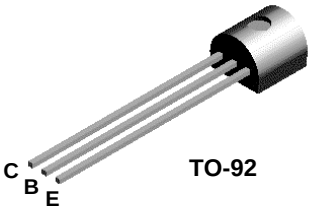
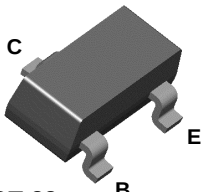
FAIRCHILD
SEMICONDUCTOR TM

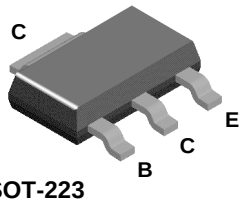
2N3906 MMBT3906 PZT3906



TO-92



SOT-23
Mark: 2A



SOT-223

PNP General Purpose Amplifier

This device is designed for general purpose amplifier and switching applications at collector currents of 10 µA to 100 mA.

Absolute Maximum Ratings*

T_A = 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

T_A = 25°C unless otherwise noted

Symbol	Characteristic	Max			Units
		2N3906	*MMBT3906	**PZT3906	
P_D	Total Device Dissipation Derate above 25°C	625 5.0	350 2.8	1,000 8.0	mW mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3			°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	125	°C/W

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

**Device mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 cm^2.

PNP General Purpose Amplifier
(continued)

Electrical Characteristics
T_A = 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_{BL}	Base Cutoff Current	V_{CE} = -30 V, V_{BE}= -3.0 V		-50	nA
I_{CEX}	Collector Cutoff Current	V_{CE} = -30 V, V_{BE}= -3.0 V		-50	nA
ON CHARACTERISTICS					
h_{FE}	DC Current Gain *	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, V_{CE}= -1.0 V	60 80 100 60 30	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = -10 mA, I_B= -1.0 mA I_C = -50 mA, I_B= -5.0 mA		-0.25 -0.4	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					
f_T	Current Gain - Bandwidth Product	I_C = -10 mA, V_{CE} = -20 V, f = 100 MHz	250		MHz
C_{obo}	Output Capacitance	V_{CB} = -5.0 V, I_E = 0, f = 100 kHz		4.5	pF
C_{ibo}	Input Capacitance	V_{EB} = -0.5 V, I_C = 0, f = 100 kHz		10.0	pF
NF	Noise Figure	I_C = -100 µA, V_{CE} = -5.0 V, R_S =1.0 kΩ, f=10 Hz to 15.7 kHz		4.0	dB
SWITCHING CHARACTERISTICS					
t_d	Delay Time	V_{CC} = -3.0 V, V_{BE}= -0.5 V, I_C = -10 mA, I_{B1}= -1.0 mA		35	ns
t_r	Rise Time			35	ns
t_s	Storage Time	V_{CC} = -3.0 V, I_C = -10 mA I_{B1} = I_{B2} = -1.0 mA		225	ns
t_f	Fall Time			75	ns

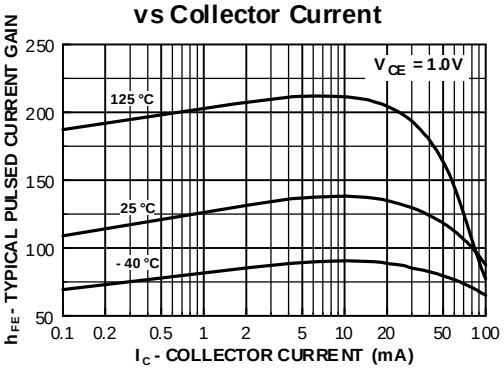
*Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%

Spice Model

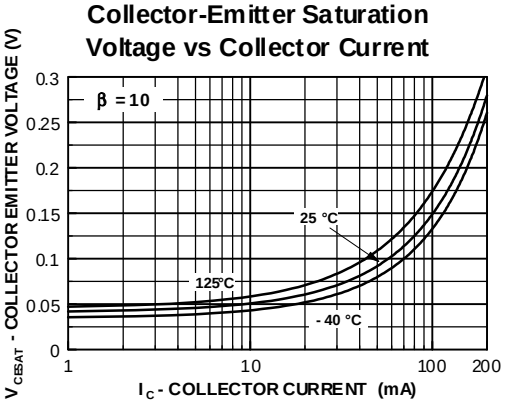
PNP (Is=1.41f Xti=3 Eg=1.11 Vaf=18.7 Bf=180.7 Ne=1.5 Ise=0 Ikf=80m Xtb=1.5 Br=4.977 Nc=2 Isc=0 Ikr=0 Rc=2.5 Cjc=9.728p Mjc=.5776 Vjc=.75 Fc=.5 Cje=8.063p Mje=.3677 Vje=.75 Tr=33.42n Tf=179.3p Itf=.4 Vtf=4 Xtf=6 Rb=10)

