



Discrete POWER & Signal
Technologies

2N4124 / MMBT4124

2N4124



MMBT4124



NPN General Purpose Amplifier

This device is designed as a general purpose amplifier and switch. The useful dynamic range extends to 100 mA as a switch and to 100 MHz as an amplifier. Sourced from Process 23. See 2N3904 for characteristics.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------------------------------|--|-------------|-------|
| V _{CEO} | Collector-Emitter Voltage | 25 | V |
| V _{CBO} | Collector-Base Voltage | 30 | V |
| V _{EBO} | Emitter-Base Voltage | 5.0 | V |
| I _C | Collector Current - Continuous | 200 | mA |
| T _J , T _{stg} | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics

TA = 25°C unless otherwise noted

| Symbol | Characteristic | Max | | Units |
|------------------|---|--------|-----------|-------|
| | | 2N4124 | *MMBT4124 | |
| P _D | Total Device Dissipation Derate above 25°C | 625 | 350 | mW |
| | | 5.0 | 2.8 | mW/°C |
| R _{θJC} | Thermal Resistance, Junction to Case | 83.3 | | °C/W |
| R _{θJA} | Thermal Resistance, Junction to Ambient | 200 | 357 | °C/W |

* Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

NPN General Purpose Amplifier

(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|--------|-----------|-----------------|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-------|

OFF CHARACTERISTICS

| | | | | | |
|---------------|-------------------------------------|-----------------------------------|-----|----|----|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage | $I_C = 1.0 \text{ mA}, I_B = 0$ | 25 | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage | $I_C = 10 \mu\text{A}, I_E = 0$ | 30 | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage | $I_C = 10 \mu\text{A}, I_C = 0$ | 5.0 | | V |
| I_{CBO} | Collector Cutoff Current | $V_{CB} = 20 \text{ V}, I_E = 0$ | | 50 | nA |
| I_{EBO} | Emitter Cutoff Current | $V_{EB} = 3.0 \text{ V}, I_C = 0$ | | 50 | nA |

ON CHARACTERISTICS*

| | | | | | |
|---------------|--------------------------------------|---|-----------|------|---|
| h_{FE} | DC Current Gain | $I_C = 2.0 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1.0 \text{ V}$ | 120 60 | 360 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ | | 0.3 | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ | | 0.95 | V |

SMALL SIGNAL CHARACTERISTICS

| | | | | | |
|-----------|----------------------------------|---|-----|-----|-----|
| f_T | Current Gain - Bandwidth Product | $I_C = 10 \text{ mA}, V_{CE} = 20 \text{ V},$ $f = 100 \text{ MHz}$ | 300 | | MHz |
| C_{obo} | Output Capacitance | $V_{CB} = 5.0 \text{ V}, I_E = 0,$ $f = 100 \text{ kHz}$ | | 4.0 | pF |
| C_{ibo} | Input Capacitance | $V_{BE} = 0.5 \text{ V}, I_C = 0,$ $f = 1.0 \text{ kHz}$ | | 8.0 | pF |
| C_{cb} | Collector-Base Capacitance | $V_{CB} = 5.0 \text{ V}, I_E = 0,$ $f = 100 \text{ kHz}$ | | 4.0 | pF |
| h_{fe} | Small-Signal Current Gain | $V_{CE} = 10 \text{ V}, I_C = 2.0 \text{ mA},$ $f = 1.0 \text{ kHz}$ | 120 | 480 | |
| NF | Noise Figure | $I_C = 100 \mu\text{A}, V_{CE} = 5.0 \text{ V},$ $R_S = 1.0 \text{ k}\Omega, f = 10 \text{ Hz to } 15.7 \text{ kHz}$ | | 5.0 | dB |

*Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$

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