# SFM11-M THRU SFM18-M

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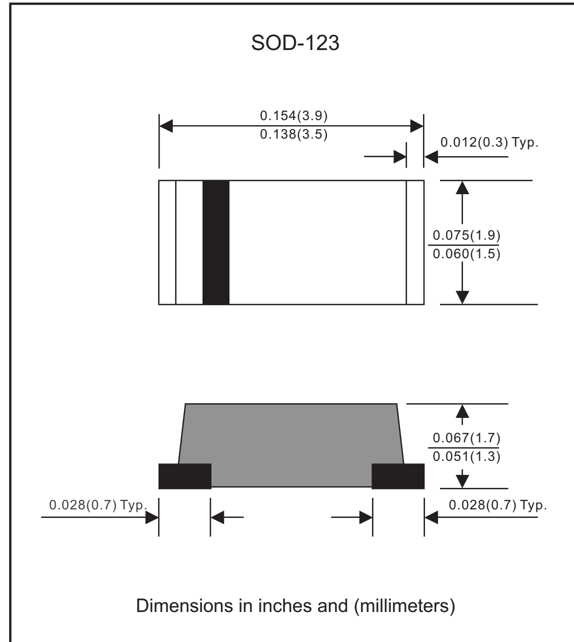
# SFM11-M THRU SFM18-M

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

## Package outline




## Features

- Batch process design, excellent power dissipation offers better reverse leakage current and thermal resistance.
- Tiny plastic SMD package.
- High current capability.
- Superfast recovery time for switching mode application.
- High surge current capability.
- Glass passivated chip junction.
- Lead-free parts meet RoHS requirments.
- Suffix "-H" indicates Halogen free parts, ex. SFM11-M-H.

## Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-123 / MINI SMA
- Terminals :Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.018 gram

## Maximum ratings and Electrical Characteristics (AT $T_A$=25°C unless otherwise noted)

| PARAMETER | CONDITIONS | Symbol | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Forward rectified current | See Fig.2 | $I_O$ | | | 1.0 | A |
| Forward surge current | 8.3ms single half sine-wave (JEDEC methode) | $I_{FSM}$ | | | 25 | A |
| Reverse current | $V_R$ = $V_{RRM}$ $T_J$ = 25°C | $I_R$ | | | 5.0 | μA |
| | $V_R$ = $V_{RRM}$ $T_J$ = 125°C | | | | 100 | |
| Diode junction capacitance | f=1MHz and applied 4V DC reverse voltage | $C_J$ | | 10 | | pF |
| Storage temperature | | $T_{STG}$ | -65 | | +175 | °C |

| SYMBOLS | $V_{RRM}$ *1 (V) | $V_{RMS}$ *2 (V) | $V_R$ *3 (V) | $V_F$ *4 (V) | $t_{rr}$ *5 (ns) | Operating temperature $T_J$, (°C) |
|---|---|---|---|---|---|---|
| SFM11-M | 50 | 35 | 50 | 0.95 | 35 | -55 to +150 |
| SFM12-M | 100 | 70 | 100 | | | |
| SFM13-M | 150 | 105 | 150 | | | |
| SFM14-M | 200 | 140 | 200 | | | |
| SFM15-M | 300 | 210 | 300 | 1.25 | | |
| SFM16-M | 400 | 280 | 400 | | | |
| SFM17-M | 500 | 350 | 500 | 1.70 | | |
| SFM18-M | 600 | 420 | 600 | | | |

*1 Repetitive peak reverse voltage

*2 RMS voltage

*3 Continuous reverse voltage

*4 Maximum forward voltage@$I_F$=1.0A

*5 Maximum Reverse recovery time, note 1

Note 1. Reverse recovery time test condition, $I_F$=0.5A, $I_R$=1.0A, $I_{RR}$=0.25A

