

# FMBTRC101SS Thru FMBTRC106SS

## List

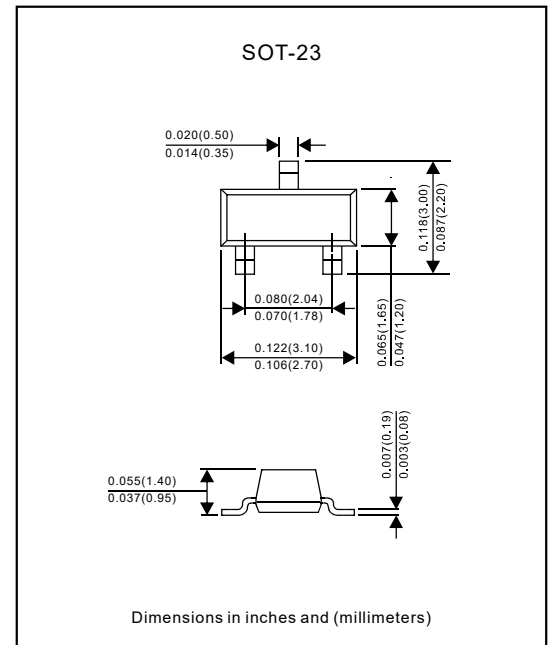
|                                                         |     |
|---------------------------------------------------------|-----|
| List.....                                               | 1   |
| Package outline.....                                    | 2   |
| Features.....                                           | 2   |
| Mechanical data.....                                    | 2   |
| Maximum ratings .....                                   | 2   |
| Electrical characteristics.....                         | 3   |
| Rating and characteristic curves.....                   | 4~6 |
| Pinning information.....                                | 7   |
| Marking and Resistor values.....                        | 7   |
| Suggested solder pad layout.....                        | 7   |
| Packing Information.....                                | 8   |
| Reel packing.....                                       | 9   |
| Suggested thermal profiles for soldering processes..... | 9   |

**FMBTRC101SS Thru FMBTRC106SS****100mA 50V NPN Silicon Digital Transistors****Features**

- With built-in bias resistors.
- Simplify circuit design.
- Reduce a quantity of parts and manufacturing process.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen free parts, ex. FMBTRC101SS-H.

**Mechanical data**

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

**Package outline****Maximum ratings** (At  $T_A=25^\circ\text{C}$  unless otherwise noted)

| Parameter                 |             | Symbol    | Value       | Unit             |
|---------------------------|-------------|-----------|-------------|------------------|
| Output voltage            |             | $V_o$     | 50          | V                |
| Input voltage             | FMBTRC101SS | $V_i$     | 20, -10     | V                |
|                           | FMBTRC102SS |           | 30, -10     |                  |
|                           | FMBTRC103SS |           | 40, -10     |                  |
|                           | FMBTRC104SS |           | 40, -10     |                  |
|                           | FMBTRC105SS |           | 12, -5      |                  |
|                           | FMBTRC106SS |           | 20, -5      |                  |
| Output current            |             | $I_o$     | 100         | mA               |
| Total power dissipation   |             | $P_{tot}$ | 200         | mW               |
| Junction temperature      |             | $T_J$     | +150        | $^\circ\text{C}$ |
| Storage temperature range |             | $T_{STG}$ | -55 to +150 | $^\circ\text{C}$ |

