

# FMBTRA104SS

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# FMBTRA104SS

## PNP Silicon Epitaxial Planar Digital Transistor

### Features

- With built-in bias resistors.
- Simplify circuit design.
- Reduce a quantity of parts and manufacturing process.
- We declare that the material of product compliance with RoHS requirements.
- Suffix "-H" indicates Halogen free parts, ex. FMBTRA104SS-H.

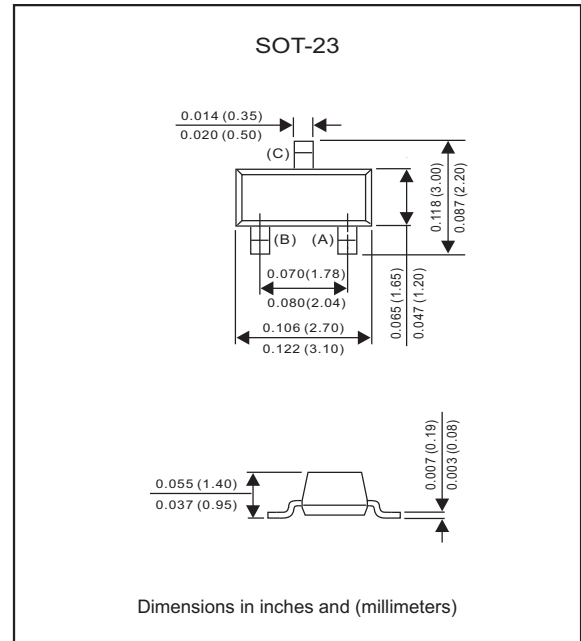
### Applications

- Inverter, Interface, Driver

### 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
- Weight : Approximated 0.008 gram

### 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             | $-V_i$    | 40, -10     | V                  |
| Output current            | $-I_o$    | 100         | mA                 |
| Power dissipation         | $P_{tot}$ | 200         | mW                 |
| Junction temperature      | $T_j$     | 150         | $^{\circ}\text{C}$ |
| Storage temperature range | $T_{stg}$ | -55 to +150 | $^{\circ}\text{C}$ |

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

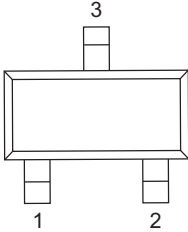
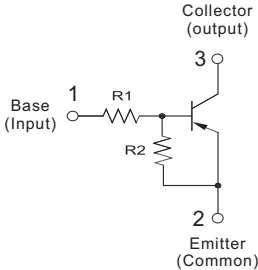
| Parameter              | Conditions                                     | Symbol        | Min. | Typ. | Max. | Unit       |
|------------------------|------------------------------------------------|---------------|------|------|------|------------|
| DC current gain        | $-V_o=5\text{V}$ , $-I_o=10\text{mA}$          | $h_{FE}$      | 80   |      |      |            |
| Output cut-off current | $-V_o=50\text{V}$                              | $-I_{O(OFF)}$ |      |      | 500  | nA         |
| Input current          | $-V_i=5\text{V}$                               | $I_i$         |      |      | 0.18 | mA         |
| Output voltage         | $-I_o=10\text{mA}$ , $-I_i=0.5\text{mA}$       | $-V_{O(ON)}$  |      |      | 0.3  | V          |
| Input voltage (ON)     | $-V_o=0.2\text{V}$ , $-I_o=5\text{mA}$         | $-V_{I(ON)}$  |      |      | 5    | V          |
| Input voltage (OFF)    | $-V_o=5\text{V}$ , $-I_o=0.1\text{mA}$         | $-V_{I(OFF)}$ | 1    |      |      | V          |
| Transition frequency   | $-V_o=10\text{V}$ , $-I_o=5\text{mA}$ (Note 1) | $f_T$         |      | 200  |      | MHZ        |
| Input resistance       |                                                | $R_i$         |      | 47   |      | K $\Omega$ |
| Resistance ratio       |                                                | $R_1 / R_2$   |      | 1    |      |            |

Note :

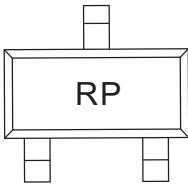
1.Characteristic of transistor only.

