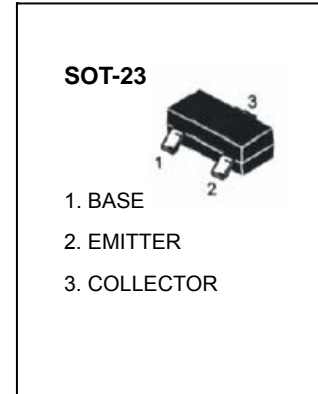


# SOT-23 Plastic-Encapsulate Transistors

## MMBT3906 TRANSISTOR (PNP)

### FEATURES

- As complementary type, the NPN transistor MMBT3904 is Recommended
- Epitaxial planar die construction



### MARKING: 2A

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

| Symbol    | Parameter                     | Value   | Units            |
|-----------|-------------------------------|---------|------------------|
| $V_{CB0}$ | Collector-Base Voltage        | -40     | V                |
| $V_{CE0}$ | Collector-Emitter Voltage     | -40     | V                |
| $V_{EBO}$ | Emitter-Base Voltage          | -5      | V                |
| $I_C$     | Collector Current -Continuous | -0.2    | A                |
| $P_C$     | Collector Power Dissipation   | 0.3     | W                |
| $T_J$     | Junction Temperature          | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage Temperature           | -55-150 | $^\circ\text{C}$ |

### ELECTRICAL CHARACTERISTICS ( $T_{amb}=25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol        | Test 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            | $I_{CBO}$     | $V_{CB} = -40\text{V}, I_E = 0$                               |     | -0.1  | $\mu\text{A}$ |
| Collector cut-off current            | $I_{CEX}$     | $V_{CE} = -30\text{V}, V_{BE(off)} = -3\text{V}$              |     | -50   | nA            |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = -5\text{V}, I_C = 0$                                |     | -0.1  | $\mu\text{A}$ |
| DC current gain                      | $h_{FE(1)}$   | $V_{CE} = -1\text{V}, I_C = -10\text{mA}$                     | 100 | 300   |               |
|                                      | $h_{FE(2)}$   | $V_{CE} = -1\text{V}, I_C = -50\text{mA}$                     | 60  |       |               |
|                                      | $h_{FE(3)}$   | $V_{CE} = -1\text{V}, I_C = -100\text{mA}$                    | 30  |       |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -50\text{mA}, I_B = -5\text{mA}$                       |     | -0.4  | V             |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = -50\text{mA}, I_B = -5\text{mA}$                       |     | -0.95 | V             |
| Transition frequency                 | $f_T$         | $V_{CE} = -20\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$ | 250 |       | MHz           |
| Delay Time                           | $t_d$         | $V_{CC} = -3.0\text{V}, V_{BE} = -0.5\text{V}$                |     | 35    | nS            |
| Rise Time                            | $t_r$         | $I_C = -10\text{mA}, I_{B1} = -1.0\text{mA}$                  |     | 35    | nS            |
| Storage Time                         | $t_s$         | $V_{CC} = -3.0\text{V}, I_C = -10\text{mA}$                   |     | 225   | nS            |
| Fall Time                            | $t_f$         | $I_{B1} = I_{B2} = -1.0\text{mA}$                             |     | 75    | nS            |

### CLASSIFICATION OF $h_{FE1}$

| Rank  | O       | Y       |
|-------|---------|---------|
| Range | 100-200 | 200-300 |

