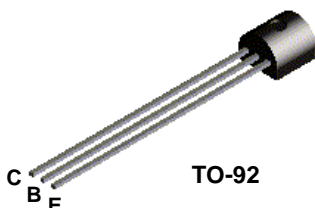


## 2N4402



### PNP General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500 mA.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	40	V
V <sub>CB0</sub>	Collector-Base Voltage	40	V
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	V
I <sub>C</sub>	Collector Current - Continuous	600	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
		2N4402	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	625	mW
		5.0	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	°C/W

# PNP General Purpose Amplifier

(continued)

2N4402

## 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*	$I_C = 1.0 \text{ mA}, I_B = 0$	40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \text{ } \mu\text{A}, I_E = 0$	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100 \text{ } \mu\text{A}, I_C = 0$	5.0		V
$I_{CEX}$	Collector Cutoff Current	$V_{CE} = 35 \text{ V}, V_{EB} = 0.4 \text{ V}$		0.1	$\mu\text{A}$
$I_{BL}$	Base Cutoff Current	$V_{CE} = 35 \text{ V}, V_{EB} = 0.4 \text{ V}$		0.1	$\mu\text{A}$

### ON CHARACTERISTICS\*

$h_{FE}$	DC Current Gain	$V_{CE} = 1.0 \text{ V}, I_C = 1.0 \text{ mA}$ $V_{CE} = 1.0 \text{ V}, I_C = 10 \text{ mA}$ $V_{CE} = 2.0 \text{ V}, I_C = 150 \text{ mA}$ $V_{CE} = 2.0 \text{ V}, I_C = 500 \text{ mA}$	30 50 50 20	150	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$		0.40 0.75	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$	0.75	0.95 1.30	V

### SMALL SIGNAL CHARACTERISTICS

$C_{ob}$	Output Capacitance	$V_{CB} = 10 \text{ V}, f = 140 \text{ kHz}$		8.5	pF
$C_{ib}$	Input Capacitance	$V_{EB} = 0.5 \text{ V}, f = 140 \text{ kHz}$		30	pF
$h_{fe}$	Small-Signal Current Gain	$I_C = 20 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$	1.5		
$h_{fe}$	Small-Signal Current Gain	$I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 1.0 \text{ kHz}$	30	250	
$h_{ie}$	Input Impedance	$f = 1.0 \text{ kHz}$	0.75	7.5	$k\Omega$
$h_{re}$	Voltage Feedback Ratio		0.10	8.0	$\times 10^{-4}$
$h_{oe}$	Output Admittance		1.0	100	$\mu\text{mhos}$

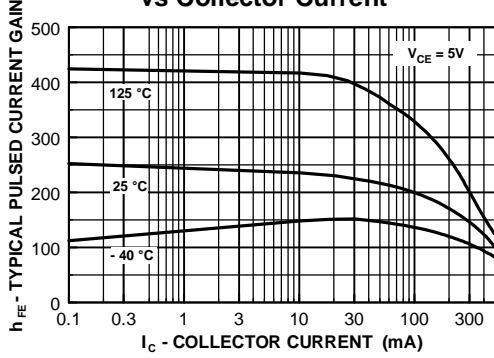
### SWITCHING CHARACTERISTICS

$t_d$	Delay Time	$V_{CC} = 30 \text{ V}, I_C = 150 \text{ mA},$		15	ns
$t_r$	Rise Time	$I_{B1} = 15 \text{ mA}, V_{BE(off)} = 2.0 \text{ V}$		20	ns
$t_s$	Storage Time	$V_{CC} = 30 \text{ V}, I_C = 150 \text{ mA},$		225	ns
$t_f$	Fall Time	$I_{B1} = I_{B2} = 15 \text{ mA}$		30	ns

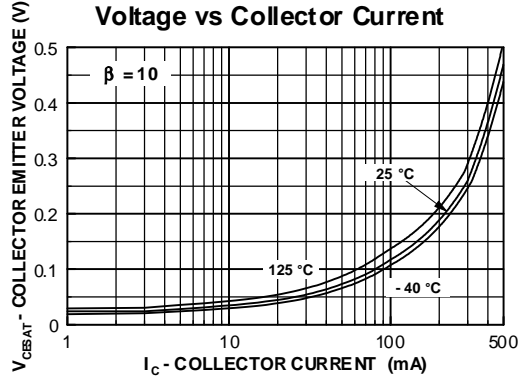
\*Pulse Test: Pulse Width  $\leq 300 \text{ } \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

Typical Characteristics

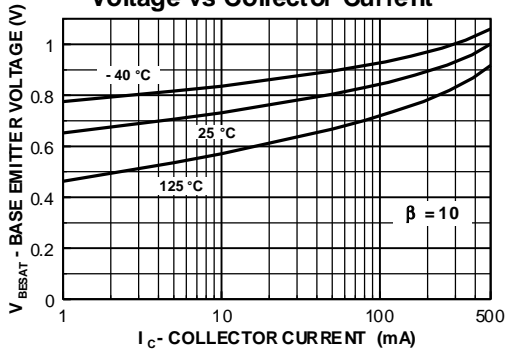
Typical Pulsed Current Gain vs Collector Current



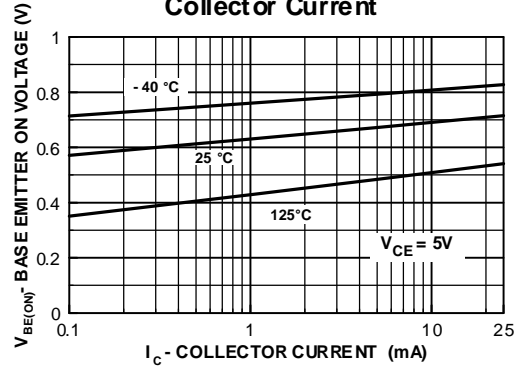
Collector-Emitter Saturation Voltage vs Collector Current



