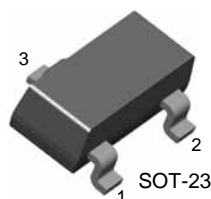


MMBT3904K

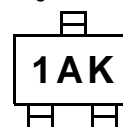
NPN Epitaxial Silicon Transistor

General Purpose Transistor



1. Base 2. Emitter 3. Collector

Marking



Absolute 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 | 200 | mA |
| P_C | Collector Power Dissipation | 350 | mW |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 ~ 150 | $^\circ\text{C}$ |

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

| Symbol | Parameter | Test Condition | Min. | Max. | Units |
|---------------|--|--|-----------------------------|--------------|--------|
| BV_{CBO} | Collector-Base Breakdown Voltage | $I_C = 10\mu\text{A}, I_E = 0$ | 60 | | V |
| BV_{CEO} | Collector-Emitter Breakdown Voltage * | $I_C = 1\text{mA}, I_B = 0$ | 40 | | V |
| BV_{EBO} | Emitter-Base Breakdown Voltage | $I_E = 10\mu\text{A}, I_C = 0$ | 6 | | V |
| I_{CEX} | Collector Cut-off Current | $V_{CE} = 30\text{V}, V_{EB} = 3\text{V}$ | | 50 | nA |
| h_{FE} | DC Current Gain * | $V_{CE} = 1\text{V}, I_C = 0.1\text{mA}$ $V_{CE} = 1\text{V}, I_C = 1\text{mA}$ $V_{CE} = 1\text{V}, I_C = 10\text{mA}$ $V_{CE} = 1\text{V}, I_C = 50\text{mA}$ $V_{CE} = 1\text{V}, I_C = 100\text{mA}$ | 40 70 100 60 30 | 300 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage * | $I_C = 10\text{mA}, I_B = 1\text{mA}$ $I_C = 50\text{mA}, I_B = 5\text{mA}$ | | 0.2 0.3 | V V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage * | $I_C = 10\text{mA}, I_B = 1\text{mA}$ $I_C = 50\text{mA}, I_B = 5\text{mA}$ | 0.65 | 0.85 0.95 | V V |
| C_{ob} | Output Capacitance | $V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$ | | 4 | pF |
| f_T | Current Gain-Bandwidth Product | $V_{CE} = 20\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$ | 300 | | MHz |
| NF | Noise Figure | $I_C = 100\mu\text{A}, V_{CE} = 5\text{V}, R_S = 1\text{K}\Omega$ $f = 10\text{Hz to } 15.7\text{KHz}$ | | 5 | dB |
| t_{ON} | Turn On Time | $V_{CC} = 3\text{V}, V_{BE} = 0.5\text{V}$ $I_C = 10\text{mA}, I_{B1} = 1\text{mA}$ | | 70 | ns |
| t_{OFF} | Turn Off Time | $V_{CC} = 3\text{V}, I_C = 10\text{mA}, I_{B1} = I_{B2} = 1\text{mA}$ | | 250 | ns |

* Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure 1. DC current Gain

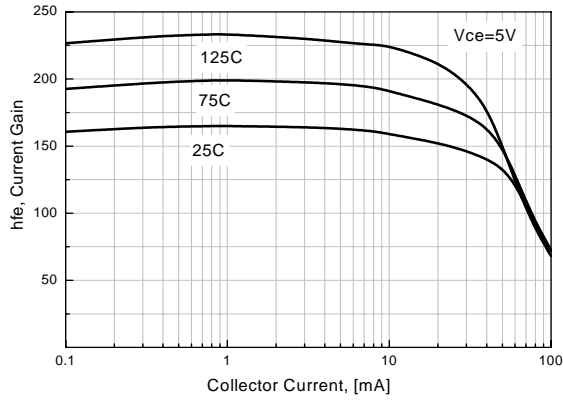


Figure 2. Collector-Emitter Saturation Voltage

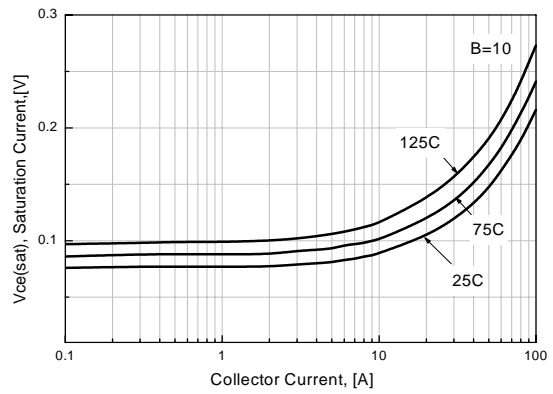


Figure 3. Base-Emitter Saturation Voltage

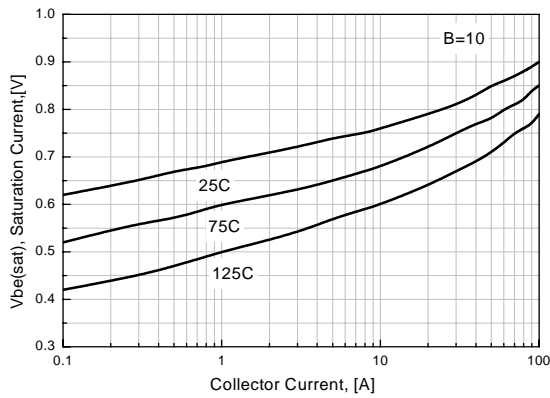


Figure 4. Collector - Base Leakage Current

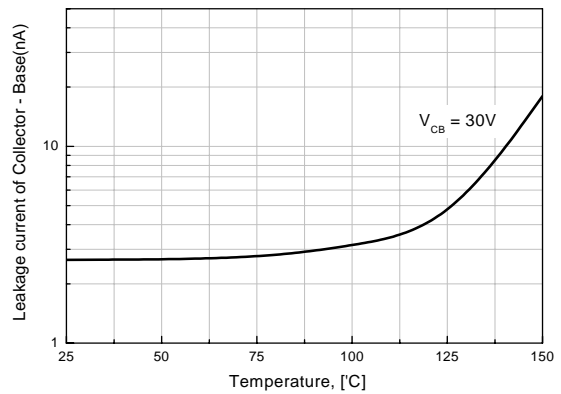


Figure 5. Output Capacitance

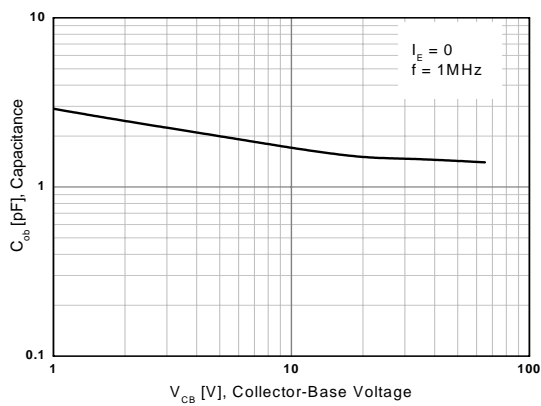
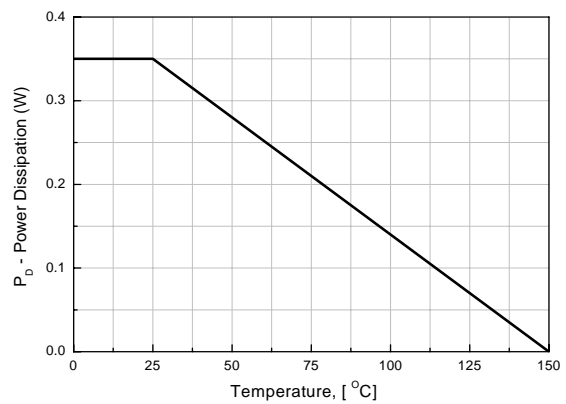
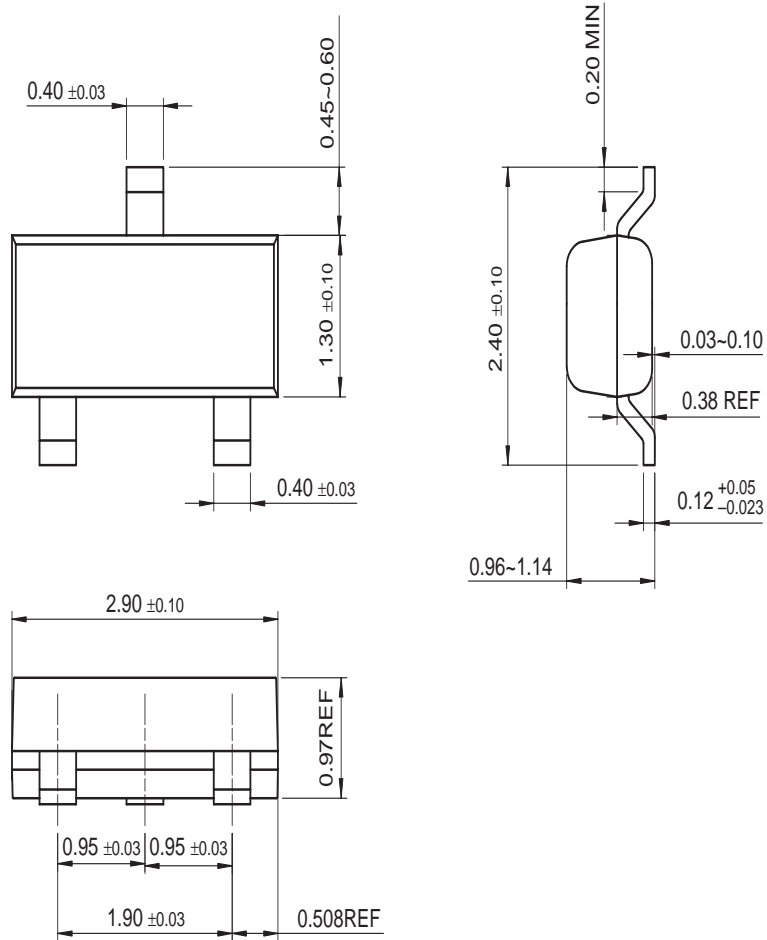


Figure 6. Power Dissipation vs Ambient Temperature



Mechanical Dimensions

SOT-23



Dimensions in Millimeters

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