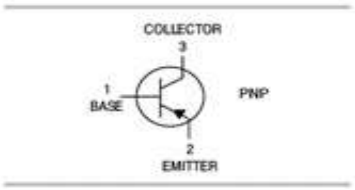
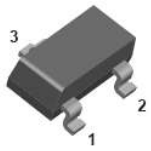
# MMBT3906-3L

**SOT-23-3L Bipolar Transistor(PNP)**

## FEATURES

- Epitaxial planar die construction.
- Complementary NPN type available (MMBT3904-3L).
- Collector Current Capability $I_{CM}$ =-200mA.
- Low Voltage(Max:-40V).




**SOT-23-3L**

## APPLICATIONS

- Ideal for medium power amplification and switching.

## ORDERING INFORMATION

| Type No. | Marking | Package Code |
|---|---|---|
| MMBT3906□-3L | 2A | SOT-23-3L |

□: none is for Lead Free package;

"G" is for Halogen Free package

## MAXIMUM RATING @ Ta=25℃ unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | Value | UNIT |
|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | -40 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | -40 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | -6 | V |
| $I_C$ | collector current (DC) | | -100 | mA |
| $I_{CM}$ | peak collector current | | -200 | mA |
| $I_{BM}$ | peak base current | | -100 | mA |
| $P_{tot}$ | total power dissipation | Tamb≤25°C | 250 | mW |
| $T_{stg}$ | storage temperature | | -65 to +150 | °C |
| $T_j$ | junction temperature | | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | -65 to +150 | °C |

Note Transistor mounted on an FR4 printed-circuit board.

# MMBT3906-3L

**SOT-23-3L Bipolar Transistor(PNP)**

## ELECTRICAL CHARACTERISTICS @ Ta=25℃ unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $I_{CBO}$ | collector cut-off current | $I_E$ = 0; $V_{CB}$ = -30 V | - | -50 | nA |
| $I_{EBO}$ | emitter cut-off current | $I_C$ = 0; $V_{EB}$ = 6 V | - | -50 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = -1V;<br>$I_C$= -0.1mA<br>$I_C$ = -1mA<br>$I_C$ = -10mA<br>$I_C$ = -50mA<br>$I_C$ = -100mA | <br>60<br>80<br>100<br>60<br>30 | <br>-<br>-<br>300<br>-<br>- | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = -10mA; $I_B$ = 1mA | - | -200 | mV |
| | | $I_C$ = -50mA; $I_B$ = -5mA | - | -300 | mV |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = -10mA; $I_B$ = -1mA | - | -850 | mV |
| | | $I_C$ = -50mA; $I_B$ = -5mA | - | -950 | mV |
| $C_c$ | collector capacitance | $I_E$ = $I_e$= 0; $V_{CB}$ = -5 V;<br>f = 1 MHz | - | 4.5 | pF |
| $C_e$ | emitter capacitance | $I_C$ = $I_c$= 0; $V_{EB}$ = -500 mV;<br>f = 1 MHz | - | 10 | pF |
| $f_T$ | transition frequency | $I_C$ = -10mA; $V_{CE}$ = -20 V;<br>f = 100MHz | 250 | - | MHz |
| NF | noise figure | $I_C$ = -100μA; $V_{CE}$ = -5V;<br>$R_S$ = 1 kΩ;f = 10Hz to15.7 kHz | - | 4 | dB |
| Switching times (between 10% and 90% levels); | | | | | |
| $t_{on}$ | Turn-on time | $I_{Con}$= -10mA; $I_{Bon}$ = -1mA;<br>$I_{Boff}$= -1mA | - | 65 | ns |
| $t_d$ | delay time | | - | 35 | ns |
| $t_r$ | rise time | | - | 35 | ns |
| $t_{off}$ | turn-off time | | - | 300 | ns |
| $t_s$ | storage time | | - | 225 | ns |
| $t_r$ | fall time | | - | 75 | ns |

Note Pulse test: tp≤300 ms; d≤0.02.

