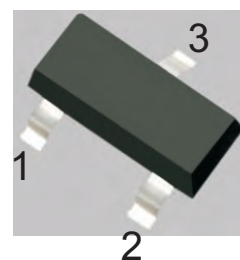


## SOT-23



1.BASE  
2.EMITTER  
3.COLLECTOR

### FEATURES

- Epitaxial planar die construction
- Complementary NPN Type available(MMBT2222A)

### MAXIMUM RATINGS (Ta=25°C unless otherwise noted)

| Parameter                                        | Symbol         | Value    | Unit |
|--------------------------------------------------|----------------|----------|------|
| Collector–Base Voltage                           | $V_{CB0}$      | -60      | V    |
| Collector–Emitter Voltage                        | $V_{CEO}$      | -60      | V    |
| Emitter–Base Voltage                             | $V_{EBO}$      | -5       | V    |
| Collector Current — Continuous                   | $I_C$          | -600     | mA   |
| Total Device Dissipation                         | $P_D$          | 250      | mW   |
| Thermal Resistance From Junction To Ambient      | $R_{thJA}$     | 500      | °C/W |
| Operation Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55~+150 | °C   |

### ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

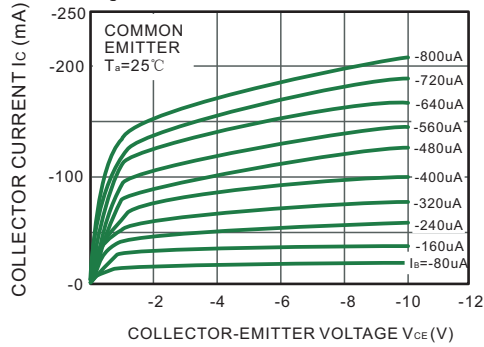
| Parameter                            | Symbol        | Test conditions                                        | Min | Typ | Max  | Unit |
|--------------------------------------|---------------|--------------------------------------------------------|-----|-----|------|------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C = -10\mu A, I_E = 0$                              | -60 |     |      | V    |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C = -10mA, I_B = 0$                                 | -60 |     |      | V    |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E = -10\mu A, I_C = 0$                              | -5  |     |      | V    |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = -50V, I_E = 0$                               |     |     | -20  | nA   |
| Base cut-off current                 | $I_{EBO}$     | $V_{EB} = -3V, I_C = 0$                                |     |     | -10  | nA   |
| Collector cut-off current            | $I_{CEX}$     | $V_{CE} = -30V, V_{BE} = -0.5V$                        |     |     | -50  | nA   |
| DC current gain                      | $h_{FE1}$     | $V_{CE} = -10V, I_C = -150mA$                          | 100 |     | 300  |      |
|                                      | $h_{FE2}$     | $V_{CE} = -10V, I_C = -0.1mA$                          | 75  |     |      |      |
|                                      | $h_{FE3}$     | $V_{CE} = -10V, I_C = -1mA$                            | 100 |     |      |      |
|                                      | $h_{FE4}$     | $V_{CE} = -10V, I_C = -10mA$                           | 100 |     |      |      |
|                                      | $h_{FE5}$     | $V_{CE} = -10V, I_C = -500mA$                          | 50  |     |      |      |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -150mA, I_B = -15mA$                            |     |     | -0.4 | V    |
|                                      | $V_{CE(sat)}$ | $I_C = -500mA, I_B = -50mA$                            |     |     | -1.6 | V    |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = -150mA, I_B = -15mA$                            |     |     | -1.3 | V    |
|                                      | $V_{BE(sat)}$ | $I_C = -500mA, I_B = -50mA$                            |     |     | -2.6 | V    |
| Transition frequency                 | $f_T$         | $V_{CE} = -20V, I_C = -50mA, f = 100MHz$               | 200 |     |      | MHz  |
| Delay time                           | $t_d$         | $V_{CE} = -30V, I_C = -150mA, I_{B1} = -15mA$          |     |     | 10   | ns   |
| Rise time                            | $t_r$         |                                                        |     |     | 25   | ns   |
| Storage time                         | $t_s$         | $V_{CE} = -6V, I_C = -150mA, I_{B1} = -I_{B2} = -15mA$ |     |     | 225  | ns   |
| Fall time                            | $t_f$         |                                                        |     |     | 60   | ns   |