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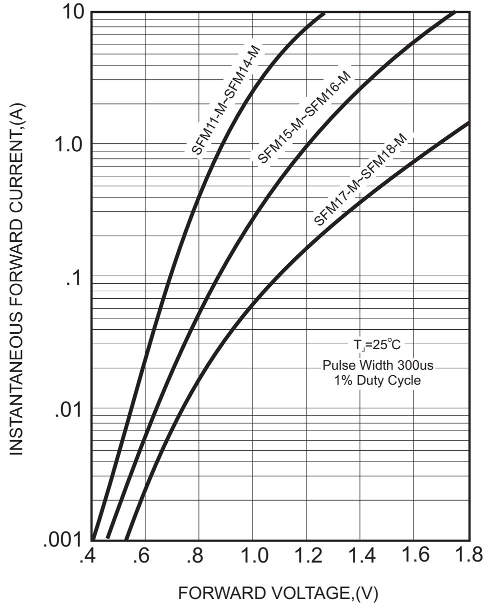
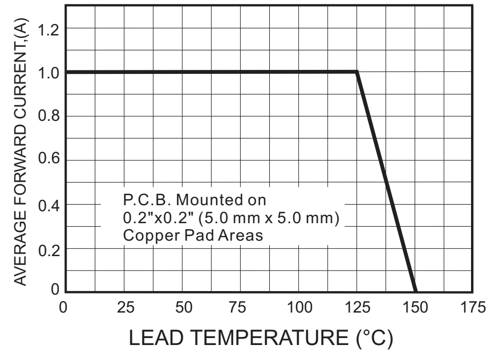
# Rating and characteristic curves (SFM11-M THRU SFM18-M)

FIG.1-TYPICAL FORWARD CHARACTERISTICS



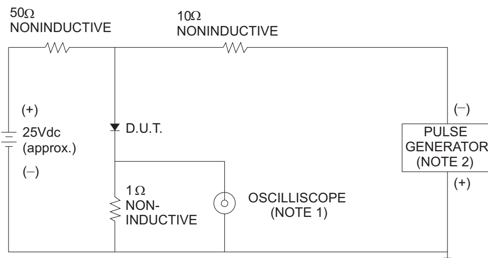

FORWARD VOLTAGE,(V)

FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE



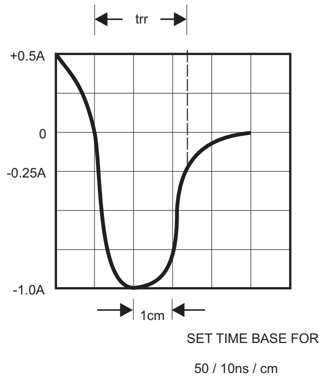

LEAD TEMPERATURE (°C)

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




NOTES: 1. Rise Time= 7ns max., Input Impedance= 1 megohm.22pF.

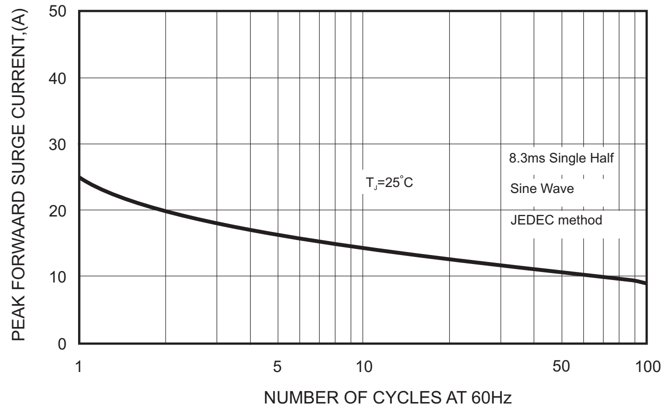
2. Rise Time= 10ns max., Source Impedance= 50 ohms.




SET TIME BASE FOR

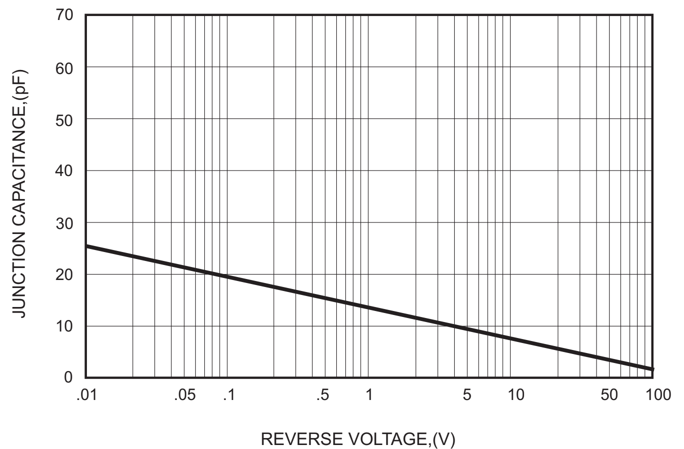
50 / 10ns / cm

FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT




NUMBER OF CYCLES AT 60Hz

FIG.5-TYPICAL JUNCTION CAPACITANCE




REVERSE VOLTAGE,(V)