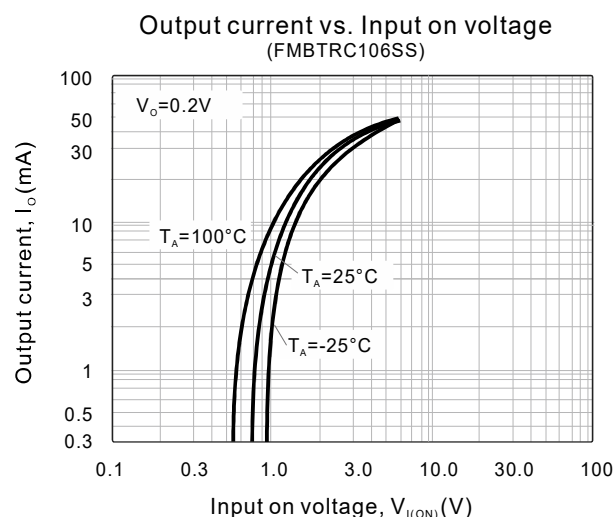
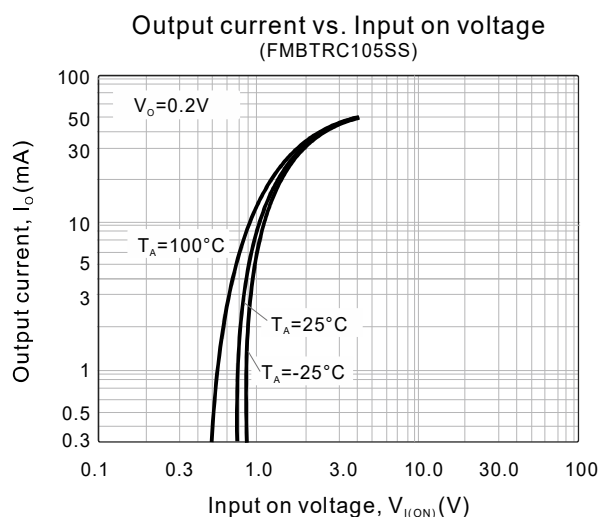
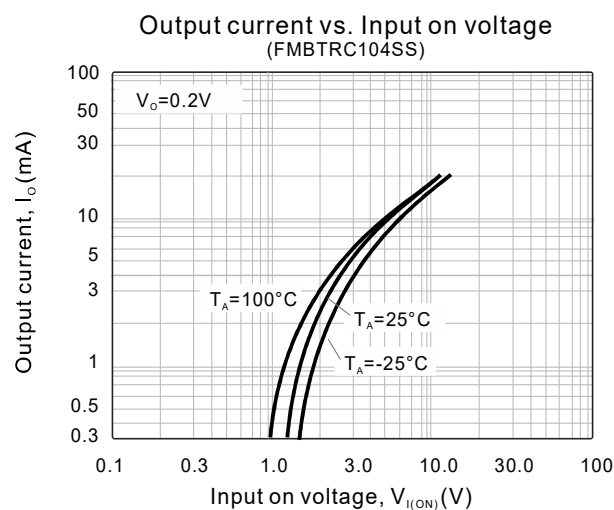
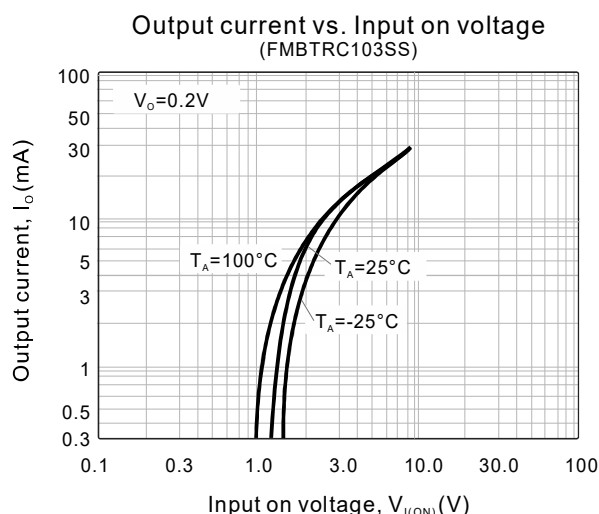
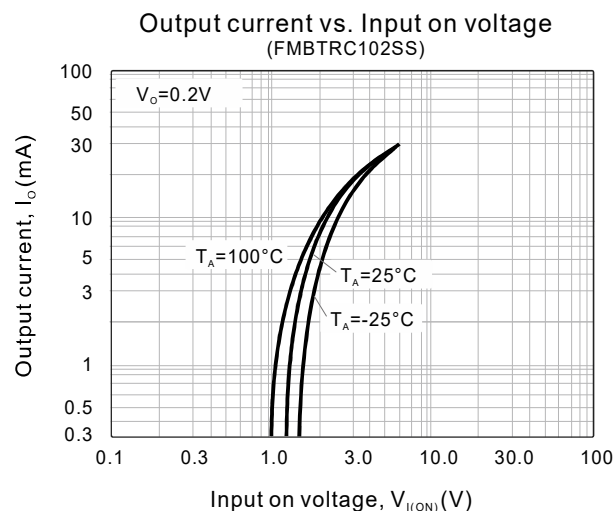
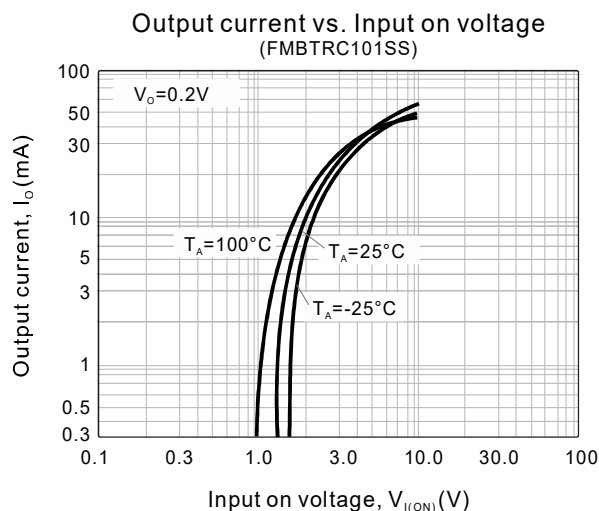
## FMBTRC101SS Thru FMBTRC106SS

