface mounted application in order to optimize board space..
- Tiny plastic SMD package.
- High current capability.
- Super fast recovery time for switching mode application.
- High surge current capability.
- Glass passivated chip junction.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen free parts, ex. SFM11-MS-H.

### Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-123S/MINI SMA
- Terminals :Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.0155 gram

### Package outline



### Maximum ratings and Electrical Characteristics (AT T<sub>A</sub>=25°C unless otherwise noted)

| PARAMETER                  | CONDITIONS   | Symbol           | MIN. | TYP. | MAX. | UNIT |
|----------------------------|--|------------------|------|------|------|------|
| Forward rectified current  | See Fig.2  | I <sub>O</sub>   |      |      | 1.0  | A    |
| Forward surge current      | 8.3ms single half sine-wave (JEDEC methode)              | I <sub>FSM</sub> |      |      | 25   | A    |
| Reverse current            | V <sub>R</sub> = V <sub>RRM</sub> T <sub>J</sub> = 25°C  | I <sub>R</sub>   |      |      | 5.0  | uA   |
|                            | V <sub>R</sub> = V <sub>RRM</sub> T <sub>J</sub> = 125°C |                  |      |      | 100  |      |
| Diode junction capacitance | f=1MHz and applied 4V DC reverse voltage                 | C <sub>J</sub>   |      | 10   |      | pF   |
| Storage temperature        |  | T <sub>STG</sub> | -65  |      | +175 | °C   |

| SYMBOLS  | V <sub>RRM</sub> *1<br>(V) | V <sub>RMS</sub> *2<br>(V) | V <sub>R</sub> *3<br>(V) | V <sub>F</sub> *4<br>(V) | t <sub>rr</sub> *5<br>(ns) | Operating temperature<br>T <sub>J</sub> , (°C) |
|----------|----------------------------|----------------------------|--------------------------|--------------------------|----------------------------|--|
| SFM11-MS | 50                         | 35                         | 50                       | 0.95                     | 35                         | -55 to +150                                    |
| SFM12-MS | 100                        | 70                         | 100                      |                          |                            |  |
| SFM13-MS | 150                        | 105                        | 150                      |                          |                            |  |
| SFM14-MS | 200                        | 140                        | 200                      |                          |                            |  |
| SFM15-MS | 300                        | 210                        | 300                      | 1.25                     |                            |  |
| SFM16-MS | 400                        | 280                        | 400                      |                          |                            |  |
| SFM17-MS | 500                        | 350                        | 500                      | 1.70                     |                            |  |
| SFM18-MS | 600                        | 420                        | 600                      |                          |                            |  |

- \*1 Repetitive peak reverse voltage
- \*2 RMS voltage
- \*3 Continuous reverse voltage
- \*4 Maximum forward voltage@I<sub>F</sub>=1.0A
- \*5 Maximum Reverse recovery time, note 1

Note 1. Reverse recovery time test condition, I<sub>F</sub>=0.5A, I<sub>R</sub>=1.0A, I<sub>RR</sub>=0.25A