# SFM11-M THRU SFM18-M

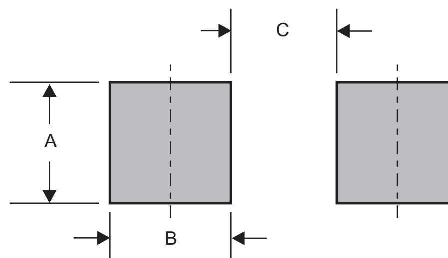
## Pinning information

| Pin | Simplified outline | Symbol |
|---|---|---|
| Pin1 cathode<br>Pin2 anode | 1 [outline] 2 | 1 —▶|— 2 |

## Marking

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

## Suggested solder pad layout

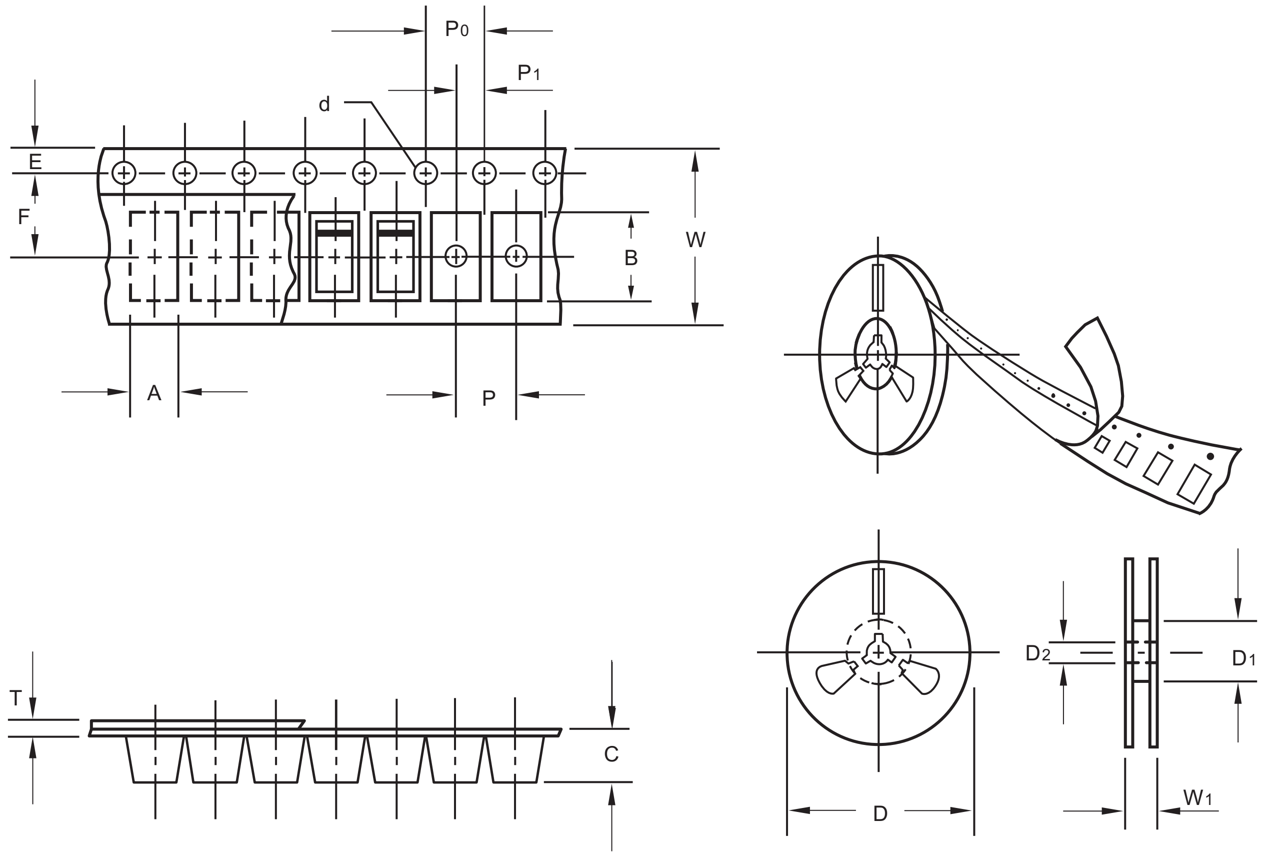



Dimensions in inches and (millimeters)

