



MMBT3904

SMALL SIGNAL NPN TRANSISTOR

PRELIMINARY DATA

| Type | Marking |
|----------|---------|
| MMBT3904 | 34 |

- SILICON EPITAXIAL PLANAR NPN TRANSISTOR
- MINIATURE SOT-23 PLASTIC PACKAGE FOR SURFACE MOUNTING CIRCUITS
- TAPE AND REEL PACKING
- THE PNP COMPLEMENTARY TYPE IS MMBT3906

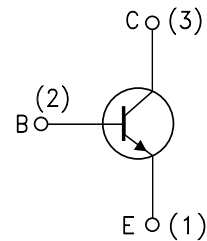
APPLICATIONS

- WELL SUITABLE FOR PORTABLE EQUIPMENT
- SMALL LOAD SWITCH TRANSISTOR WITH HIGH GAIN AND LOW SATURATION VOLTAGE



SOT-23

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|---|------------|------------------|
| V_{CBO} | Collector-Base Voltage ($I_E = 0$) | 60 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | 40 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | 6 | V |
| I_C | Collector Current | 200 | mA |
| P_{tot} | Total Dissipation at $T_C = 25\text{ }^\circ\text{C}$ | 350 | mW |
| T_{stg} | Storage Temperature | -65 to 150 | $^\circ\text{C}$ |
| T_j | Max. Operating Junction Temperature | 150 | $^\circ\text{C}$ |

MMBT3904

THERMAL DATA

| | | | | |
|-----------------|-------------------------------------|-----|-------|------|
| $R_{thj-amb}$ • | Thermal Resistance Junction-Ambient | Max | 357.1 | °C/W |
|-----------------|-------------------------------------|-----|-------|------|

