

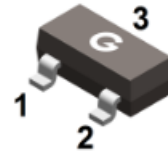
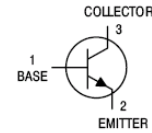
### Features

- Epitaxial planar die construction
- Ultra-small surface mount package
- RoHS compliant with Halogen-free

**HF**

### Mechanical Data

- Case: SOT-23
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Tin-plated; solderability per MIL-STD-202, Method 208



**SOT-23**

### Ordering Information

| Part Number | Package | Shipping Quantity      | Marking Code |
|-------------|---------|------------------------|--------------|
| MMBT2222    | SOT-23  | 3000 pcs / Tape & Reel | M1B          |

### Maximum Ratings (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                                                                    | Symbol    | Value | Unit |
|------------------------------------------------------------------------------|-----------|-------|------|
| Collector-Base Breakdown Voltage                                             | $V_{CBO}$ | 60    | V    |
| Collector-Emitter Breakdown Voltage                                          | $V_{CEO}$ | 30    | V    |
| Emitter-Base Breakdown Voltage                                               | $V_{EBO}$ | 5     | V    |
| Continuous Collector Current                                                 | $I_C$     | 0.6   | A    |
| Peak Collector Current (pulse width $\leq 40\mu\text{s}$ , $\delta = 0.35$ ) | $I_{CM}$  | 1.5   | A    |

### Thermal Characteristics

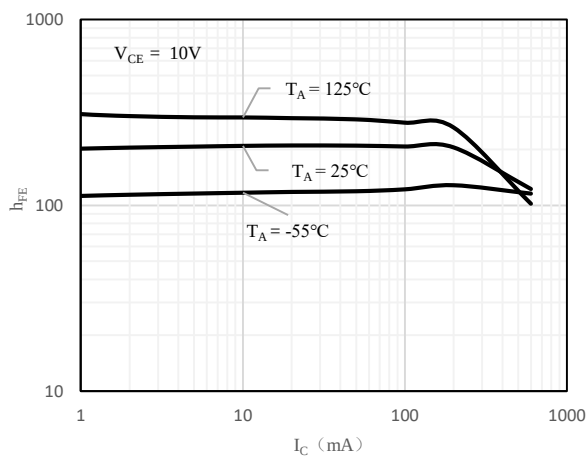
| Parameter                                              | Symbol          | Value      | Unit               |
|--------------------------------------------------------|-----------------|------------|--------------------|
| Power Dissipation                                      | $P_D$           | 300        | mW                 |
| Thermal Resistance (Junction-to-Ambient) <sup>*1</sup> | $R_{\theta JA}$ | 417        | $^\circ\text{C/W}$ |
| Thermal Resistance (Junction-to-Case) <sup>*1</sup>    | $R_{\theta JC}$ | 380        | $^\circ\text{C/W}$ |
| Thermal Resistance (Junction-to-Lead) <sup>*1</sup>    | $R_{\theta JL}$ | 350        | $^\circ\text{C/W}$ |
| Ambient Temperature                                    | $T_A$           | -55 ~ +150 | $^\circ\text{C}$   |
| Operating junction Temperature                         | $T_J$           | -55 ~ +150 | $^\circ\text{C}$   |
| Storage Temperature Range                              | $T_{STG}$       | -55 ~ +150 | $^\circ\text{C}$   |

Note 1: The data tested by surface mounted on a 15mm \* 15mm \* 1mm FR4-epoxy P.C.B