# Rating and characteristic curves (SFM11-MS THRU SFM18-MS)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

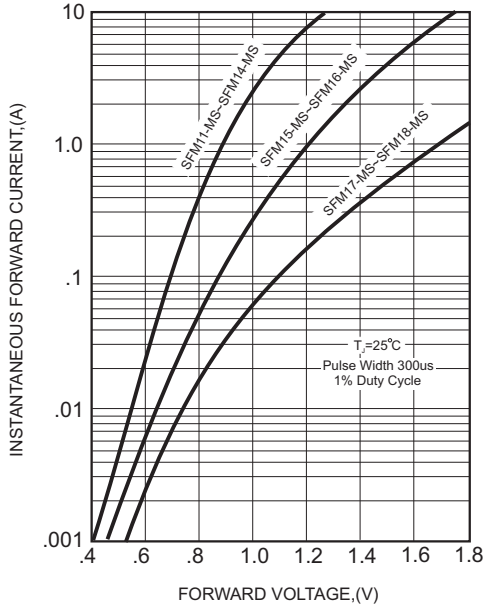


FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE

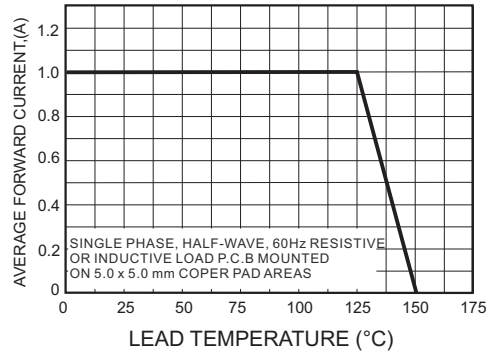


FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

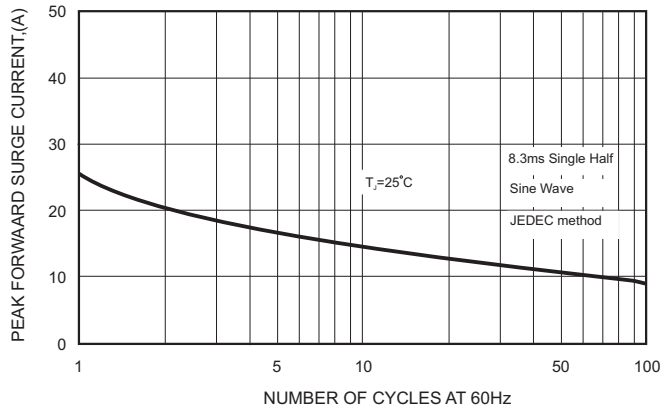
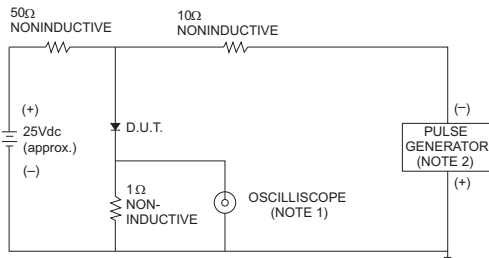


FIG.3- TEST CIRCUIT DIAGRAM AND REVERSE RECOVERY TIME CHARACTERISTICS



NOTES: 1. Rise Time= 7ns max., Input Impedance= 1 megohm.22pF.  
2. Rise Time= 10ns max., Source Impedance= 50 ohms.

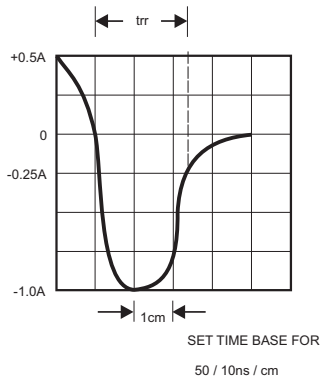
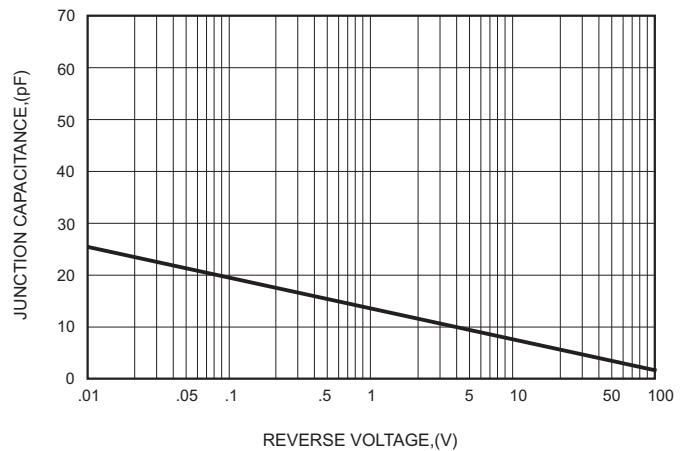




FIG.5-TYPICAL JUNCTION CAPACITANCE



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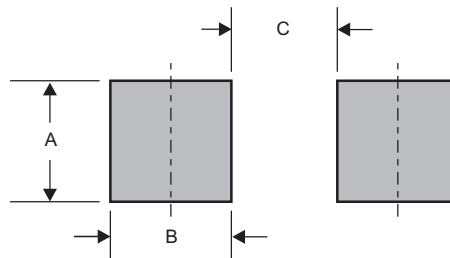
## Pinning information

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

## Marking

| Type number | Marking code |
|-------------|--------------|
| SFM11-MS    | S1           |
| SFM12-MS    | S2           |
| SFM13-MS    | S3           |
| SFM14-MS    | S4           |
| SFM15-MS    | S5           |
| SFM16-MS    | S6           |
| SFM17-MS    | S7           |
| SFM18-MS    | S8           |

