FAIRCHILD SEMICONDUCTOR®

January 2014

PN200A / MMBT200
PNP General-Purpose Amplifier

Description

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

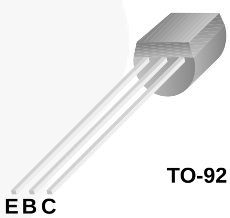


Figure 1. PN200A Device Package

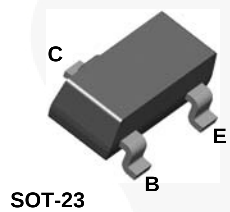


Figure 2. MMBT200 Device Package

Ordering Information

Part Number	Marking	Package	Packing Method
PN200A	PN200A	TO-92 3L	Bulk
MMBT200	N2	SOT-23 3L	Tape and Reel

Absolute Maximum Ratings(1),(2)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage	-45	V
V_{CBO}	Collector-Base Voltage	-60	V
V_{EBO}	Emitter-Base Voltage	-6	V
I_C	Collector Current - Continuous	-500	mA
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Notes:

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

Thermal Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Max.		Unit
		PN200A[3]	MMBT200[4]	
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

Notes:

3. PCB size: FR-4 76 x 114 x 1.57 mm^3 (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.
4. Device mounted on FR-4 PCB 1.6 inch X 1.6 inch X 0.06 inch.

Electrical Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Conditions		Min.	Max.	Unit
Off Characteristics						
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = -10 µA, I_B = 0		-60		V
BV_{CEO}	Collector-Emitter Breakdown Voltage[5]	I_C = -1.0 mA, I_E = 0		-45		V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = -10 µA, I_C = 0		-6.0		V
I_{CBO}	Collector Cut-Off Current	V_{CB} = -50 V, I_E = 0			-50	nA
I_{CES}	Collector Cut-Off Current	V_{CE} = -40 V, I_E = 0			-50	nA
I_{EBO}	Emitter Cut-Off Current	V_{EB} = -4.0 V, I_C = 0			-50	nA
On Characteristics						
h_{FE}	DC Current Gain	I_C = -100 µA, V_{CE} = -1.0 V	MMBT200	80		
			PN200A	240		
		I_C = -10 mA, V_{CE} = -1.0 V	MMBT200	100	450	
			PN200A	300	600	
		I_C = -100 mA, V_{CE} = -1.0 V[5]	PN200A	100		
		I_C = -150 mA, V_{CE} = -5.0 V[5]	MMBT200	100	350	
			PN200A	100		
$V_{CE}(sat)$	Collector-Emitter Saturation Voltage	I_C = -10 mA, I_B = -1.0 mA			-0.2	V
		I_C = -200 mA, I_B = -20 mA[5]			-0.4	
$V_{BE}(sat)$	Base-Emitter Saturation Voltage	I_C = -10 mA, I_B = -1.0 mA			-0.85	V
		I_C = -200 mA, I_B = -20 mA[5]			-1.00	
Small Signal Characteristics						
f_T	Current Gain - Bandwidth Product	V_{CE} = -20 V, I_C = -20 mA,		250		MHz
C_{ob}	Output Capacitance	V_{CB} = -10 V, f = -1.0 MHz			6.0	pF
NF	Noise Figure	I_C = -100 µA, V_{CE} = -5.0 V, R_G = 2.0 kΩ, f = 1.0 kHz			4.0	dB

Note:

5. Pulse test: pulse width ≤ 300 µs, duty cycle ≤ 2.0%.

Typical Performance Characteristics

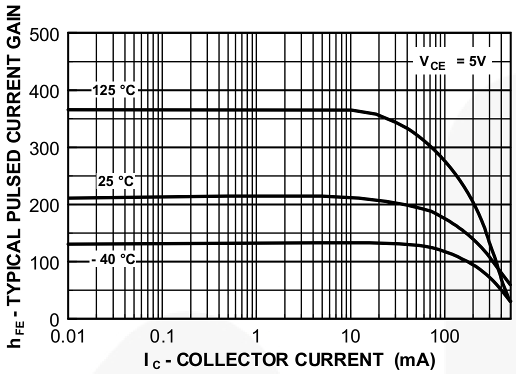


Figure 3. Typical Pulsed Current Gain vs. Collector Current

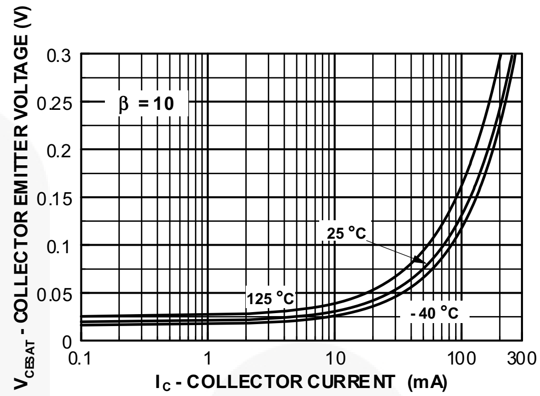


Figure 4. Collector-Emitter Saturation Voltage vs. Collector Current

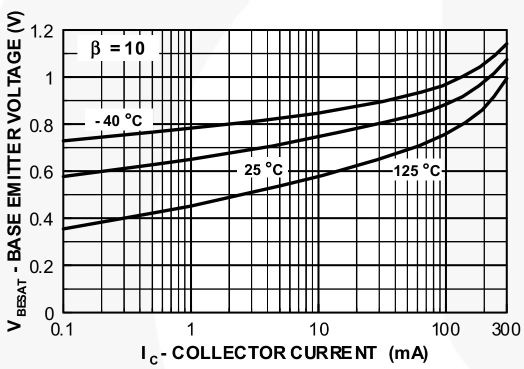


Figure 5. Base-Emitter Saturation Voltage vs. Collector Current

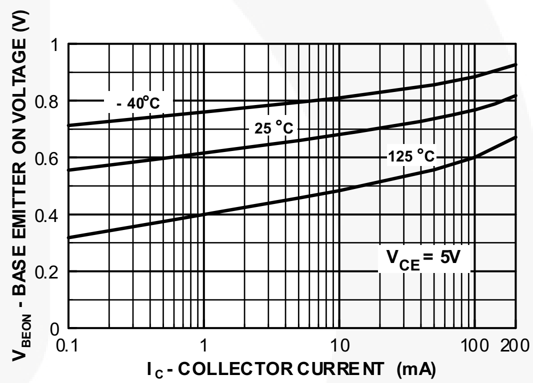


Figure 6. Base-Emitter On Voltage vs. Collector Current

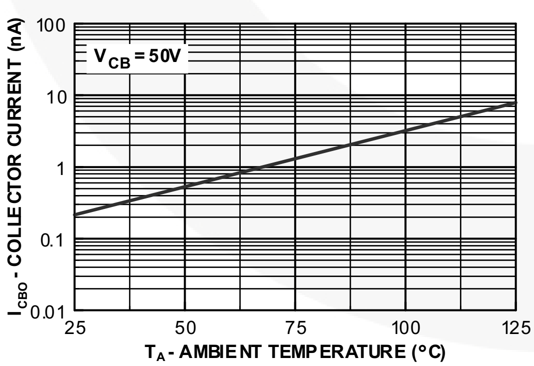


Figure 7. Collector Cut-Off Current vs. Ambient Temperature

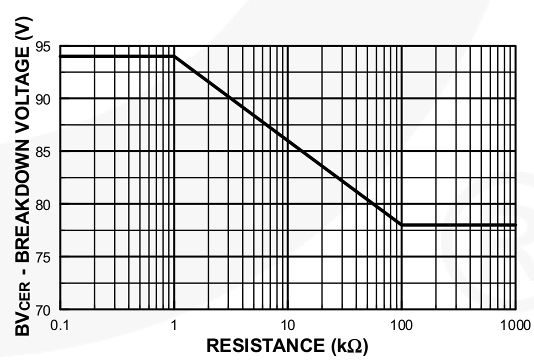


Figure 8. Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base

Typical Performance Characteristics (Continued)