# Typical Characteristics

# MMBT3906

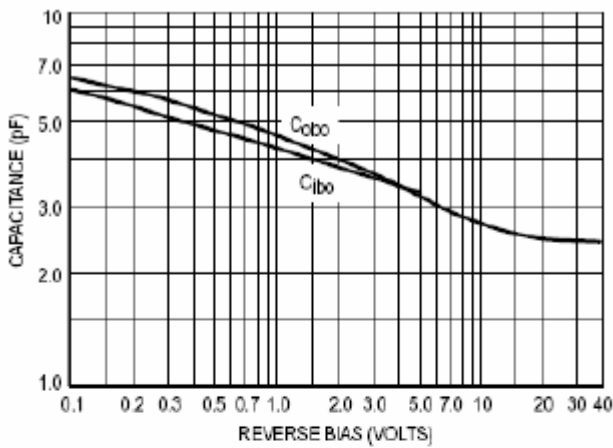


Figure 1 Capacitance

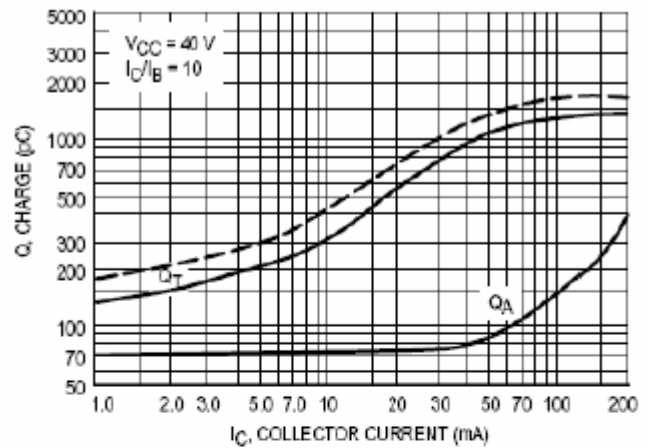


Figure 2 Charge Data

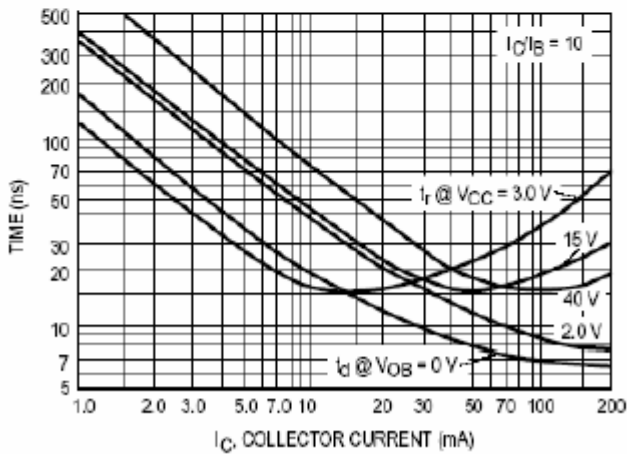


Figure 3 Turn-On Time

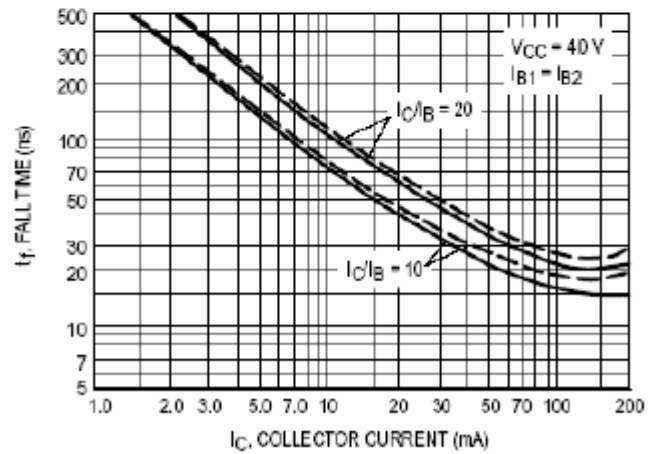


Figure 4 Fall Time

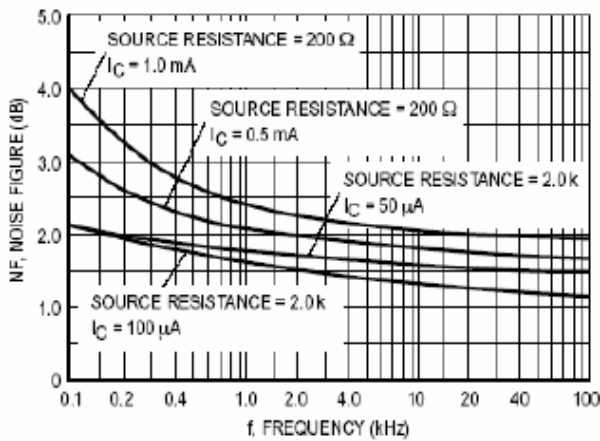


Figure 5

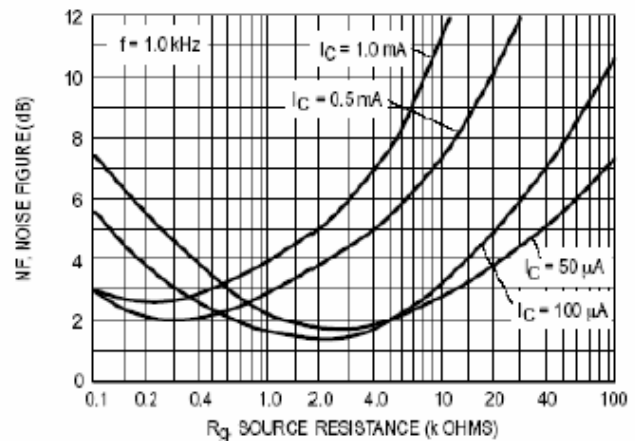


Figure 6

### h PARAMETERS

( $V_{CE} = -10$  Vdc,  $f = 1.0$  kHz,  $T_A = 25^\circ\text{C}$ )

