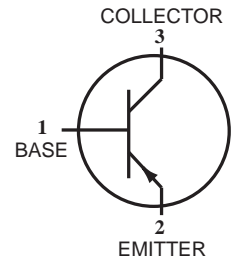
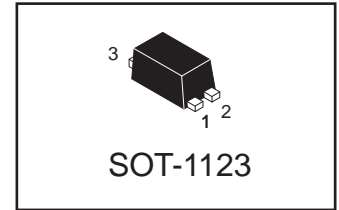


PNP General Purpose Transistor

(Pb) Lead(Pb)-Free

The MMBT3906E device is a spin-off of our popular SOT-23/SOT-323/SOT-563/SOT-963 three-leaded device. It is designed for general purpose amplifier applications and is housed in the SOT-1123 surface mount package. This device is ideal for low-power surface mount applications where board space is at a premium.



FEATURES :

- h_{FE} 100-300
- LOW $V_{CE(sat)} \leq 0.4V$
- Reduces Board Space

Maximum Ratings

| Rating | Symbol | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Emitter Voltage | V_{CEO} | -40 | Vdc |
| Collector-Base Voltage | V_{CBO} | -40 | Vdc |
| Emitter-Base Voltage | V_{EBO} | -5.0 | Vdc |
| Collector Current-Continuous | I_C | -200 | mAdc |

Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|-----------------|-------------|--------|
| Total Device Dissipation (1) $T_a=25^\circ C$ | P_D | 290 | mW |
| Derate above 25 °C | | 2.3 | mW/ °C |
| Thermal Resistance,Junction to Ambient | $R_{\theta JA}$ | 432 | °C/W |
| Total Device Dissipation (2) $T_a=25^\circ C$ | P_D | 347 | mW |
| Derate above 25 °C | | 2.8 | mW/ °C |
| Thermal Resistance,Junction to Ambient | $R_{\theta JA}$ | 360 | °C/W |
| Thermal Resistance,Junction to Lead3 (2) | $R_{\psi JL}$ | 143 | °C/W |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | °C |

1.100mm² 1 oz, copper traces.

2.500mm² 1 oz, copper traces.

Device Marking

MMBT3906E=3

Electrical Characteristics ($T_a=25^\circ C$ Unless Otherwise noted)

| Characteristics | Symbol | Min | Max | Unit |
|-----------------|--------|-----|-----|------|
|-----------------|--------|-----|-----|------|

Off Characteristics

| | | | | |
|---|---------------|------|-----|------|
| Collector-Emitter Breakdown Voltage ⁽³⁾ ($I_C=1.0mAdc, I_E=0$) | $V_{(BR)CEO}$ | -40 | - | Vdc |
| Collector-Base Breakdown Voltage ($I_C=10\mu Adc, I_E=0$) | $V_{(BR)CBO}$ | -40 | - | Vdc |
| Emitter-Base Breakdown Voltage ($I_E=10\mu Adc, I_C=0$) | $V_{(BR)EBO}$ | -5.0 | - | Vdc |
| Collector Cutoff Current ($V_{CE}=30Vdc, V_{EB}=3.0Vdc$) | I_{CEX} | - | -50 | nAdc |

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

| Characteristics | Symbol | Min | Max | Unit |
|-----------------|--------|-----|-----|------|
|-----------------|--------|-----|-----|------|

