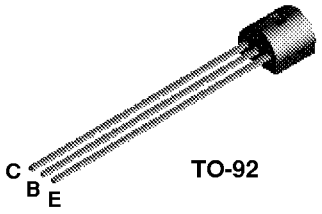
FAIRCHILD SEMICONDUCTOR™

Discrete POWER & Signal Technologies

2N3903



NPN General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 100 mA. Sourced from Process 23. See 2N3904 for characteristics.

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	60	V
V_{EBO}	Emitter-Base Voltage	6.0	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
		2N3903	
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

NPN 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	60		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10 µA, I_C = 0	6.0		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	20 35 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		0.2 0.3	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 = 100 kHz		4.0	pF
C_{ib}	Input Capacitance	V_{EB} = 0.5 V, f = 100 kHz		8.0	pF
h_{fe}	Small-Signal Current Gain	I_C = 10 mA, V_{CE} = 20 V, f = 100 MHz	2.5		
h_{fe}	Small-Signal Current Gain	V_{CE} = 10 V, I_C = 1.0 mA	50	200	
h_{ie}	Input Impedance	f = 1.0 kHz	1.0	8.0	kΩ
h_{re}	Voltage Feedback Ratio		0.1	5.0	x 10^{-4}
h_{oe}	Output Admittance		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		6.0	dB
SWITCHING CHARACTERISTICS					
t_d	Delay Time	V_{CC} = 3.0 V, I_C = 10 mA,		35	ns
t_r	Rise Time	I_{B1} = 1.0 mA , $V_{ob\ (off)}$ = 0.5 V		35	ns
t_s	Storage Time	V_{CC} = 3.0 V, I_C = 10 mA		175	ns
t_f	Fall Time	I_{B1} = I_{B2} = 1.0 mA		50	ns

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