



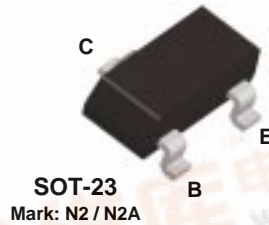
**Discrete POWER & Signal Technologies**

**PN200  
PN200A**

**MMBT200  
MMBT200A**



TO-92



SOT-23  
Mark: N2 / N2A

**PNP General Purpose Amplifier**

This device is designed for general purpose amplifier applications at collector currents to 300 mA. Sourced from Process 68.

**Absolute Maximum Ratings\***

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	45	V
V <sub>CBO</sub>	Collector-Base Voltage	75	V
V <sub>EBO</sub>	Emitter-Base Voltage	6.0	V
I <sub>C</sub>	Collector Current - Continuous	500	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		PN200A	*MMBT200A	
P <sub>D</sub>	Total Device Dissipation	625	350	mW
	Derate above 25°C	5.0	2.8	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3		°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	357	°C/W

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

PN200 / MMBT200 / PN200A / MMBT200A



## PNP General Purpose Amplifier

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### Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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#### OFF CHARACTERISTICS

BV <sub>CBO</sub>	Collector-Base Breakdown Voltage	I <sub>C</sub> = 10 μA, I <sub>B</sub> = 0	60		V
BV <sub>CEO</sub>	Collector-Emitter Breakdown Voltage*	I <sub>C</sub> = 1.0 mA, I <sub>E</sub> = 0	45		V
BV <sub>EBO</sub>	Emitter-Base Breakdown Voltage	I <sub>E</sub> = 10 μA, I <sub>C</sub> = 0	6.0		V
I <sub>CBO</sub>	Collector Cutoff Current	V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0		50	nA
I <sub>CES</sub>	Collector Cutoff Current	V <sub>CE</sub> = 40 V, I <sub>E</sub> = 10		50	nA
I <sub>EBO</sub>	Emitter Cutoff Current	V <sub>EB</sub> = 4.0 V, I <sub>C</sub> = 0		50	nA

#### ON CHARACTERISTICS

h <sub>FE</sub>	DC Current Gain	I <sub>C</sub> = 100 μA, V <sub>CE</sub> = 1.0 V	<b>200</b>	80	
			<b>200A</b>	240	
		I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 1.0 V	<b>200</b>	100	450
			<b>200A</b>	300	600
		I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 1.0 V*	<b>200A</b>	100	
		I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 5.0 V*	<b>200</b>	100	350
			<b>200A</b>	100	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA		0.2	V
		I <sub>C</sub> = 200 mA, I <sub>B</sub> = 20 mA*		0.4	V
V <sub>BE(sat)</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA		0.85	V
		I <sub>C</sub> = 200 mA, I <sub>B</sub> = 20 mA*		1.0	V

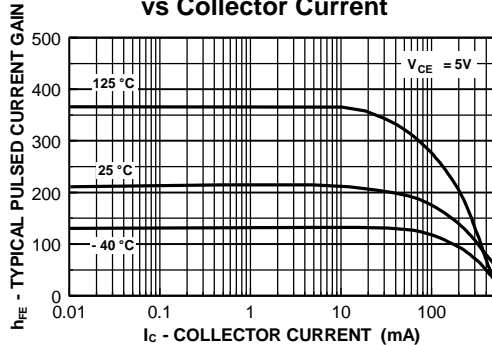
#### SMALL SIGNAL CHARACTERISTICS

f <sub>T</sub>	Current Gain - Bandwidth Product	V <sub>CE</sub> = 20 V, I <sub>C</sub> = 20 mA	250		MHz
C <sub>obo</sub>	Output Capacitance	V <sub>CB</sub> = 10 V, f = 1.0 MHz		6.0	pF
NF	Noise Figure	I <sub>C</sub> = 100 μA, V <sub>CE</sub> = 5.0 V,	<b>200</b>	5.0	dB
		R <sub>G</sub> = 2.0 kΩ, f = 1.0 kHz	<b>200A</b>	4.0	dB

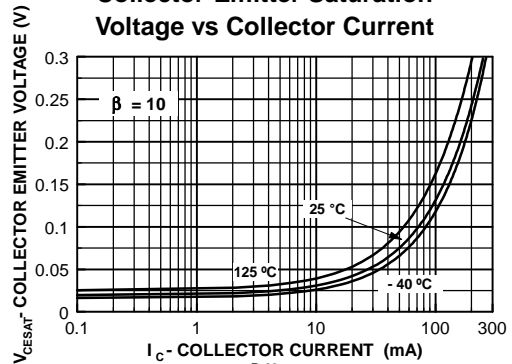
\*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

### Typical Characteristics

**Typical Pulsed Current Gain vs Collector Current**



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



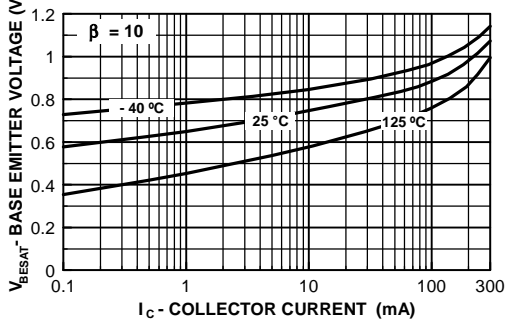
# PNP General Purpose Amplifier

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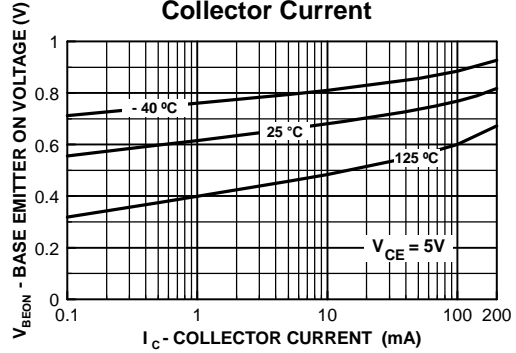
PN200 / MMBT200 / PN200A / MMBT200A