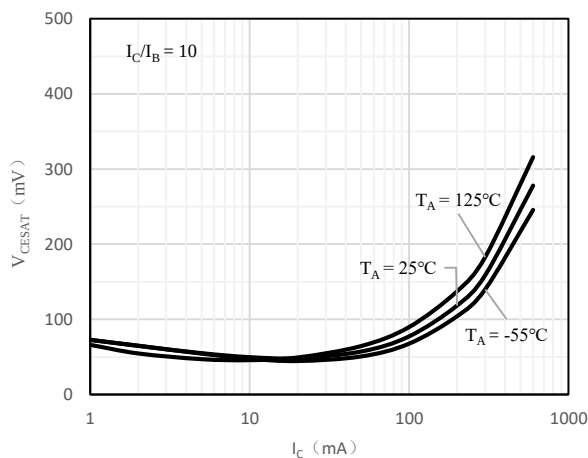
### Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol        | Test Condition                                                  | Min. | Typ. | Max. | Unit |
|--------------------------------------|---------------|-----------------------------------------------------------------|------|------|------|------|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = 10\mu\text{A}, I_E = 0$                                  | 60   | -    | -    | V    |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = 10\text{mA}, I_B = 0$                                    | 30   | -    | -    | V    |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = 10\mu\text{A}, I_C = 0$                                  | 5    | -    | -    | V    |
| Collector Cut-off Current            | $I_{CBO}$     | $V_{CB} = 50\text{V}, I_E = 0$                                  | -    | -    | 10   | nA   |
| Emitter Cut-off Current              | $I_{EBO}$     | $V_{EB} = 3\text{V}, I_C = 0$                                   | -    | -    | 10   | nA   |
| DC Current Gain                      | $h_{FE}$      | $V_{CE} = 10\text{V}, I_C = 0.1\text{mA}$                       | 35   | -    | -    | -    |
|                                      |               | $V_{CE} = 10\text{V}, I_C = 1\text{mA}$                         | 50   | -    | -    | -    |
|                                      |               | $V_{CE} = 10\text{V}, I_C = 10\text{mA}$                        | 75   | -    | -    | -    |
|                                      |               | $V_{CE} = 10\text{V}, I_C = 150\text{mA}$                       | 100  | -    | 300  | -    |
|                                      |               | $V_{CE} = 10\text{V}, I_C = 500\text{mA}$                       | 30   | -    | -    | -    |
|                                      |               | $V_{CE} = 1\text{V}, I_C = 150\text{mA}$                        | 50   | -    | -    | -    |
| Collector-emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 500\text{mA}, I_B = 50\text{mA}$                         | -    | -    | 1.6  | V    |
|                                      |               | $I_C = 150\text{mA}, I_B = 15\text{mA}$                         | -    | -    | 0.4  | V    |
| Base-emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = 500\text{mA}, I_B = 50\text{mA}$                         | -    | -    | 2.6  | V    |
|                                      |               | $I_C = 150\text{mA}, I_B = 15\text{mA}$                         | -    | -    | 1.3  | V    |
| Base-Emitter Voltage                 | $V_{BE(on)}$  | $I_C = 200\text{mA}, V_{CE} = 10\text{V}$                       | -    | -    | 1    | V    |
| Transition Frequency                 | $f_T$         | $I_C = 20\text{mA}, V_{CE} = 20\text{V}$<br>$f = 100\text{MHz}$ | 250  | -    | -    | MHz  |
| Collector Output Capacitance         | $C_{OBO}$     | $V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$                 | -    | -    | 8    | pF   |
| Delay Time                           | $t_d$         | $V_{CC} = 30\text{V}, I_C = 150\text{mA}$                       | -    | -    | 10   | ns   |
| Rise Time                            | $t_r$         | $V_{BE(OFF)} = -0.5\text{V}, I_{B1} = 15\text{mA}$              | -    | -    | 25   | ns   |
| Storag Time                          | $t_s$         | $V_{CC} = 30\text{V}, I_C = 150\text{mA}$                       | -    | -    | 225  | ns   |
| Fall Time                            | $t_f$         | $I_{B1} = -I_{B2} = 15\text{mA}$                                | -    | -    | 60   | ns   |

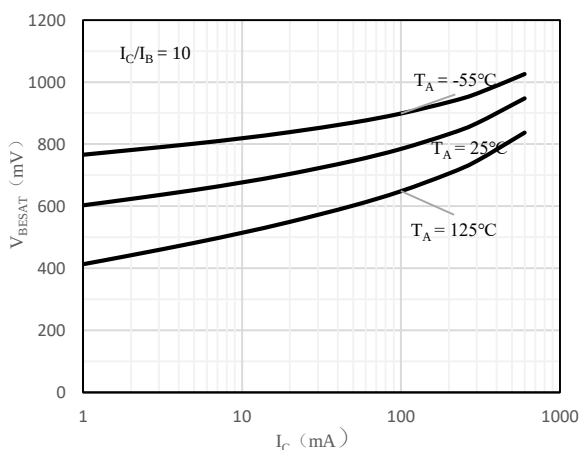
**Ratings and Characteristics Curves** (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)