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Pinning information

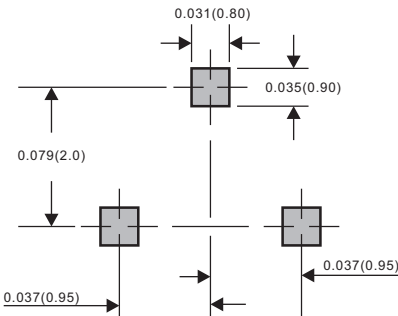
| Pin                                         | Simplified outline                                                                | Symbol                                                                              |
|---------------------------------------------|-----------------------------------------------------------------------------------|---------------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

Marking

| Type numbe  | Marking code                                                                       |
|-------------|------------------------------------------------------------------------------------|
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Suggested solder pad layout

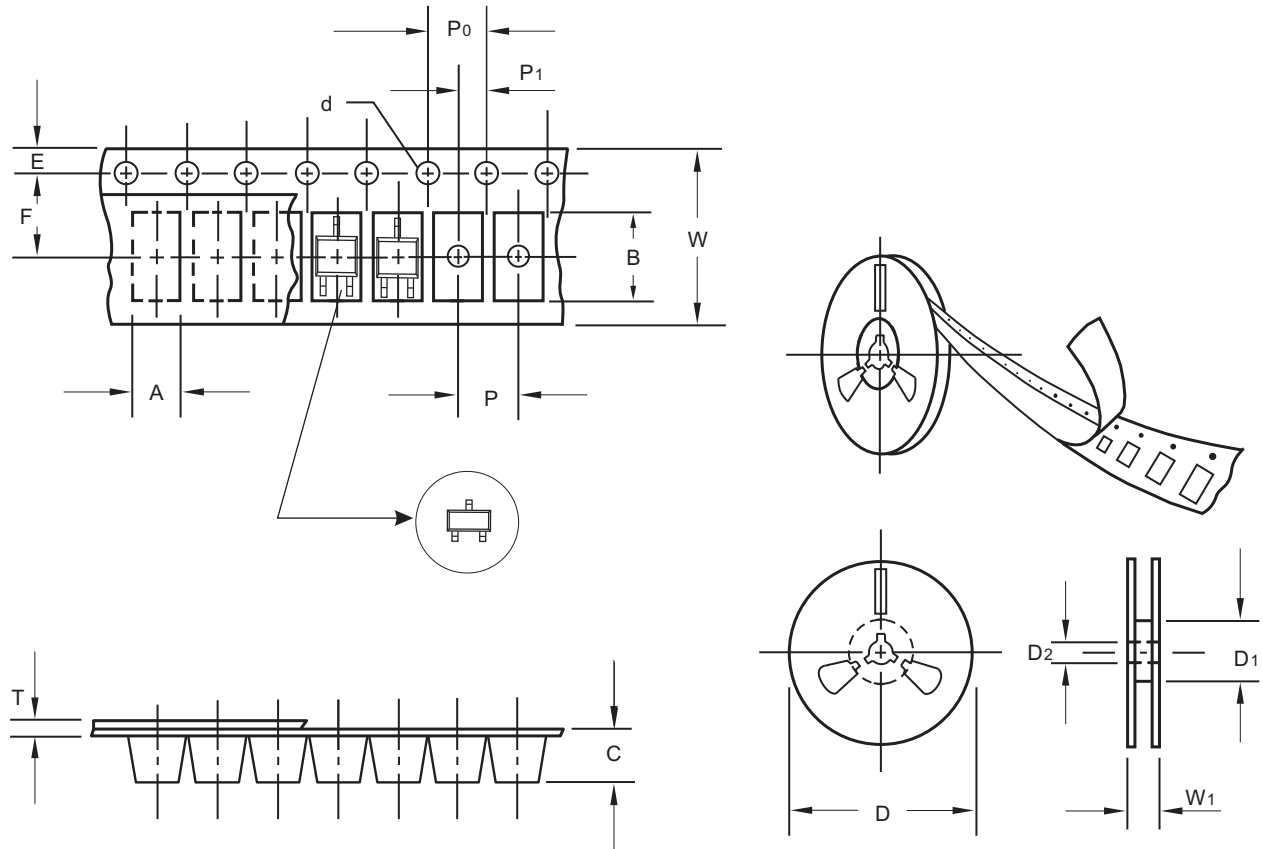
SOT-23



Dimensions in inches and (millimeters)