Typical Characteristics

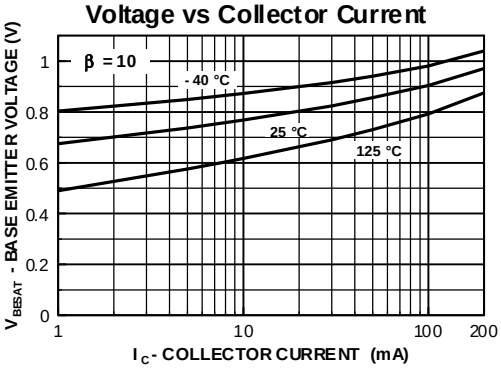
Typical Pulsed Current Gain vs Collector Current



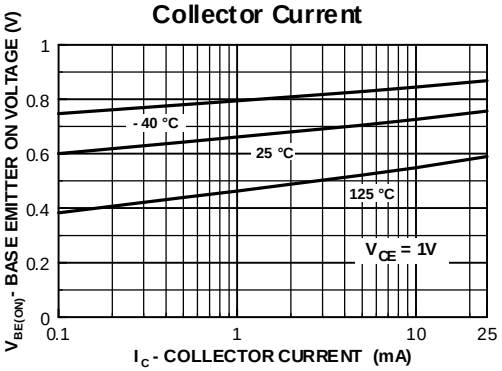
Collector-Emitter Saturation Voltage vs Collector Current



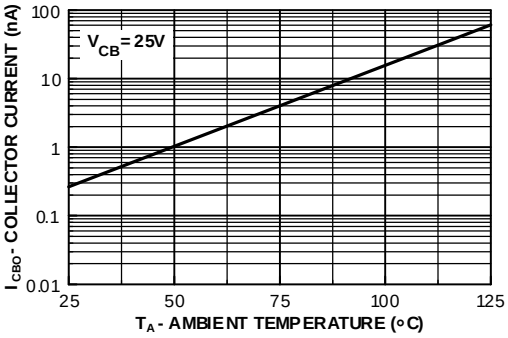
Base-Emitter Saturation Voltage vs Collector Current



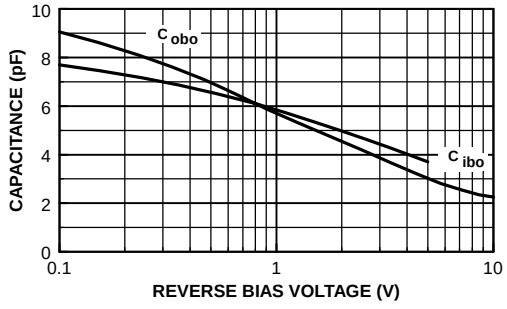
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

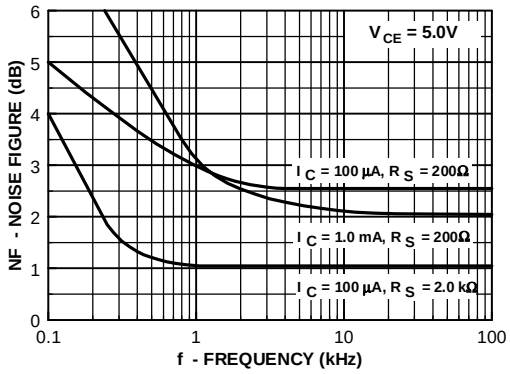


Common-Base Open Circuit Input and Output Capacitance vs Reverse Bias Voltage

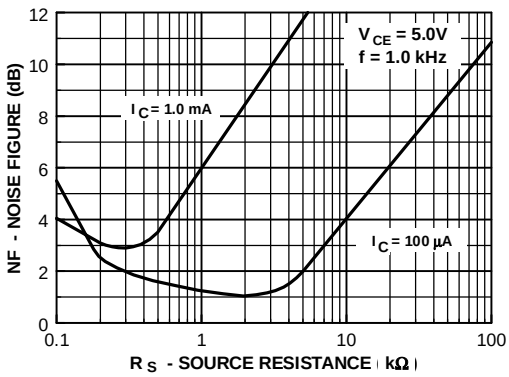


Typical Characteristics (continued)

