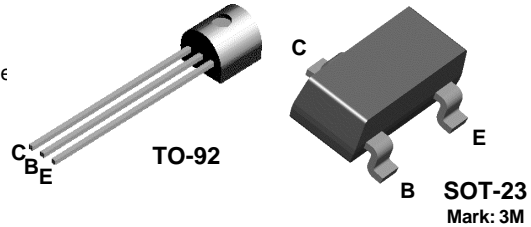


## 2N5210/MMBT5210

### 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	625	350	mW
	Derate above 25°C	5.0	2.8	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	°C/W

## NPN General Purpose Amplifier (continued)

2N5210/MMBT5210

### Electrical Characteristics

TA = 25°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	$I_C = 100 \mu\text{A}, V_{CE} = 5.0 \text{ V}$ $I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}^*$	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

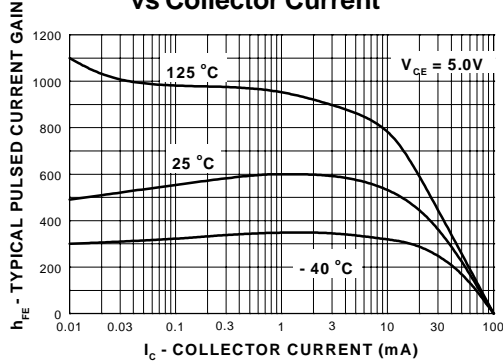
#### SMALL SIGNAL CHARACTERISTICS

$f_T$	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

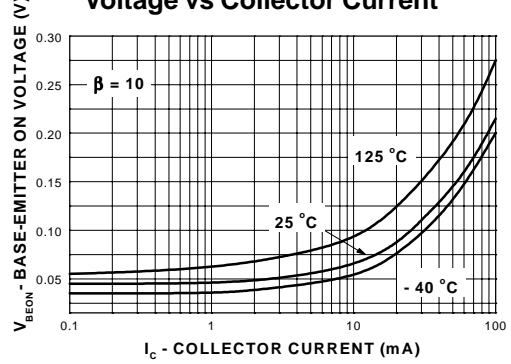
\*Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

Typical Characteristics

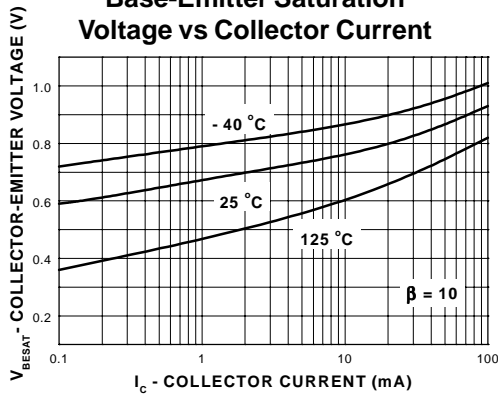
Typical Pulsed Current Gain vs Collector Current



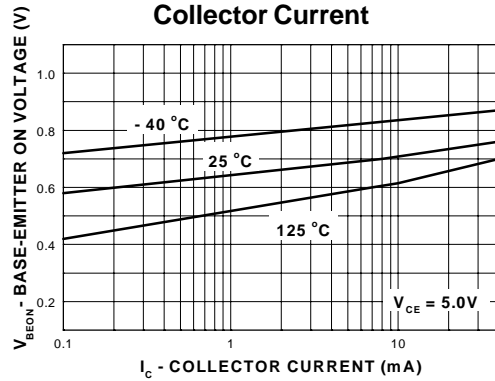
Collector-Emitter Saturation Voltage vs Collector Current



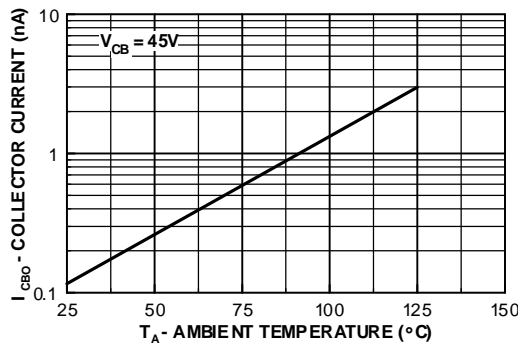
Base-Emitter Saturation Voltage vs Collector Current