### CLASSIFICATION OF $h_{FE}(1)$

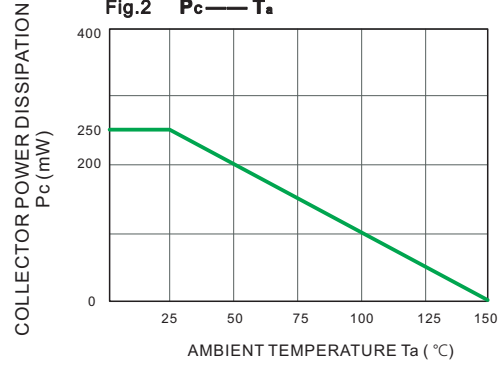
|       |         |         |
|-------|---------|---------|
| HFE   | 100-300 |         |
| RANK  | L       | H       |
| RANGE | 100-200 | 200-300 |

## TYPICAL CHARACTERISTICS

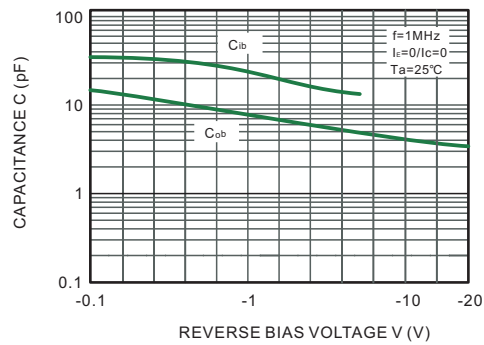
**Fig.1 Static characteristics**



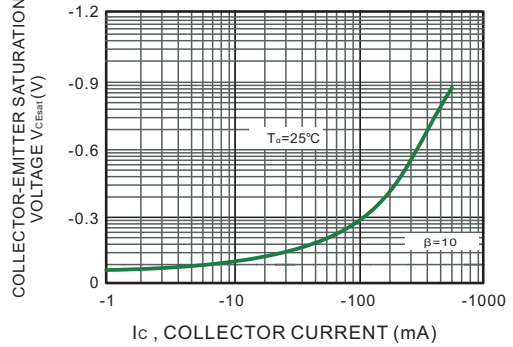
**Fig.2  $P_c$  —  $T_a$**



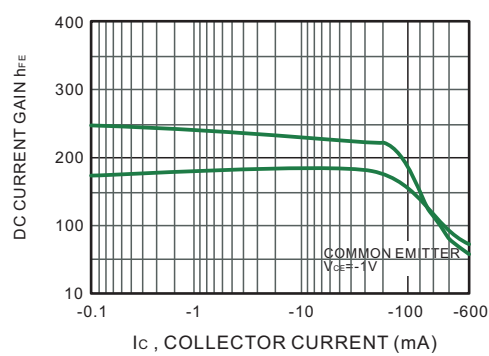
**Fig.3  $C_{ob}/C_{ib}$  —  $V_{cb}/V_{eb}$**