## Typical Characteristics (continued)

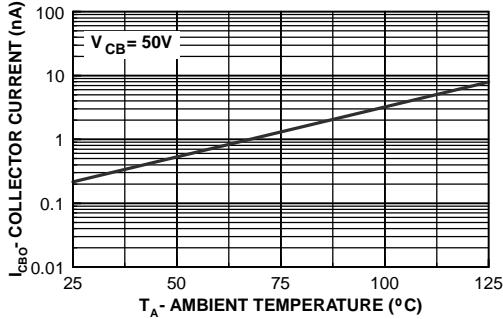
**Base-Emitter Saturation Voltage vs Collector Current**



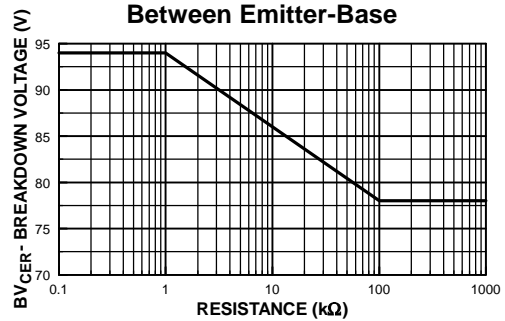
**Base Emitter ON Voltage vs Collector Current**



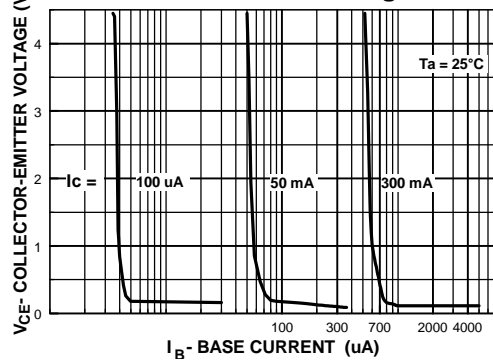
**Collector-Cutoff Current vs. Ambient Temperature**



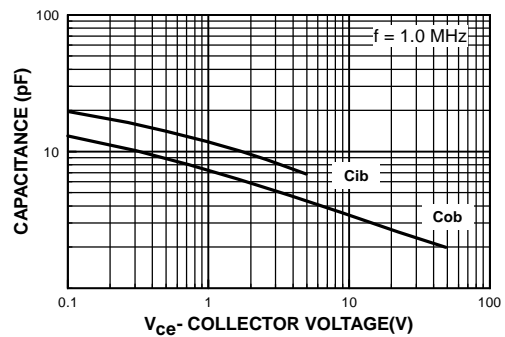
**Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base**



**Collector Saturation Region**



**Input and Output Capacitance vs Reverse Voltage**

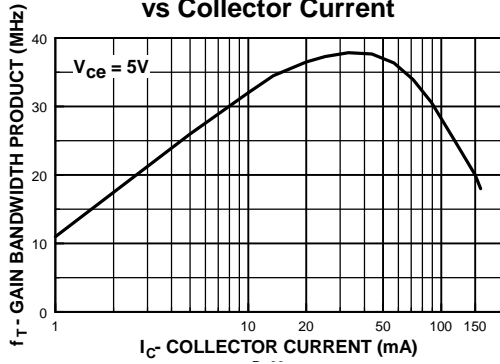


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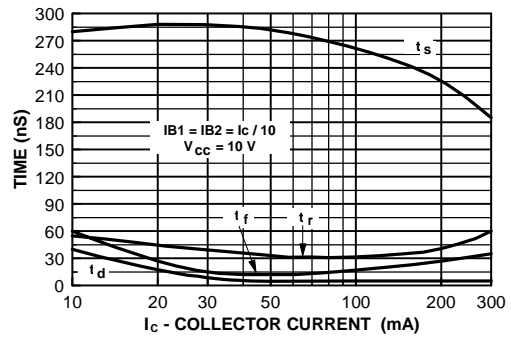
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## Typical Characteristics (continued)

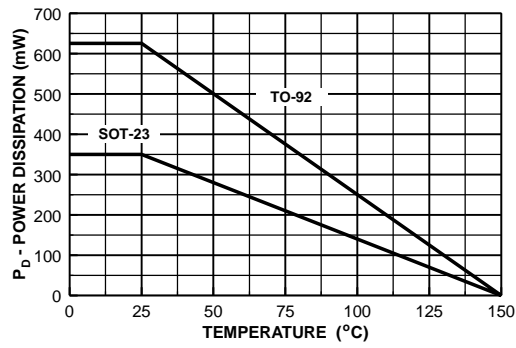
**Gain Bandwidth Product vs Collector Current**



**Switching Times vs Collector Current**



**Power Dissipation vs Ambient Temperature**



PN200 / MMBT200 / PN200A / MMBT200A