

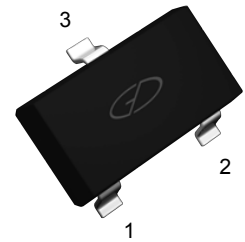
# MMBT3906

## PNP Transistor

### Features

- PNP transistor, complementary type MMBT3904
- High stability and high reliability
- SOT-23 small outline plastic package

1. BASE
2. EMITTER
3. COLLECTOR



SOT-23

### Absolute Maximum Ratings (T<sub>A</sub>=25°C unless otherwise specified)

| Parameter   | Symbol           | Max.        | Unit |
|---|------------------|-------------|------|
| Collector-Base Voltage                              | V <sub>CB0</sub> | -40         | V    |
| Collector-Emitter Voltage                           | V <sub>CEO</sub> | -40         | V    |
| Emitter-Base Voltage                                | V <sub>EBO</sub> | -5          | V    |
| Collector Current - Continuous                      | I <sub>C</sub>   | -0.2        | A    |
| Collector Power Dissipation                         | P <sub>C</sub>   | 0.2         | W    |
| Typical Thermal Resistance from Junction to Ambient | R <sub>θJA</sub> | 625         | °C/W |
| Operating Junction Temperature Range                | T <sub>J</sub>   | -55 To +150 | °C   |
| Storage Temperature Range                           | T <sub>STG</sub> | -55 To +150 | °C   |

### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                            | Symbol               | Conditions   | Min. | Max.  | Unit |
|--------------------------------------|----------------------|--|------|-------|------|
| Collector-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | I <sub>C</sub> =-10μA, I <sub>E</sub> =0               | -40  | -     | V    |
| Collector-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | I <sub>C</sub> =-1mA, I <sub>B</sub> =0                | -40  | -     | V    |
| Emitter-Base Breakdown Voltage       | V <sub>(BR)EBO</sub> | I <sub>E</sub> =-10μA, I <sub>C</sub> =0               | -5   | -     | V    |
| Collector Cut-off Current            | I <sub>CBO</sub>     | V <sub>CB</sub> =-40V, I <sub>E</sub> =0               | -    | -50   | nA   |
| Collector Cut-off Current            | I <sub>CEX</sub>     | V <sub>CE</sub> =-30V, V <sub>BE(off)</sub> =-3V       | -    | -100  | nA   |
| Emitter Cut-off Current              | I <sub>EBO</sub>     | V <sub>EB</sub> =-5V, I <sub>C</sub> =0                | -    | -100  | nA   |
| DC Current Gain                      | h <sub>FE</sub>      | V <sub>CE</sub> =-1V, I <sub>C</sub> =-10mA            | 100  | 300   | -    |
|                                      |                      | V <sub>CE</sub> =-1V, I <sub>C</sub> =-50mA            | 60   | -     |      |
|                                      |                      | V <sub>CE</sub> =-1V, I <sub>C</sub> =-100mA           | 30   | -     |      |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA            | -    | -0.3  | V    |
| Base-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA            | -    | -0.95 | V    |
| Transition Frequency                 | f <sub>T</sub>       | V <sub>CE</sub> =-20V, I <sub>C</sub> =-10mA, F=100MHz | 300  | -     | MHz  |
| Delay Time                           | t <sub>d</sub>       | V <sub>CC</sub> =-3V, V <sub>BE</sub> =-0.5V           | -    | 35    | nS   |
| Rise Time                            | t <sub>r</sub>       | I <sub>C</sub> =-10mA, I <sub>B1</sub> =-1mA           | -    | 35    | nS   |
| Storage Time                         | t <sub>s</sub>       | V <sub>CC</sub> =-3V, I <sub>C</sub> =-10mA            | -    | 225   | nS   |
| Fall Time                            | t <sub>f</sub>       | I <sub>B1</sub> =I <sub>B2</sub> =-1mA                 | -    | 75    | nS   |

