

# HFM101-MS THRU HFM107-MS

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# HFM101-MS THRU HFM107-MS

## 1.0A Surface Mount High Efficiency Rectifiers 50V-1000V

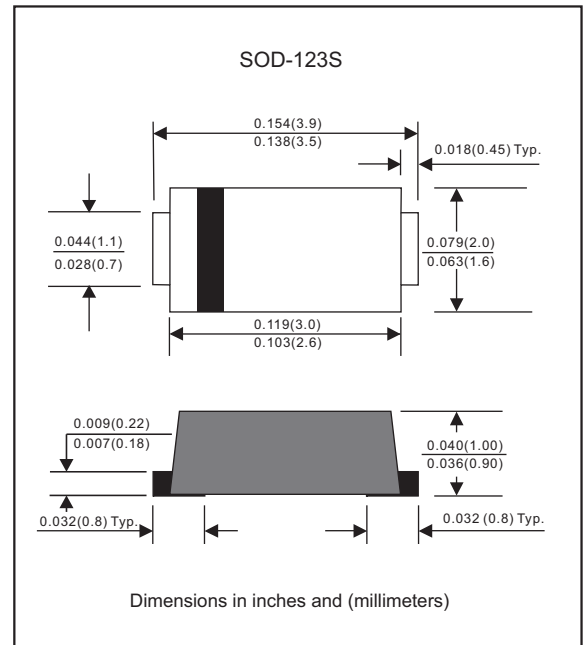
### Features

- 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
- Ultrafast recovery time for high efficiency
- High surge current capability
- Glass passivated chip junction
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen free parts, ex. HFM101-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 (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER                                                                | SYMBOLS   | HFM101-MS   | HFM102-MS | HFM103-MS | HFM104-MS | HFM105-MS | HFM106-MS | HFM107-MS | UNIT               |
|--------------------------------------------------------------------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------|
| Maximum repetitive peak reverse voltage                                  | $V_{RRM}$ | 50          | 100       | 200       | 400       | 600       | 800       | 1000      | V                  |
| Maximum RMS voltage                                                      | $V_{RMS}$ | 35          | 70        | 140       | 280       | 420       | 560       | 700       | V                  |
| Maximum continuous reverse voltage                                       | $V_R$     | 50          | 100       | 200       | 400       | 600       | 800       | 1000      | V                  |
| Maximum average forward rectified current                                | $I_o$     | 1.0         |           |           |           |           |           |           | A                  |
| Non-repetitive peak forward surge current<br>8.3ms single half sine-wave | $I_{FSM}$ | 30          |           |           |           |           |           |           | A                  |
| Typical junction capacitance (Note 1)                                    | $C_J$     | 20          |           |           |           |           |           |           | pF                 |
| Operating junction temperature range                                     | $T_J$     | -55 to +150 |           |           |           |           |           |           | $^{\circ}\text{C}$ |
| Storage temperature range                                                | $T_{STG}$ | -65 to +175 |           |           |           |           |           |           | $^{\circ}\text{C}$ |

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

| PARAMETER                                                                                            | SYMBOLS  | HFM101-MS  | HFM102-MS | HFM103-MS | HFM104-MS | HFM105-MS | HFM106-MS | HFM107-MS | UNIT                           |
|------------------------------------------------------------------------------------------------------|----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------------------|
| Maximum instantaneous forward voltage<br>at $I_F=1.0\text{A}$                                        | $V_F$    | 1.00       |           |           | 1.30      | 1.70      |           |           | V                              |
| Maximum reverse leakage current $T_J=25^{\circ}\text{C}$<br>at rated $V_R$ $T_J=125^{\circ}\text{C}$ | $I_R$    | 5.0<br>150 |           |           |           |           |           |           | $\mu\text{A}$<br>$\mu\text{A}$ |
| Maximum reverse recovery time (Note 2)                                                               | $t_{rr}$ | 50         |           |           |           | 75        |           |           | ns                             |

### Thermal characteristics

| PARAMETER                                               | SYMBOLS         | HFM101-MS | HFM102-MS | HFM103-MS | HFM104-MS | HFM105-MS | HFM106-MS | HFM107-MS | UNIT                 |
|---------------------------------------------------------|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------------|
| Typical thermal resistance junction to ambient (Note 3) | $R_{\theta JA}$ | 66        |           |           |           |           |           |           | $^{\circ}\text{C/W}$ |
| Typical thermal resistance junction to case (Note 3)    | $R_{\theta JC}$ | 51        |           |           |           |           |           |           | $^{\circ}\text{C/W}$ |