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## 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   | D1     | min       | -      |
| 7" Reel outside diameter  | D      | 2.0       | 178.00 |
| 7" Reel inner diameter    | D1     | min       | 55.00  |
| 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       | 12.0   |

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

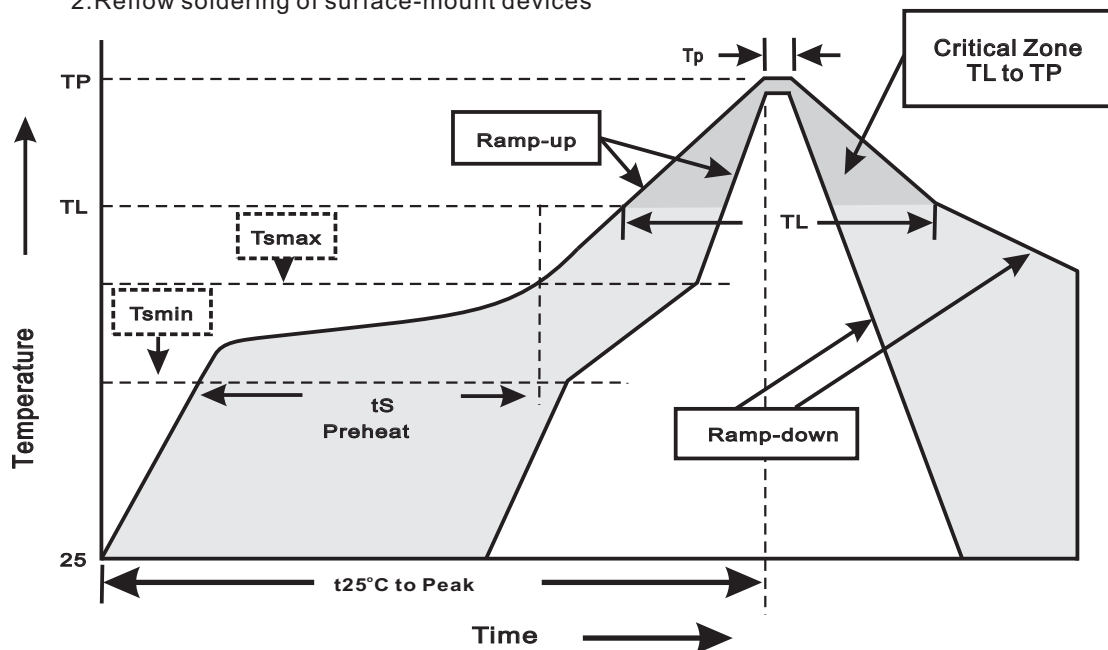
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## Reel packing

| 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) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SOT-23  | 7"        | 3,000      | 4.0                     | 30,000    | 183*123*183     | 178             | 382*257*387       | 240,000      | 11.6                      |

## 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( $T_{smin}$ )<br>-Temperature Max( $T_{smax}$ )<br>-Time(min to max)( $t_s$ ) | 150°C<br>200°C<br>60~120sec |
| $T_{smax}$ 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                   |