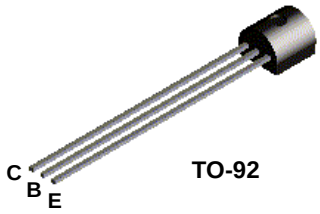
FAIRCHILD
SEMICONDUCTOR TM

2N3905



TO-92

PNP General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 100 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	200	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
		2N3905	
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)

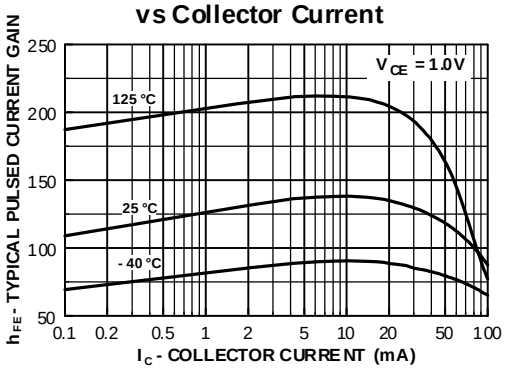
Electrical Characteristics
TA = 25°C unless otherwise noted

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 = 10 µA, I_E = 0	40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10 µA, I_C = 0	5.0		V
I_{CEX}	Collector Cutoff Current	V_{CE} = 30 V, V_{OB} = 3.0 V		50	nA
I_{BL}	Base Cutoff Current	V_{CE} = 30 V, V_{OB} = 3.0 V		50	nA
ON CHARACTERISTICS*					
h_{FE}	DC Current Gain	V_{CE} = 1.0 V, I_C = 0.1 mA V_{CE} = 1.0 V, I_C = 1.0 mA V_{CE} = 1.0 V, I_C = 10 mA V_{CE} = 1.0 V, I_C = 50 mA V_{CE} = 1.0 V, I_C = 100 mA	30 40 50 30 15	 150 	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA I_C = 50 mA, I_B = 5.0 mA		0.25 0.40	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA I_C = 50 mA, I_B = 5.0 mA	0.65	0.85 0.95	V V
SMALL SIGNAL CHARACTERISTICS					
C_{ob}	Output Capacitance	V_{CB} = 5.0 V, f = 1.0 MHz		4.5	pF
C_{ib}	Input Capacitance	V_{EB} = 0.5 V, f = 1.0 MHz		10	pF
h_{fe}	Small-Signal Current Gain	I_C = 10 mA, V_{CE} = 20 V, f = 100 MHz	2.0		
h_{fe}	Small-Signal Current Gain	I_C = 1.0 mA, V_{CE} =10 V, f = 1.0 KHz	50	200	
h_{re}	Voltage Feedback Ratio		0.1	5.0	x10 $^{-4}$
h_{ie}	Input Impedance		0.5	8.0	kΩ
h_{oe}	Output Impedance		1.0	40	µmhos
NF	Noise Figure	V_{CE} = 5.0 V, I_C = 100 µA, R_S = 1.0 kΩ, B_W = 10 Hz to 15.7 KHz		5.0	dB
SWITCHING CHARACTERISTICS					
t_d	Delay Time	V_{CC} = 3.0 V, I_{CS} = 10 mA, I_{B1} = 1.0 mA ,$V_{OB\,(off)}$ = 3.0 V		35	ns
t_r	Rise Time			35	ns
t_s	Storage Time	V_{CC} = 3.0 V, I_{CS} = 10 mA, I_{B1} = I_{B2} = 1.0 mA		200	ns
t_f	Fall Time			60	ns

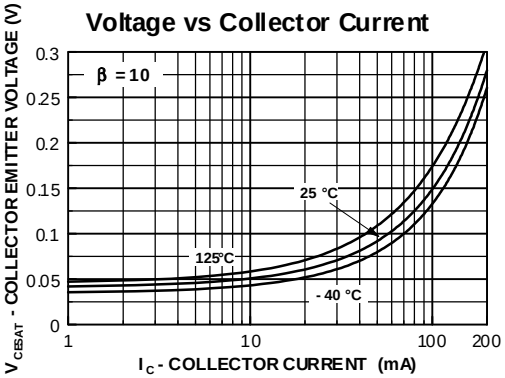
*Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%