Notes 1: Measured at 1 MHz and applied reverse voltage of 4.0 VDC

2: Measured with  $I_F = 0.5\text{A}$ ,  $I_R = 1\text{A}$ ,  $t_{rr} = 0.25\text{A}$

3: Mounted on FR-4 PCB Copper, minimum recommended pad layout

## Rating and characteristic curves (HFM101-MS THRU HFM107-MS)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

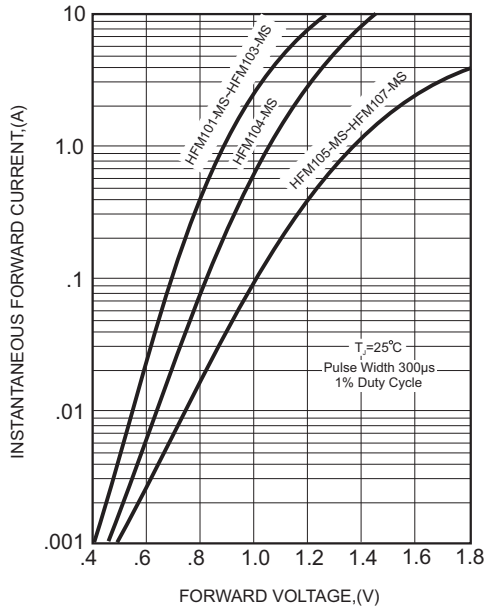


FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE

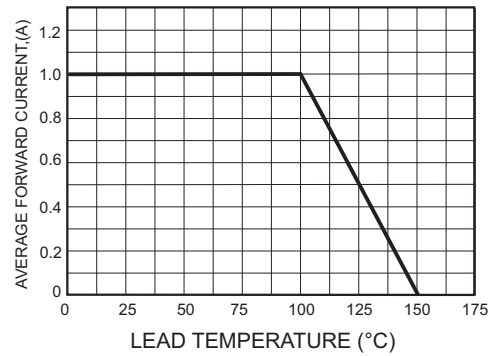


FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

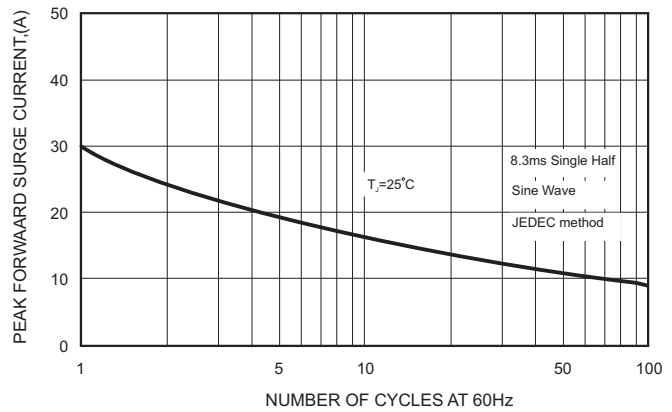
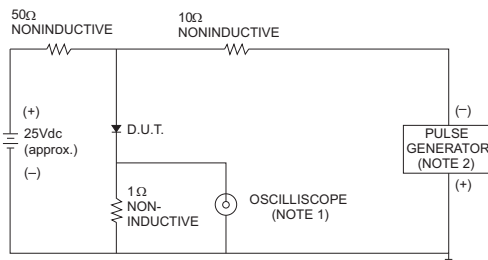


FIG.3- TEST CIRCUIT DIAGRAM AND REVERSE RECOVERY TIME CHARACTERISTICS



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

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

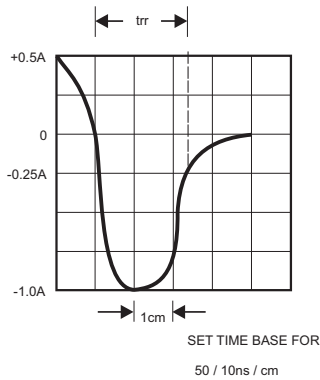
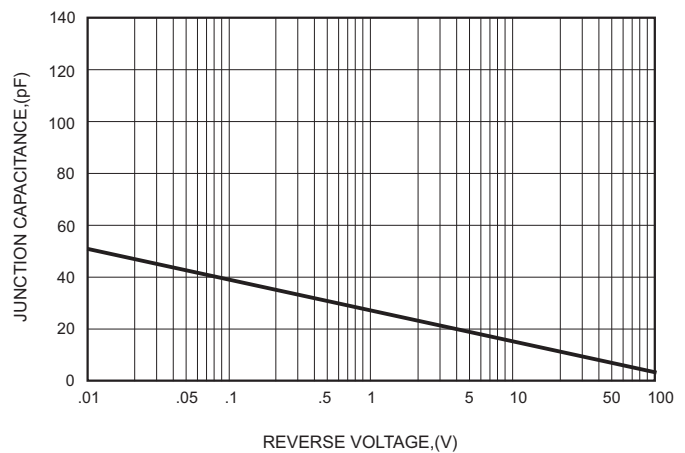