On Characteristics (3)

| | | | | |
|--|---------------|-----------------------------|-------------------------|-----|
| DC Current Gain ($I_C = -0.1\text{ mA}$, $V_{CE} = -1.0\text{ Vdc}$) ($I_C = -1.0\text{ mA}$, $V_{CE} = -1.0\text{ Vdc}$) ($I_C = -10\text{ mA}$, $V_{CE} = -1.0\text{ Vdc}$) ($I_C = -50\text{ mA}$, $V_{CE} = -1.0\text{ Vdc}$) ($I_C = -100\text{ mA}$, $V_{CE} = -1.0\text{ Vdc}$) | h_{FE} | 60 80 100 60 30 | - - 300 - - | - |
| Collector-Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -1.0\text{ mA}$) ($I_C = -50\text{ mA}$, $I_B = -5.0\text{ mA}$) | $V_{CE(sat)}$ | - - | -0.25 -0.4 | Vdc |
| Base-Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -1.0\text{ mA}$) ($I_C = -50\text{ mA}$, $I_B = -5.0\text{ mA}$) | $V_{BE(sat)}$ | -0.65 - | -0.85 -0.95 | Vdc |

Small-signal Characteristics

| | | | | |
|--|-----------|-----|------|-----|
| Current-Gain-Bandwidth Product ($I_C = 10\text{ mA}$, $V_{CE} = 20\text{ Vdc}$, $f = 100\text{ MHz}$) | f_T | 250 | - | MHz |
| Output Capacitance ($V_{CB} = -5.0\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | C_{obo} | - | 4.5 | pF |
| Input Capacitance ($V_{EB} = -0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$) | C_{ibo} | - | 10.0 | pF |
| Noise Figure ($V_{CE} = -5.0\text{ Vdc}$, $I_C = -100\text{ }\mu\text{A}$, $R_S = 1.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$) | NF | - | 4.0 | dB |

Switching Characteristics

| | | | | | |
|--------------|---|-------|---|-----|----|
| Delay Time | (Vcc= -3.0 Vdc, VBE= 0.5 Vdc Ic= -10 mA, IB1= -1.0 mA) | t_d | - | 35 | ns |
| Rise Time | | t_r | - | 35 | |
| Storage Time | (Vcc= -3.0Vdc, Ic= -10 mA IB1=IB2= -1.0 mA) | t_s | - | 250 | ns |
| Fall Time | | t_f | - | 50 | |

