

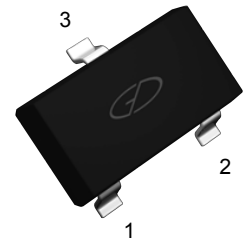
# MMBT3906

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

| Parameter                                           | Symbol          | Max.        | Unit                 |
|-----------------------------------------------------|-----------------|-------------|----------------------|
| Collector-Base Voltage                              | $V_{CBO}$       | -40         | V                    |
| Collector-Emitter Voltage                           | $V_{CEO}$       | -40         | V                    |
| Emitter-Base Voltage                                | $V_{EBO}$       | -5          | V                    |
| Collector Current - Continuous                      | $I_C$           | -0.2        | A                    |
| Collector Power Dissipation                         | $P_C$           | 0.2         | W                    |
| Typical Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 625         | $^{\circ}\text{C/W}$ |
| Operating Junction Temperature Range                | $T_J$           | -55 To +150 | $^{\circ}\text{C}$   |
| Storage Temperature Range                           | $T_{STG}$       | -55 To +150 | $^{\circ}\text{C}$   |

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

| Parameter                            | Symbol        | Conditions                                                       | Min. | Max.  | Unit |
|--------------------------------------|---------------|------------------------------------------------------------------|------|-------|------|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=-10\mu\text{A}$ , $I_E=0$                                   | -40  | -     | V    |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=-1\text{mA}$ , $I_B=0$                                      | -40  | -     | V    |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=-10\mu\text{A}$ , $I_C=0$                                   | -5   | -     | V    |
| Collector Cut-off Current            | $I_{CBO}$     | $V_{CB}=-40\text{V}$ , $I_E=0$                                   | -    | -50   | nA   |
| Collector Cut-off Current            | $I_{CEX}$     | $V_{CE}=-30\text{V}$ , $V_{BE(off)}=-3\text{V}$                  | -    | -100  | nA   |
| Emitter Cut-off Current              | $I_{EBO}$     | $V_{EB}=-5\text{V}$ , $I_C=0$                                    | -    | -100  | nA   |
| DC Current Gain                      | $h_{FE}$      | $V_{CE}=-1\text{V}$ , $I_C=-10\text{mA}$                         | 100  | 300   | -    |
|                                      |               | $V_{CE}=-1\text{V}$ , $I_C=-50\text{mA}$                         | 60   | -     |      |
|                                      |               | $V_{CE}=-1\text{V}$ , $I_C=-100\text{mA}$                        | 30   | -     |      |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=-50\text{mA}$ , $I_B=-5\text{mA}$                           | -    | -0.3  | V    |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=-50\text{mA}$ , $I_B=-5\text{mA}$                           | -    | -0.95 | V    |
| Transition Frequency                 | $f_T$         | $V_{CE}=-20\text{V}$ , $I_C=-10\text{mA}$ ,<br>$F=100\text{MHz}$ | 300  | -     | MHz  |
| Delay Time                           | $t_d$         | $V_{CC}=-3\text{V}$ , $V_{BE}=-0.5\text{V}$                      | -    | 35    | nS   |
| Rise Time                            | $t_r$         | $I_C=-10\text{mA}$ , $I_{B1}=-1\text{mA}$                        | -    | 35    | nS   |
| Storage Time                         | $t_s$         | $V_{CC}=-3\text{V}$ , $I_C=-10\text{mA}$                         | -    | 225   | nS   |
| Fall Time                            | $t_f$         | $I_{B1}=I_{B2}=-1\text{mA}$                                      | -    | 75    | nS   |