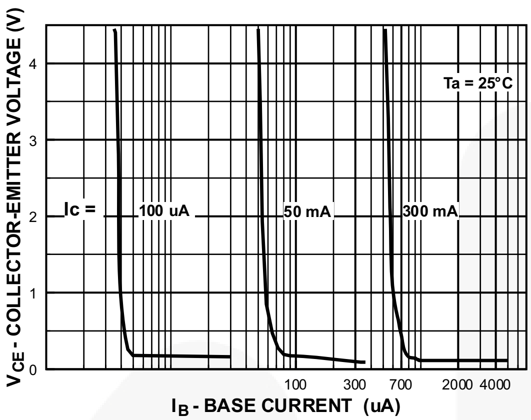


Figure 9. Collector Saturation Region

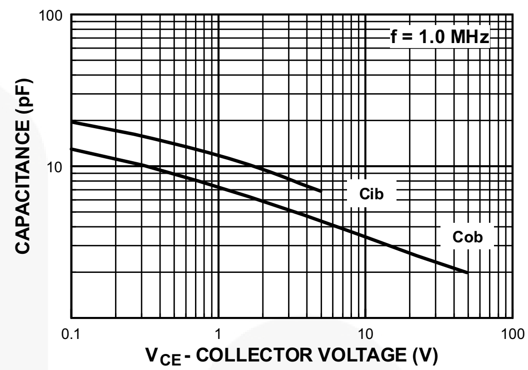


Figure 10. Input and Output Capacitance vs. Reverse Voltage

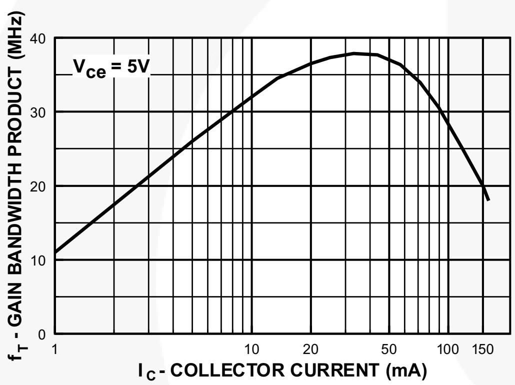


Figure 11. Gain Bandwidth Product vs. Collector Current

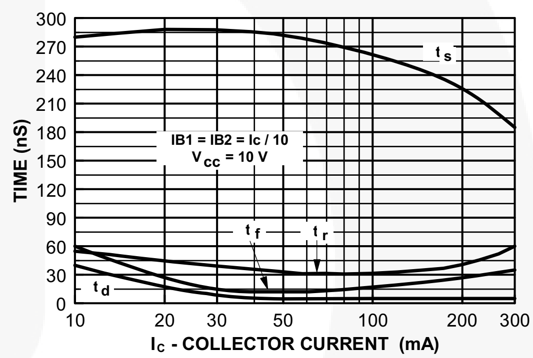


Figure 12. Switching Times vs. Collector Current

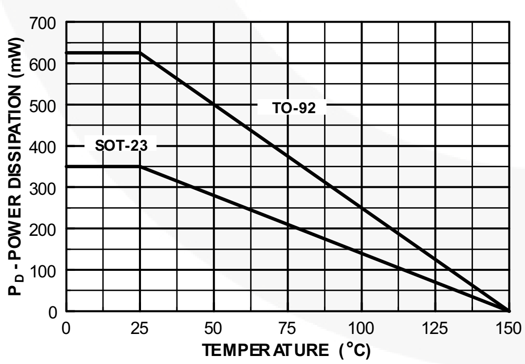
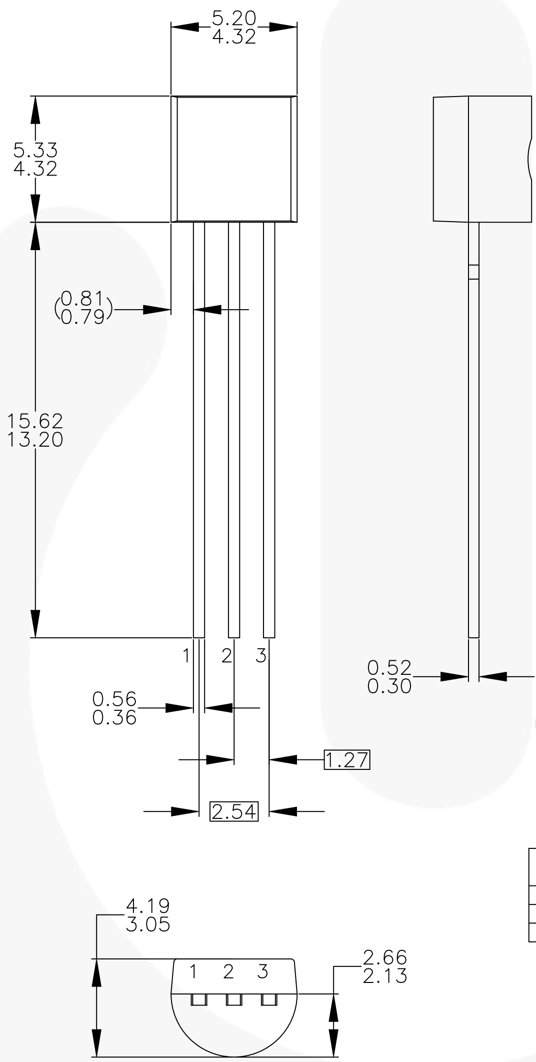