FIG.5-TYPICAL JUNCTION CAPACITANCE



## HFM101-MS THRU HFM107-MS

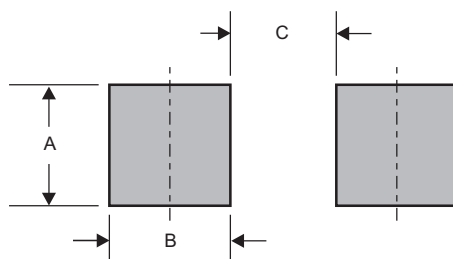
## Pinning information

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

## Marking

| Type number | Marking code |
|-------------|--------------|
| HFM101-MS   | H1           |
| HFM102-MS   | H2           |
| HFM103-MS   | H3           |
| HFM104-MS   | H4           |
| HFM105-MS   | H5           |
| HFM106-MS   | H6           |
| HFM107-MS   | H7           |

## Suggested solder pad layout

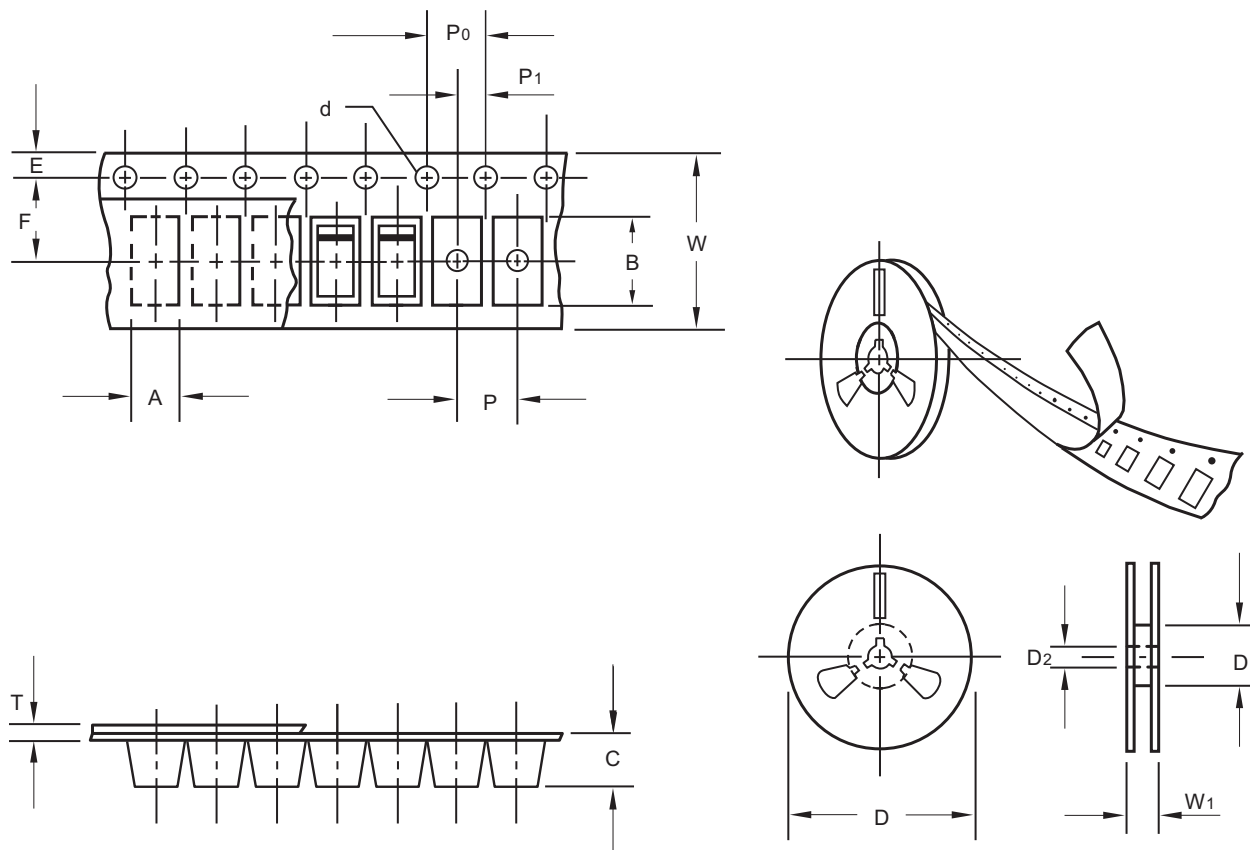


Dimensions in inches and (millimeters)