### Typical Electrical Characteristic Curves

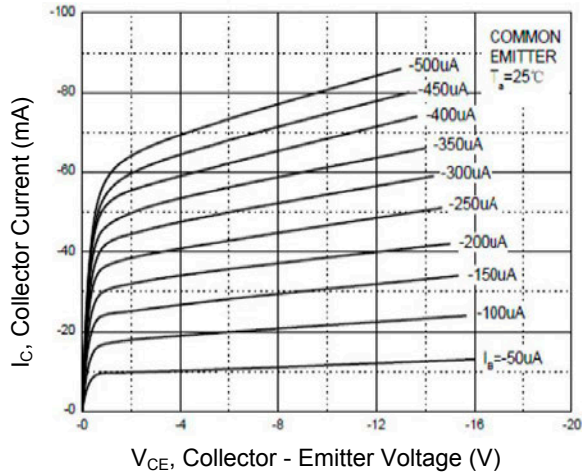


Figure 1. Static Characteristics

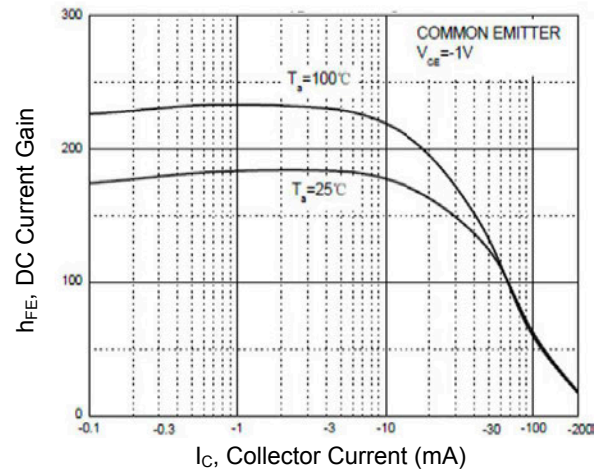


Figure 2. DC Current Gain vs. Collector Current

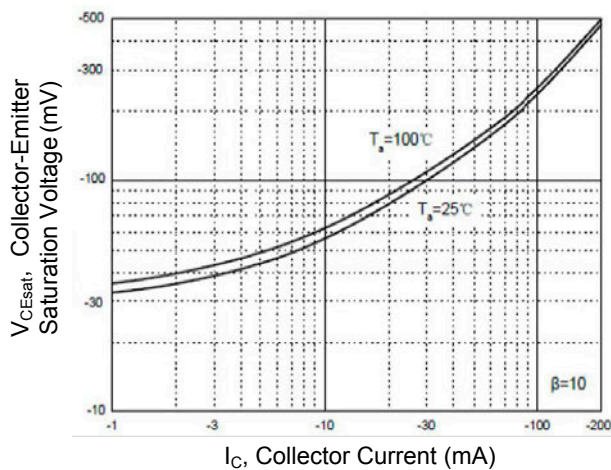


Figure 3. Collector - Emitter Saturation Voltage vs. Collector Current

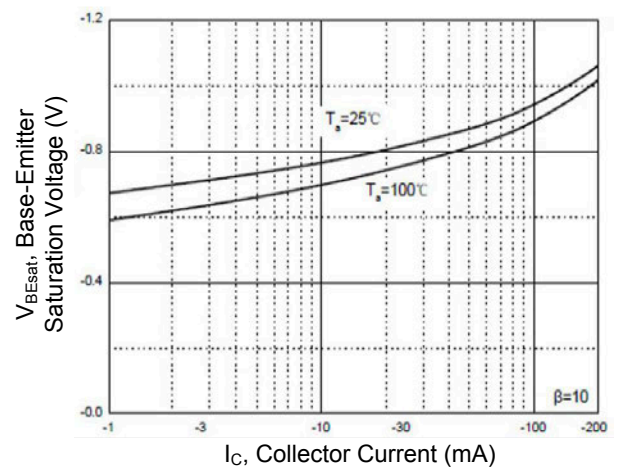


Figure 4. Base - Emitter Saturation Voltage vs. Collector Current

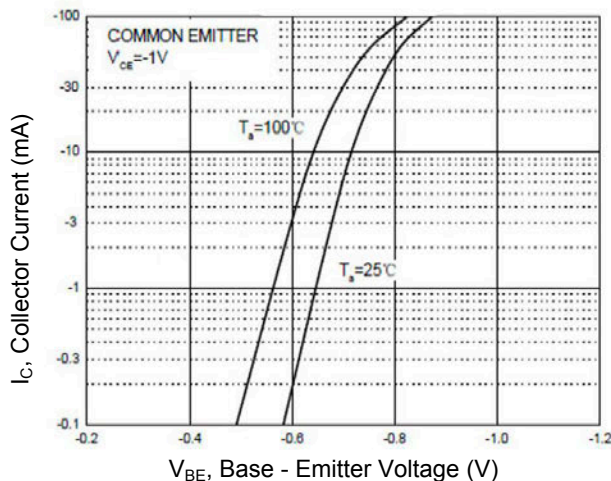


Figure 5. Collector Current vs. Base - Emitter Voltage