Figure 13. Power Dissipation vs. Ambient Temperature

Physical Dimensions

TO-92



NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DRAWING CONFORMS TO ASME Y14.5M-1994.
D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:
P – BIPOLAR E – EMITTER D – DRAIN
F – JFET B – BASE S – SOURCE
M – DMOS C – COLLECTOR G – GATE

E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEAGLE AT JFET "F" OPTION.
F) DRAWING FILENAME: MKT-ZA03DREV3.

Figure 14. 3-LEAD, TO-92, MOLDED, STD STRAGHIT LEAD (NO EOL CODE) (ACTIVE)

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http://www.fairchildsemi.com/packing_dwg/PKG-ZA03D_BK.pdf.

Physical Dimensions (Continued)

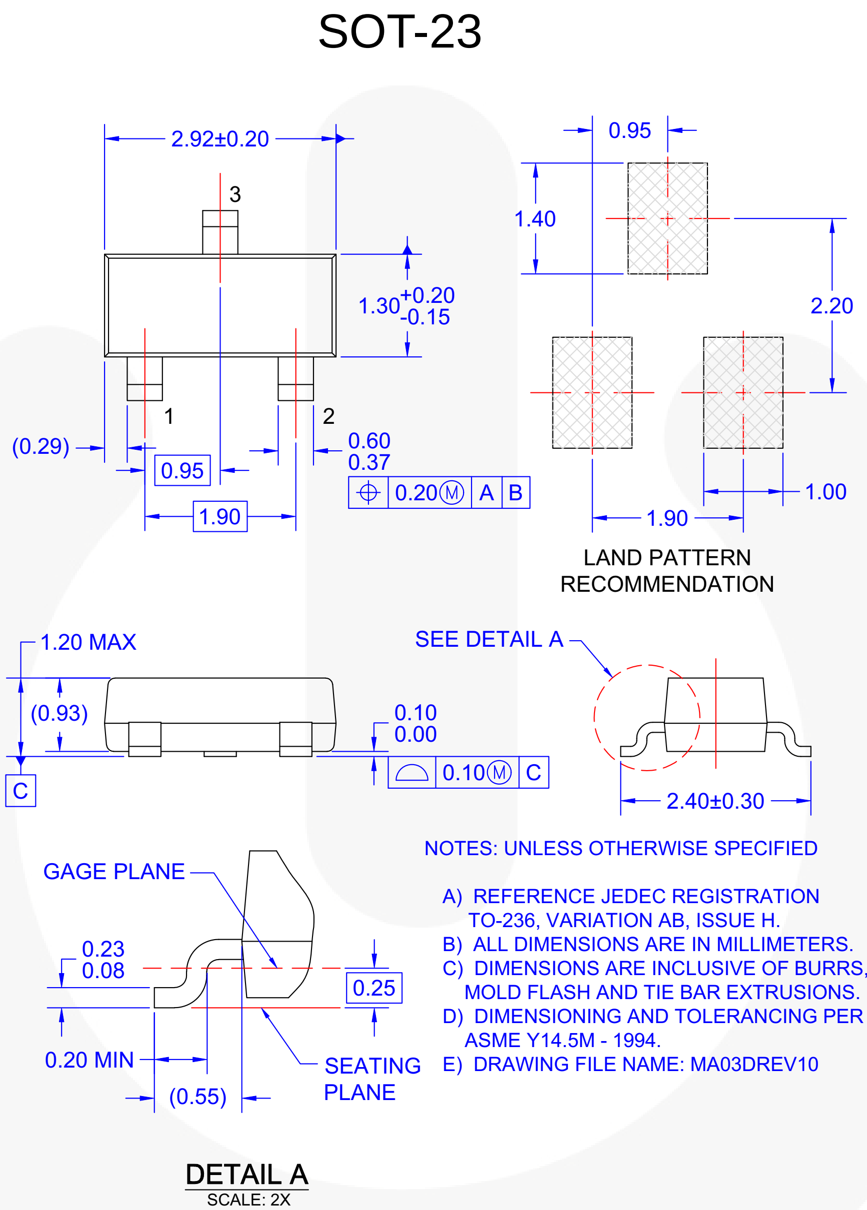

Figure 15. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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