Base-Emitter Saturation Voltage vs Collector Current



Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature



Input and Output Capacitance vs Reverse Bias Voltage

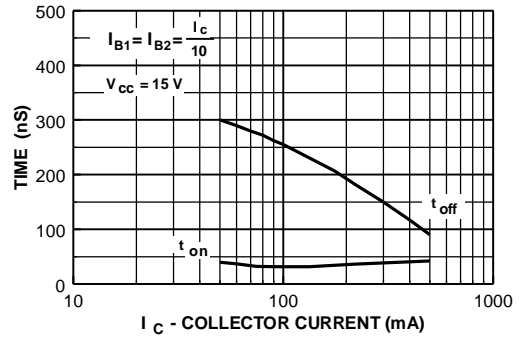


Typical Characteristics (continued)

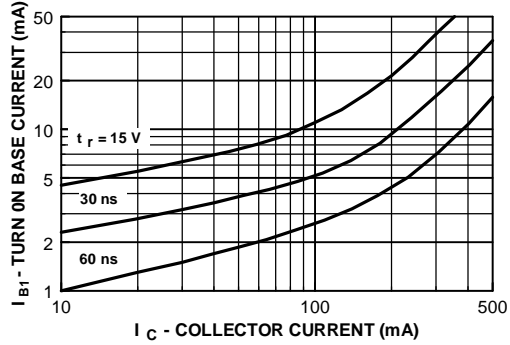
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current



Rise Time vs Collector and Turn On Base Currents



Power Dissipation vs Ambient Temperature

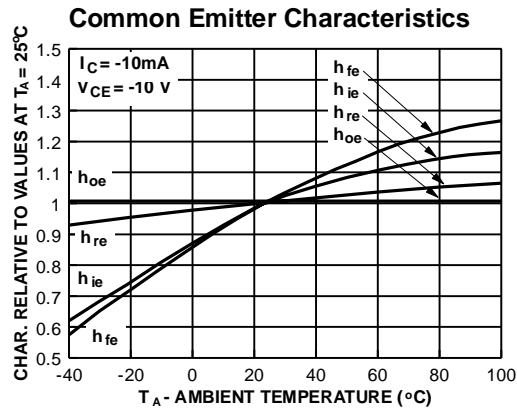
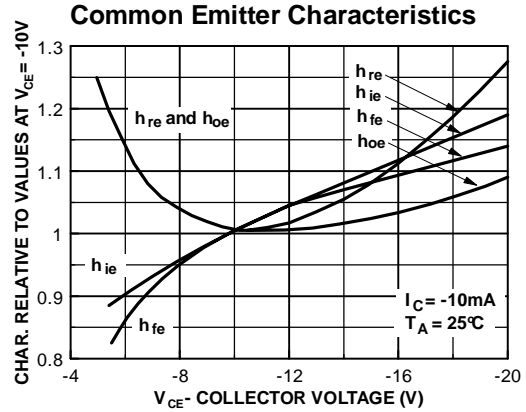
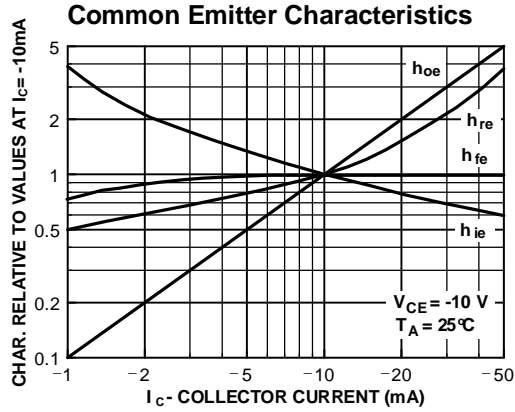


# PNP General Purpose Amplifier

(continued)

2N4402

## Typical Common Emitter Characteristics (f = 1.0kHz)



Test Circuits



FIGURE 1: Saturated Turn-On Switching Time Test Circuit



FIGURE 2: Saturated Turn-Off Switching Time Test Circuit

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## 2N4402

PNP General Purpose Amplifier

### Contents

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- [Product status/pricing/packageing](#)
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### General description

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500 mA.

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### Product status/pricing/packageing

BUY

Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method	Package Marking Convention**
2N4402BU	Full Production	 Full Production	\$0.0275	<a href="#">TO-92</a>	3	BULK	Line 1: 2N Line 2: 4402 Line 3: -&3
2N4402TA	Full Production	 Full Production	\$0.0275	<a href="#">TO-92</a>	3	AMMO	Line 1: 2N Line 2: 4402 Line 3: -&3
2N4402TAR	Full Production	 Full Production	\$0.0275	<a href="#">TO-92</a>	3	AMMO	Line 1: 2N Line 2: 4402 Line 3: -&3
2N4402TF	Full Production		\$0.0275	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: 2N Line 2: 4402 Line 3: -&3

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		 Full Production					
2N4402TFR	Full Production	 Full Production	\$0.0275	<a href="#">TO-92</a>	3	TAPE REEL	Line 1: 2N Line 2: 4402 Line 3: -&3
2N4402_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: 4402
2N4402_J14Z	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: 4402

\* 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 2N4402 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

<b>Product</b>
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<a href="#">2N4402TAR</a>
<a href="#">2N4402TF</a>
<a href="#">2N4402TFR</a>
<a href="#">2N4402_D81Z</a>
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