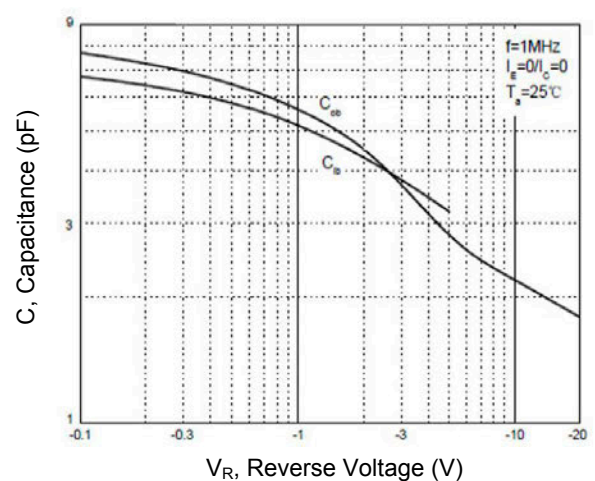


Figure 6. Capacitance Characteristics

## Typical Electrical Characteristic Curves

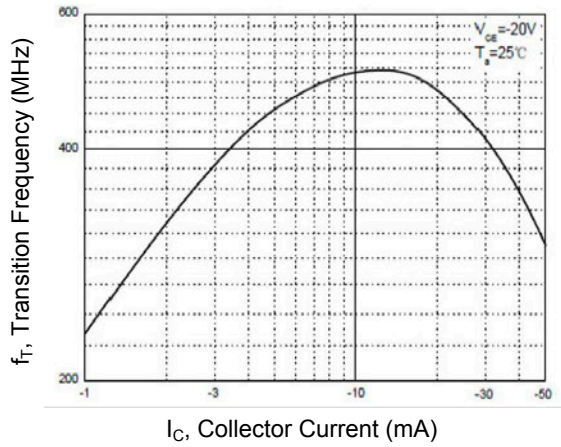


Figure 7. Transition Frequency vs. Collector Current

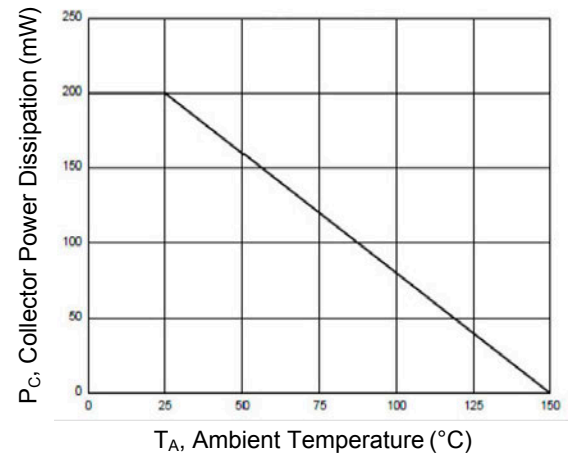
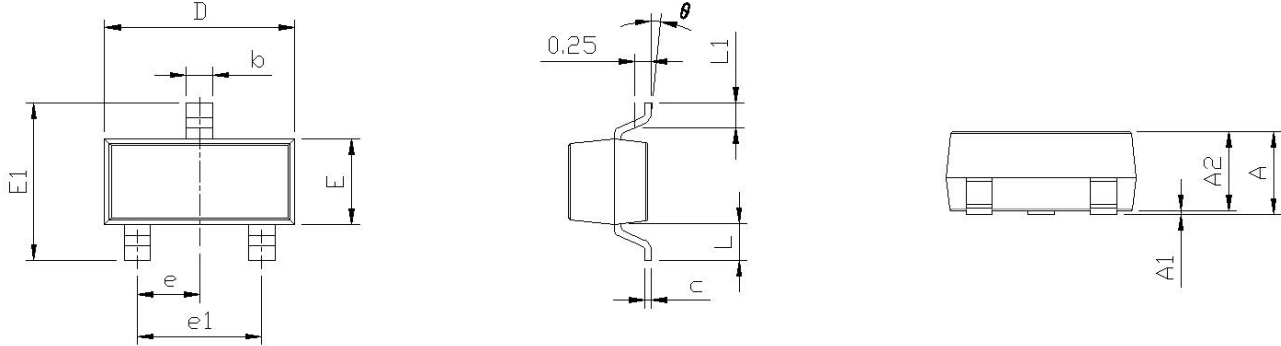


Figure 8. Power Dissipation vs Ambient Temperature

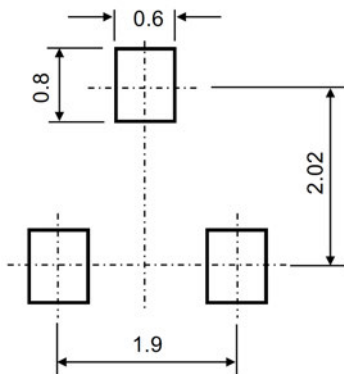
# MMBT3906 PNP Transistor

## 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 |