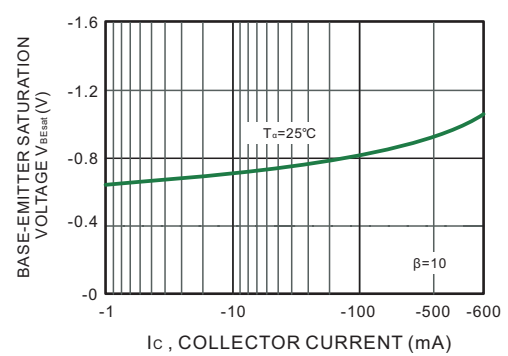
**Fig.4  $V_{ce(sat)}$  —  $I_c$**



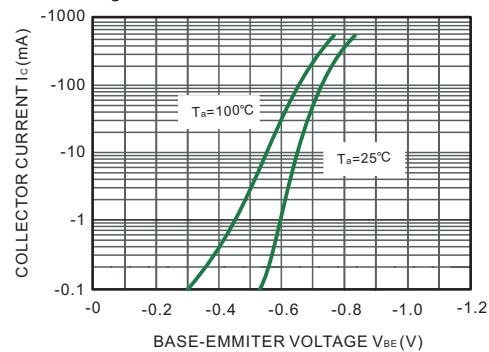
**Fig.5  $h_{FE}$  —  $I_c$**



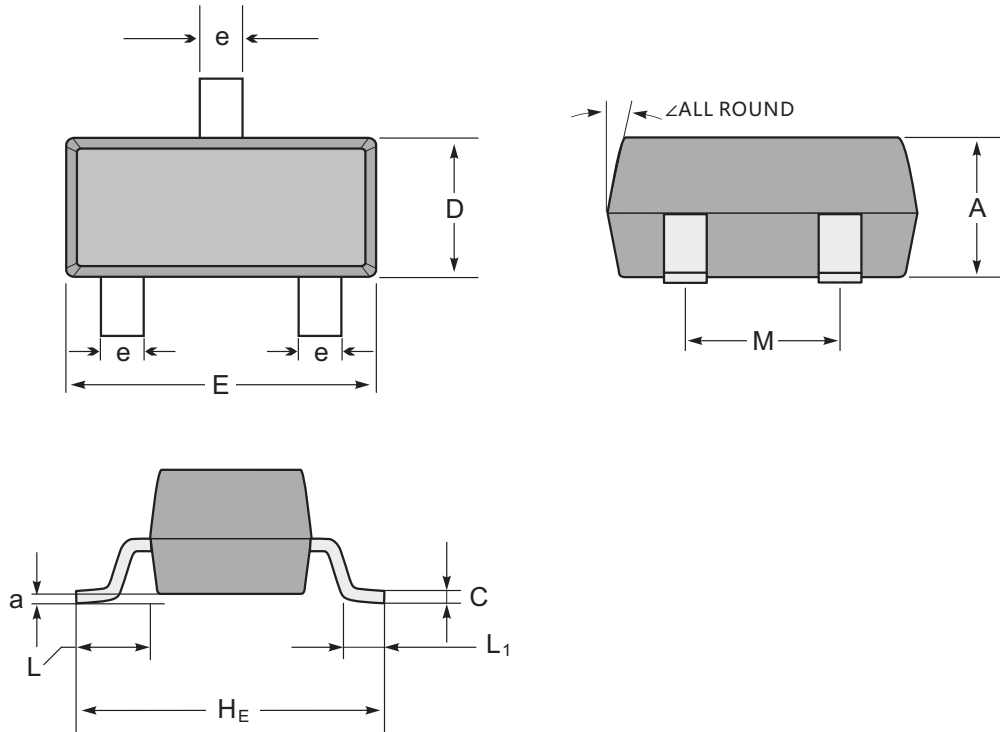
**Fig.6  $V_{be(sat)}$  —  $I_c$**



**Fig.7  $I_c$  —  $V_{be}$**



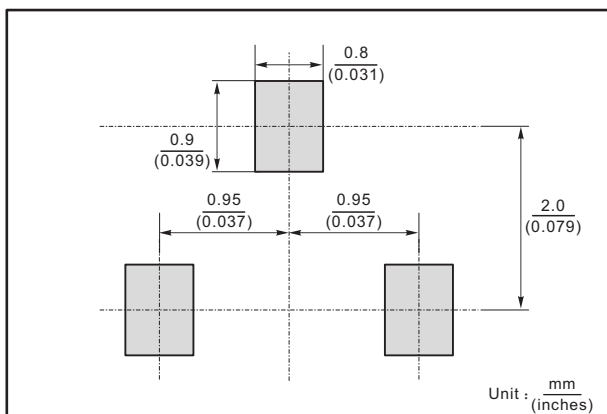
## SOT-23 Package Outline Dimensions



### SOT-23 mechanical data

| UNIT |     | A   | C    | D   | E   | HE  | e   | M    | L          | L <sub>1</sub> | a    | ∠   |
|------|-----|-----|------|-----|-----|-----|-----|------|------------|----------------|------|-----|
| mm   | max | 1.1 | 0.15 | 1.4 | 3.0 | 2.6 | 0.5 | 1.95 | 0.55 (ref) | 0.36 (ref)     | 0.0  | 12° |
|      | min | 0.9 | 0.08 | 1.2 | 2.8 | 2.2 | 0.3 | 1.7  |            |                | 0.15 |     |
| mil  | max | 43  | 6    | 55  | 118 | 102 | 20  | 77   | 22 (ref)   | 14 (ref)       | 0.0  |     |
|      | min | 35  | 3    | 47  | 110 | 87  | 12  | 67   |            |                | 6    |     |