• Device mounted on a PCB area of 1 cm²

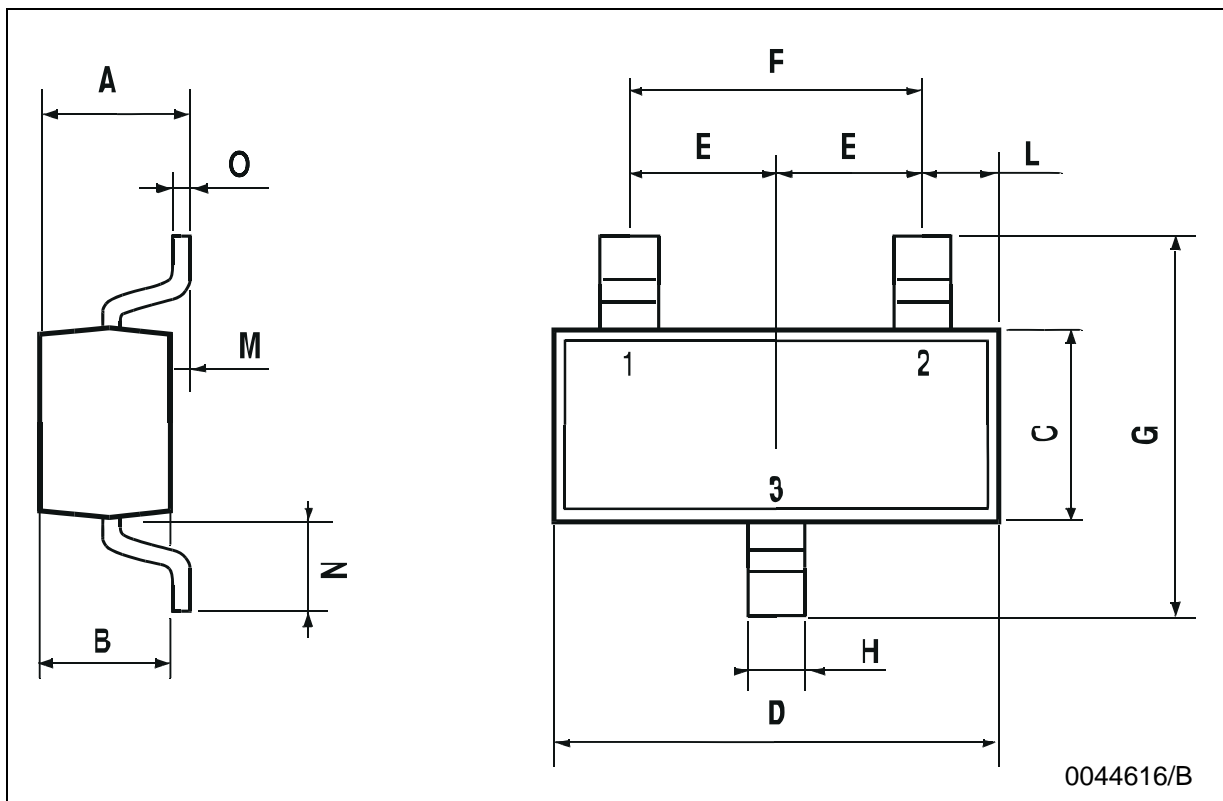
ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------|--|--|-----------------------------|------|--------------|--------|
| I _{CEX} | Collector Cut-off Current (V _{BE} = -3 V) | V _{CE} = 30 V | | | 50 | nA |
| I _{BEX} | Base Cut-off Current (V _{BE} = -3 V) | V _{CE} = 30 V | | | 50 | nA |
| V _{(BR)CEO} * | Collector-Emitter Breakdown Voltage (I _B = 0) | I _C = 1 mA | 40 | | | V |
| V _{(BR)CBO} | Collector-Base Breakdown Voltage (I _E = 0) | I _C = 10 μA | 60 | | | V |
| V _{(BR)EBO} | Emitter-Base Breakdown Voltage (I _C = 0) | I _E = 10 μA | 6 | | | V |
| V _{CE(sat)} * | Collector-Emitter Saturation Voltage | I _C = 10 mA I _B = 1 mA I _C = 50 mA I _B = 5 mA | | | 0.2 0.2 | V V |
| V _{BE(sat)} * | Base-Emitter Saturation Voltage | I _C = 10 mA I _B = 1 mA I _C = 50 mA I _B = 5 mA | 0.65 | | 0.85 0.95 | V V |
| h _{FE} * | DC Current Gain | I _C = 0.1 mA V _{CE} = 1 V I _C = 1 mA V _{CE} = 1 V I _C = 10 mA V _{CE} = 1 V I _C = 50 mA V _{CE} = 1 V I _C = 100 mA V _{CE} = 1 V | 60 80 100 60 30 | | 300 | |
| f _T | Transition Frequency | I _C = 10 mA V _{CE} = 20 V f = 100 MHz | 250 | 270 | | MHz |
| C _{CB0} | Collector-Base Capacitance | I _E = 0 V _{CB} = 10 V f = 1 MHz | | 4 | | pF |
| C _{EBO} | Emitter-Base Capacitance | I _C = 0 V _{EB} = 0.5 V f = 1 MHz | | 18 | | pF |
| NF | Noise Figure | V _{CE} = 5 V I _C = 0.1 mA f = 10 Hz to 15.7 KHz R _G = 1 KΩ | | 5 | | dB |
| t _d | Delay Time | I _C = 10 mA I _B = 1 mA | | | 35 | ns |
| t _r | Rise Time | V _{CC} = 30 V | | | 35 | ns |
| t _s | Storage Time | I _C = 10 mA I _{B1} = -I _{B2} = 1 mA | | | 200 | ns |
| t _f | Fall Time | V _{CC} = 30 V | | | 50 | ns |

* Pulsed: Pulse duration = 300 μs, duty cycle ≤ 2 %

SOT-23 MECHANICAL DATA

| DIM. | mm | | | mils | | |
|------|------|------|------|-------|------|------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 0.85 | | 1.1 | 33.4 | | 43.3 |
| B | 0.65 | | 0.95 | 25.6 | | 37.4 |
| C | 1.20 | | 1.4 | 47.2 | | 55.1 |
| D | 2.80 | | 3 | 110.2 | | 118 |
| E | 0.95 | | 1.05 | 37.4 | | 41.3 |
| F | 1.9 | | 2.05 | 74.8 | | 80.7 |
| G | 2.1 | | 2.5 | 82.6 | | 98.4 |
| H | 0.38 | | 0.48 | 14.9 | | 18.8 |
| L | 0.3 | | 0.6 | 11.8 | | 23.6 |
| M | 0 | | 0.1 | 0 | | 3.9 |
| N | 0.3 | | 0.65 | 11.8 | | 25.6 |
| O | 0.09 | | 0.17 | 3.5 | | 6.7 |



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