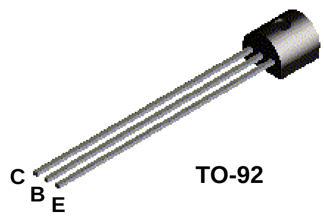
FAIRCHILD
SEMICONDUCTOR™

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_{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)

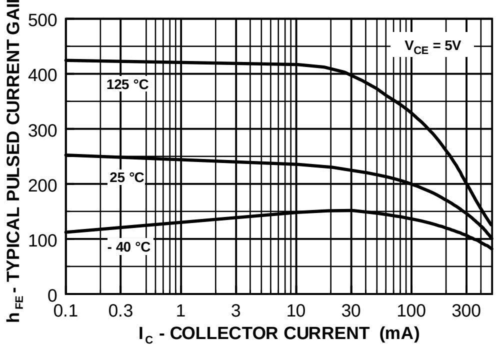
Electrical Characteristics
TA = 25°C unless otherwise noted

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	$I_C = 100\ \mu$A, $I_E = 0$	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 100\ \mu$A, $I_C = 0$	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,	30	250	
h_{ie}	Input Impedance	f = 1.0 kHz	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,		15	ns
t_r	Rise Time	$I_{B1} = 15$ mA, $V_{BE(off)} = 2.0$ V		20	ns
t_s	Storage Time	$V_{CC} = 30$ V, $I_C = 150$ mA,		225	ns
t_f	Fall Time	$I_{B1} = I_{B2} = 15$ mA		30	ns

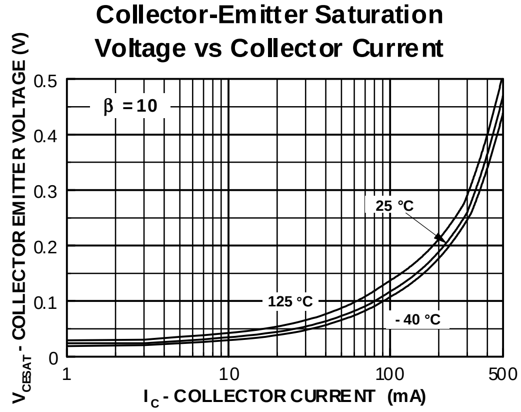
*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

Typical Characteristics

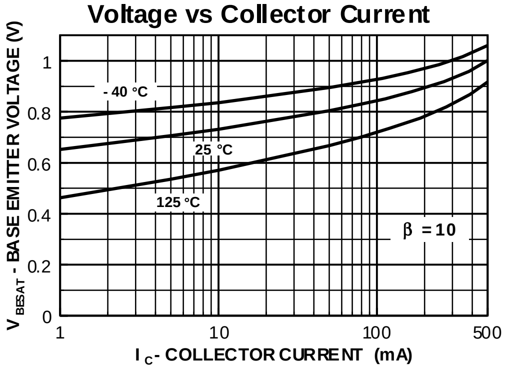
Typical Pulsed Current Gain vs Collector Current



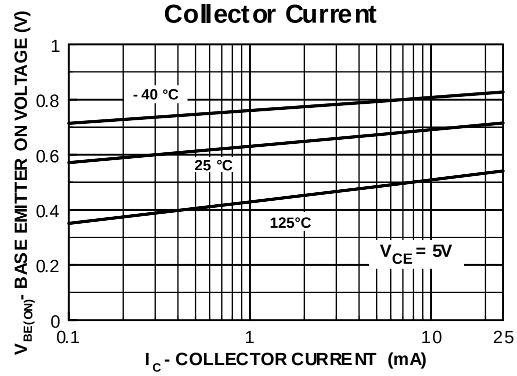
Collector-Emitter Saturation Voltage vs Collector Current



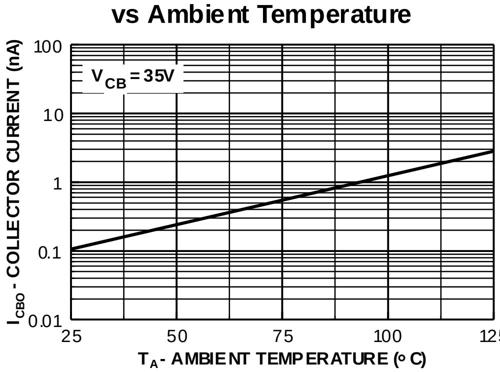
Base-Emitter Saturation Voltage vs Collector Current



