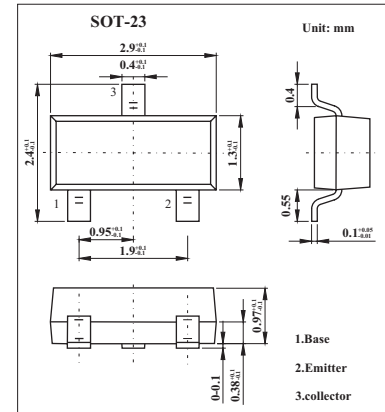


NPN Transistors

KMBT3904(MMBT3904)

■ Features

- Epitaxial planar die construction



■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Rating | Unit |
|--------------------------------|-----------|------------|------------------|
| Collector - Base Voltage | V_{CBO} | 60 | V |
| Collector - Emitter Voltage | V_{CEO} | 40 | V |
| Emitter - Base Voltage | V_{EBO} | 6 | V |
| Collector Current - Continuous | I_C | 0.2 | A |
| Collector Power Dissipation | P_C | 0.2 | W |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

■ Electrical Characteristics $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Testconditons | Min | Typ | Max | Unit |
|--------------------------------------|---------------|---|-----|-----|------|---------------|
| Collecto- base breakdown voltage | V_{CBO} | $I_C = 100 \mu\text{A}$, $I_E = 0$ | 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_{CEO} | $V_{CE} = 30 \text{ V}$, $V_{BE(off)} = 3\text{V}$ | | | 50 | nA |
| Emitter cut-off current | I_{EBO} | $V_{EB} = 5 \text{ V}$, $I_C = 0$ | | | 0.1 | μA |
| DC current gain | h_{FE} | $V_{CE} = 1\text{V}$, $I_C = 10\text{mA}$ | 100 | | 400 | |
| | | $V_{CE} = 1\text{V}$, $I_C = 50\text{mA}$ | 60 | | | |
| 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 |
| Delay time | t_d | $V_{CC} = 3.0\text{V}$, $V_{BE} = -0.5\text{V}$ | | | 35 | ns |
| Rise time | t_r | $I_C = 10\text{mA}$, $I_{B1} = -I_{B2} = 1.0\text{mA}$ | | | 35 | |
| Storage time | t_s | $V_{CC} = 3.0\text{V}$, $I_C = 10\text{mA}$ | | | 200 | ns |
| Fall time | t_f | $I_{B1} = -I_{B2} = 1.0\text{mA}$ | | | 50 | |
| Transition frequency | f_T | $V_{CE} = 20\text{V}$, $I_C = 10\text{mA}$, $f = 100\text{MHz}$ | 250 | | | MHz |

■ Marking

| | |
|---------|-----|
| Marking | 1AM |
|---------|-----|

KMBT3904(MMBT3904)

■ Typical Characteristics

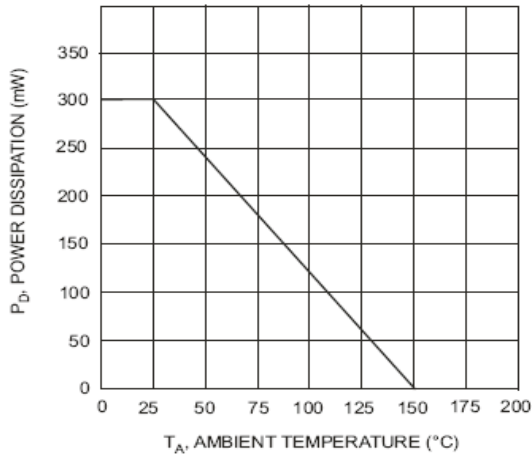


Fig.1 Max Power Dissipation vs Ambient Temperature

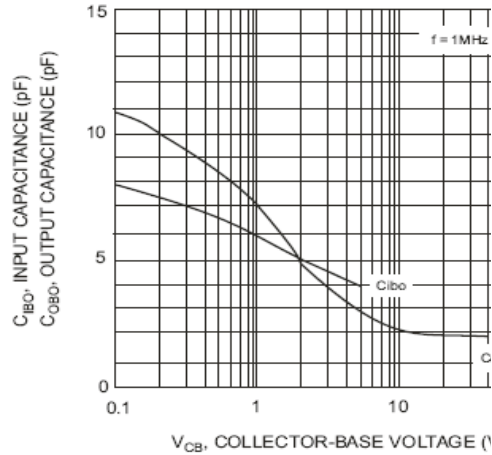


Fig.2 Input and Output Capacitance vs. Collector-Base Voltage

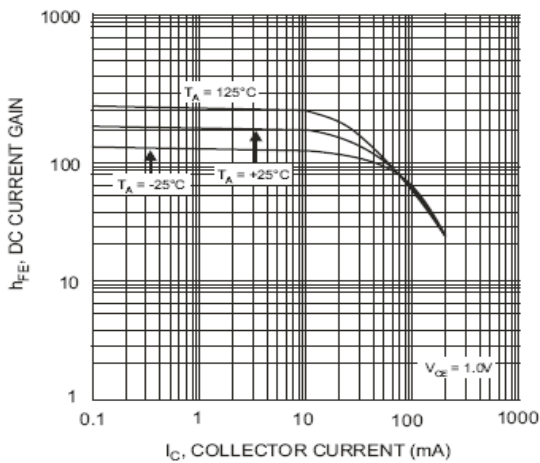


Fig.3 Typical DC Current Gain vs Collector Current

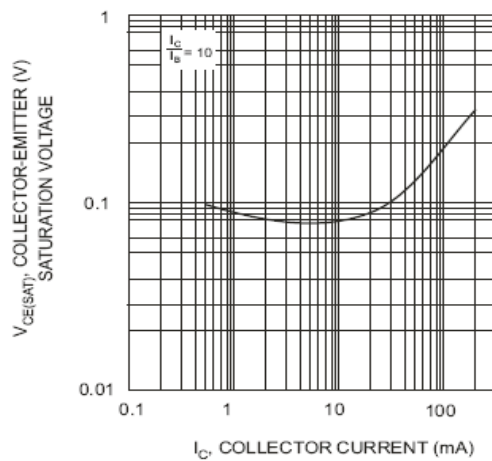


Fig.4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

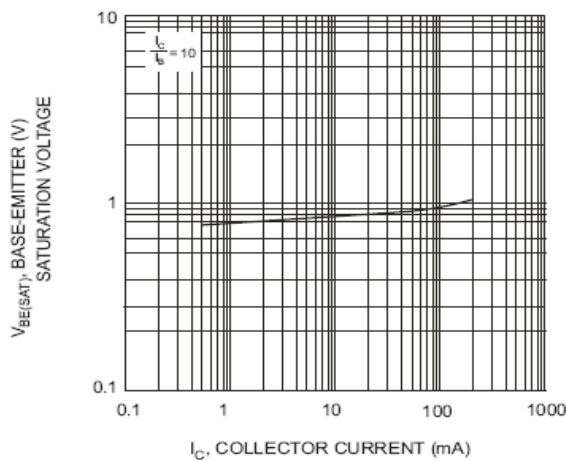


Fig.5 Typical Base-Emitter Saturation Voltage vs. Collector Current