Typical Characteristics

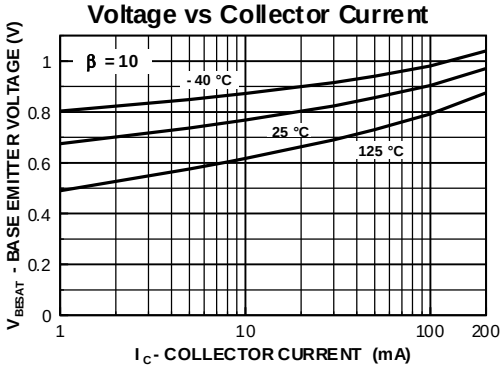
Typical Pulsed Current Gain vs Collector Current



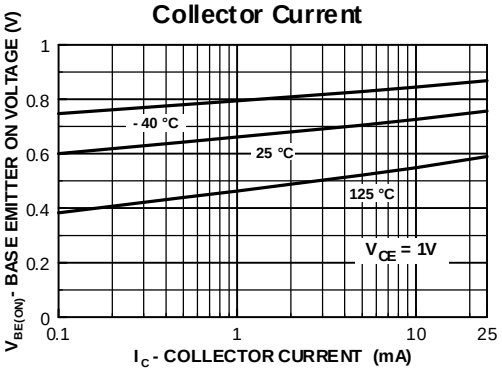
Collector-Emitter Saturation Voltage vs Collector Current



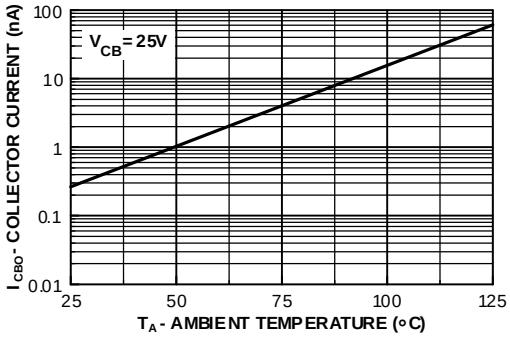
Base-Emitter Saturation Voltage vs Collector Current



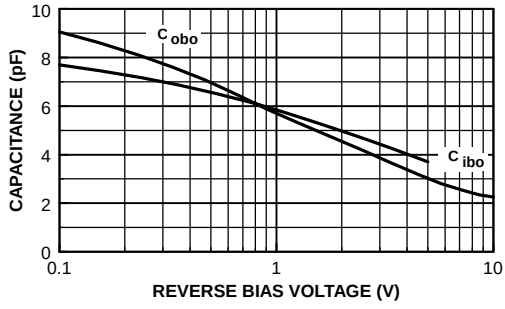
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

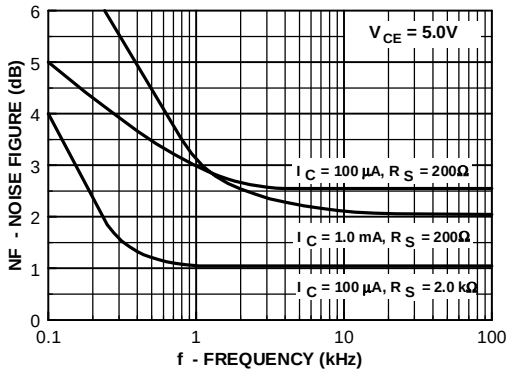


Common-Base Open Circuit Input and Output Capacitance vs Reverse Bias Voltage

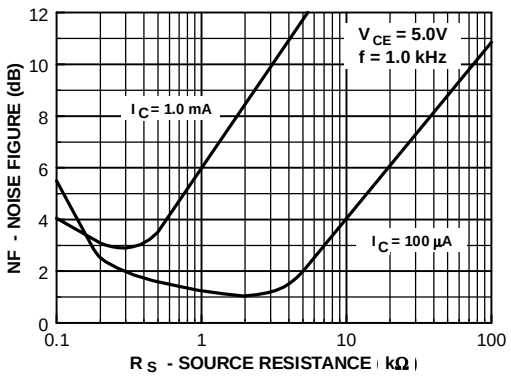


Typical Characteristics (continued)

