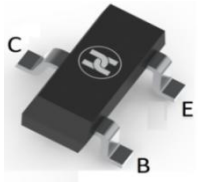
BIPOLAR TRANSISTOR (NPN)

## FEATURES

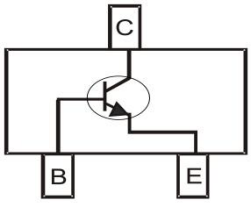
- Complementary to MMBT3906
- Surface Mount device




SOT-23

## MECHANICAL DATA

- Case: SOT-23
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.008 grams (approximate)




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

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 60 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 40 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 6 | V |
| Collector Current | $I_C$ | 200 | mA |
| Collector Power Dissipation | $P_C$ | 200 | mW |
| Thermal Resistance From Junction To Ambient | $R_{\theta JA}$ | 625 | °C/W |
| Junction Temperature | $T_J$ | 150 | °C |
| Storage Temperature | $T_{STG}$ | -55 ~+150 | °C |

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise specified)

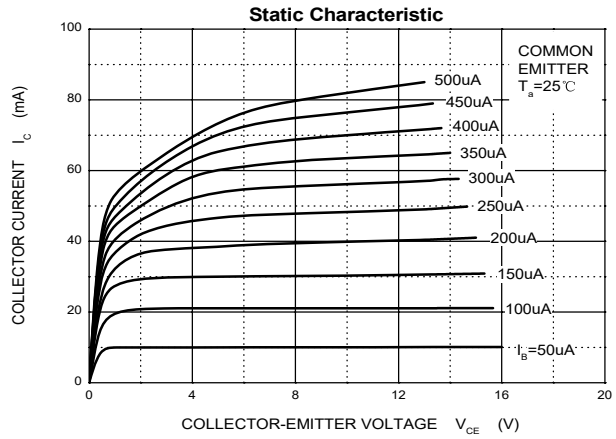
| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | 60 | | | V | $I_C$=10uA, $I_E$=0 |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | 40 | | | V | $I_C$=1mA, $I_B$=0 |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | 6 | | | V | $I_E$=10uA, $I_C$=0 |
| Collector cut-off current | $I_{CBO}$ | | | 0.1 | uA | $V_{CB}$=60V, $I_E$=0 |
| Collector cut-off current | $I_{CEX}$ | | | 0.05 | uA | $V_{CE}$=30V, $V_{BE(OFF)}$=3V |
| Emitter cut-off current | $I_{EBO}$ | | | 0.1 | uA | $V_{EB}$=5V, $I_C$=0 |
| DC current gain | $h_{FE1}$ | 100 | | 300 | | $V_{CE}$=1V, $I_C$=10mA |
| | $h_{FE2}$ | 60 | | | | $V_{CE}$=1V, $I_C$=50mA |
| | $h_{FE3}$ | 30 | | | | $V_{CE}$=1V, $I_C$=100mA |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | | | 0.3 | V | $I_C$=50mA, $I_B$=5mA |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | | | 0.95 | V | $I_C$=50mA, $I_B$=5mA |
| Transition frequency | $f_T$ | 300 | | | MHz | $V_{CE}$=20V, $I_C$=10mA,f=100MHz |
| Delay time | $t_d$ | | | 35 | ns | $V_{CC}$=3V, $V_{BE(OFF)}$=0.5V, $I_C$=10mA, $I_{B1}$=1mA |
| Rise time | $t_r$ | | | 35 | ns | |
| Storage time | $t_S$ | | | 200 | ns | $V_{CC}$=3V, $I_C$=10mA $I_{B1}$=$I_{B2}$=1mA |
| Fall time | $t_f$ | | | 50 | ns | |

