

MMBT3904 TRANSISTOR (NPN)

FEATURES

- As complementary type the PNP transistor MMBT3906 is recommended
- Epitaxial planar die construction

MARKING: 1AM

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

| Symbol | Parameter | Value | Units |
|-----------------|--|-------------|-----------------------------|
| V_{CBO} | Collector-Base Voltage | 60 | V |
| V_{CEO} | Collector-Emitter Voltage | 40 | V |
| V_{EBO} | Emitter-Base Voltage | 6 | V |
| I_C | Collector Current -Continuous | 200 | mA |
| P_C | Total Device Dissipation | 200 | mW |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | 625 | $^{\circ}\text{C}/\text{W}$ |
| T_J | Junction Temperature | 150 | $^{\circ}\text{C}$ |
| T_{stg} | Storage Temperature | -55 to +150 | $^{\circ}\text{C}$ |

SOT-23



1. BASE
2. EMITTER
3. COLLECTOR

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

| Parameter | Symbol | Test conditions | MIN | MAX | UNIT |
|--------------------------------------|---------------|---|-----|------|---------------|
| Collector-base breakdown voltage | V_{CBO} | $I_C=10\mu\text{A}, I_E=0$ | 60 | | V |
| Collector-emitter breakdown voltage | V_{CEO} | $I_C=1\text{mA}, I_B=0$ | 40 | | V |
| Emitter-base breakdown voltage | V_{EBO} | $I_E=10\mu\text{A}, I_C=0$ | 6 | | V |
| Collector cut-off current | I_{CBO} | $V_{CB}=60\text{V}, I_E=0$ | | 0.1 | μA |
| 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 | μA |
| DC current gain | $h_{FE(1)}$ | $V_{CE}=1\text{V}, I_C=10\text{mA}$ | 100 | 400 | |
| | $h_{FE(2)}$ | $V_{CE}=1\text{V}, I_C=50\text{mA}$ | 60 | | |
| | $h_{FE(3)}$ | $V_{CE}=1\text{V}, I_C=100\text{mA}$ | 30 | | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C=50\text{mA}, I_B=5\text{mA}$ | | 0.3 | 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 | $V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$ | 300 | | MHz |
| Delay Time | t_d | $V_{CC}=3\text{V}, V_{BE}=-0.5\text{V}$ | | 35 | nS |
| Rise Time | t_r | $I_C=10\text{mA}, I_{B1}=-I_{B2}=1.0\text{mA}$ | | 35 | nS |
| Storage Time | t_s | $V_{CC}=3\text{V}, I_C=10\text{mA}$, | | 200 | nS |
| Fall Time | t_f | $I_{B1}=-I_{B2}=1\text{mA}$ | | 50 | nS |

CLASSIFICATION OF $h_{FE(1)}$

| Rank | O | Y | G |
|-------|---------|---------|---------|
| Range | 100-200 | 200-300 | 300-400 |