Base-Emitter ON Voltage vs Collector Current



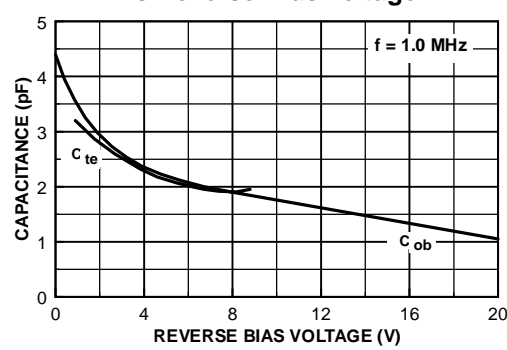
Collector-Cutoff Current vs Ambient Temperature



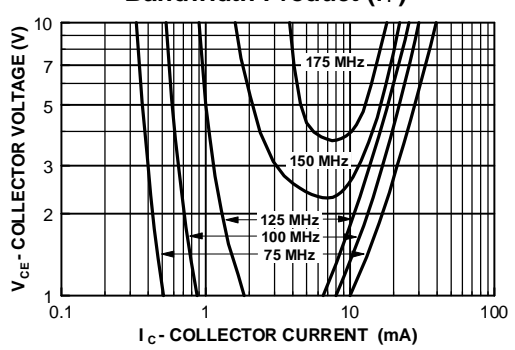
**NPN General Purpose Amplifier**  
(continued)

**Typical Characteristics** (continued)

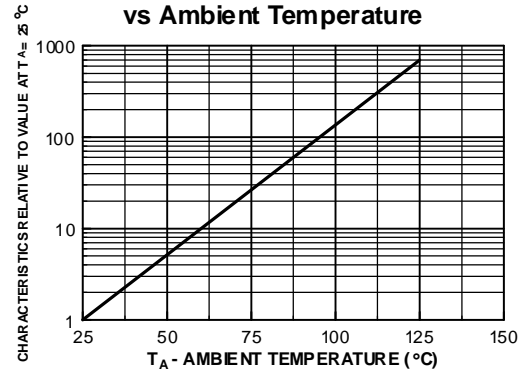
**Input and Output Capacitance vs Reverse Bias Voltage**



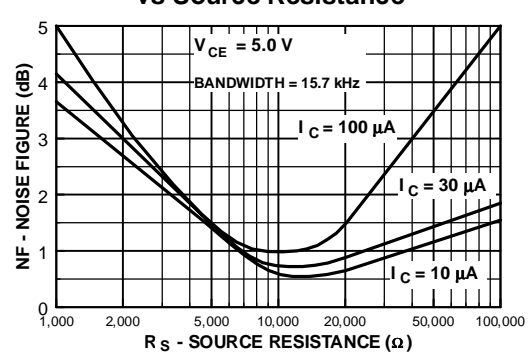
**Contours of Constant Gain Bandwidth Product ( $f_T$ )**



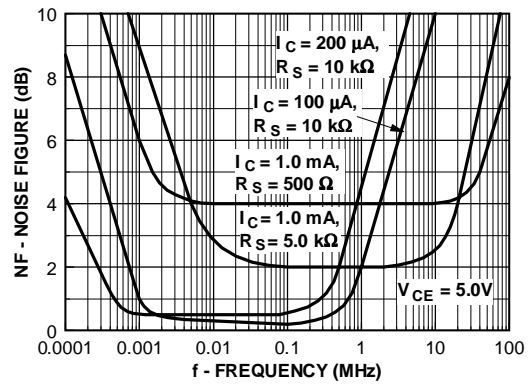
**Normalized Collector-Cutoff Current vs Ambient Temperature**