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

| Parameter               | Conditions             | Device      | Symbol         | Min. | Typ. | Max. | Unit |
|-------------------------|------------------------|-------------|----------------|------|------|------|------|
| DC current gain         | $V_o=5V, I_o=10mA$     | FMBTRC101SS | $h_{FE}$       | 30   |      |      |      |
|                         |                        | FMBTRC102SS |                | 50   |      |      |      |
|                         |                        | FMBTRC103SS |                | 70   |      |      |      |
|                         |                        | FMBTRC104SS |                | 80   |      |      |      |
|                         |                        | FMBTRC105SS |                | 80   |      |      |      |
|                         |                        | FMBTRC106SS |                | 80   |      |      |      |
| Output cutoff current   | $V_o=50V$              |             | $I_{O( OFF )}$ |      |      | 500  | nA   |
| Input current           | $V_i=5V$               | FMBTRC101SS | $I_i$          |      |      | 1.8  | mA   |
|                         |                        | FMBTRC102SS |                |      |      | 0.88 |      |
|                         |                        | FMBTRC103SS |                |      |      | 0.36 |      |
|                         |                        | FMBTRC104SS |                |      |      | 0.18 |      |
|                         |                        | FMBTRC105SS |                |      |      | 3.6  |      |
|                         |                        | FMBTRC106SS |                |      |      | 1.8  |      |
| Output voltage          | $I_o=10mA, I_i=0.5mA$  |             | $V_{O( ON )}$  |      |      | 0.3  | V    |
| Input on voltage (ON)   | $V_o=0.2V, I_o=5mA$    | FMBTRC101SS | $V_{I( ON )}$  |      |      | 2.0  | V    |
|                         |                        | FMBTRC102SS |                |      |      | 2.4  |      |
|                         |                        | FMBTRC103SS |                |      |      | 3.0  |      |
|                         |                        | FMBTRC104SS |                |      |      | 5.0  |      |
|                         |                        | FMBTRC105SS |                |      |      | 1.1  |      |
|                         |                        | FMBTRC106SS |                |      |      | 1.3  |      |
| Input off voltage (OFF) | $V_o=5V, I_o=100\mu A$ | FMBTRC101SS | $V_{I( OFF )}$ | 1.0  |      |      | V    |
|                         |                        | FMBTRC102SS |                |      |      |      |      |
|                         |                        | FMBTRC103SS |                |      |      |      |      |
|                         |                        | FMBTRC104SS |                | 0.5  |      |      |      |
|                         |                        | FMBTRC105SS |                |      |      |      |      |
|                         |                        | FMBTRC106SS |                |      |      |      |      |
| Transition frequency    | $V_o=10V, I_o=5mA$     |             | $f_T^{(1)}$    |      | 200  |      | MHz  |

