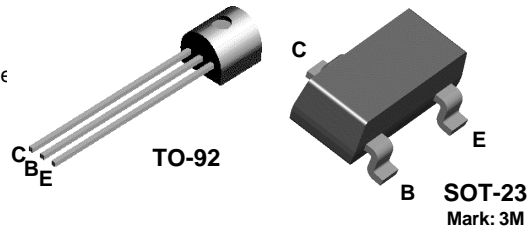


2N5210/MMBT5210

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 5.0	350 2.8	mW 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

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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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	$I_C = 100\text{ }\mu\text{A}, V_{CE} = 5.0\text{ V}$ $I_C = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 5.0\text{ V}^*$	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	$I_C = 500\text{ }\mu\text{A}, V_{CE} = 5.0\text{ V},$ $f = 20\text{ MHz}$	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	$I_C = 20\text{ }\mu\text{A}, V_{CE} = 5.0\text{ V},$ $R_S = 22\text{ k}\Omega, f = 10\text{ Hz to }15.7\text{ kHz}$ $I_C = 20\text{ }\mu\text{A}, V_{CE} = 5.0\text{ V},$ $R_S = 10\text{ k}\Omega, f = 1.0\text{ kHz}$		2.0 3.0	dB dB

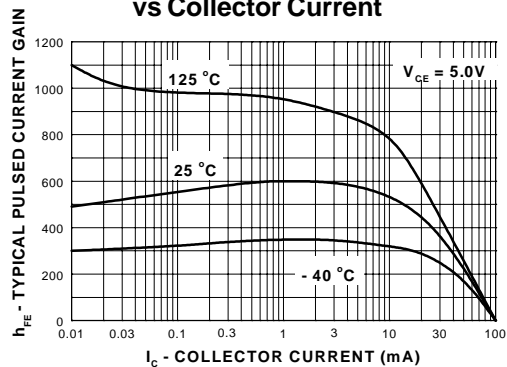
*Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$

NPN General Purpose Amplifier

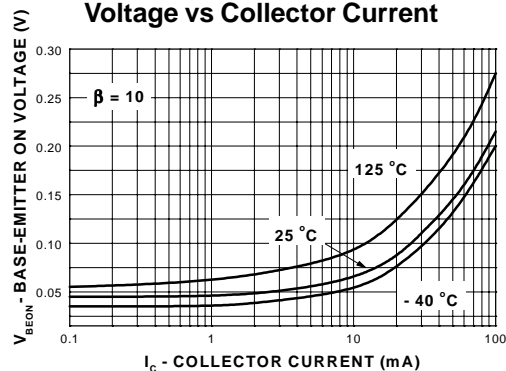
(continued)

Typical Characteristics

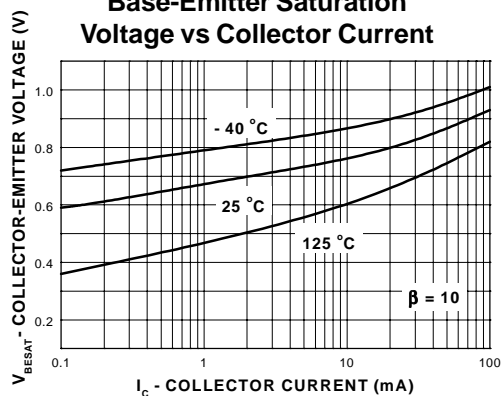
Typical Pulsed Current Gain vs Collector Current



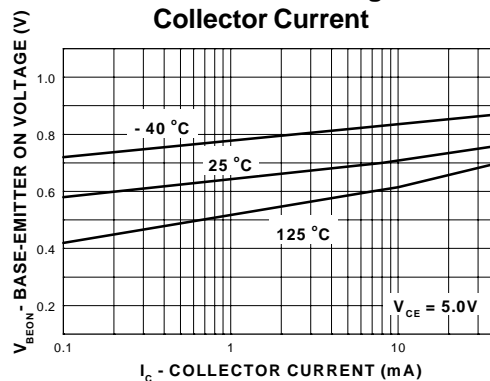
Collector-Emitter Saturation Voltage vs Collector Current



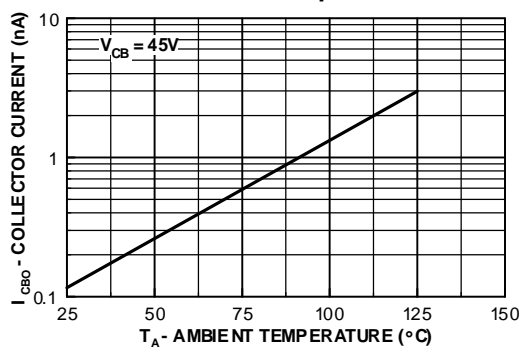
Base-Emitter Saturation Voltage vs Collector Current



