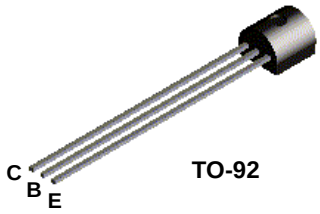
FAIRCHILD
SEMICONDUCTOR TM

2N4402



TO-92

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_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	40	V
V_{EBO}	Emitter-Base Voltage	5.0	V
I_C	Collector Current - Continuous	600	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
		2N4402	
P_D	Total Device Dissipation Derate above 25°C	625 5.0	mW mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	°C/W

PNP General Purpose Amplifier
(continued)

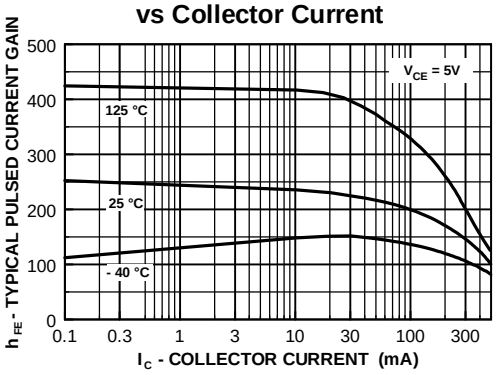
Electrical Characteristics
TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	I_C = 1.0 mA, I_B = 0	40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 µA, I_E = 0	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 µA, I_C = 0	5.0		V
I_{CEX}	Collector Cutoff Current	V_{CE} = 35 V, V_{EB} = 0.4 V		0.1	µA
I_{BL}	Base Cutoff Current	V_{CE} = 35 V, V_{EB} = 0.4 V		0.1	µA
ON CHARACTERISTICS*					
h_{FE}	DC Current Gain	V_{CE} = 1.0 V, I_C = 1.0 mA V_{CE} = 1.0 V, I_C = 10 mA V_{CE} = 2.0 V, I_C = 150 mA V_{CE} = 2.0 V, I_C = 500 mA	30 50 50 20	 150 	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA		0.40 0.75	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA	0.75	0.95 1.30	V V
SMALL SIGNAL CHARACTERISTICS					
C_{ob}	Output Capacitance	V_{CB} = 10 V, f = 140 kHz		8.5	pF
C_{ib}	Input Capacitance	V_{EB} = 0.5 V, f = 140 kHz		30	pF
h_{fe}	Small-Signal Current Gain	I_C = 20 mA, V_{CE} = 10 V, f = 100 MHz	1.5		
h_{fe}	Small-Signal Current Gain	I_C = 1.0 mA, V_{CE} = 10 V, f = 1.0 kHz	30	250	
h_{ie}	Input Impedance		0.75	7.5	kΩ
h_{re}	Voltage Feedback Ratio		0.10	8.0	$x10^{-4}$
h_{oe}	Output Admittance		1.0	100	µmhos
SWITCHING CHARACTERISTICS					
t_d	Delay Time	V_{CC} = 30 V, I_C =150 mA, I_{B1} = 15 mA, $V_{BE(off)}$ = 2.0 V		15	ns
t_r	Rise Time			20	ns
t_s	Storage Time	V_{CC} = 30 V, I_C =150 mA, I_{B1} = I_{B2} = 15 mA		225	ns
t_f	Fall Time			30	ns

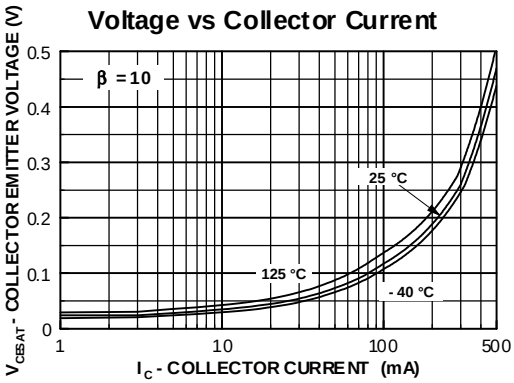
*Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%

Typical Characteristics

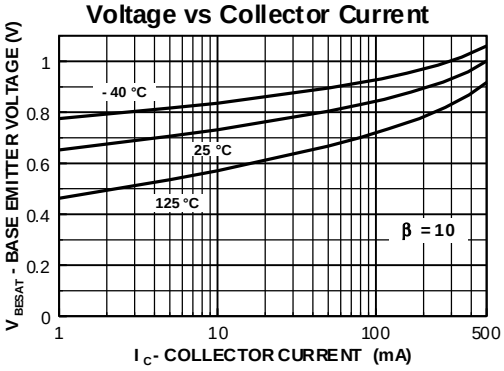
Typical Pulsed Current Gain vs Collector Current