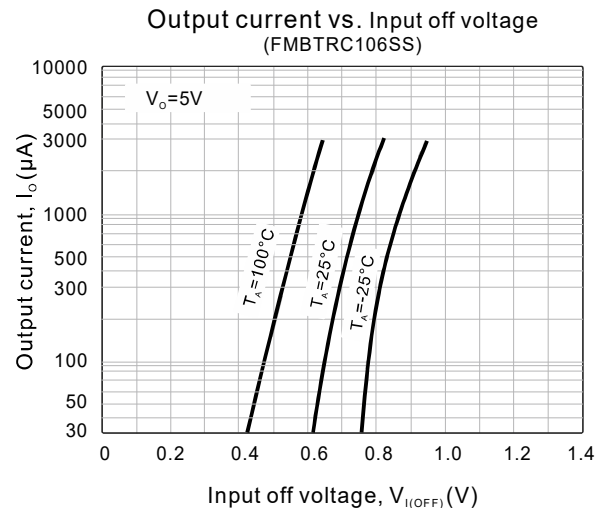
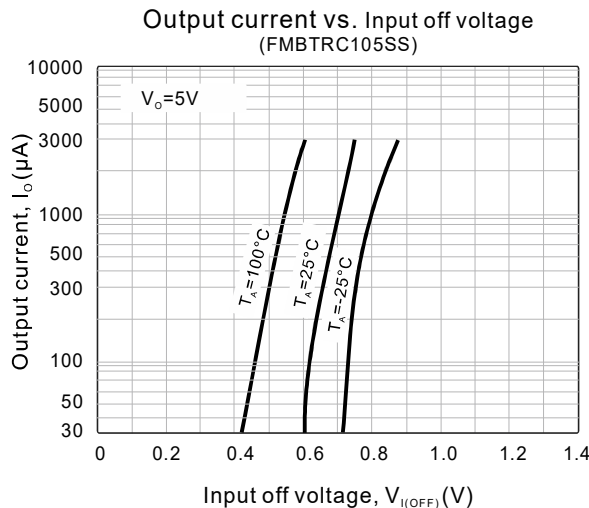
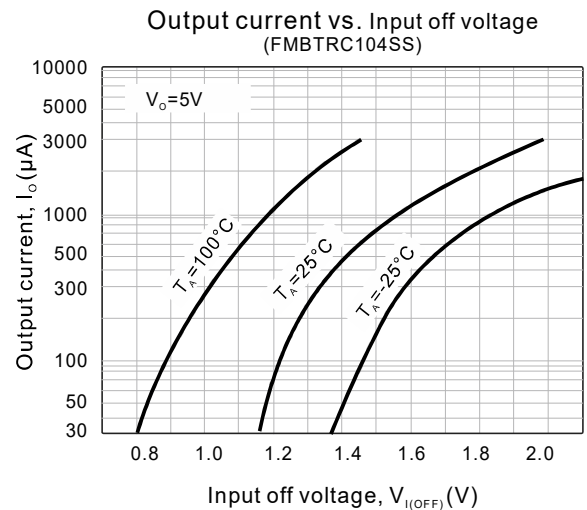
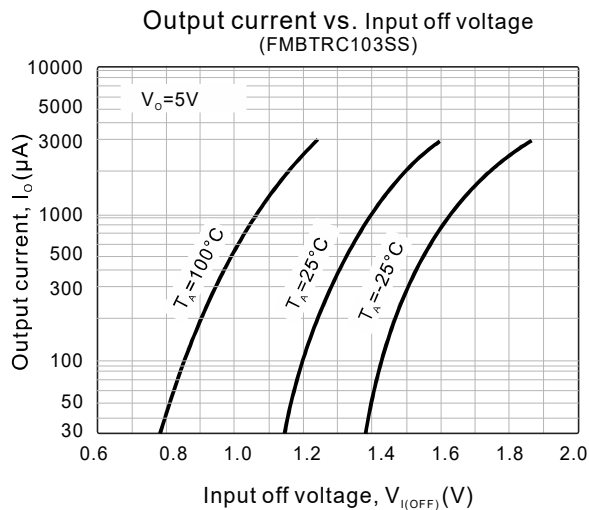
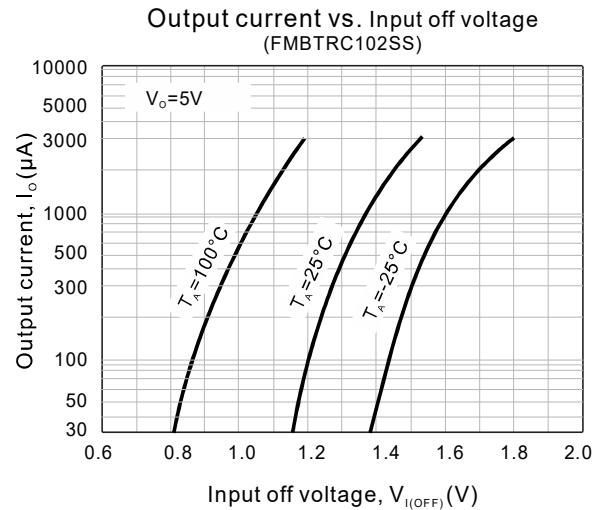
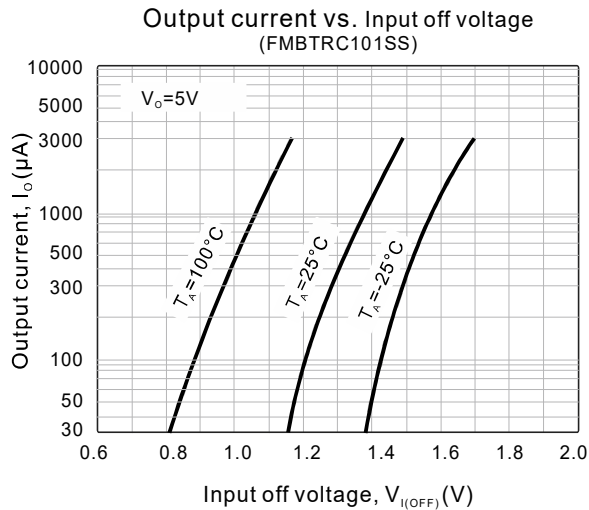
1. Characteristic of transistor only.