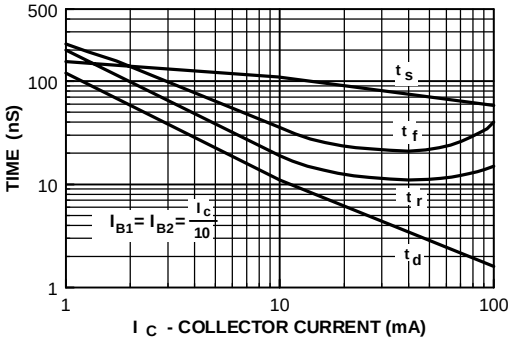
Noise Figure vs Frequency



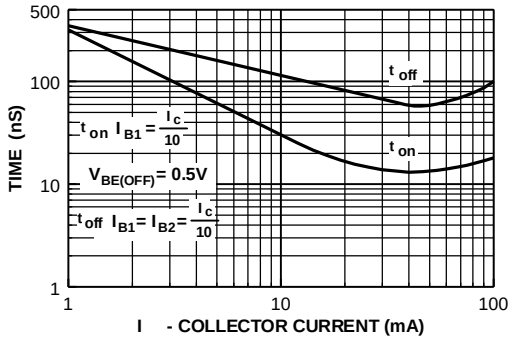
Noise Figure vs Source Resistance



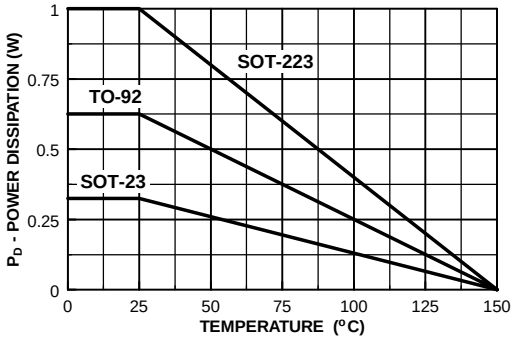
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current

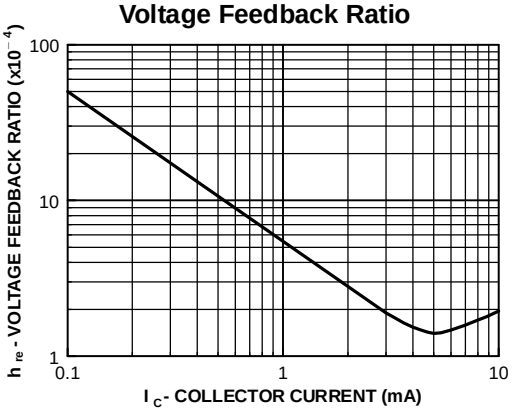


Power Dissipation vs Ambient Temperature

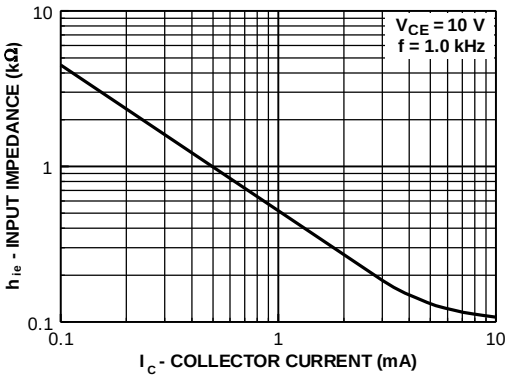


Typical Characteristics (continued)

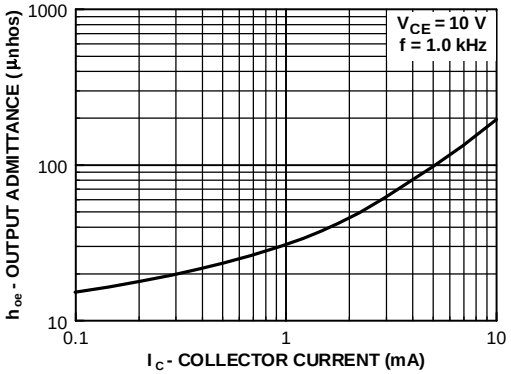
Voltage Feedback Ratio



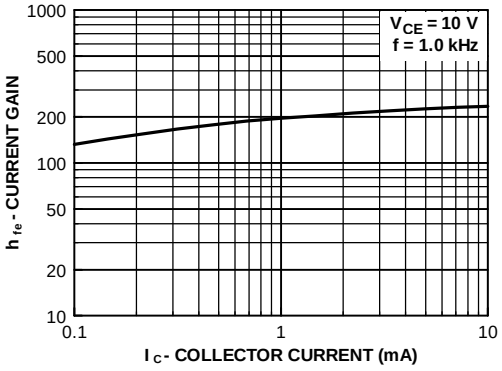
Input Impedance



Output Admittance



Current Gain



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