## Suggested solder pad layout

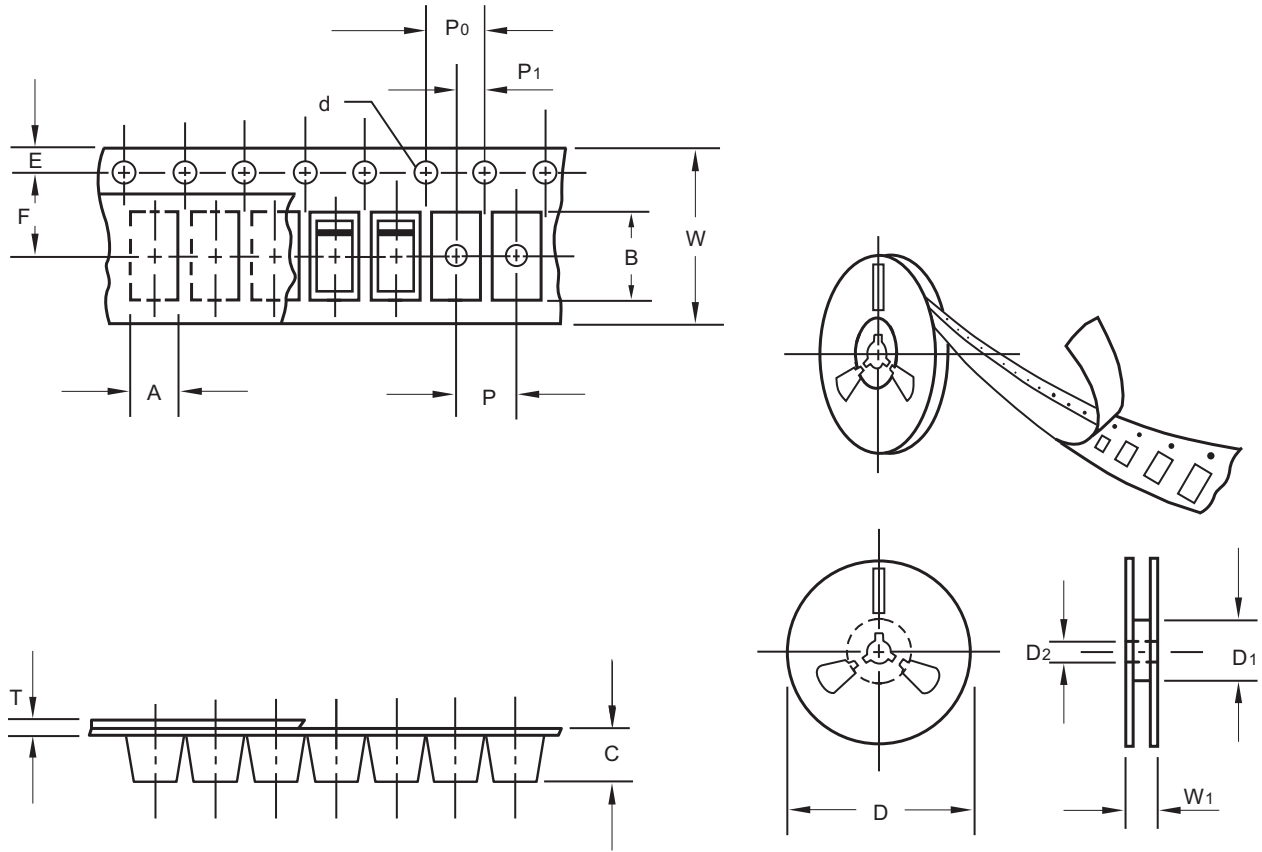


Dimensions in inches and (millimeters)

| PACKAGE  | A            | B            | C            |
|----------|--------------|--------------|--------------|
| SOD-123S | 0.044 (1.10) | 0.040 (1.00) | 0.079 (2.00) |

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## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SOD-123S |
|---------------------------|--------|-----------|----------|
| Carrier width             | A      | 0.1       | 2.00     |
| Carrier length            | B      | 0.1       | 3.85     |
| Carrier depth             | C      | 0.1       | 1.10     |
| Sprocket hole             | d      | 0.1       | 1.50     |
| 13" Reel outside diameter | D      | 2.0       | -        |
| 13" Reel inner diameter   | D1     | min       | -        |
| 7" Reel outside diameter  | D      | 2.0       | 178.00   |
| 7" Reel inner diameter    | D1     | min       | 62.00    |
| Feed hole diameter        | D2     | 0.5       | 13.00    |
| Sprocket hole position    | E      | 0.1       | 1.75     |
| Punch hole position       | F      | 0.1       | 3.50     |
| Punch hole pitch          | P      | 0.1       | 4.00     |
| Sprocket hole pitch       | P0     | 0.1       | 4.00     |
| Embossment center         | P1     | 0.1       | 2.00     |
| Overall tape thickness    | T      | 0.1       | 0.23     |
| Tape width                | W      | 0.3       | 8.00     |
| Reel width                | W1     | 1.0       | 11.40    |