## FMBTRC101SS Thru FMBTRC106SS

Rating and characteristic curves (At  $T_A=25^\circ\text{C}$  unless otherwise noted)

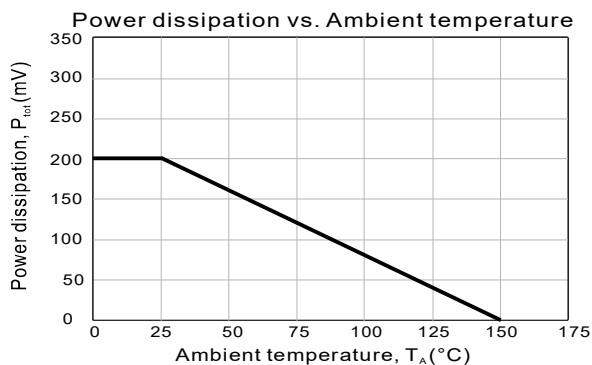
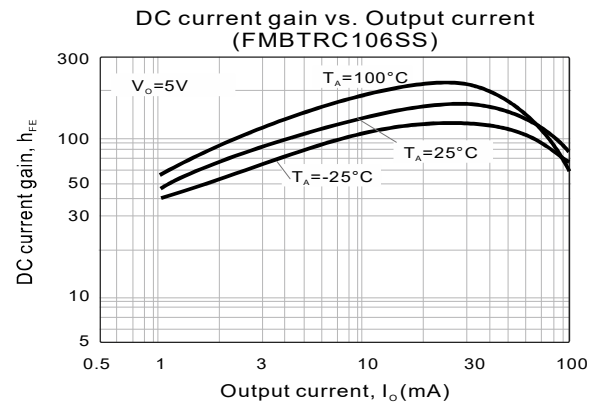
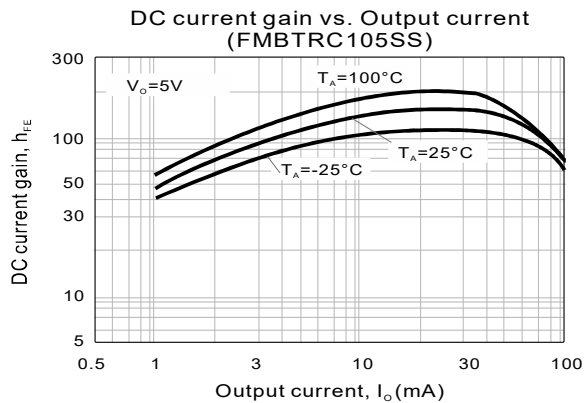
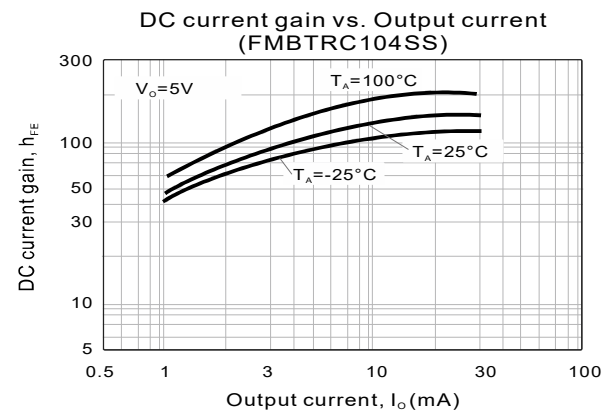
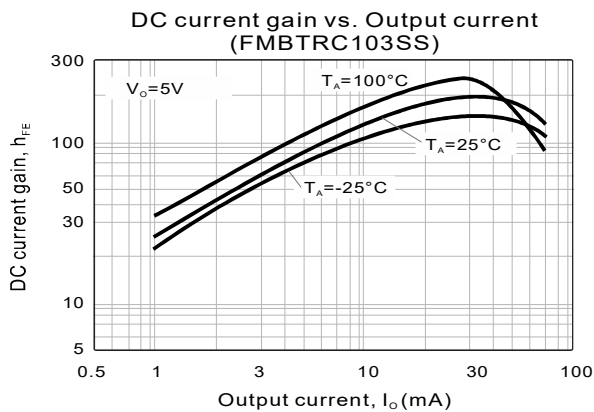
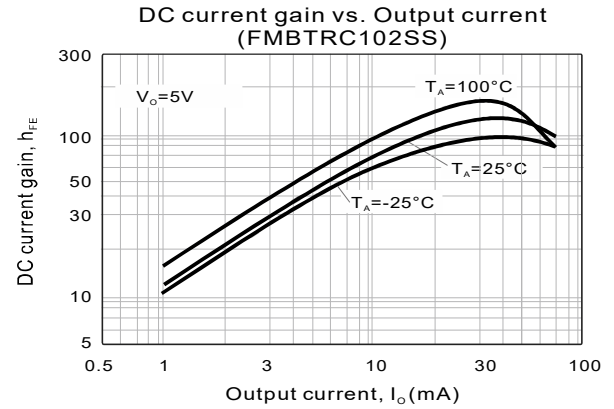