## TYPICAL CHARACTERISTICS @ Ta=25℃ unless otherwise specified

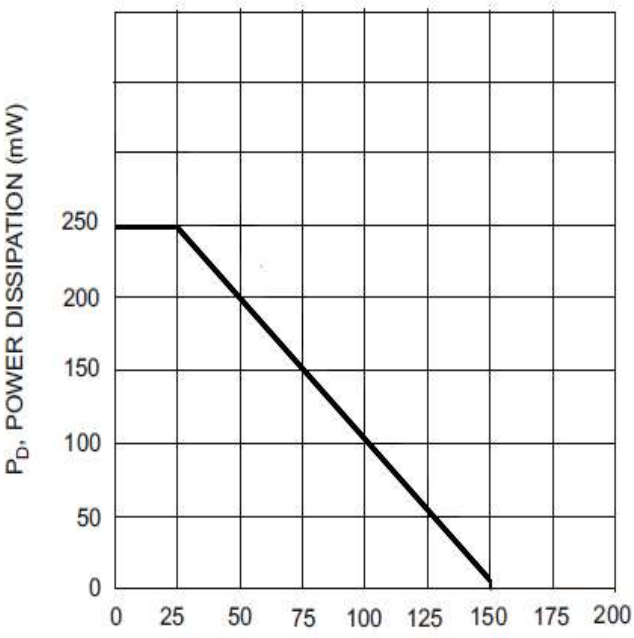



Fig. 1, Max Power Dissipation vs Ambient Temperature

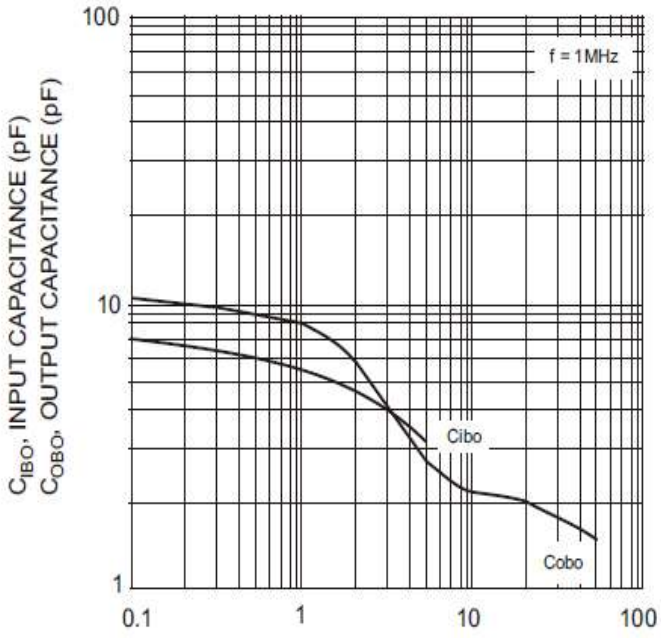
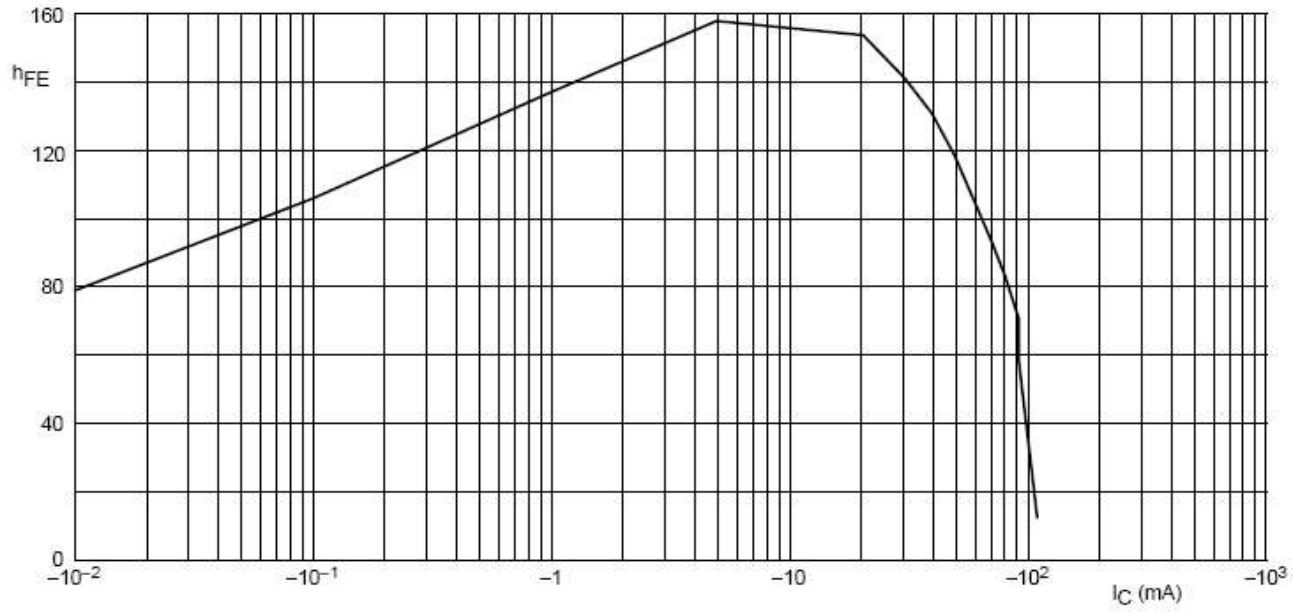



Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage




$V_{CE} = -1$ V.