| PACKAGE | A | B | C |
|---|---|---|---|
| SOD-123 | 0.075 (1.90) | 0.055 (1.40) | 0.075 (1.90) |

# SFM11-M THRU SFM18-M

## Packing information




unit:mm

| Item | Symbol | Tolerance | SOD-123 |
|---|---|---|---|
| Carrier width | A | 0.1 | 1.90 |
| Carrier length | B | 0.1 | 3.90 |
| Carrier depth | C | 0.1 | 1.68 |
| Sprocket hole | d | 0.1 | 1.50 |
| 13" Reel outside diameter | D | 2.0 | - |
| 13" Reel inner diameter | $D_1$ | min | - |
| 7" Reel outside diameter | D | 2.0 | 178.00 |
| 7" Reel inner diameter | $D_1$ | min | 62.00 |
| Feed hole diameter | $D_2$ | 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 | $P_0$ | 0.1 | 4.00 |
| Embossment center | $P_1$ | 0.1 | 2.00 |
| Overall tape thickness | T | 0.1 | 0.23 |
| Tape width | W | 0.3 | 8.00 |
| Reel width | $W_1$ | 1.0 | 11.40 |

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

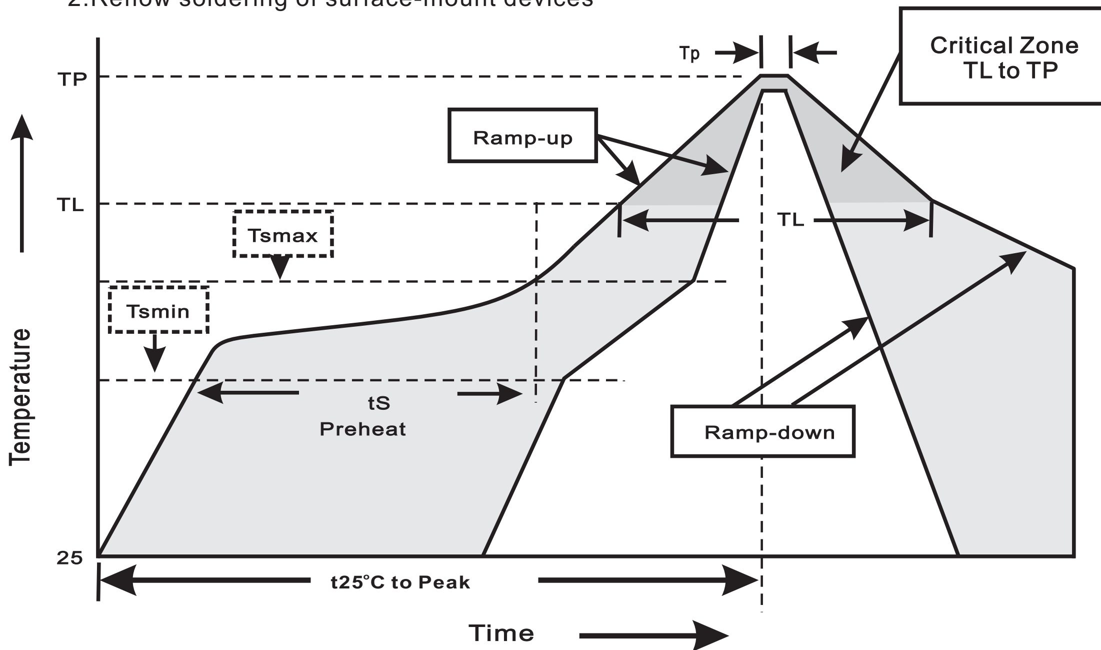
# SFM11-M THRU SFM18-M

## 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-123 | 7" | 2,500 | 4.0 | 25,000 | 183*183*123 | 178 | 382*262*387 | 200,000 | 9.5 |

## 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($T_L$ to $T_P$) | <3°C/sec |
| Preheat<br>-Temperature Min(Tsmin)<br>-Temperature Max(Tsmax)<br>-Time(min to max)($t_s$) | 150°C<br>200°C<br>60~120sec |
| Tsmax to $T_L$<br>-Ramp-upRate | <3°C/sec |
| Time maintained above:<br>-Temperature($T_L$)<br>-Time($t_L$) | 217°C<br>60~260sec |
| Peak Temperature($T_P$) | 255°C-0/+5°C |
| Time within 5°C of actual Peak Temperature($t_P$) | 10~30sec |
| Ramp-down Rate | <6°C/sec |
| Time 25°C to Peak Temperature | <6minutes |

# SFM11-M THRU SFM18-M

## 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°C for 168 hrs. | MIL-STD-750D<br>METHOD-1038 |
| 4. Forward Operation Life | Rated average rectifier current at $T_A$=25°C for 500hrs. | MIL-STD-750D<br>METHOD-1027 |
| 5. Intermittent Operation Life | $T_A$ = 25°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 | 15$P_{SIG}$ at $T_A$=121°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°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 |