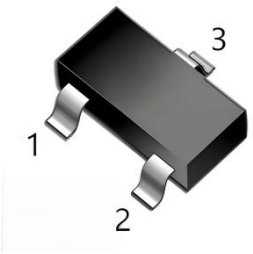
# TRANSISTOR (NPN)

| Parameter | Value | Unit |
|---|---|---|
| $V_{CEO}$ | 40 | V |
| $I_C$ | 0.2 | A |

1. BASE
2. EMITTER
3. COLLECTOR




SOT-23

## Features

- Complementary to PNP Transistor MMBT3906
- Epitaxial Planar Die Construction

## Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 60 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 40 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 6 | V |
| $I_C$ | Collector Current | 0.2 | A |
| $P_C$ | Total Device Dissipation | 200 | mW |
| $T_J$ | Junction Temperature | 150 | °C |
| $T_{STG}$ | Storage Temperature | -55 ~ +150 | °C |
| $R_{\theta JA}$ | Thermal Resistance From Junction to Ambient | 625 | °C/W |

Note:
Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

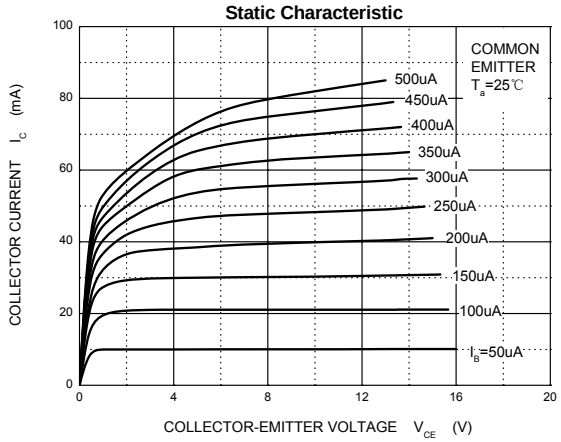
## Electrical Characteristics(Ta=25°C unless otherwise noted)

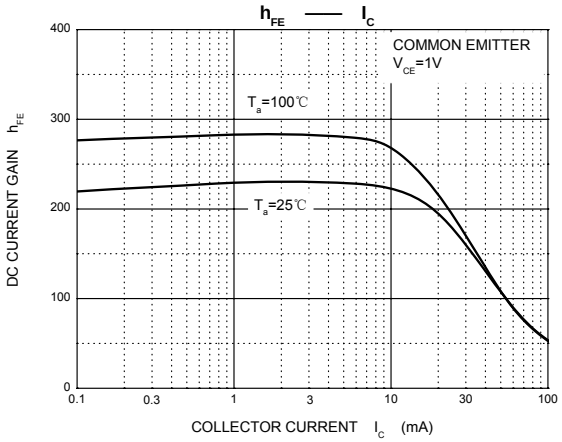
| Parameter | Symbol | Test conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | $I_C$=10μA, $I_E$=0 | 60 | | V |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C$=1mA, $I_B$=0 | 40 | | V |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E$=10μA, $I_C$=0 | 6 | | V |
| Collector cut-off current | $I_{CBO}$ | $V_{CB}$=60V, $I_E$=0 | | 100 | nA |
| Collector cut-off current | $I_{CEX}$ | $V_{CE}$=30V,$V_{BE(off)}$=3V | | 50 | nA |
| Emitter cut-off current | $I_{EBO}$ | $V_{EB}$=5V, $I_C$=0 | | 100 | nA |
| DC Current Gain （CLASSIFICATION OF hFE1） | $h_{FE1}$ | $V_{CE}$=1V, $I_C$=10mA | 100 | 300 | |
| | $h_{FE2}$ | $V_{CE}$=1V, $I_C$=50mA | 60 | | |
| | $h_{FE3}$ | $V_{CE}$=1V, $I_C$=100mA | 30 | | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C$=50mA, $I_B$=5mA | | 0.3 | V |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C$= 50mA, $I_B$=5mA | | 0.95 | V |
| Transition frequency | $f_T$ | $V_{CE}$=20V, $I_C$=10mA,f=100MHz | 300 | | MHz |
| Delay Time | $t_d$ | $V_{CC}$=3V,$V_{BE}$=-0.5V $I_C$=10mA, $I_{B1}$=-$I_{B2}$=1.0mA | | 35 | nS |
| Rise Time | $t_r$ | | | 35 | nS |
| Storage Time | $t_s$ | $V_{CC}$=3V,$I_C$=10mA, $I_{B1}$=-$I_{B2}$=1mA | | 200 | nS |
| Fall Time | $t_f$ | | | 50 | nS |

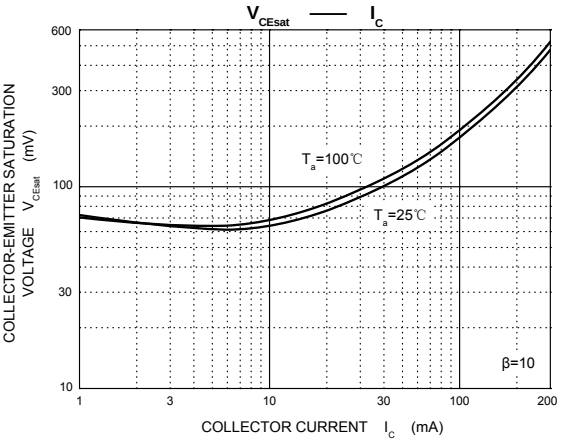
## CLASSIFICATION OF $h_{FE\ (1)}$

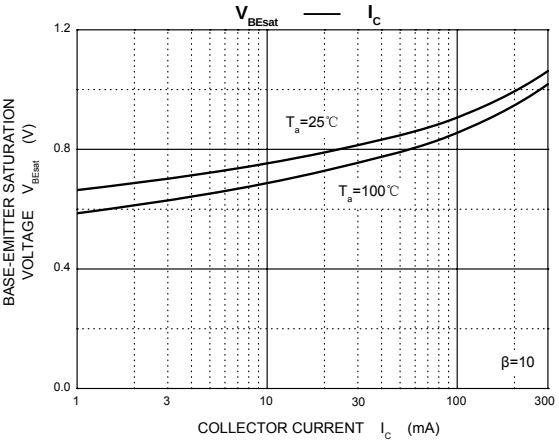
| HFE | 100-300 | |
|---|---|---|
| RANK | L | H |
| RANGE | 100-200 | 200-300 |

