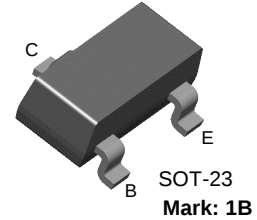


# MMBT2222

## NPN General Purpose Amplifier

- Sourced from process 19.



## Absolute Maximum Ratings\* $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter                                        | Ratings   | Units            |
|----------------|--------------------------------------------------|-----------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 30        | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 60        | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 5.0       | V                |
| $I_C$          | Collector Current - Continuous                   | 0.6       | A                |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 ~ 150 | $^\circ\text{C}$ |

\* This ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

### NOTES:

- These rating are based on a maximum junction temperature of 150 degrees C.
- These are steady limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

## Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol                     | Parameter                              | Test Condition                                                                                                                                                                                                                                                                   | Min.                              | Max.       | Units                          |
|----------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------|--------------------------------|
| <b>Off Characteristics</b> |                                        |                                                                                                                                                                                                                                                                                  |                                   |            |                                |
| $V_{(BR)CEO}$              | Collector-Emitter Breakdown Voltage *  | $I_C = 10\text{mA}, I_B = 0$                                                                                                                                                                                                                                                     | 30                                |            | V                              |
| $V_{(BR)CBO}$              | Collector-Base Breakdown Voltage       | $I_C = 10\mu\text{A}, I_E = 0$                                                                                                                                                                                                                                                   | 60                                |            | V                              |
| $V_{(BR)EBO}$              | Emitter-Base Breakdown Voltage         | $I_E = 10\mu\text{A}, I_C = 0$                                                                                                                                                                                                                                                   | 5.0                               |            | V                              |
| $I_{CBO}$                  | Collector Cutoff Current               | $V_{CB} = 50\text{V}, I_E = 0$<br>$V_{CB} = 50\text{V}, I_E = 0, T_a = 125^\circ\text{C}$                                                                                                                                                                                        |                                   | 10<br>10   | $\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{EBO}$                  | Emitter Cutoff Current                 | $V_{EB} = 3.0\text{V}, I_C = 0$                                                                                                                                                                                                                                                  |                                   | 10         | nA                             |
| <b>On Characteristics</b>  |                                        |                                                                                                                                                                                                                                                                                  |                                   |            |                                |
| $h_{FE}$                   | DC Current Gain                        | $I_C = 0.1\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 1.0\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 10\text{mA}, V_{CE} = 10\text{V}$<br>$I_C = 150\text{mA}, V_{CE} = 10\text{V} *$<br>$I_C = 150\text{mA}, V_{CE} = 1.0\text{V} *$<br>$I_C = 500\text{mA}, V_{CE} = 10\text{V} *$ | 35<br>50<br>75<br>100<br>50<br>30 | 300        |                                |
| $V_{CE(sat)}$              | Collector-Emitter Saturation Voltage * | $I_C = 150\text{mA}, I_B = 15\text{V}$<br>$I_C = 500\text{mA}, I_B = 50\text{V}$                                                                                                                                                                                                 |                                   | 0.4<br>1.6 | V                              |
| $V_{BE(sat)}$              | Base-Emitter Saturation Voltage        | $I_C = 150\text{mA}, I_B = 15\text{V}$<br>$I_C = 500\text{mA}, I_B = 50\text{V}$                                                                                                                                                                                                 |                                   | 1.3<br>2.6 | V                              |