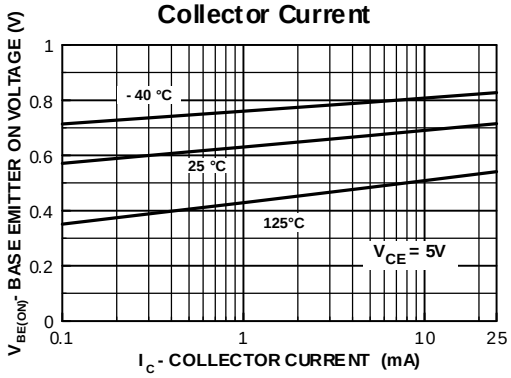
Collector-Emitter Saturation Voltage vs Collector Current



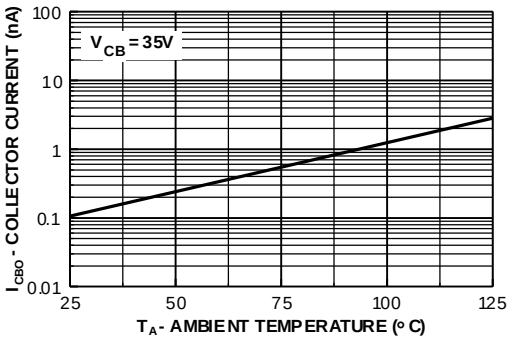
Base-Emitter Saturation Voltage vs Collector Current



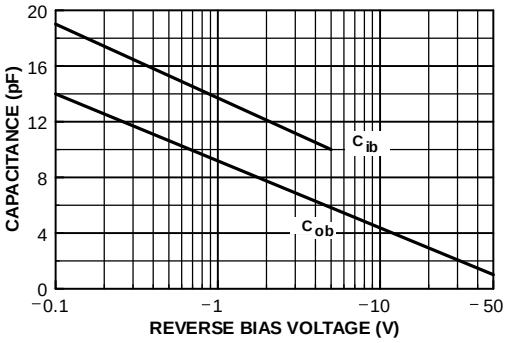
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

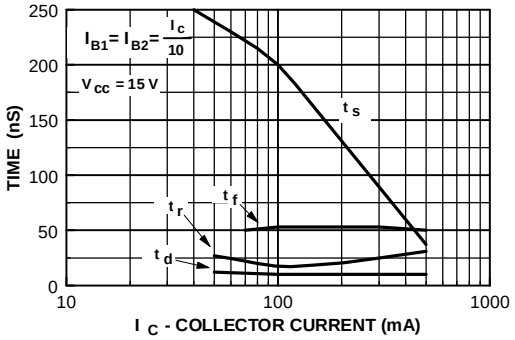


Input and Output Capacitance vs Reverse Bias Voltage

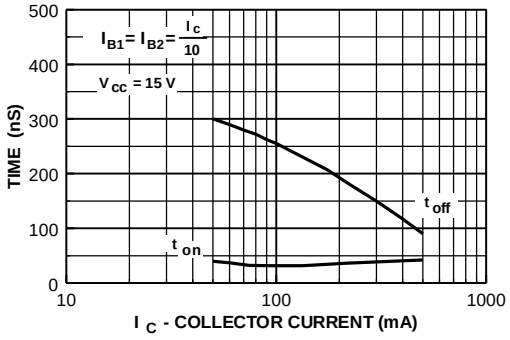


Typical Characteristics (continued)

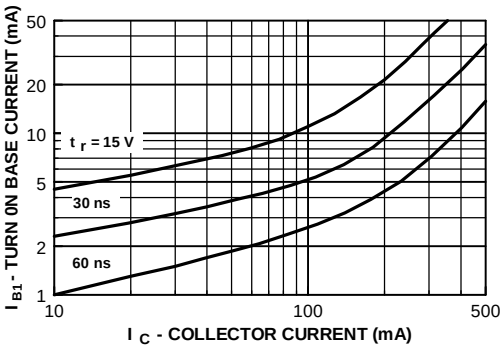
Switching Times vs Collector Current



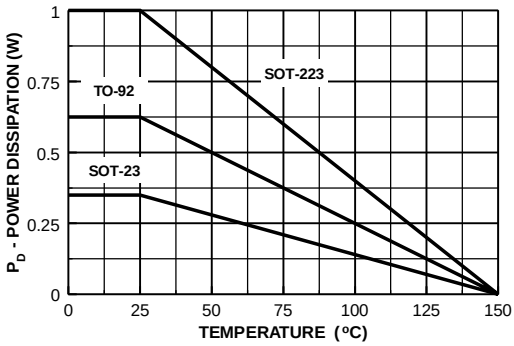
Turn On and Turn Off Times vs Collector Current



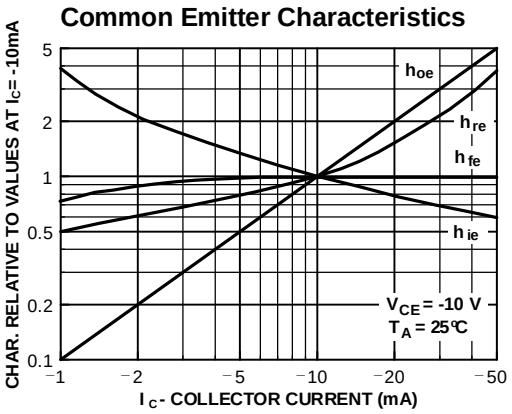
Rise Time vs Collector and Turn On Base Currents