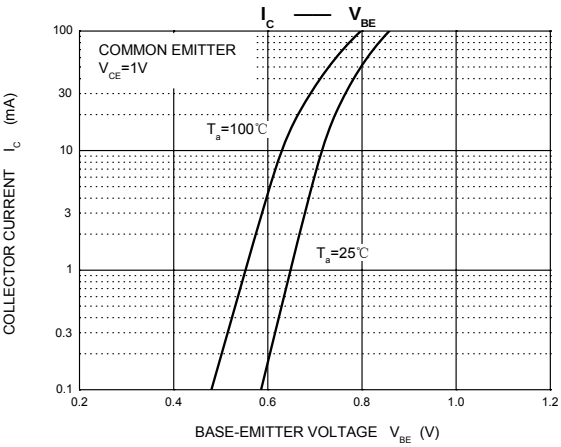
## Typical Characteristics

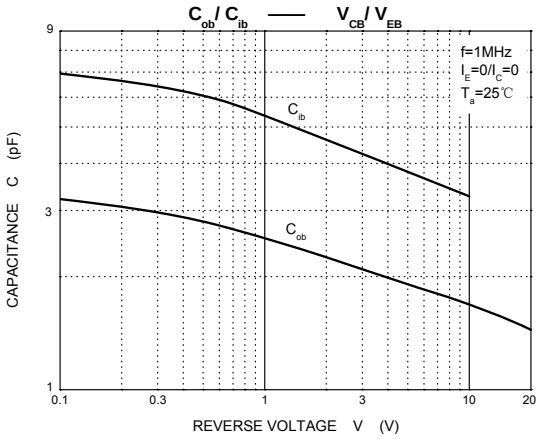


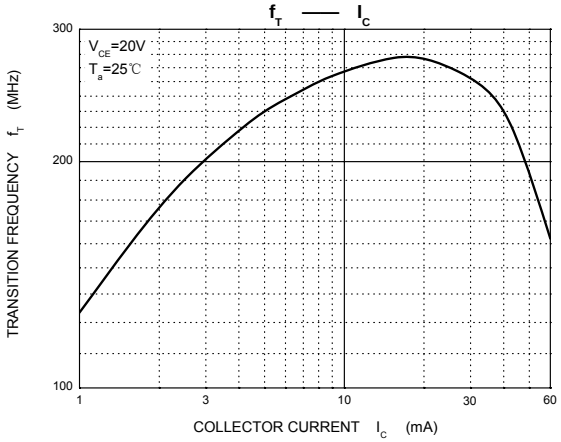



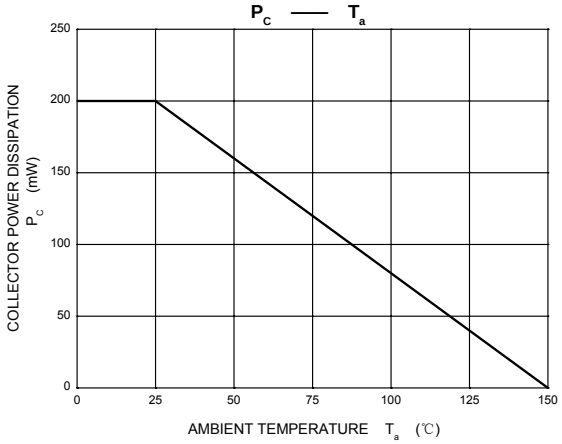



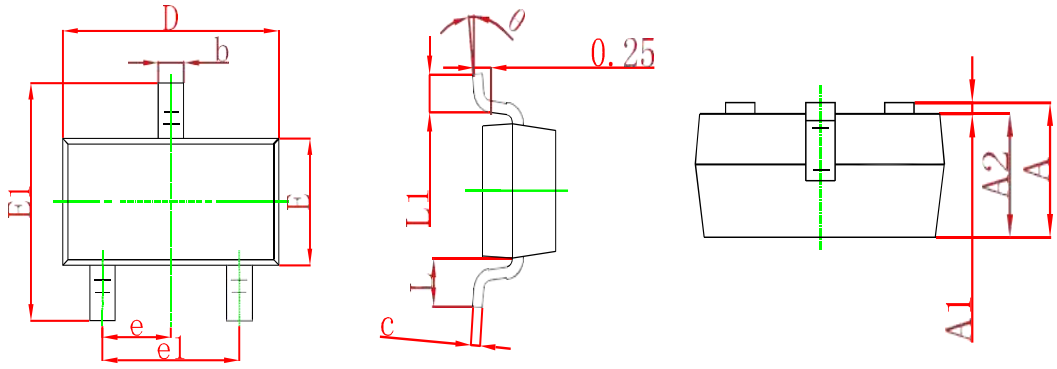



## Package Outline Dimensions

### SOT-23




| 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° |

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