### Typical Electrical Characteristic Curves

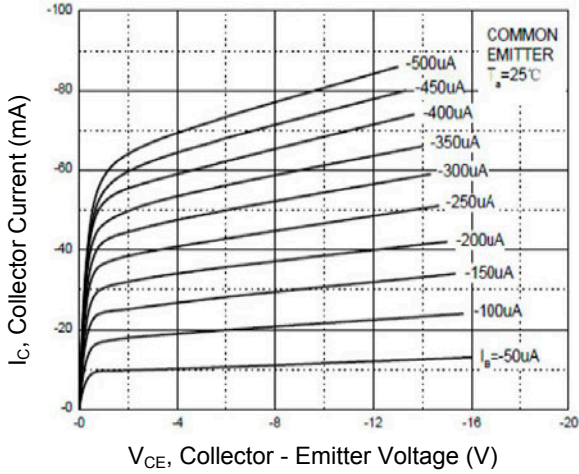


Figure 1. Static Characteristics

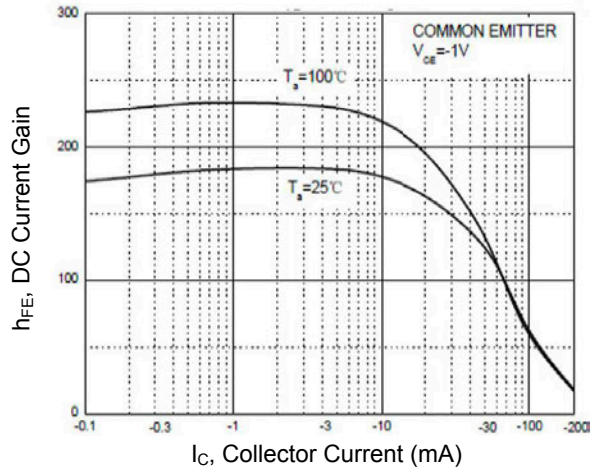


Figure 2. DC Current Gain vs. Collector Current

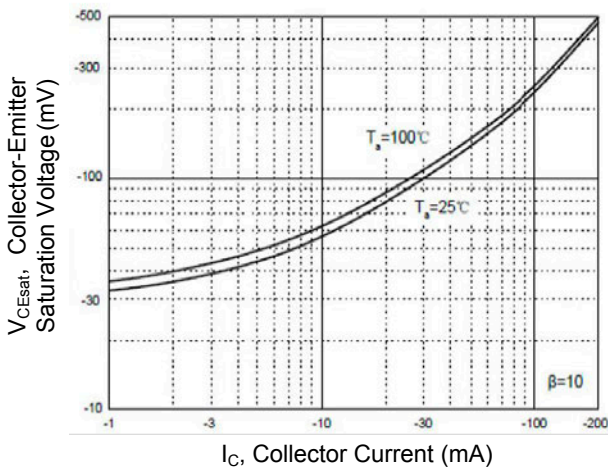


Figure 3. Collector - Emitter Saturation Voltage vs. Collector Current

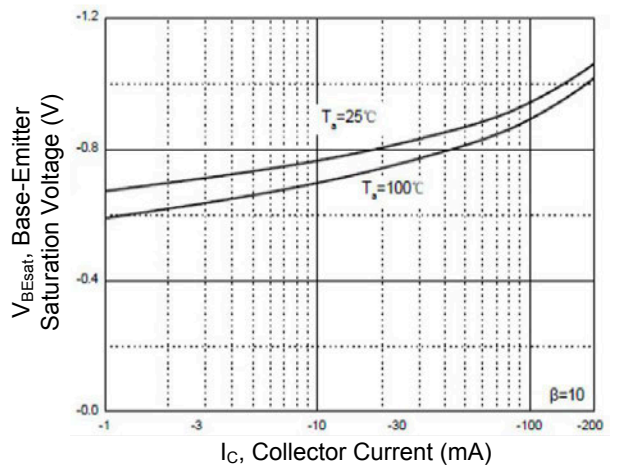


Figure 4. Base - Emitter Saturation Voltage vs. Collector Current

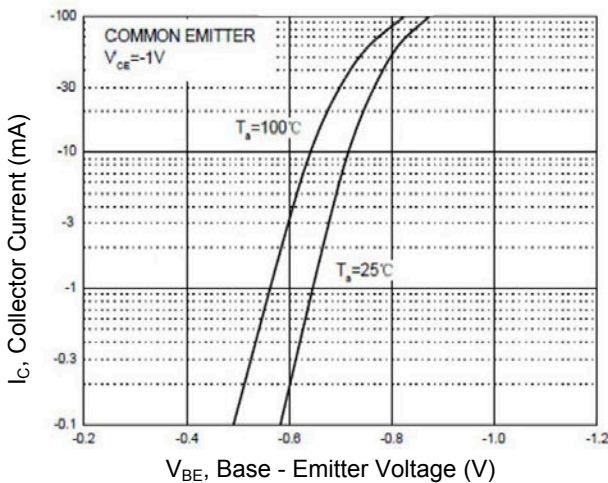


Figure 5. Collector Current vs. Base - Emitter Voltage

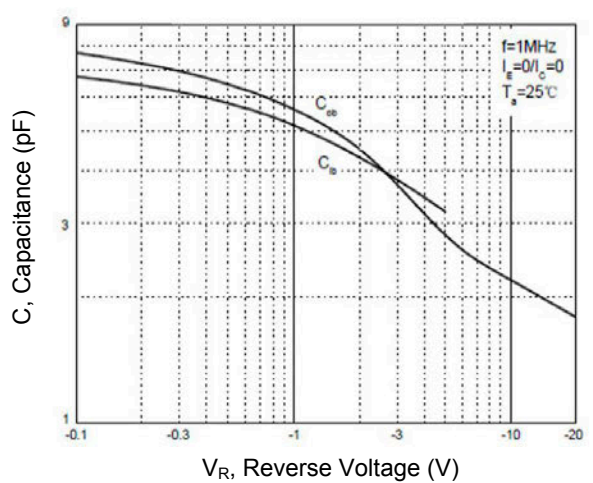


Figure 6. Capacitance Characteristics

## Typical Electrical Characteristic Curves

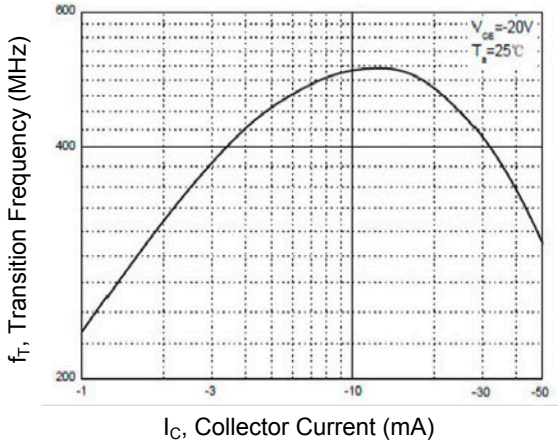