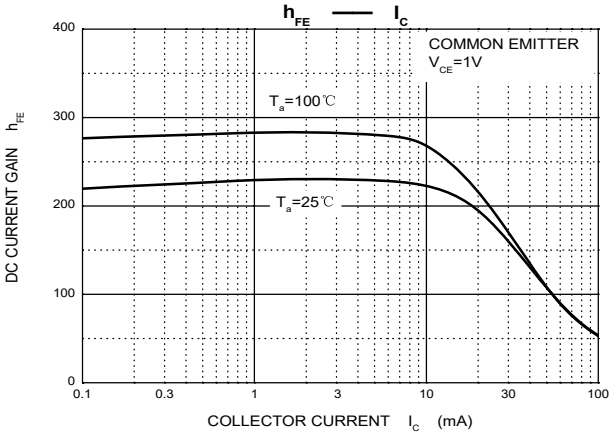
## CLASSIFICATION OF $h_{FE}$

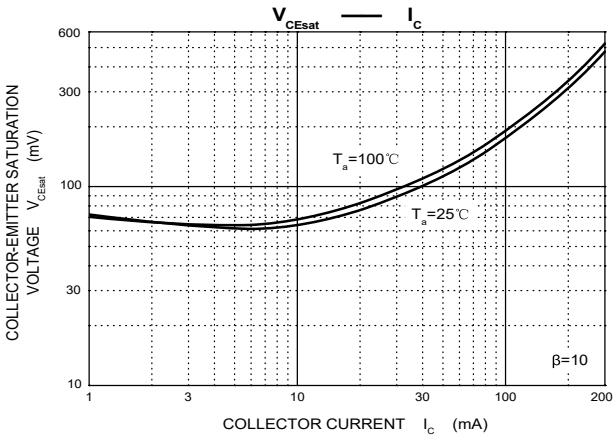
| Rank | L | H |
|---|---|---|
| Range | 100-200 | 200-300 |
| Marking | 1AM | |

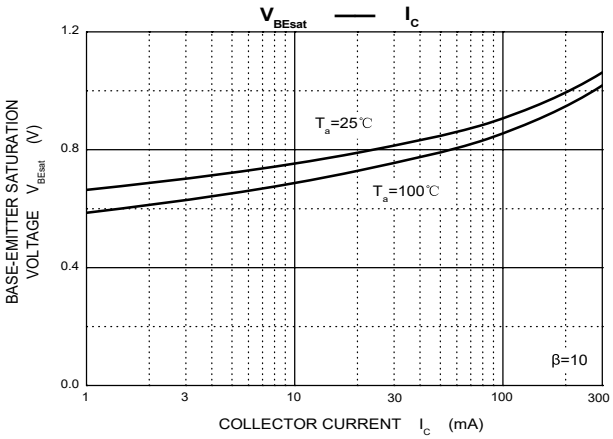
# BIPOLAR TRANSISTOR (NPN)