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

## HFM101-MS THRU HFM107-MS

## 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.

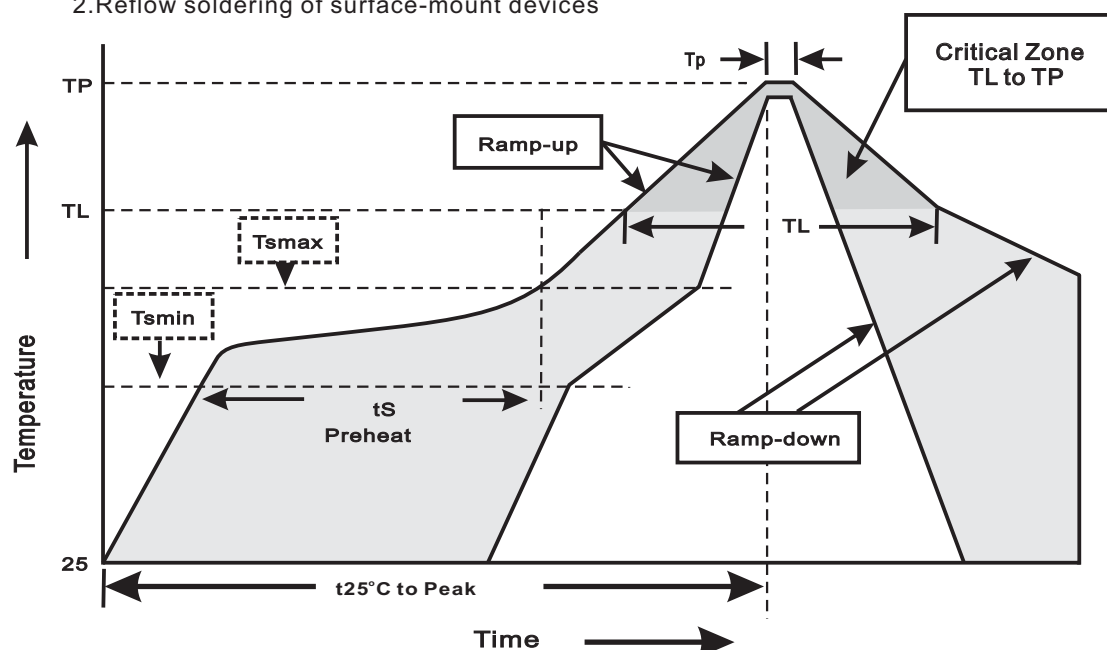
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## Reel packing

| PACKAGE  | REEL SIZE | REEL<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) |
|----------|-----------|---------------|-------------------------------|--------------|-----------------------|-----------------------|-------------------------|-----------------|---------------------------------|
| SOD-123S | 7"        | 3,000         | 4.0                           | 30,000       | 183*123*183           | 178                   | 382*257*387             | 240,000         | 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 $T_P$ )                                                                    | $<3^{\circ}\text{C}/\text{sec}$                                          |
| Preheat<br>-Temperature Min( $T_{smin}$ )<br>-Temperature Max( $T_{smax}$ )<br>-Time(min to max)( $t_s$ ) | $150^{\circ}\text{C}$<br>$200^{\circ}\text{C}$<br>$60\sim 120\text{sec}$ |
| $T_{smax}$ 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                                                             | $<6\text{minutes}$                                                       |

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## High reliability test capabilities

| Item Test                         | Conditions                                                                                                                                 | Reference                     |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. Solder Resistance              | at $260 \pm 5^{\circ}\text{C}$ for $10 \pm 2\text{sec.}$                                                                                   | MIL-STD-750D<br>METHOD-2031   |
| 2. Solderability                  | at $245 \pm 5^{\circ}\text{C}$ 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 $175^{\circ}\text{C}$ for 1000 hrs.                                                                                                     | MIL-STD-750D<br>METHOD-1031   |