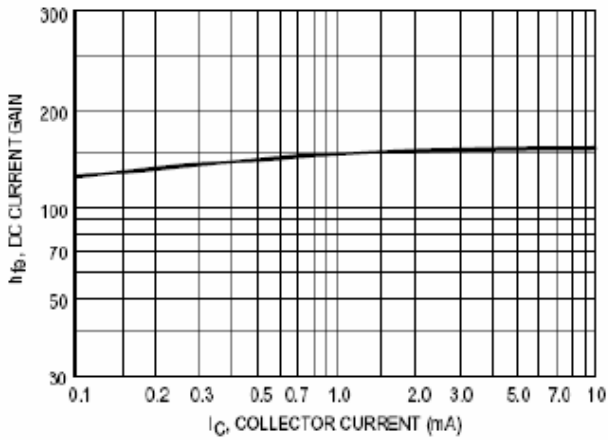


Figure 7 Current Gain

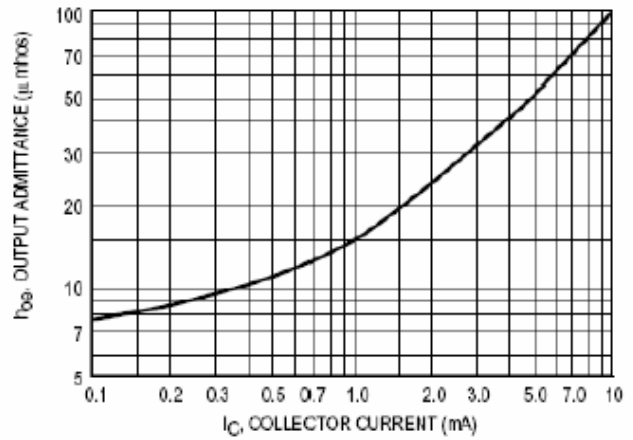


Figure 8 Output Admittance

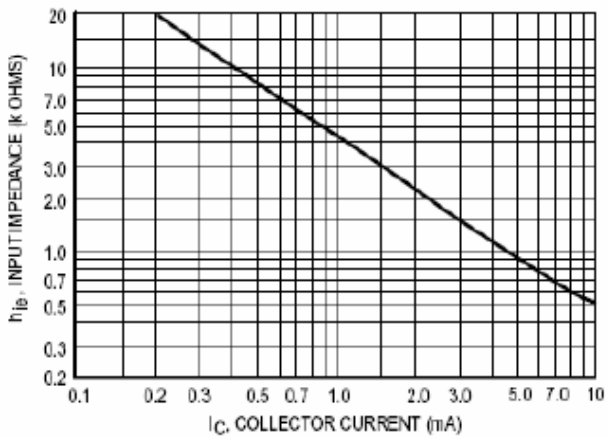


Figure 9 Input Impedance

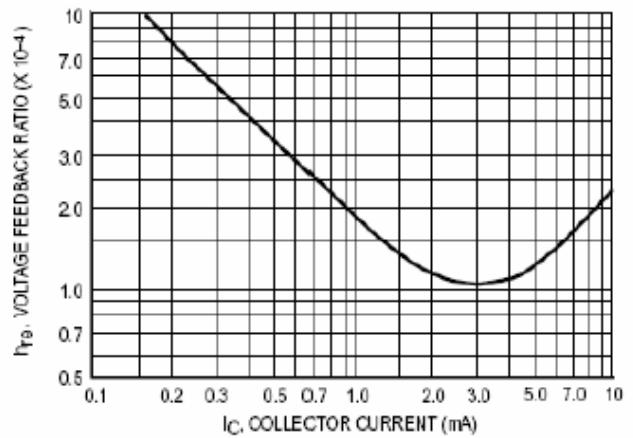


Figure 10 Voltage Feedback Ratio

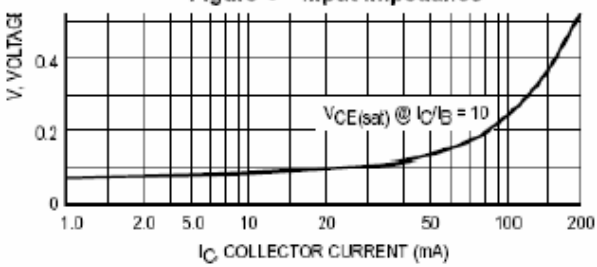


Figure 11 "ON" Voltages

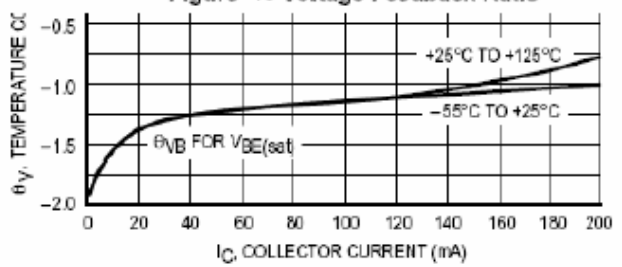


Figure 12 Temperature Coefficients