3.Pulse Test:Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

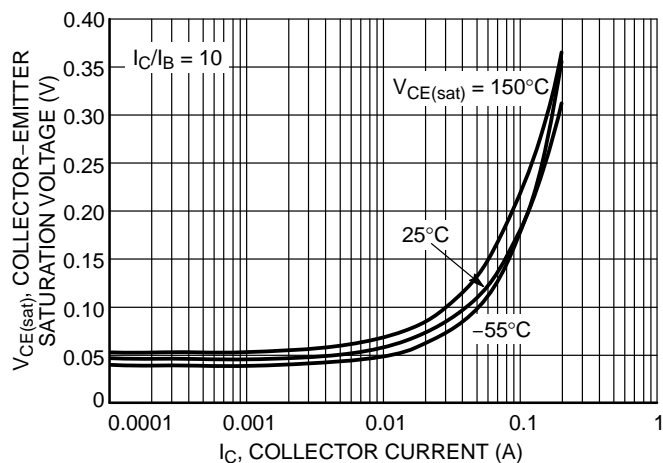


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

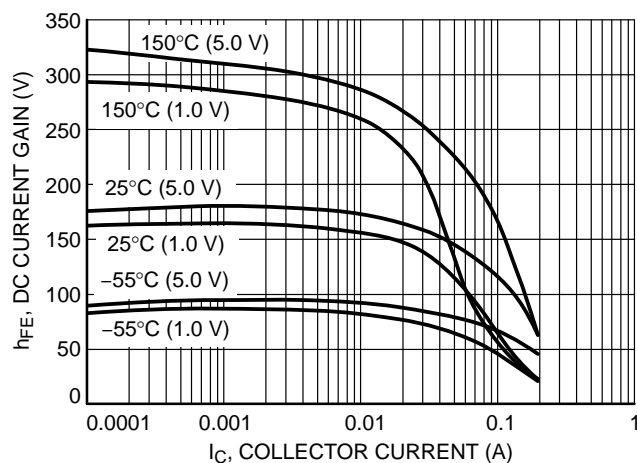


Figure 2. DC Current Gain vs. Collector Current

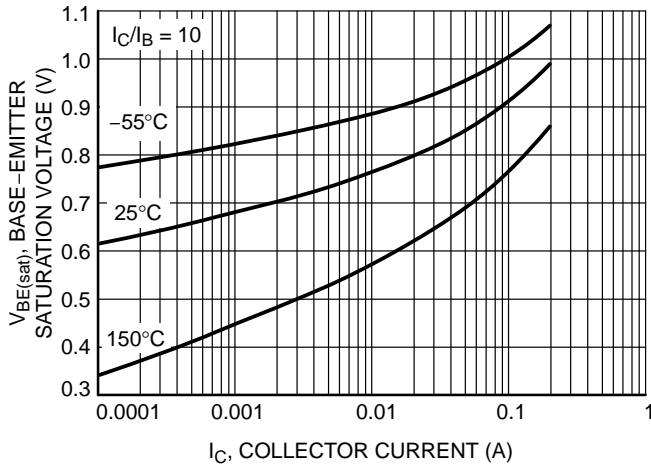


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

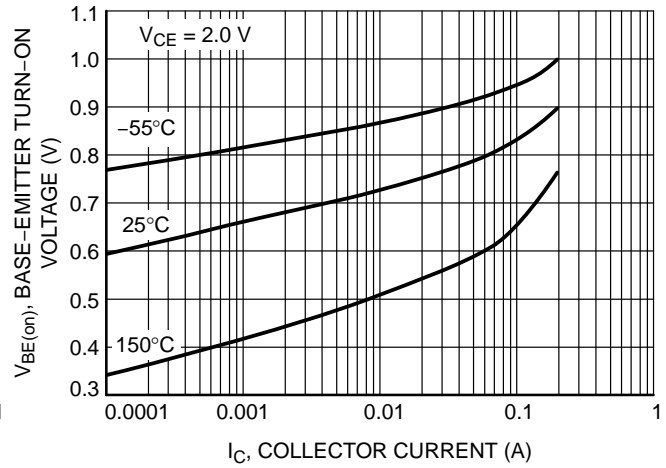


Figure 4. Base Emitter Turn-On Voltage vs. Collector Current

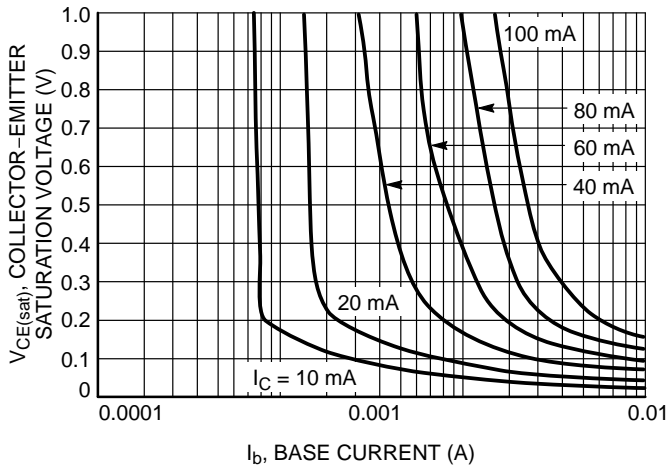


Figure 5. Saturation Region

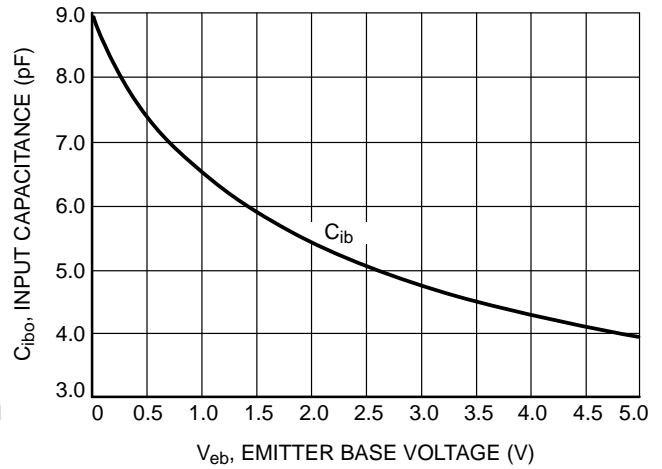


Figure 6. Input Capacitance

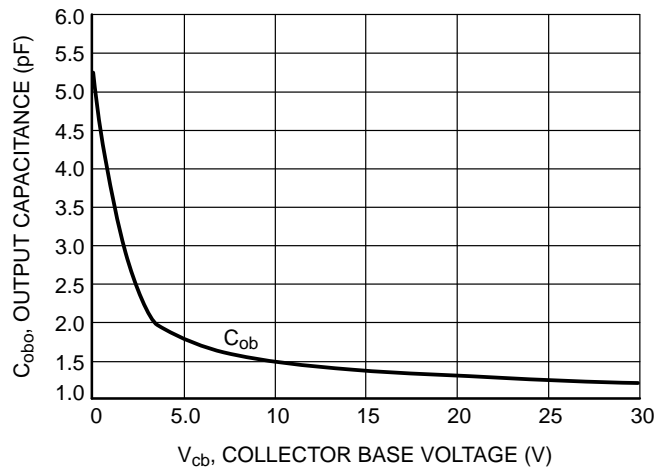
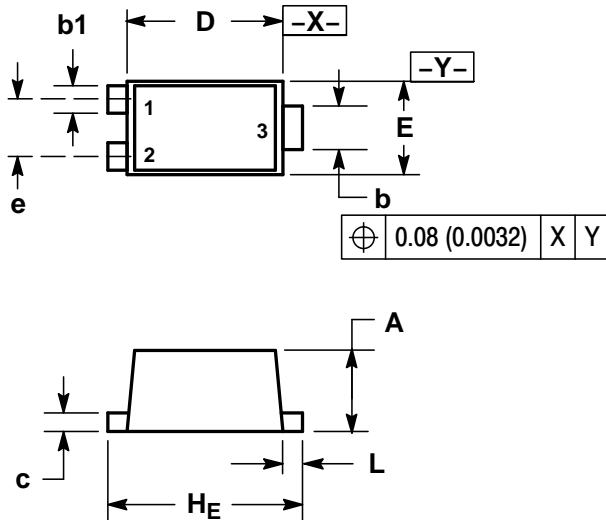


Figure 7. Output Capacitance