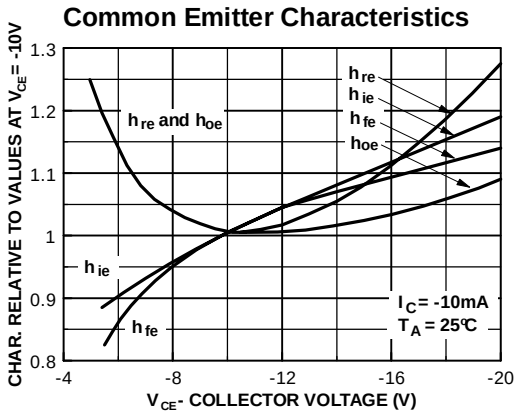


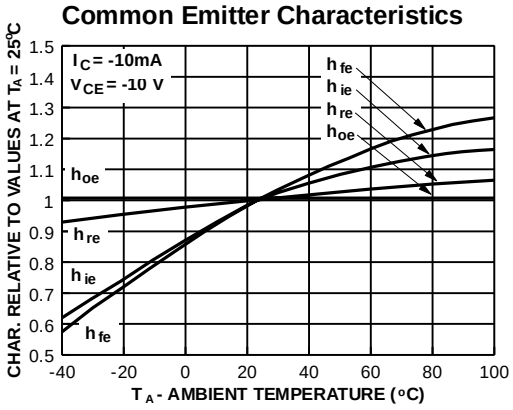
Power Dissipation vs Ambient Temperature



Typical Common Emitter Characteristics (f = 1.0kHz)







Test Circuits

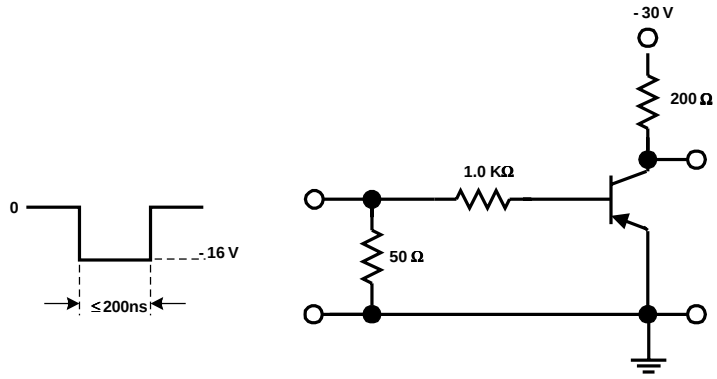


FIGURE 1: Saturated Turn-On Switching Time Test Circuit

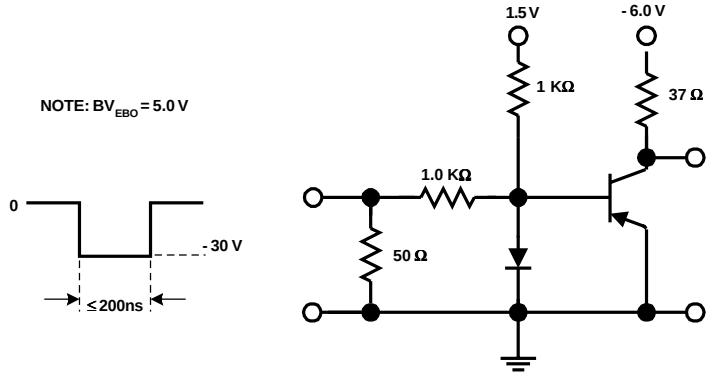


FIGURE 2: Saturated Turn-Off Switching Time Test Circuit

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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.

2N4402

PNP General Purpose Amplifier

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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/packaging

BUY

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

		Full Production					
2N4402TFR	Full Production	Full Production	$0.0275	TO-92	3	TAPE REEL	Line 1: 2N Line 2: 4402 Line 3: -&3
2N4402_D81Z	Full Production	Full Production	N/A	TO-92	3	TAPE REEL	Line 1: **$Y** (Fairchild logo) &**Z** (Asm. Plant Code) &**3** (3-Digit Date Code) Line 2: 2N Line 3: 4402
2N4402_J14Z	Full Production	Full Production	N/A	TO-92	3	BULK	Line 1: **$Y** (Fairchild logo) &**Z** (Asm. Plant Code) &**3** (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
PSPICE				
TO-92-3	Electrical	25°C	N/A	N/A

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Qualification Support

Click on a product for detailed qualification data

Product
2N4402BU
2N4402TA

2N4402TAR
2N4402TF
2N4402TFR
2N4402_D81Z
2N4402_J14Z

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