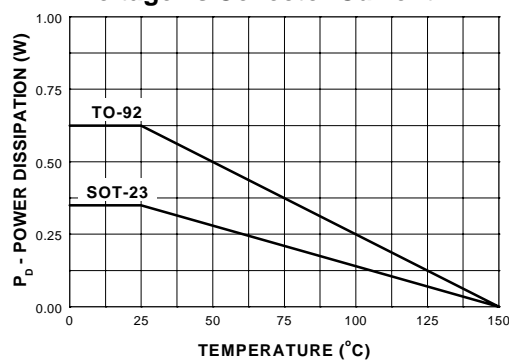
**Wideband Noise Frequency vs Source Resistance**



**Noise Figure vs Frequency**

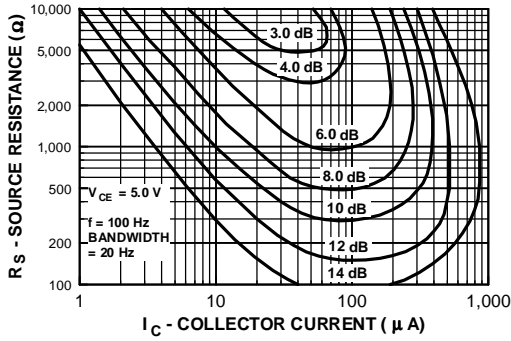


**Base-Emitter Saturation Voltage vs Collector Current**

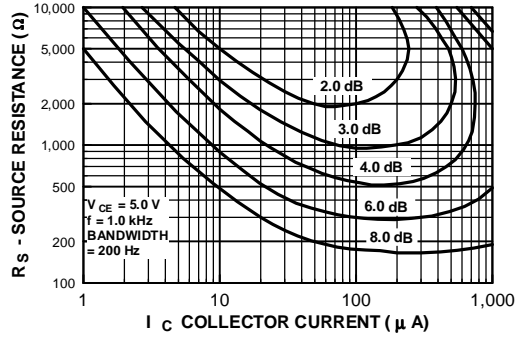


Typical Characteristics (continued)

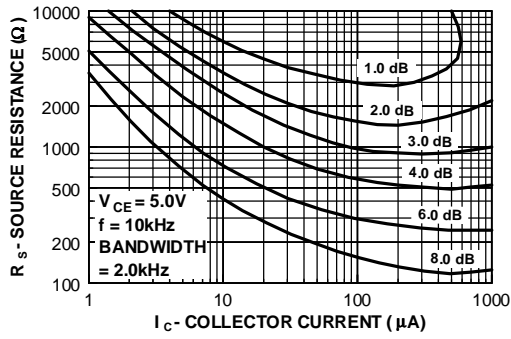
Contours of Constant  
Narrow Band Noise Figure



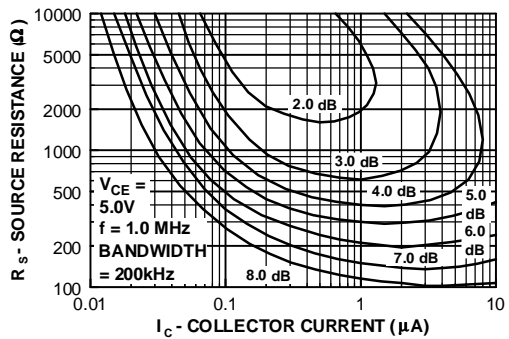
Contours of Constant  
Narrow Band Noise Figure