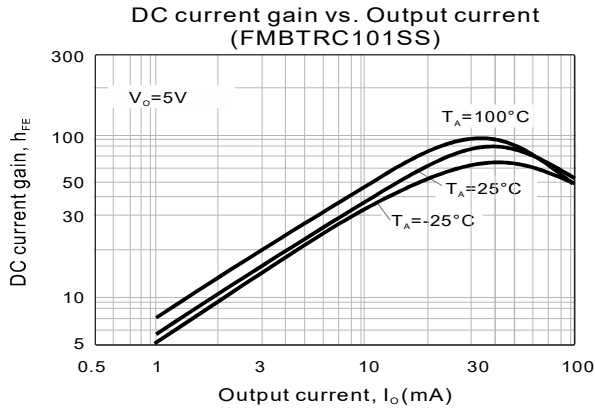
# FMBTRC101SS Thru FMBTRC106SS

**Rating and characteristic curves** (At  $T_A=25^\circ\text{C}$  unless otherwise noted)

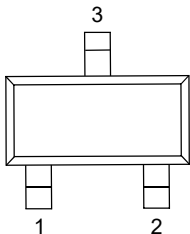
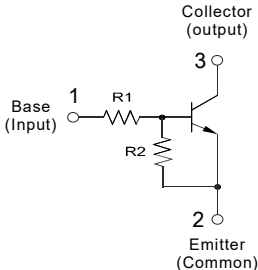


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**Rating and characteristic curves** (At  $T_A=25^\circ\text{C}$  unless otherwise noted)