**Electrical Characteristics** (Continued)  $T_a = 25^\circ\text{C}$  unless otherwise noted

| Symbol                              | Parameter                      | Test Condition                                                                                         | Min. | Max. | Units |
|-------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------|------|------|-------|
| <b>Small Signal Characteristics</b> |                                |                                                                                                        |      |      |       |
| $f_T$                               | Current Gain Bandwidth Product | $I_C = 20\text{mA}$ , $V_{CE} = 20\text{V}$ , $f = 100\text{MHz}$                                      | 250  |      |       |
| $C_{obo}$                           | Output Capacitance             | $V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$                                                  |      | 8.0  | pF    |
| $C_{ibo}$                           | Input Capacitance              | $V_{EB} = 0.5\text{V}$ , $I_C = 0$ , $f = 1\text{MHz}$                                                 |      | 30   | pF    |
| <b>Switching Characteristics</b>    |                                |                                                                                                        |      |      |       |
| $t_d$                               | Delay Time                     | $V_{CC} = 30\text{V}$ , $V_{BE(OFF)} = 0.5\text{V}$ ,<br>$I_C = 150\text{mA}$ , $I_{B1} = 15\text{mA}$ |      | 10   | ns    |
| $t_r$                               | Rise Time                      |                                                                                                        |      | 25   | ns    |
| $t_s$                               | Storage Time                   | $V_{CC} = 30\text{V}$ , $I_C = 150\text{mA}$ ,<br>$I_{B1} = I_{B2} = 15\text{mA}$                      |      | 225  | ns    |
| $t_f$                               | Fall Time                      |                                                                                                        |      | 60   | ns    |

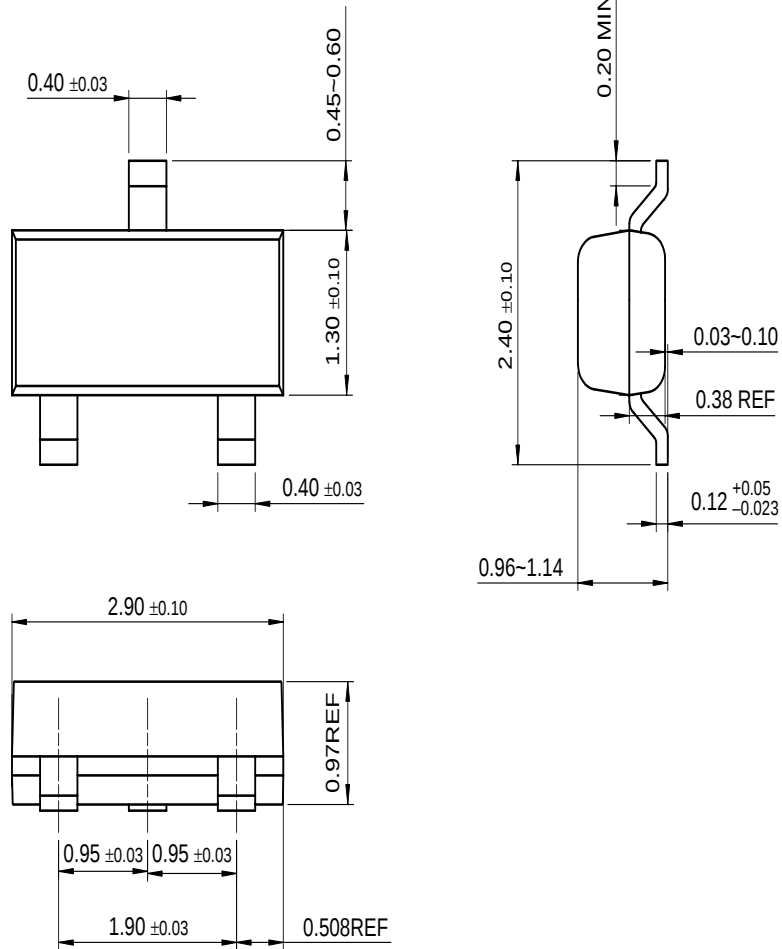
\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ **Thermal Characteristics**  $T_a = 25^\circ\text{C}$  unless otherwise noted

| Symbol          | Parameter                               | Max. | Units                |
|-----------------|-----------------------------------------|------|----------------------|
| $P_D$           | Total Device Dissipation                | 350  | mW                   |
|                 | Derate above $25^\circ\text{C}$         | 2.8  | mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 357  | $^\circ\text{C/W}$   |

\* Device mounted on FR-4PCB  $1.6" \times 1.6" \times 0.06"$ .

## Package Dimensions

## SOT-23



Dimensions in Millimeters

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