Base-Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

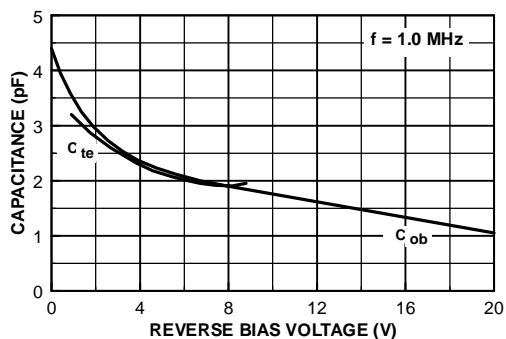


NPN General Purpose Amplifier

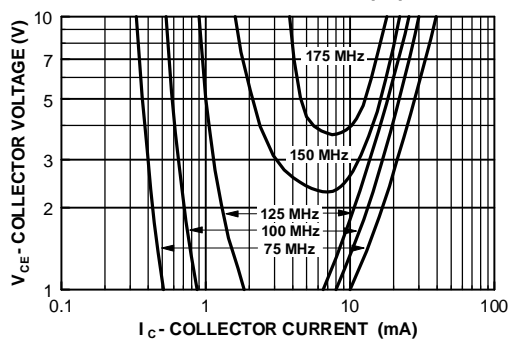
(continued)

Typical Characteristics (continued)

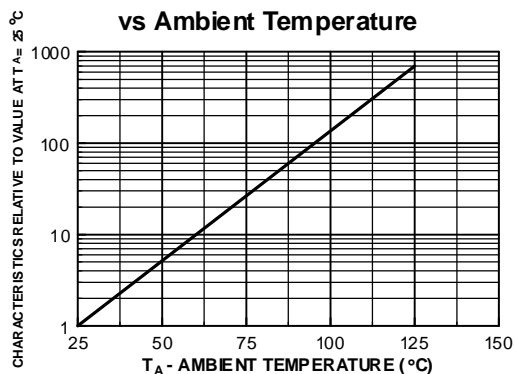
Input and Output Capacitance
vs Reverse Bias Voltage



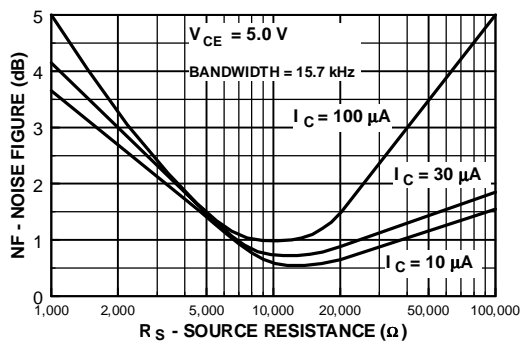
Contours of Constant Gain
Bandwidth Product (f_T)



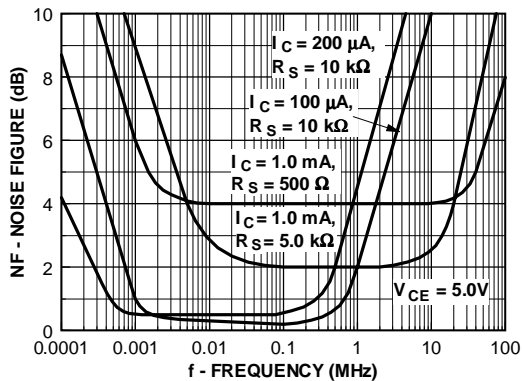
Normalized Collector-Cutoff Current
vs Ambient Temperature



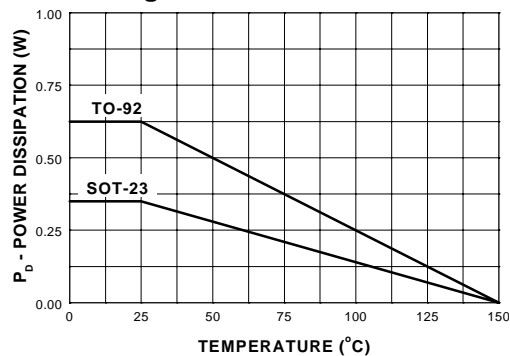
Wideband Noise Frequency
vs Source Resistance