SOT-1123 Package Outline Dimensions



NOTES:

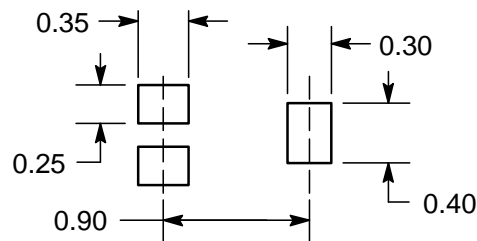
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM | MILLIMETERS | | | INCHES | | |
|-------|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.34 | 0.37 | 0.40 | 0.013 | 0.015 | 0.016 |
| b | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| b1 | 0.10 | 0.15 | 0.20 | 0.004 | 0.006 | 0.008 |
| c | 0.07 | 0.12 | 0.17 | 0.003 | 0.005 | 0.007 |
| D | 0.75 | 0.80 | 0.85 | 0.030 | 0.031 | 0.033 |
| E | 0.55 | 0.60 | 0.65 | 0.022 | 0.024 | 0.026 |
| e | 0.35 | | | 0.014 | | |
| H_E | 0.95 | 1.00 | 1.05 | 0.037 | 0.039 | 0.041 |
| L | 0.05 | 0.10 | 0.15 | 0.002 | 0.004 | 0.006 |

STYLE 1:

1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS