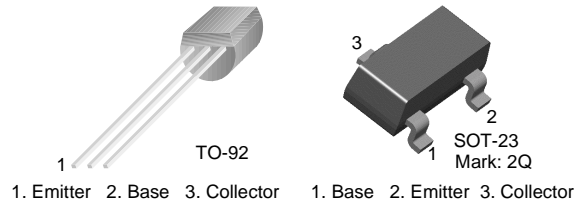


## 2N5086/2N5087/MMBT5087

### PNP General Purpose Amplifier

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



### Absolute Maximum Ratings\* $T_a=25^\circ\text{C}$ 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	-3.0	V
$I_C$	Collector current - Continuous	-100	mA
$T_J, T_{stg}$	Junction and Storage Temperature	-55 ~ +150	$^\circ\text{C}$

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- These ratings are based on a maximum junction temperature of 150 degrees C.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Max.	Units	
<b>Off Characteristics</b>						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage *	$I_C = -1.0\text{mA}, I_B = 0$	-50		V	
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -100\mu\text{A}, I_E = 0$	-50		V	
$I_{CEO}$	Collector Cutoff Current	$V_{CB} = -10\text{V}, I_E = 0$ $V_{CB} = -35\text{V}, I_E = 0$		-10 -50	nA nA	
$I_{CBO}$	Emitter Cutoff Current	$V_{EB} = -3.0\text{V}, I_C = 0$		-50	nA	
<b>On Characteristics</b>						
$h_{FE}$	DC Current Gain	$I_C = -100\mu\text{A}, V_{CE} = -5.0\text{V}$ $I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$ $I_C = -10\text{mA}, V_{CE} = -5.0\text{V}$	5086 5087 5086 5087 5086 5087	150 250 150 250 150 250	500 800	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$		-0.3	V	
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$		-0.85	V	
<b>Small Signal Characteristics</b>						
$f_T$	Current Gain Bandwidth Product	$I_C = -500\mu\text{A}, V_{CE} = -5.0\text{V}, f = 20\text{MHz}$	40		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	$I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}, f = 1.0\text{KHz}$	5086 5087	150 250	600 900	
NF	Noise Figure	$I_C = -100\mu\text{A}, V_{CE} = -5.0\text{V}, R_S = 3.0\text{k}\Omega, f = 1.0\text{KHz}$ $I_C = -20\mu\text{A}, V_{CE} = -5.0\text{V}, R_S = 10\text{k}\Omega, f = 10\text{Hz to } 15.7\text{KHz}$	5086 5087 5086 5087		3.0 2.0 3.0 2.0	dB dB dB dB

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

**Thermal Characteristics**  $T_a=25^{\circ}\text{C}$  unless otherwise noted

Symbol	Parameter	Max.		Units
		2N5086 2N5087	*MMBT5087	
$P_D$	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

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

# Typical Characteristics

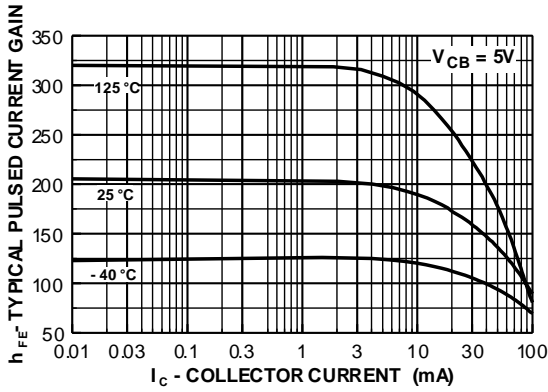


Figure 1. Typical Pulsed Current Gain vs Collector Current

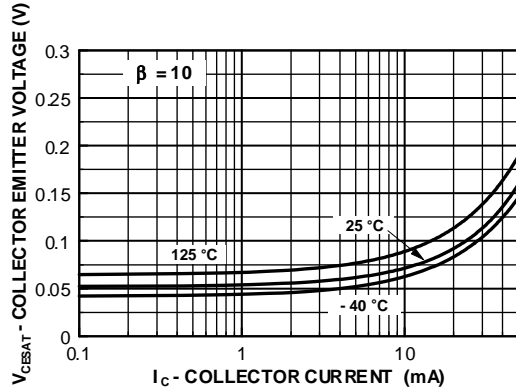


Figure 2. Collector-Emitter Saturation Voltage vs Collector Current

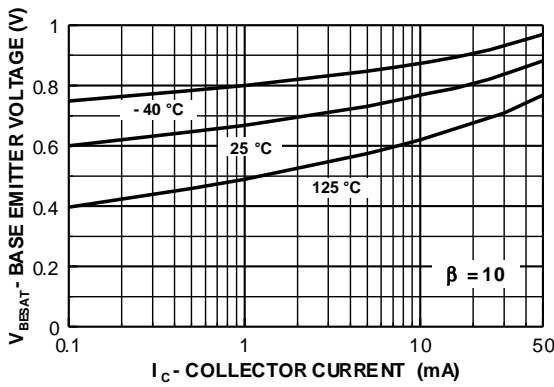


Figure 3. Base-Emitter Saturation Voltage vs Collector Current

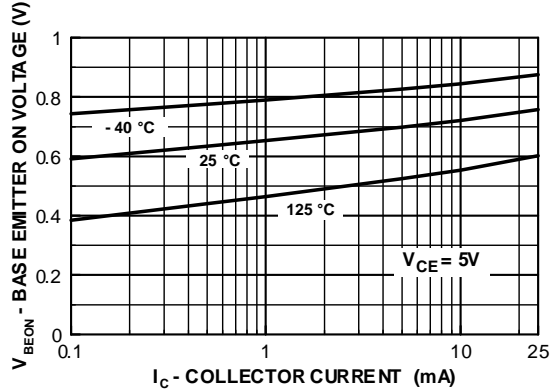


Figure 4. Base-Emitter On Voltage vs Collector Current

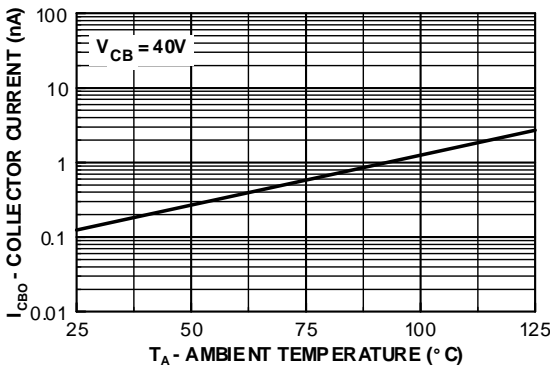


Figure 5. Collector Cutoff Current vs Ambient Temperature

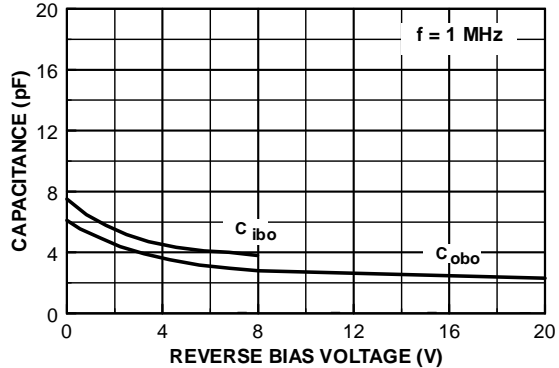


Figure 6. Input and Output Capacitance vs Reverse Voltage

Typical Characteristics (Continue)

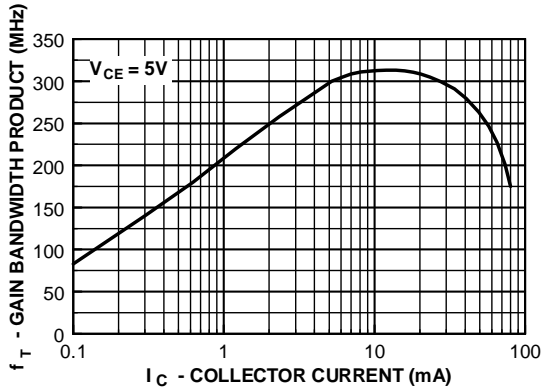


Figure 7. Gain Bandwidth Product vs Collector Current

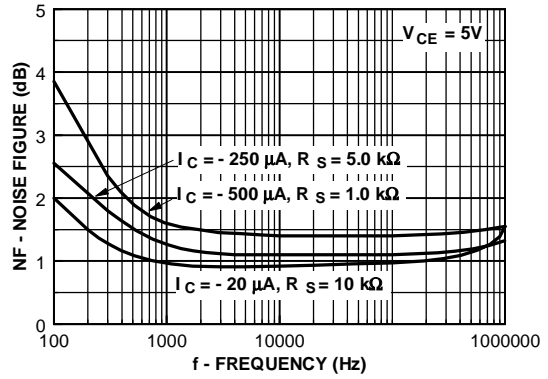


Figure 8. Noise Figure vs Frequency

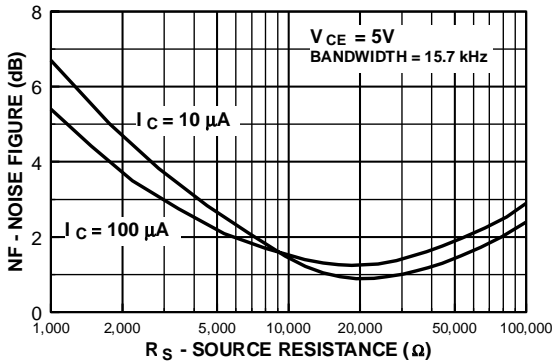


Figure 9. Wideband Noise Frequency vs Source Resistance

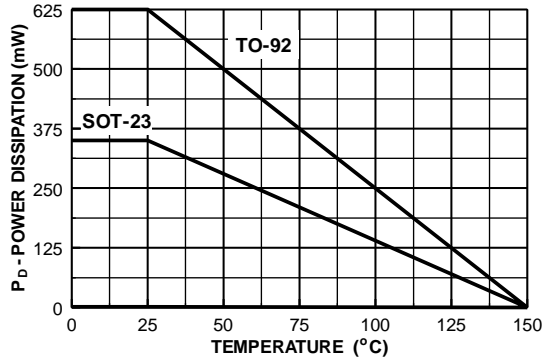


Figure 10. Power Dissipation vs Ambient Temperature

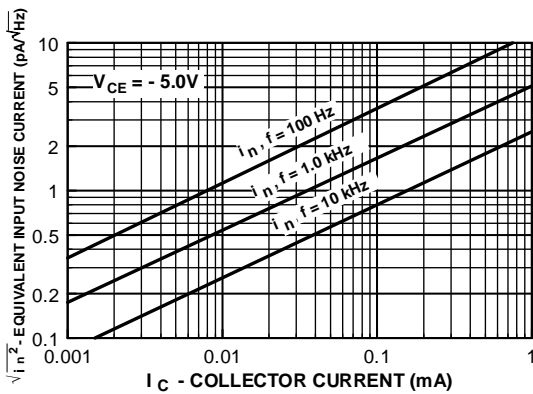


Figure 11. Equivalent Input Noise Current vs Collector Current

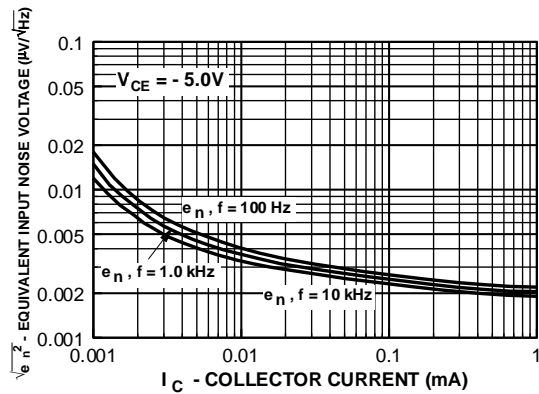


Figure 12. Equivalent Input Noise Voltage vs Collector Current

Typical Characteristics (Continue)

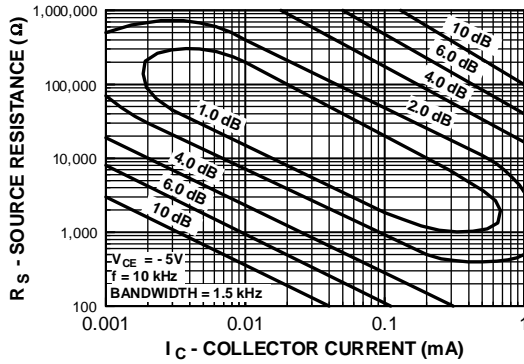


Figure 13. Contours of Constant Narrow Band Noise Figure

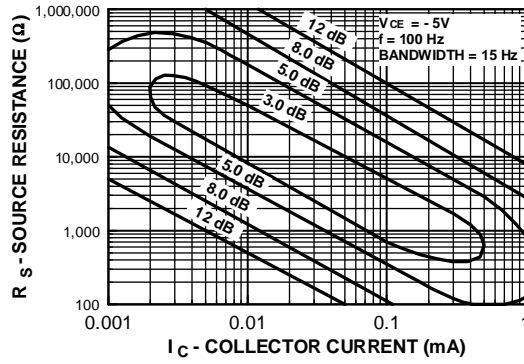


Figure 14. Contours of Constant Narrow Band Noise Figure

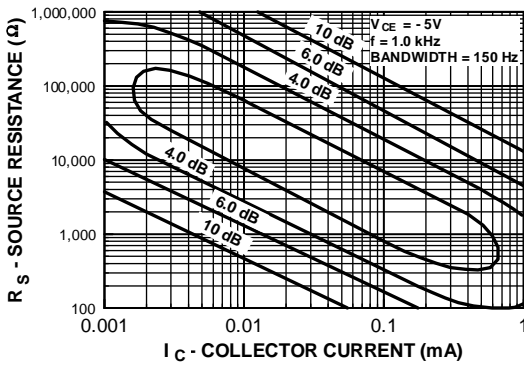


Figure 15. Contours of Constant Narrow Band Noise Figure

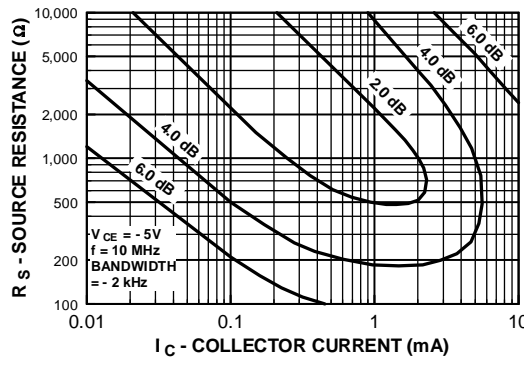
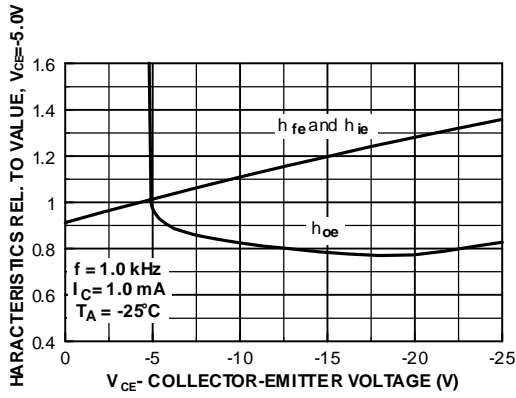
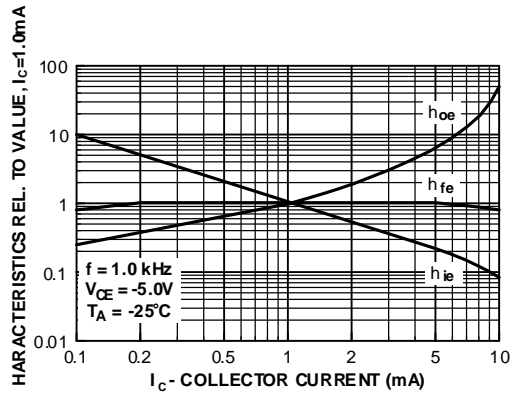


Figure 16. Contours of Constant Narrow Band Noise Figure

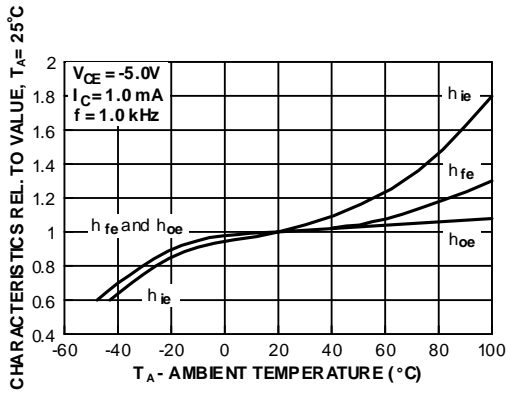
# Typical Common Emitter Characteristics (f = 1.0KHz)



Typical Common Emitter Characteristics



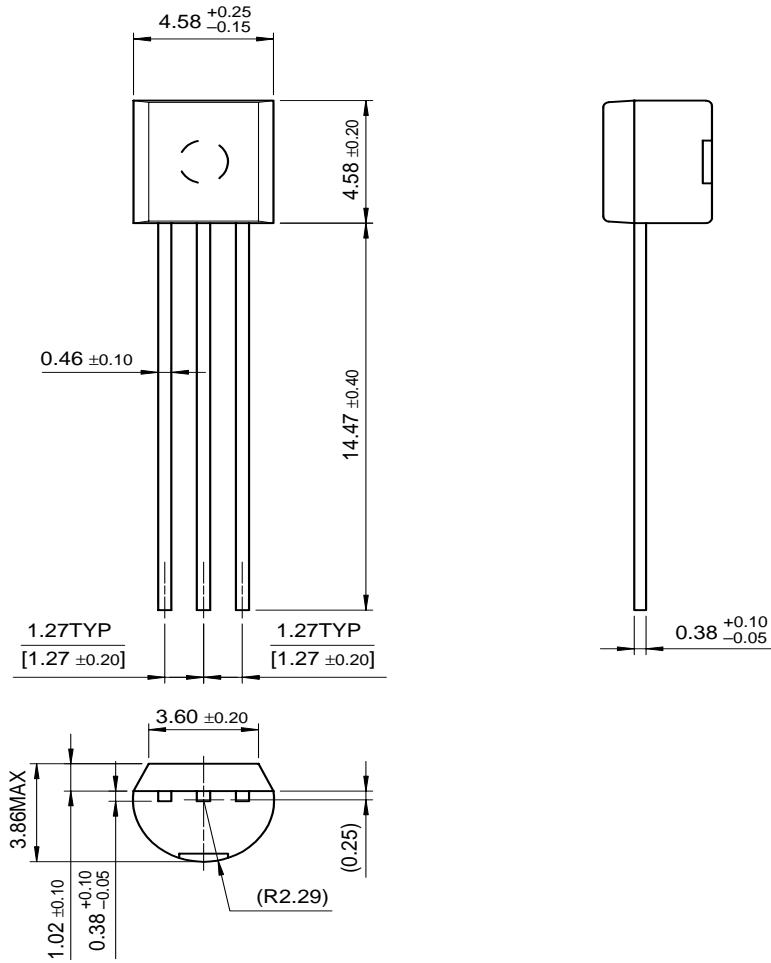
Typical Common Emitter Characteristics



Typical Common Emitter Characteristics

# Package Dimensions

## TO-92

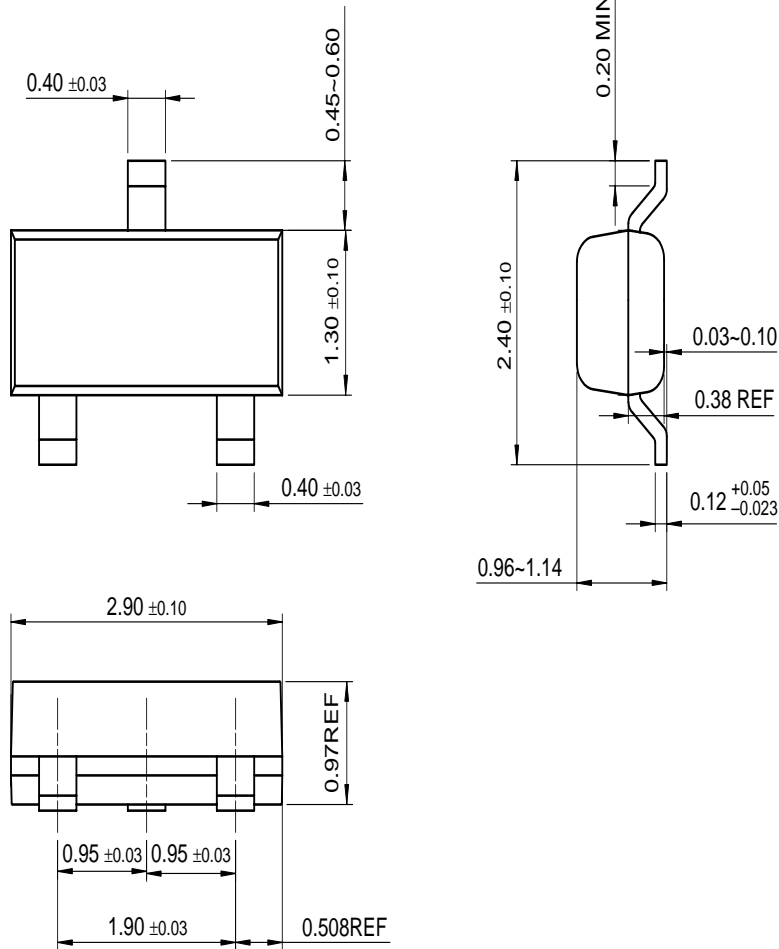


2N5086/2N5087/MMBT5087

Dimensions in Millimeters

# Package Dimensions (Continued)

## SOT-23



Dimensions in Millimeters

2N5086/2N5087/MMBT5087



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E <sup>2</sup> CMOS <sup>™</sup>	I <sup>2</sup> C <sup>™</sup>	OCX <sup>™</sup>	RapidConnect <sup>™</sup>	UltraFET <sup>®</sup>
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FACT <sup>™</sup>	ISOPLANAR <sup>™</sup>	OPTOLOGIC <sup>®</sup>	SMART START <sup>™</sup>	
Across the board. Around the world. <sup>™</sup>		OPTOPLANAR <sup>™</sup>	SPM <sup>™</sup>	
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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

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.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

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## 2N5086

PNP General Purpose Amplifier

### Contents

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- [Product status/pricing/packageing](#)
- [Order Samples](#)
- [Models](#)

• [Qualification Support](#)

### General description

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

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### Product status/pricing/packageing

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### Datasheet

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Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method	Package Marking Convention**
2N5086BU	Full Production	Full Production	\$0.025	<a href="#">TO-92</a>	3	BULK	Line 1: 2N Line 2: 5086 Line 3: -&3
2N5086TA	Full Production	Full Production	\$0.025	<a href="#">TO-92</a>	3	AMMO	Line 1: 2N Line 2: 5086 Line 3: -&3
2N5086TAR	Full Production	Full Production	\$0.025	<a href="#">TO-92</a>	3	AMMO	Line 1: 2N Line 2: 5086 Line 3: -&3
2N5086TF	Full Production		\$0.025	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: 2N Line 2: 5086 Line 3: -&3

		 Full Production					
2N5086TFR	Full Production	 Full Production	\$0.025	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: 2N Line 2: 5086 Line 3: -&3

\* 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 2N5086 is available. [Click here for more information](#).

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### Models

Package & leads	Condition	Temperature range	Vcc range	Software version	Revision date
<b>PSPICE</b>					
TO-92-3	<a href="#">Electrical/Thermal</a>	-55°C to 150°C	0V to -50V	9.2	Jan 3, 2003

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### Qualification Support

Click on a product for detailed qualification data

Product
<a href="#">2N5086BU</a>
<a href="#">2N5086TA</a>
<a href="#">2N5086TAR</a>
<a href="#">2N5086TF</a>
<a href="#">2N5086TFR</a>

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