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

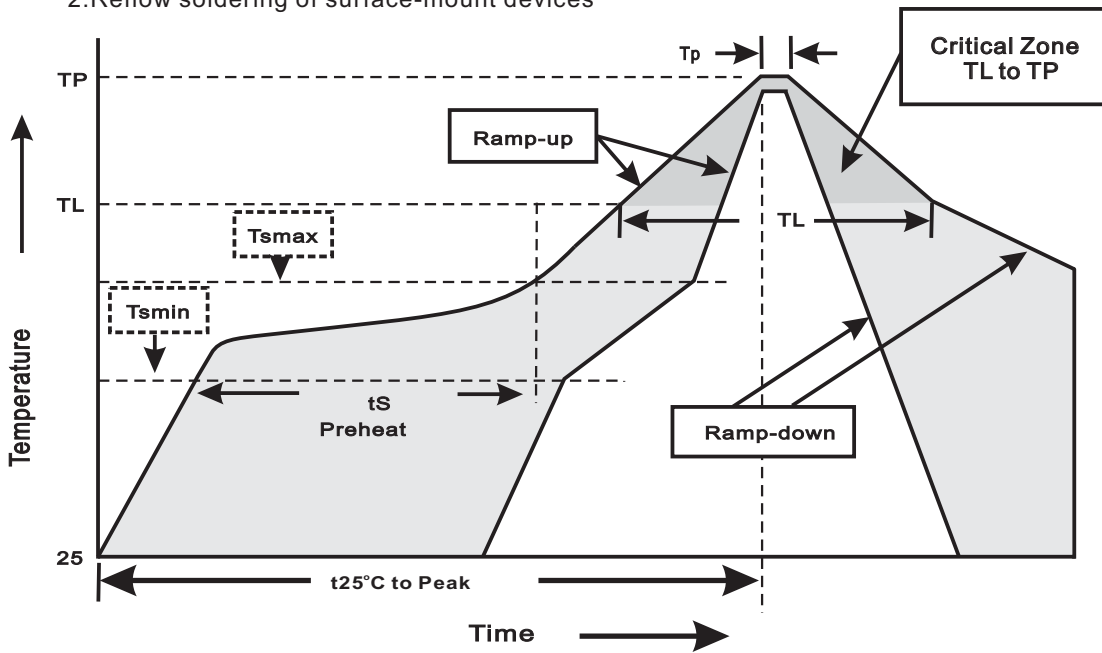
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## Reel packing

| 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) |
|----------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SOD-123S | 7"        | 3,000      | 4.0                     | 30,000    | 183*183*123     | 178             | 382*262*387       | 240,000      | 8.7                       |

## 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(T <sub>L</sub> to T <sub>P</sub> )  | <3°C/sec                    |
| Preheat<br>-Temperature Min(T <sub> Amin</sub> )<br>-Temperature Max(T <sub> Smax</sub> )<br>-Time(min to max)(t <sub> S</sub> ) | 150°C<br>200°C<br>60~120sec |
| T <sub> Smax</sub> to T <sub> L</sub><br>-Ramp-upRate  | <3°C/sec                    |
| Time maintained above:<br>-Temperature(T <sub> L</sub> )<br>-Time(t <sub> L</sub> )  | 217°C<br>60~260sec          |
| Peak Temperature(T <sub> P</sub> )   | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(t <sub> P</sub> )   | 10~30sec                    |
| Ramp-down Rate   | <6°C/sec                    |
| Time 25°C to Peak Temperature  | <6minutes                   |

**SFM11-MS THRU SFM18-MS****High reliability test capabilities**

| Item Test                         | Conditions   | Reference                     |
|-----------------------------------|--|-------------------------------|
| 1. Solder Resistance              | at 260±5°C for 10±2sec.<br>immerse body into solder 1/16"±1/32"  | MIL-STD-750D<br>METHOD-2031   |
| 2. Solderability                  | at 245±5°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 <sub>SIG</sub> at $T_A=121^\circ\text{C}$ for 4 hrs.   | JESD22-A102                   |
| 7. Temperature Cycling            | -55°C to +125°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 175°C for 1000 hrs.   | MIL-STD-750D<br>METHOD-1031   |