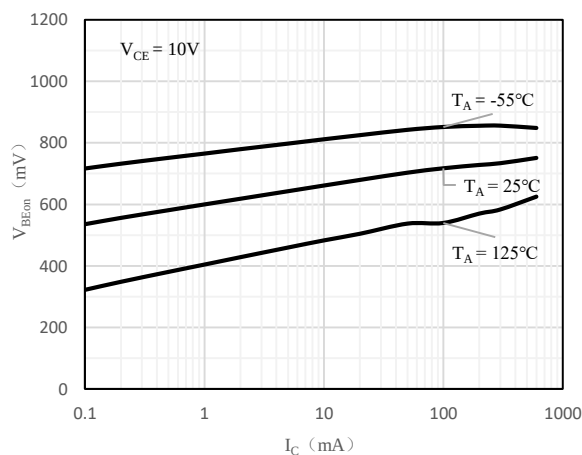
**Fig 1**  $h_{FE}$  vs.  $I_C$



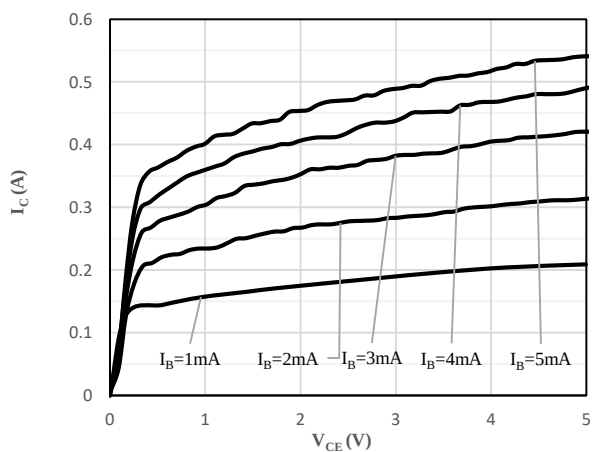
**Fig 2**  $V_{CE(sat)}$  vs.  $I_C$



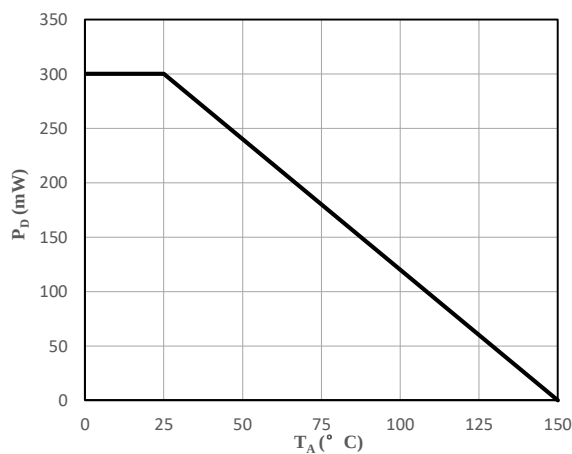
**Fig 3**  $V_{BE(sat)}$  vs.  $I_C$



**Fig 4**  $V_{BE(on)}$  vs.  $I_C$



**Fig 5**  $I_C$  vs.  $V_{CE}$



**Fig 6**  $P_D$  vs.  $T_A$

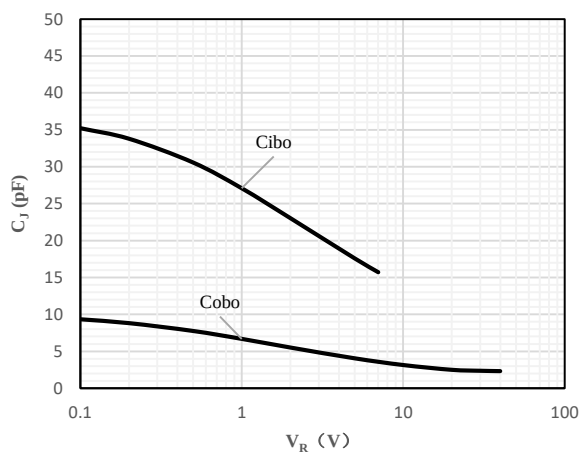
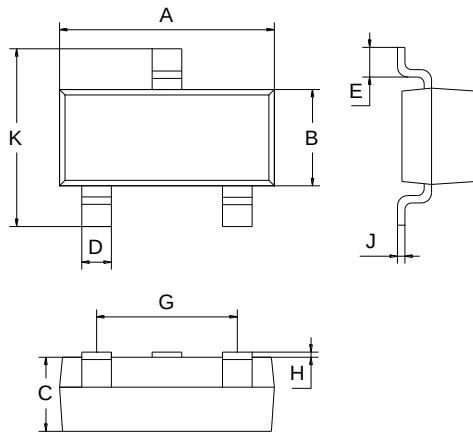


Fig 7  $C_J$  vs.  $V_R$

**Package Outline Dimensions** (Unit: mm)



| SOT-23    |      |      |
|-----------|------|------|
| Dimension | Min. | Max. |
| A         | 2.70 | 3.10 |
| B         | 1.10 | 1.50 |
| C         | 0.9  | 1.1  |
| D         | 0.3  | 0.5  |
| E         | 0.35 | 0.48 |
| G         | 1.80 | 2.00 |
| H         | 0.02 | 0.1  |
| J         | 0.05 | 0.15 |
| K         | 2.20 | 2.60 |

**Package Outline Dimensions** (Unit: mm)

**SOT-23**

