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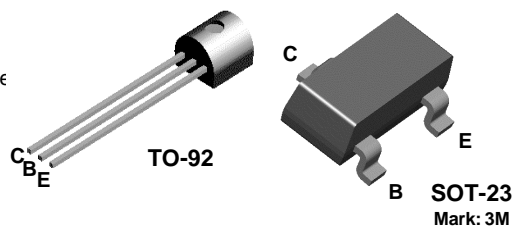
sales@integrated-circuit.com



2N5210/MMBT5210

NPN General Purpose Amplifier

This device is designed for low noise, high gain, general purpose amplifier applications at collector currents from 1μA to 50 mA.



Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------------------------------|--|-------------|-------|
| V _{CEO} | Collector-Emitter Voltage | 50 | V |
| V _{CBO} | Collector-Base Voltage | 50 | V |
| V _{EBO} | Emitter-Base Voltage | 4.5 | V |
| I _C | Collector Current - Continuous | 100 | 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 |
|------------------|---|--------|----------|-------|
| | | 2N5210 | MMBT5210 | |
| 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 |

NPN General Purpose Amplifier

(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

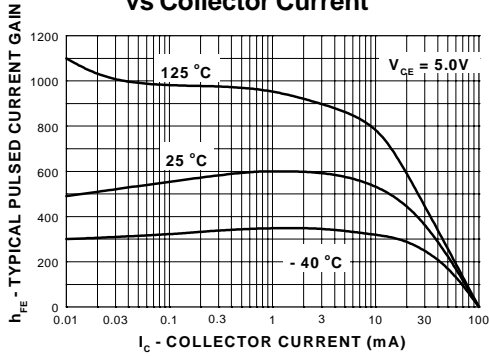
| Symbol | Parameter | Test Conditions | Min | Max | Units |
|-------------------------------------|--------------------------------------|---|-------------------|------------|----------|
| OFF CHARACTERISTICS | | | | | |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage | $I_C = 1.0 \text{ mA}, I_B = 0$ | 50 | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage | $I_C = 0.1 \text{ mA}, I_E = 0$ | 50 | | V |
| I_{CBO} | Collector Cutoff Current | $V_{CB} = 35 \text{ V}, I_E = 0$ | | 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 | $I_C = 100 \mu\text{A}, V_{CE} = 5.0 \text{ V}$ $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}^*$ | 200 250 250 | 600 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ | | 0.7 | V |
| $V_{BE(on)}$ | Base-Emitter On Voltage | $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ | | 0.85 | V |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| f_T | Current Gain - Bandwidth Product | $I_C = 500 \mu\text{A}, V_{CE} = 5.0 \text{ V},$ $f = 20 \text{ MHz}$ | 30 | | MHz |
| 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 | $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V},$ $f = 1.0 \text{ kHz}$ | 250 | 900 | |
| NF | Noise Figure | $I_C = 20 \mu\text{A}, V_{CE} = 5.0 \text{ V},$ $R_S = 22 \text{ k}\Omega, f = 10 \text{ Hz to } 15.7 \text{ kHz}$ $I_C = 20 \mu\text{A}, V_{CE} = 5.0 \text{ V},$ $R_S = 10 \text{ k}\Omega, f = 1.0 \text{ kHz}$ | | 2.0 3.0 | dB dB |

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

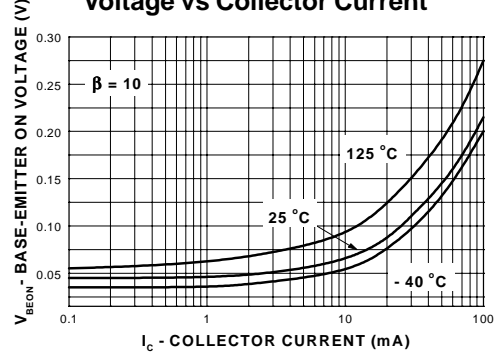
NPN General Purpose Amplifier
(continued)

Typical Characteristics

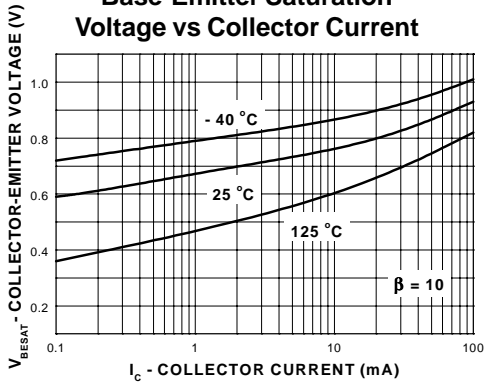
Typical Pulsed Current Gain vs Collector Current