Noise Figure vs Frequency

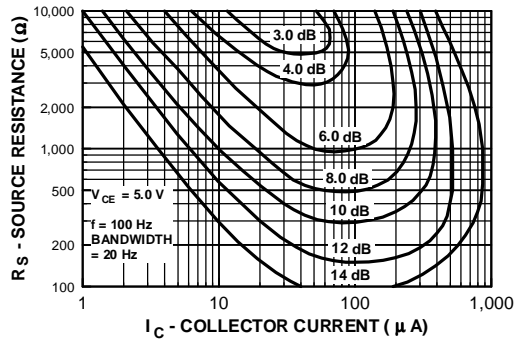


Base-Emitter Saturation
Voltage vs Collector Current

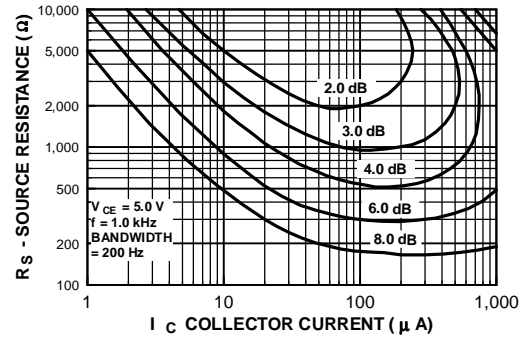


Typical Characteristics (continued)

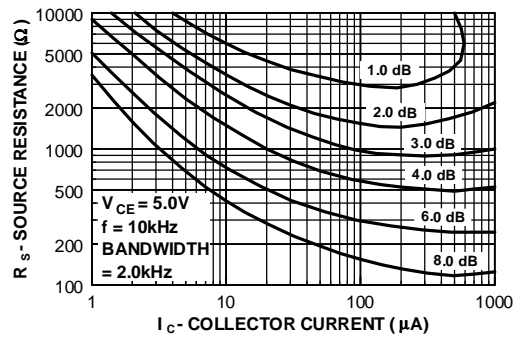
**Contours of Constant
Narrow Band Noise Figure**



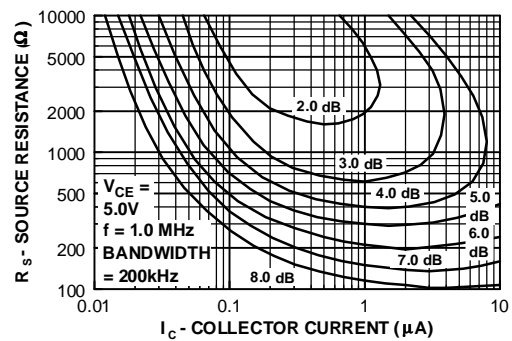
**Contours of Constant
Narrow Band Noise Figure**



**Contours of Constant
Narrow Band Noise Figure**



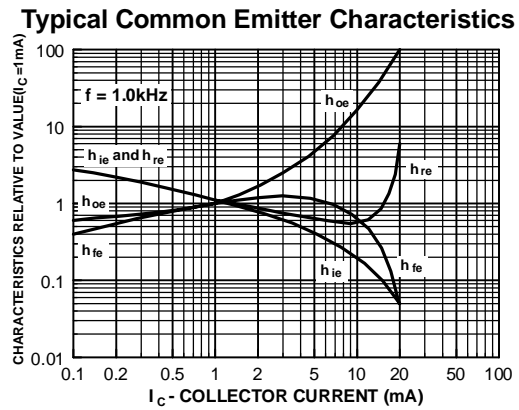
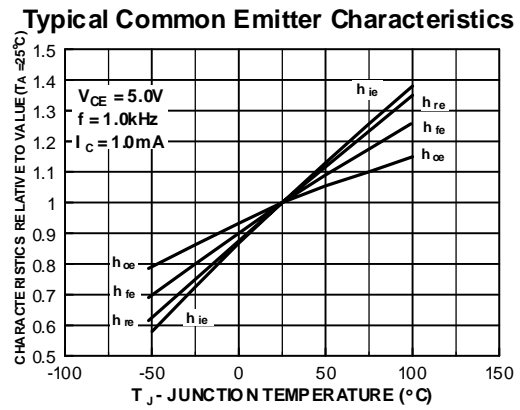
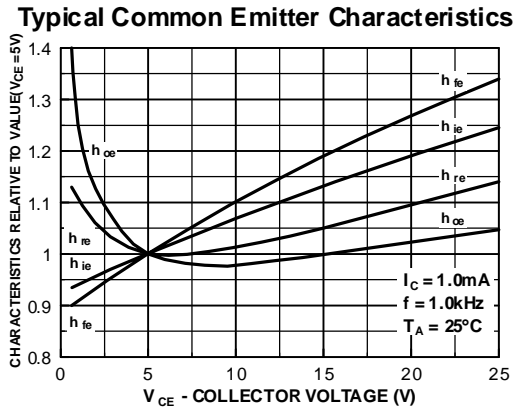
**Contours of Constant
Narrow Band Noise Figure**



NPN General Purpose Amplifier (continued)

2N5210/MMBT5210

Typical Common Emitter Characteristics (f = 1.0 kHz)



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