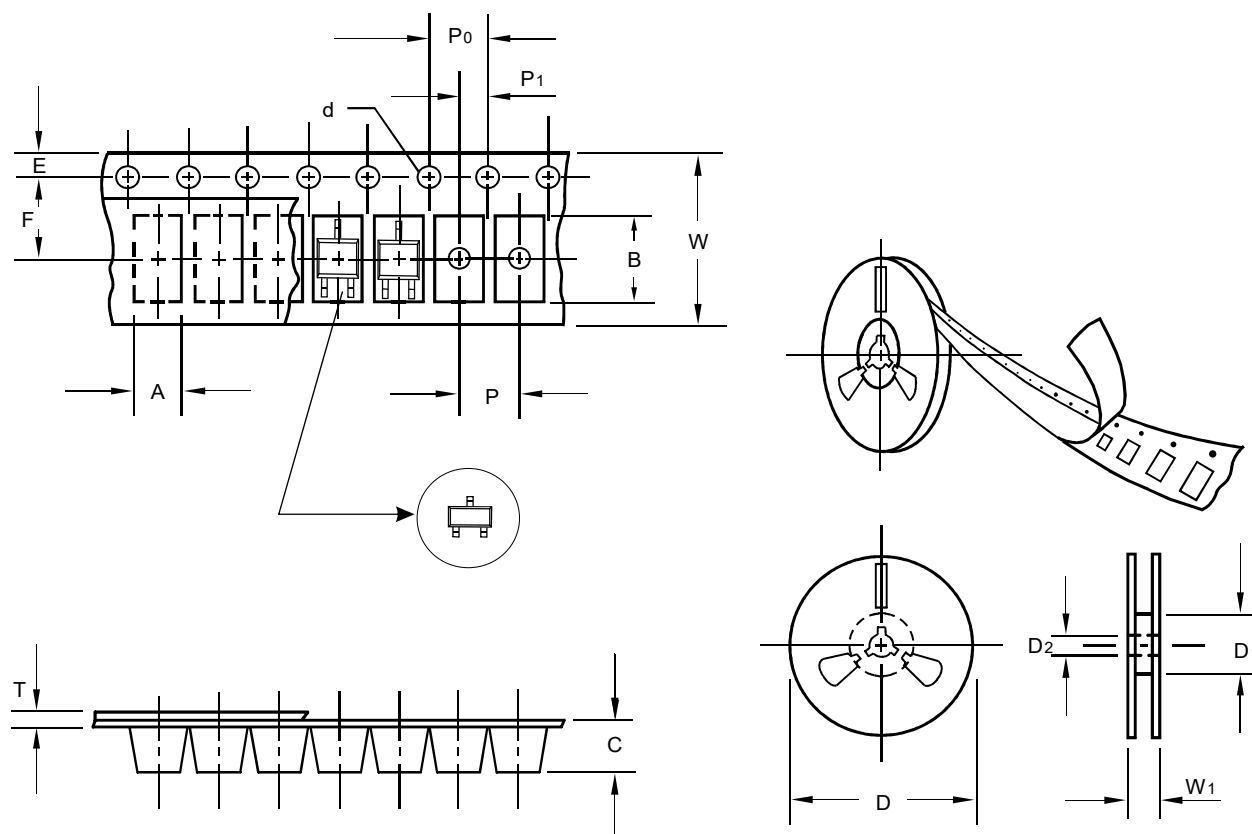


**FMBTRC101SS Thru FMBTRC106SS****Pinning information**

| Pin                                         | Simplified outline                                                                | Symbol                                                                              |
|---------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin1 Base<br>Pin2 Emitter<br>Pin3 Collector |  |  |

**Marking and resistor values**

| Type number | Marking code | R1(k $\Omega$ ) | R2(k $\Omega$ ) |
|-------------|--------------|-----------------|-----------------|
| FMBTRC101SS | 1BR          | 4.7             | 4.7             |
| FMBTRC102SS | 2BR          | 10              | 10              |
| FMBTRC103SS | 3BR          | 22              | 22              |
| FMBTRC104SS | 4BR          | 47              | 47              |
| FMBTRC105SS | 5BR          | 2.2             | 47              |
| FMBTRC106SS | 6BR          | 4.7             | 47              |