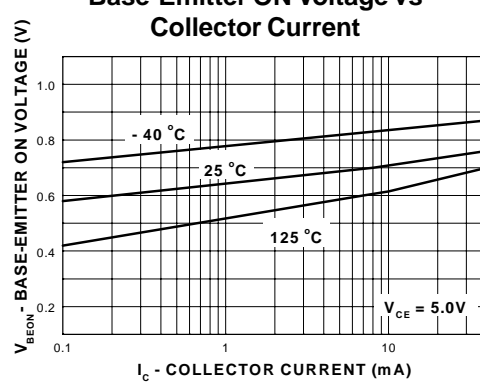
Collector-Emitter Saturation Voltage vs Collector Current



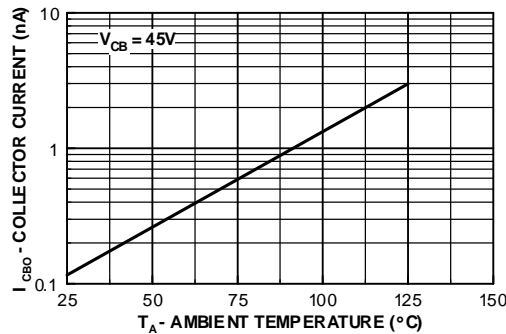
Base-Emitter Saturation Voltage vs Collector Current



Base-Emitter ON Voltage vs Collector Current



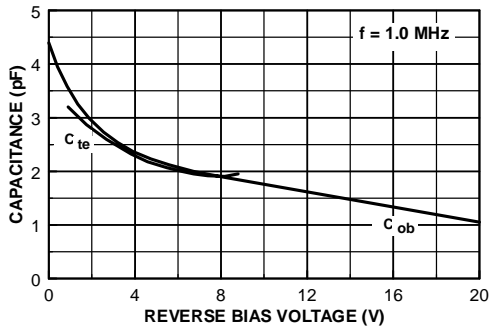
Collector-Cutoff Current vs Ambient Temperature



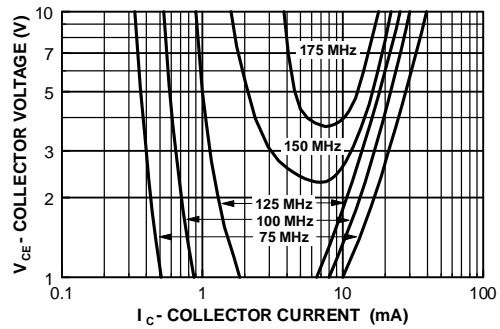
NPN General Purpose Amplifier
(continued)

Typical Characteristics (continued)

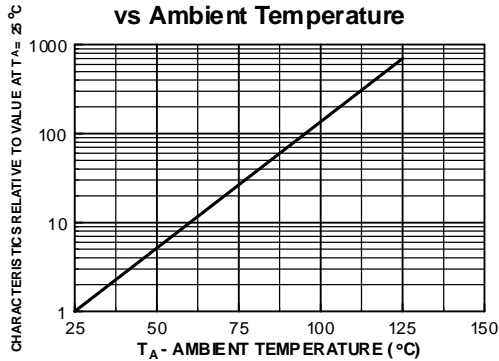
Input and Output Capacitance vs Reverse Bias Voltage



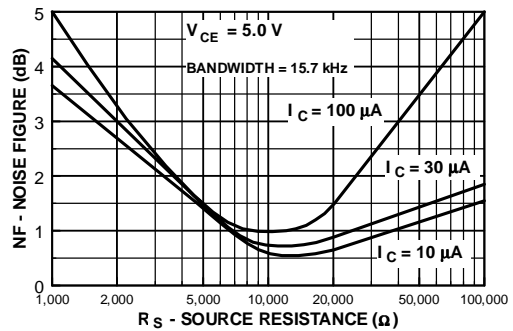
Contours of Constant Gain Bandwidth Product (f_T)



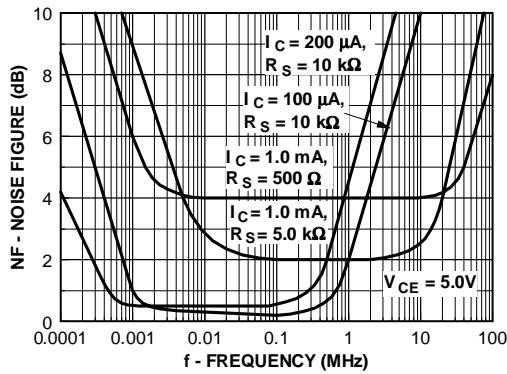
Normalized Collector-Cutoff Current vs Ambient Temperature



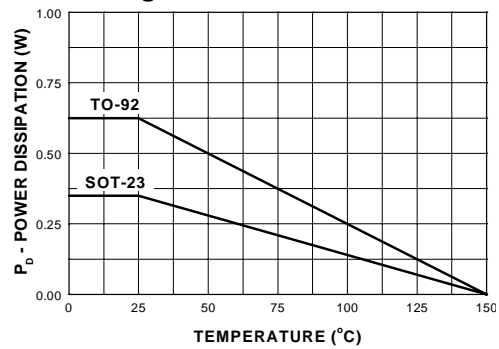
Wideband Noise Frequency vs Source Resistance