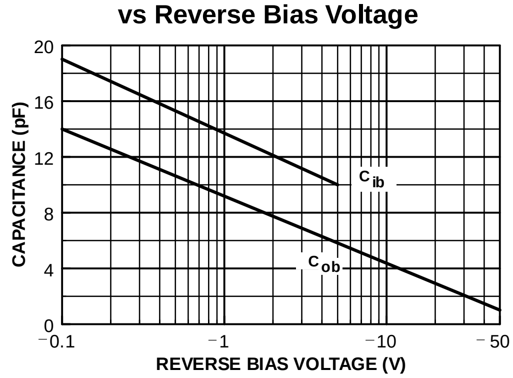
Base Emitter ON Voltage vs Collector Current



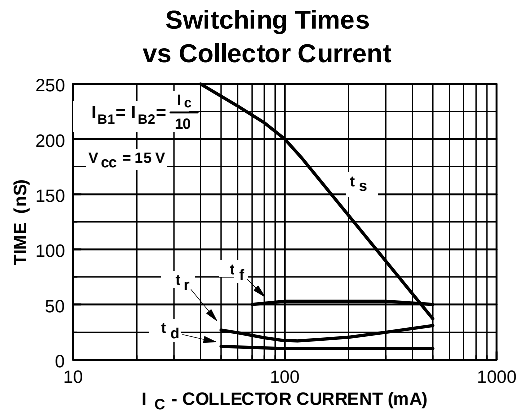
Collector-Cutoff Current vs Ambient Temperature

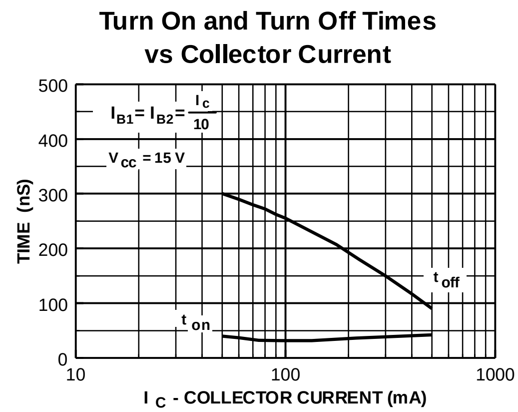


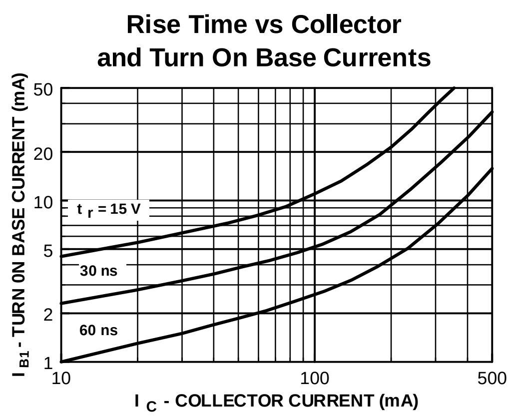
Input and Output Capacitance vs Reverse Bias Voltage

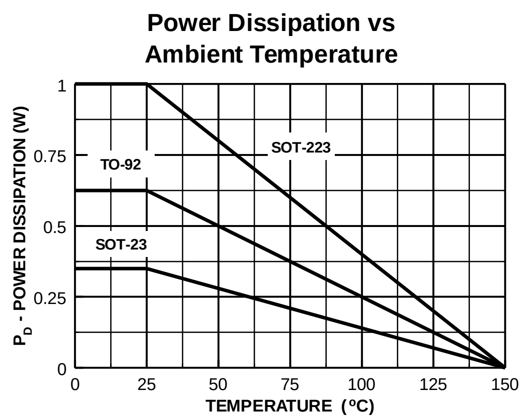


Typical Characteristics (continued)