Figure 7. Transition Frequency vs. Collector Current

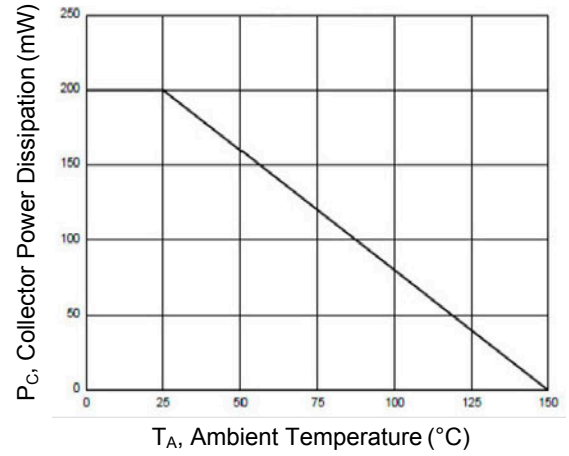
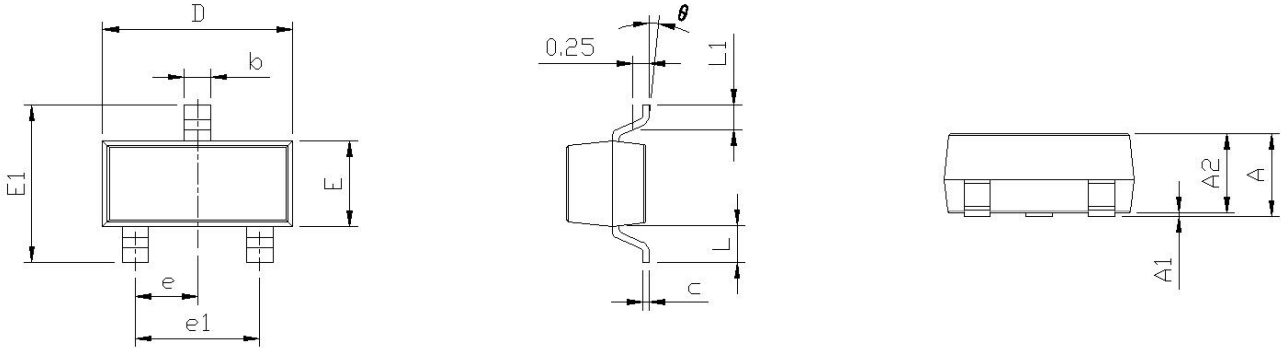


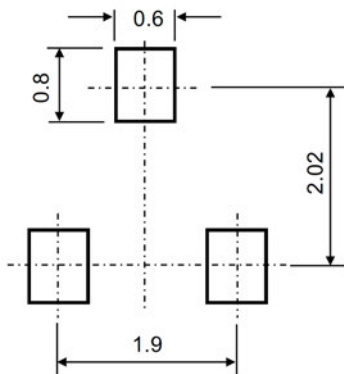
Figure 8. Power Dissipation vs Ambient Temperature

## 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°    |

## Recommended Pad Layout



Note:

1. Controlling dimension: in millimeters
2. General tolerance:  $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only

## Order Information

| Device   | Package | Marking | Quantity       | HSF Status     |
|----------|---------|---------|----------------|----------------|
| MMBT3906 | SOT-23  | 2A      | 3000pcs / Reel | RoHS Compliant |