Noise Figure vs Frequency



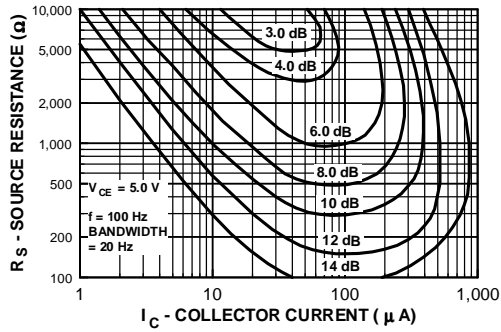
Base-Emitter Saturation Voltage vs Collector Current



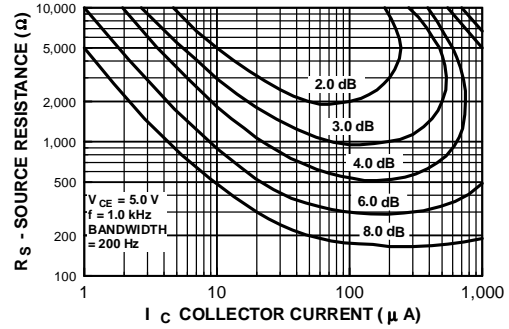
NPN General Purpose Amplifier
(continued)

Typical Characteristics (continued)

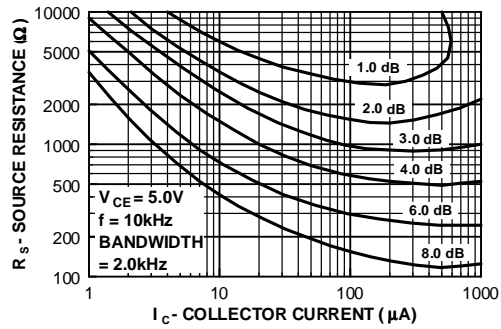
**Contours of Constant
Narrow Band Noise Figure**



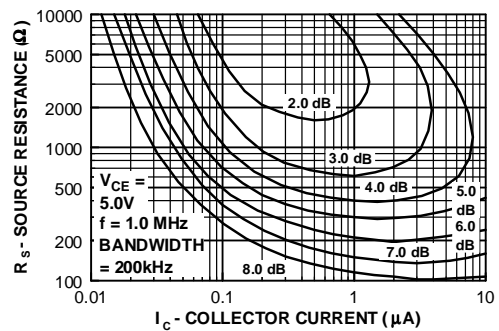
**Contours of Constant
Narrow Band Noise Figure**



**Contours of Constant
Narrow Band Noise Figure**



**Contours of Constant
Narrow Band Noise Figure**

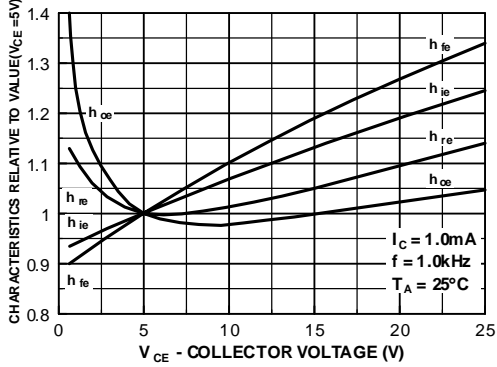


NPN General Purpose Amplifier

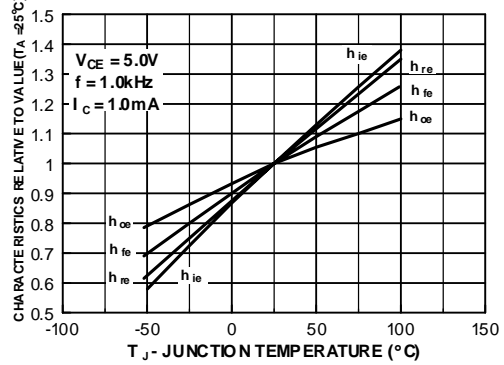
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Typical Common Emitter Characteristics ($f = 1.0 \text{ kHz}$)

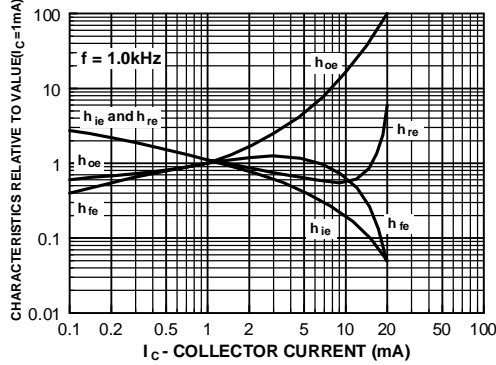
Typical Common Emitter Characteristics



Typical Common Emitter Characteristics



Typical Common Emitter Characteristics



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