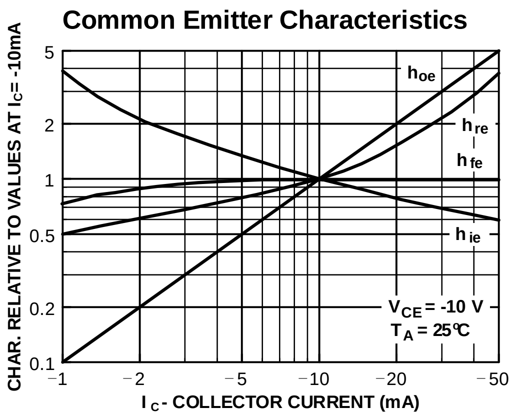


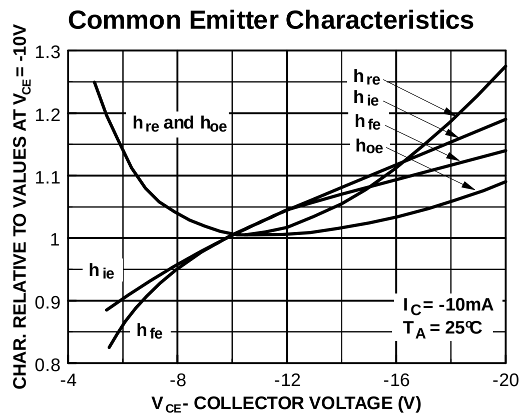


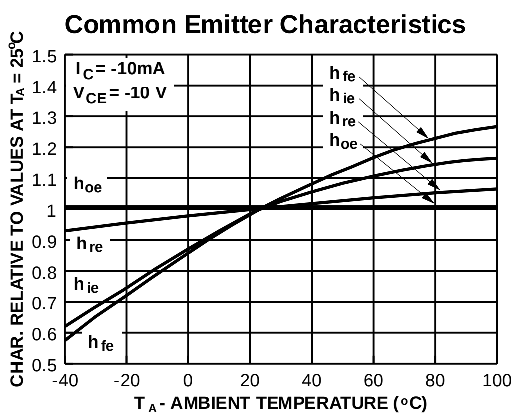




Typical Common Emitter Characteristics (f = 1.0kHz)







Test Circuits

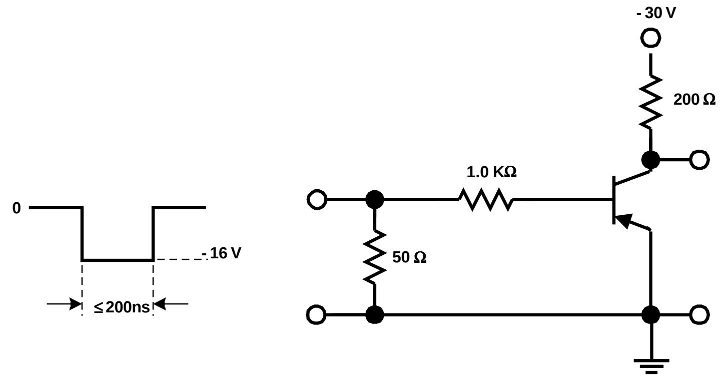


FIGURE 1: Saturated Turn-On Switching Time Test Circuit

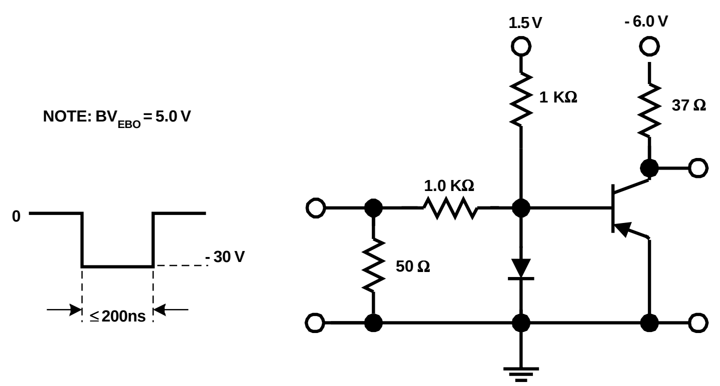


FIGURE 2: Saturated Turn-Off Switching Time Test Circuit

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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