Fig. 3, Typical DC Current Gain vs Collector Current

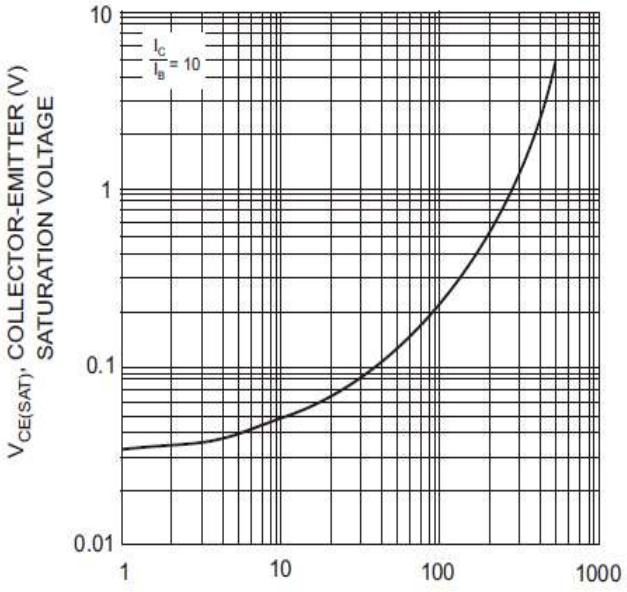



Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

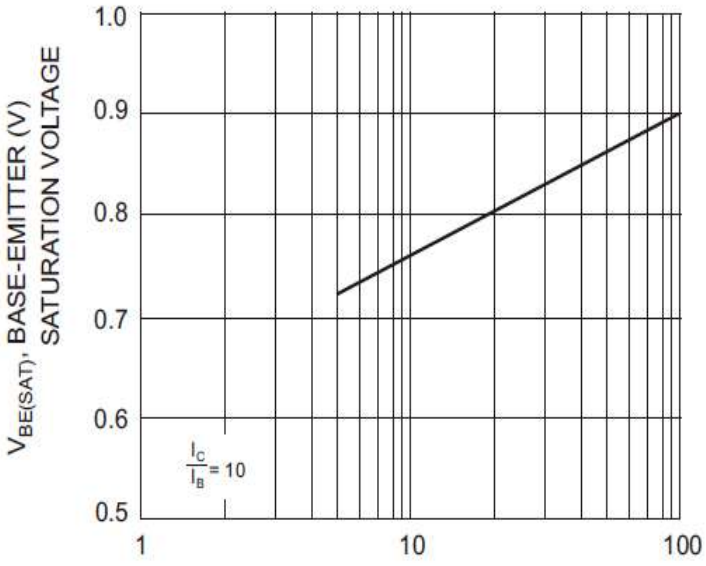
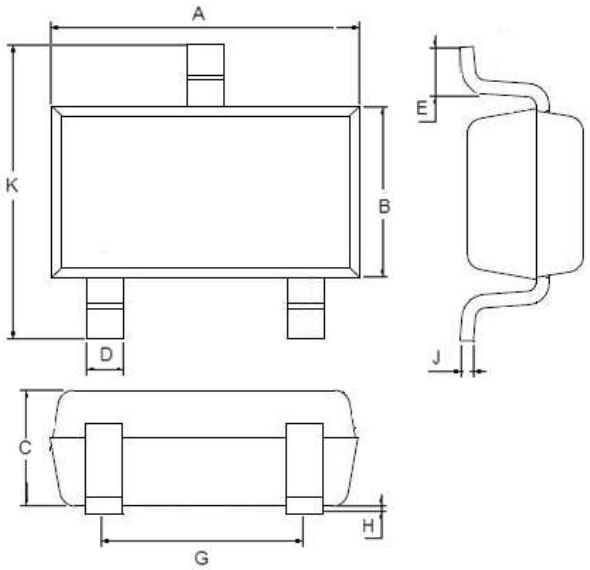



Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

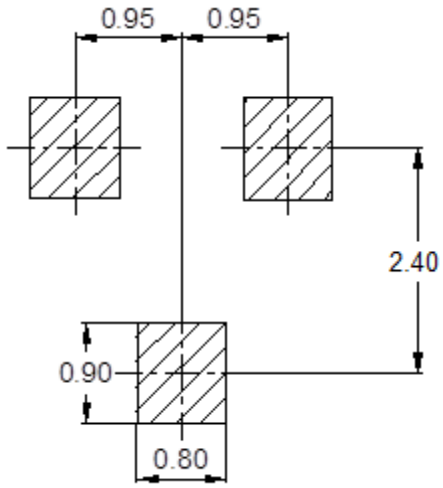
## PACKAGE OUTLINE

Plastic surface mounted package SOT-23-3L




| SOT-23-3L | | |
|---|---|---|
| Dim | Min | Max |
| A | 2.80 | 3.00 |
| B | 1.50 | 1.70 |
| C | 1.00 | 1.20 |
| D | 0.35 | 0.45 |
| E | 0.35 | 0.55 |
| G | 1.80 | 2.00 |
| H | 0.02 | 0.10 |
| J | 0.10 | 0.20 |
| K | 2.60 | 3.00 |
| All Dimensions in mm | | |

## SOLDERING FOOTPRINT




Unit : mm

| Package | Reel | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) |
|---|---|---|---|---|---|---|
| SOD-323 | 3000pcs | 7inch | 45,000pcs | 203×203×195 | 180,000pcs | 438×438×220 |