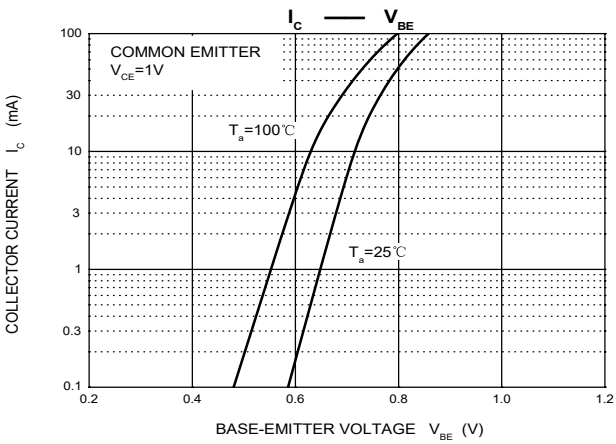
## Typical Characteristics

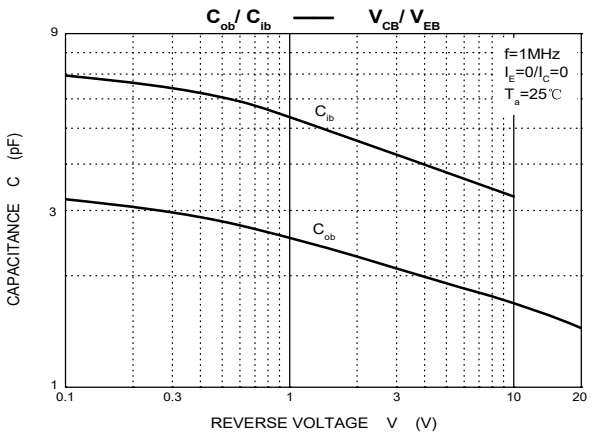


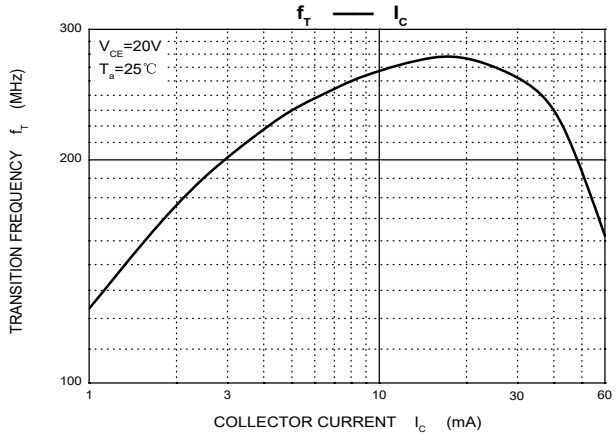



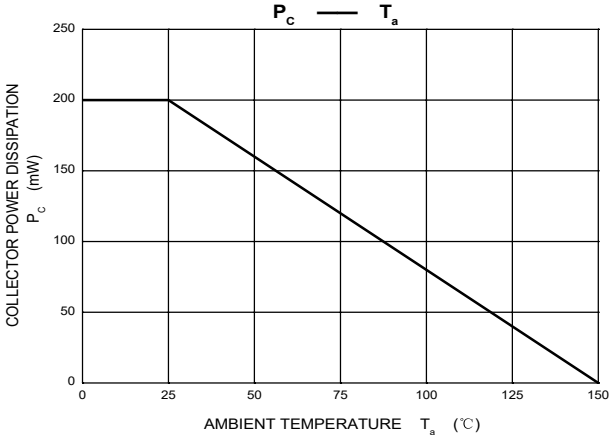



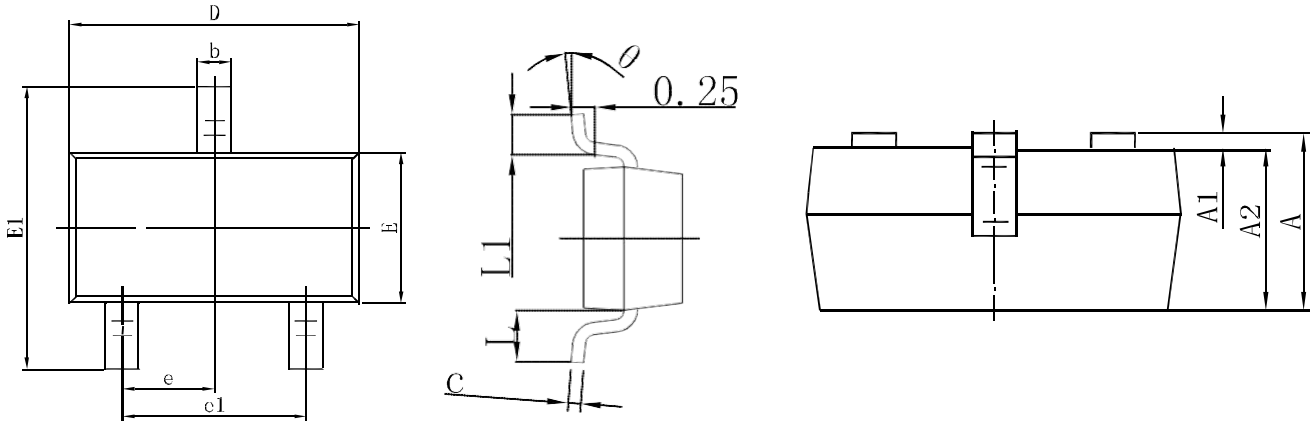



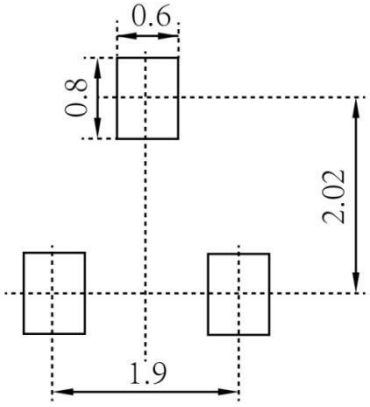
BIPOLAR TRANSISTOR (NPN)