**FMBTRC101SS Thru FMBTRC106SS****Packing information**

unit:mm

| Item                      | Symbol         | Tolerance | SOT-23 |
|---------------------------|----------------|-----------|--------|
| Carrier width             | A              | 0.1       | 3.15   |
| Carrier length            | B              | 0.1       | 2.77   |
| Carrier depth             | C              | 0.1       | 1.22   |
| Sprocket hole             | d              | 0.1       | 1.50   |
| 13" Reel outside diameter | D              | 2.0       | -      |
| 13" Reel inner diameter   | D <sub>1</sub> | min       | -      |
| 7" Reel outside diameter  | D              | 2.0       | 178.00 |
| 7" Reel inner diameter    | D <sub>1</sub> | min       | 55.00  |
| 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       | 3.50   |
| Punch hole pitch          | P              | 0.1       | 4.00   |
| 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       | 8.00   |
| Reel width                | W <sub>1</sub> | 1.0       | 12.0   |

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

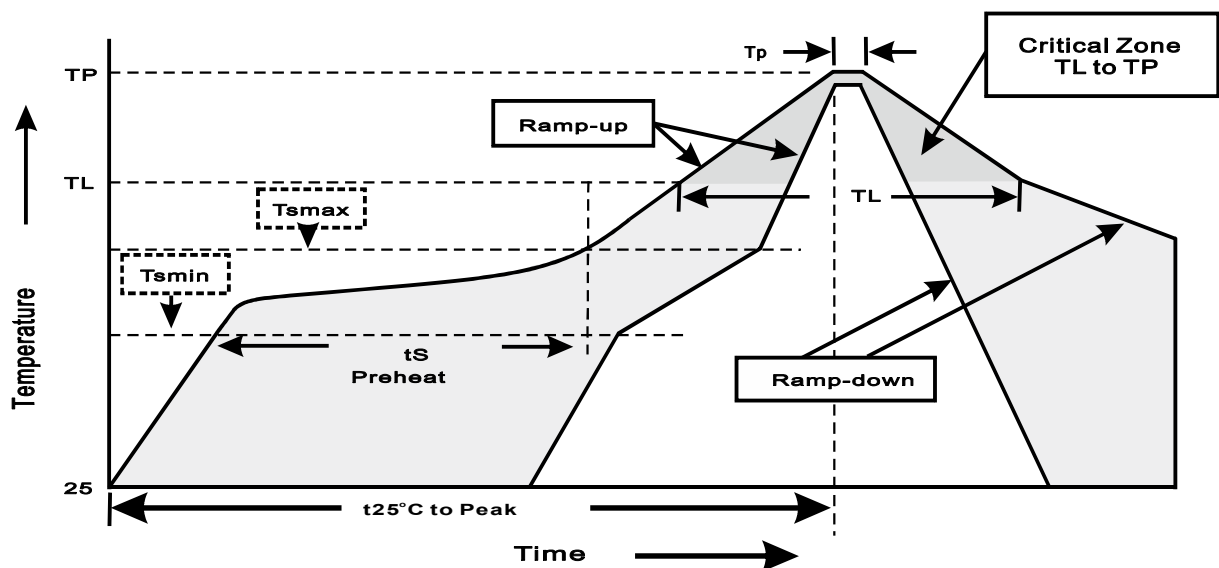
## FMBTRC101SS Thru FMBTRC106SS

## 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) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|
| SOT-23  | 7"        | 3,000      | 4.0                     | 30,000    | 183*123*183     | 178             | 382*257*387       | 240,000      |

## 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( $T_{\text{min}}$ )<br>-Temperature Max( $T_{\text{max}}$ )<br>-Time(min to max)( $t_s$ ) | 150°C<br>200°C<br>60~120sec     |
| $T_{\text{max}}$ to $T_L$<br>-Ramp-upRate                                                                             | $<3^{\circ}\text{C}/\text{sec}$ |
| Time maintained above:<br>-Temperature( $T_L$ )<br>-Time( $t_L$ )                                                     | 217°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                                                                                                        | $<6^{\circ}\text{C}/\text{sec}$ |
| Time 25°C to Peak Temperature                                                                                         | $<6\text{minutes}$              |