### The recommended mounting pad size

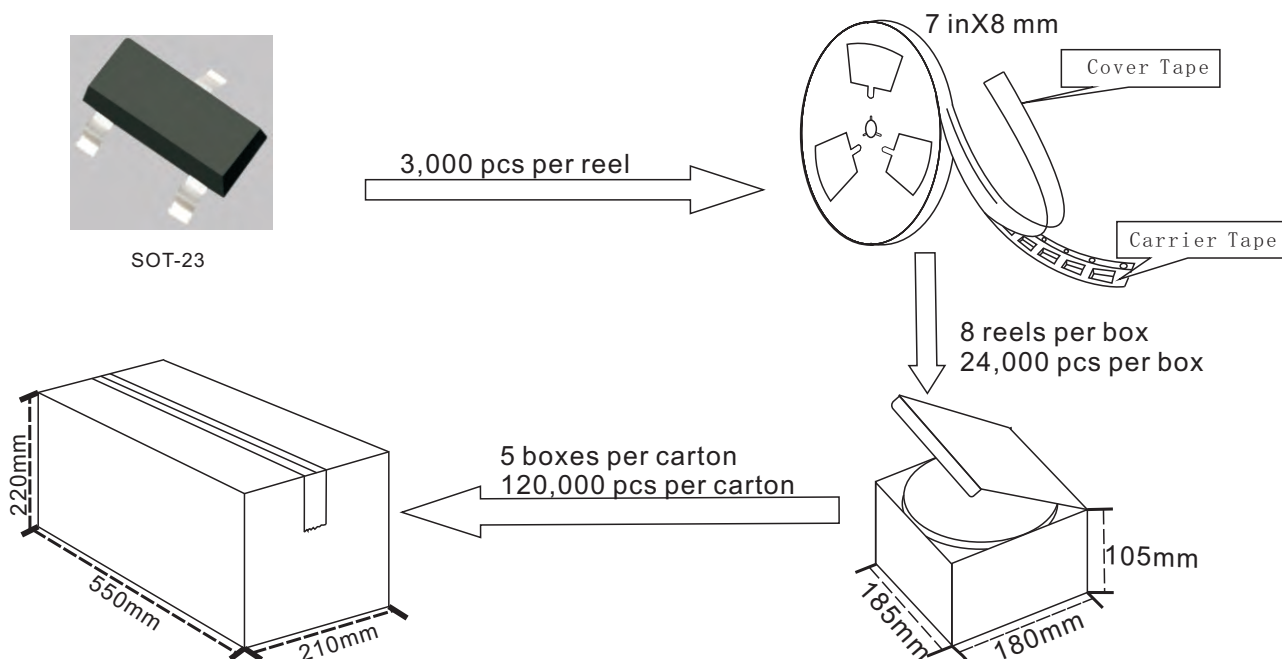


### Marking

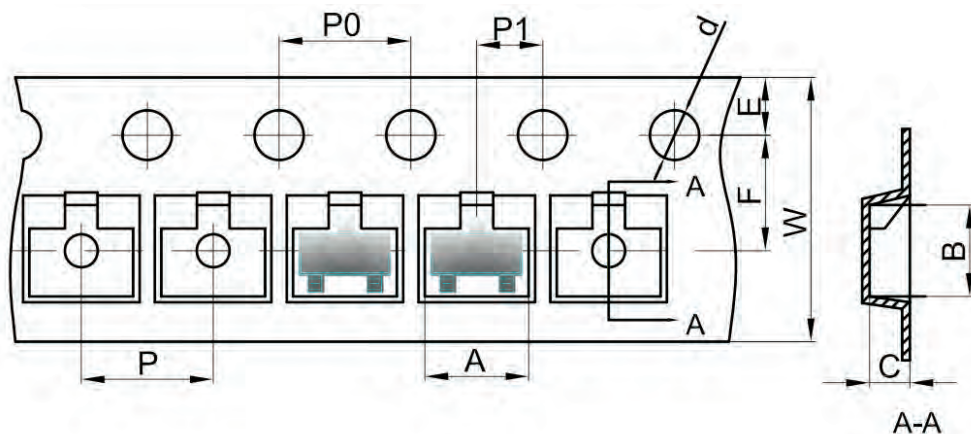
| Type number | Marking code |
|-------------|--------------|
| MMBT2907A   | 2F           |

## SOT-23 Packing

1.The method of packaging and dimension are shown as below figure. (Dimension in mm)



## SOT-23 Embossed Carrier Tape



| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |      |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type                     | A    | B    | C    | d     | E    | F    | P0   | P    | P1   | W    |
| SOT-23                       | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

## SOT-23 Tape Leader and Trailer