## SOT-23 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF | | 0.022 REF | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

## SOT-23 Suggested Pad Layout




**Note:**

1.Controlling dimension: in millimeters

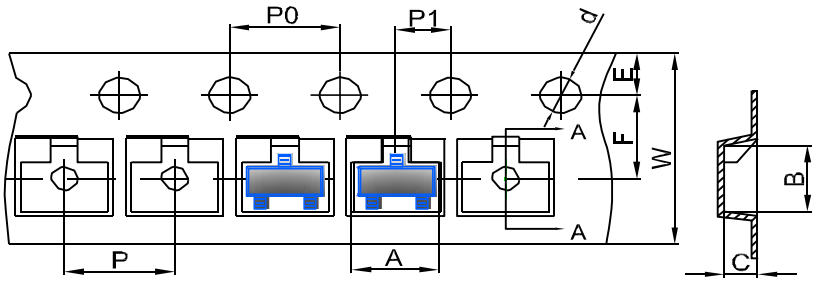
2.General tolerance: ±0.05mm

3.The pad layout is for reference purposes only

BIPOLAR TRANSISTOR (NPN)

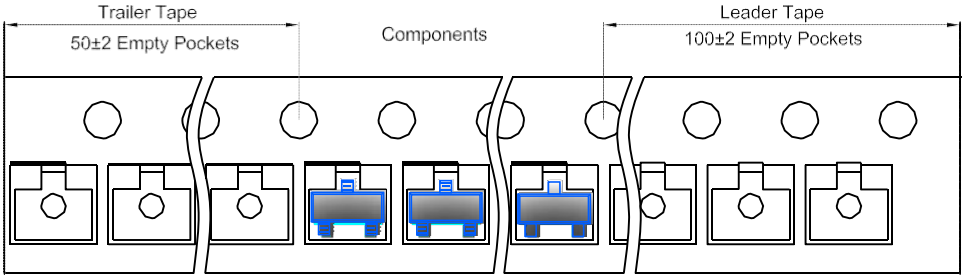
# SOT-23 Tape and Reel

## SOT-23 Embossed Carrier Tape

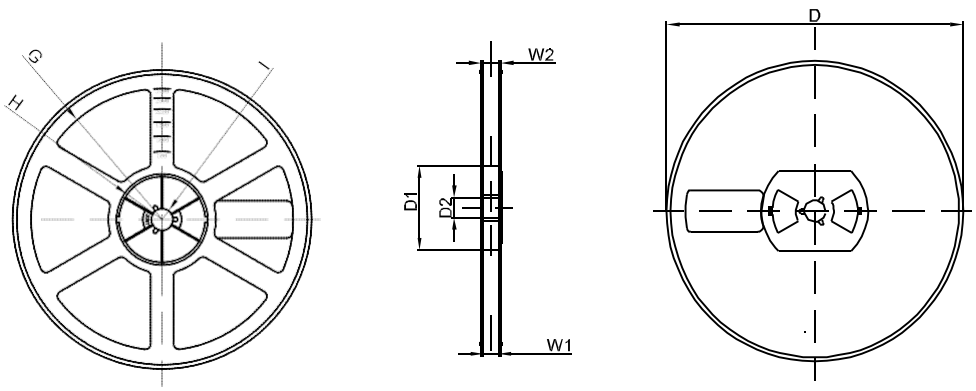



| | DIMENSIONS ARE IN MILLIMETER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TYPE | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-23 | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |
| TOLERANCE | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 |

## SOT-23 Tape Leader and Trailer




## SOT-23 Reel




| | DIMENSIONS ARE IN MILLIMETER | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| REEL OPTION | D | D1 | D2 | G | H | I | W1 | W2 |
| 7" DIA | Ø178 | 54.40 | 13.00 | R78 | R25.60 | R6.50 | 9.50 | 12.30 |
| TOLERANCE | ±2 | ±1 | ±1 | ±1 | ±1 | ±1 | ±1 | ±1 |