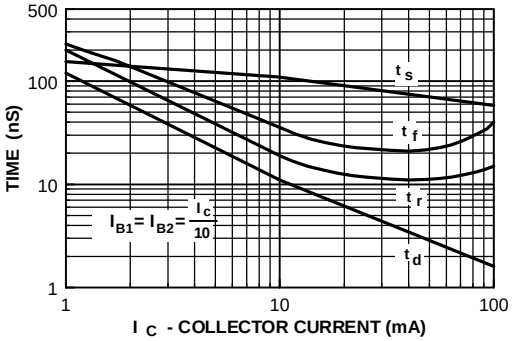
Noise Figure vs Frequency



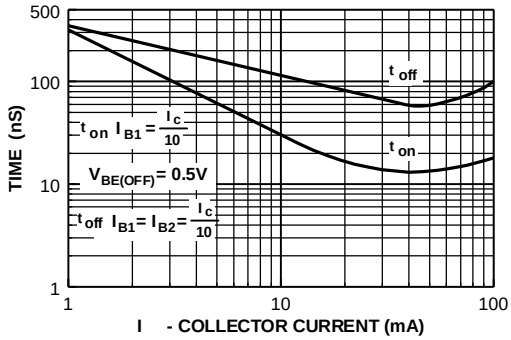
Noise Figure vs Source Resistance



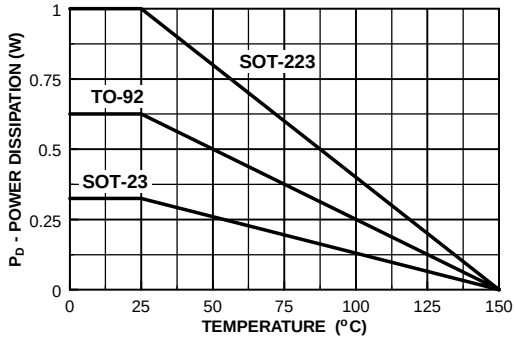
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current

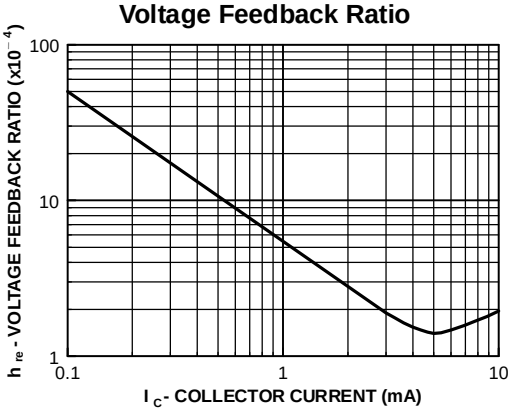


Power Dissipation vs Ambient Temperature

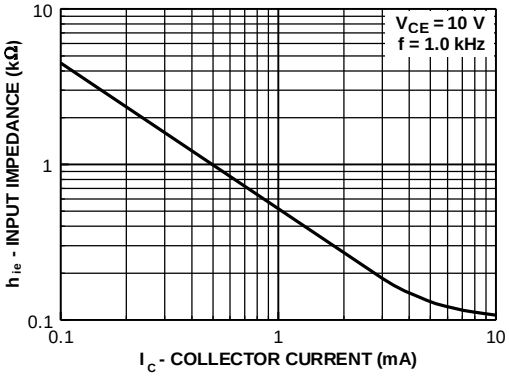


Typical Characteristics (continued)

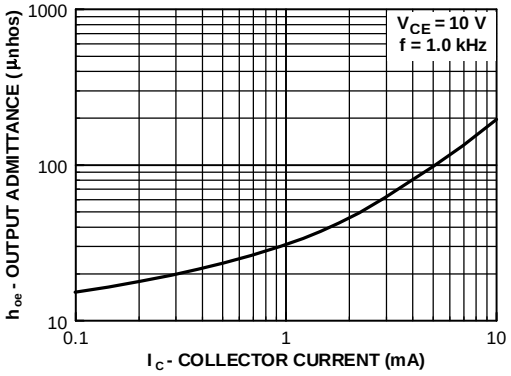
Voltage Feedback Ratio



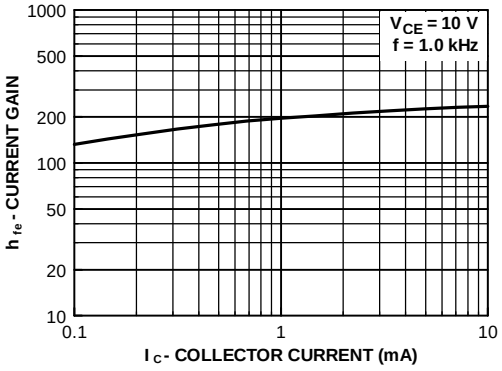
Input Impedance



Output Admittance



Current Gain



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