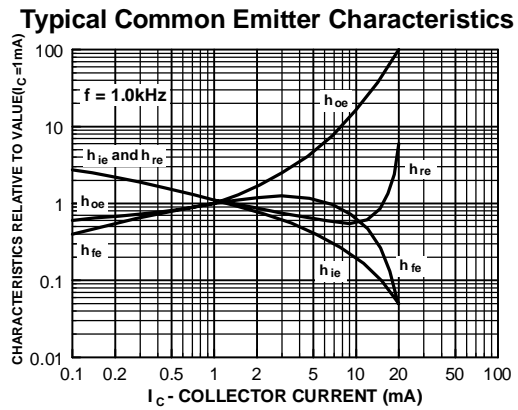
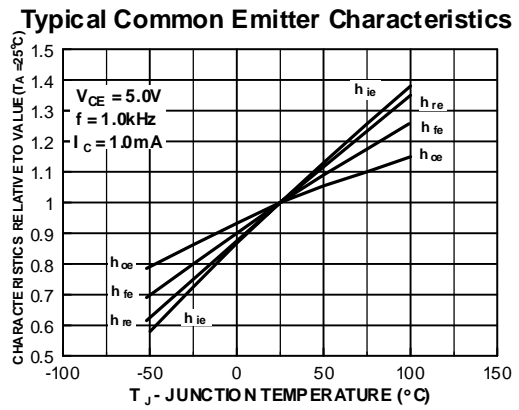
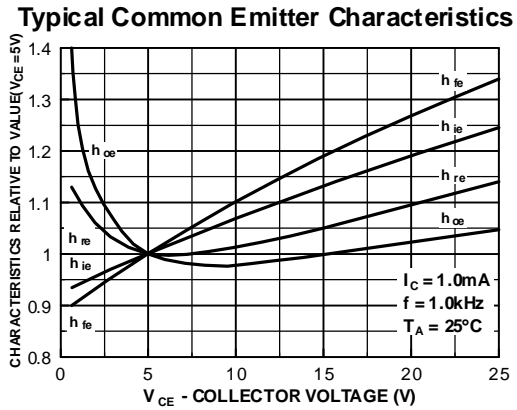
Contours of Constant  
Narrow Band Noise Figure



Contours of Constant  
Narrow Band Noise Figure



Typical Common Emitter Characteristics (f = 1.0 kHz)



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Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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## 2N5210

NPN General Purpose Amplifier

### Contents

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### General description

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

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### Product status/pricing/packageing

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Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method	Package Marking Convention**
2N5210BU	Full Production	Full Production	\$0.0238	<a href="#">TO-92</a>	3	BULK	Line 1: 2N Line 2: 5210 Line 3: -&3
2N5210NMBU	Full Production	Full Production	\$0.0238	<a href="#">TO-92</a>	3	BULK	N/A
2N5210TA	Full Production	Full Production	\$0.0238	<a href="#">TO-92</a>	3	AMMO	Line 1: 2N Line 2: 5210 Line 3: -&3
2N5210TAR	Full Production		\$0.0238	<a href="#">TO-92</a>	3	AMMO	Line 1: 2N Line 2: 5210 Line 3: -&3



		 Full Production					
2N5210TF	Full Production	 Full Production	\$0.0238	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: 2N Line 2: 5210 Line 3: -&3
2N5210TFR	Full Production	 Full Production	\$0.0238	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: 2N Line 2: 5210 Line 3: -&3
2N5210_D81Z	Full Production	 Full Production	N/A	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: <b>\$Y</b> (Fairchild logo) & <b>Z</b> (Asm. Plant Code) & <b>3</b> (3-Digit Date Code) Line 2: 2N Line 3: 5210
2N5210_J05Z	Full Production	 Full Production	N/A	<a href="#">TO-92</a>	3	BULK	Line 1: <b>\$Y</b> (Fairchild logo) & <b>Z</b> (Asm. Plant Code) & <b>3</b> (3-Digit Date Code) Line 2: 2N Line 3: 5210

\* Fairchild 1,000 piece Budgetary Pricing

\*\* A sample button will appear if the part is available through Fairchild's on-line samples program. If there is no sample button, please contact a [Fairchild distributor](#) to obtain samples



Indicates product with Pb-free second-level interconnect. For more information [click here](#).

Package marking information for product 2N5210 is available. [Click here for more information](#).

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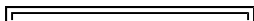
### Models

Package & leads	Condition	Temperature range	Software version	Revision date
<b>PSPICE</b>				
TO-92-3	<a href="#">Electrical</a>	25°C	N/A	N/A

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### Qualification Support

Click on a product for detailed qualification data



Product
<a href="#">2N5210BU</a>
<a href="#">2N5210NMBU</a>
<a href="#">2N5210TA</a>
<a href="#">2N5210TAR</a>
<a href="#">2N5210TF</a>
<a href="#">2N5210TFR</a>
<a href="#">2N5210_D81Z</a>
<a href="#">2N5210_J05Z</a>

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