



Micro Commercial Components

Micro Commercial Components  
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# 2N3904

## NPN General Purpose Amplifier

### Features

- Through Hole Package
- Capable of 600mWatts of Power Dissipation and 200mA I<sub>c</sub>.
- € Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0 and MSL rating 1
- € Marking: Type number
- Lead Free Finish/Rohs Compliant ("P" Suffix designates Compliant. See ordering information)

### Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter	Min	Max	Units
<b>OFF CHARACTERISTICS</b>				
V <sub>(BR)CEO</sub>	Collector-Emitter Breakdown Voltage* (I <sub>C</sub> =1.0mA, I <sub>B</sub> =0)	40		Vdc
V <sub>(BR)CBO</sub>	Collector-Base Breakdown Voltage (I <sub>C</sub> =10μA, I <sub>E</sub> =0)	60		Vdc
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>E</sub> =10μA, I <sub>C</sub> =0)	6.0		Vdc
I <sub>BL</sub>	Base Cutoff Current (V <sub>CE</sub> =30Vdc, V <sub>BE</sub> =3.0Vdc)		50	nAdc
I <sub>CEX</sub>	Collector Cutoff Current (V <sub>CE</sub> =30Vdc, V <sub>BE</sub> =3.0Vdc)		50	nAdc

### ON CHARACTERISTICS

h <sub>FE</sub>	DC Current Gain* (I <sub>C</sub> =0.1mA, V <sub>CE</sub> =1.0Vdc) (I <sub>C</sub> =1.0mA, V <sub>CE</sub> =1.0Vdc) (I <sub>C</sub> =10mA, V <sub>CE</sub> =1.0Vdc) (I <sub>C</sub> =50mA, V <sub>CE</sub> =1.0Vdc) (I <sub>C</sub> =100mA, V <sub>CE</sub> =1.0Vdc)	40 70 100 60 30	300	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage (I <sub>C</sub> =10mA, I <sub>B</sub> =1.0mA) (I <sub>C</sub> =50mA, I <sub>B</sub> =5.0mA)		0.2 0.4	Vdc
V <sub>BE(sat)</sub>	Base-Emitter Saturation Voltage (I <sub>C</sub> =10mA, I <sub>B</sub> =1.0mA) (I <sub>C</sub> =50mA, I <sub>B</sub> =5.0mA)	0.65	0.85 0.95	Vdc

### SMALL-SIGNAL CHARACTERISTICS

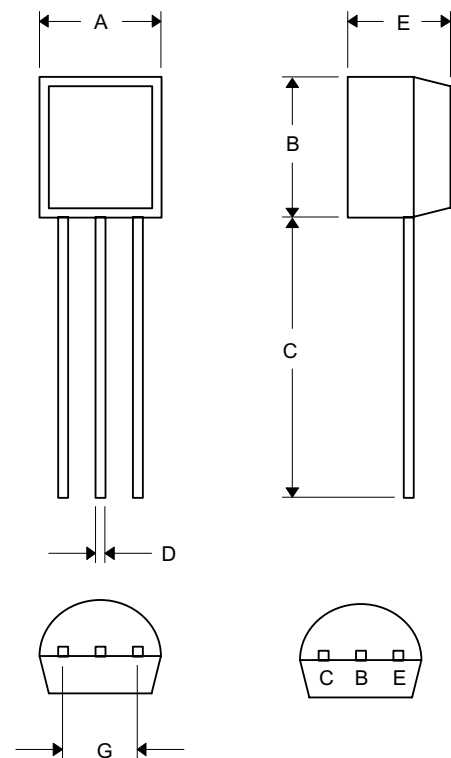
f <sub>T</sub>	Current Gain-Bandwidth Product (I <sub>C</sub> =10mA, V <sub>CE</sub> =20Vdc, f=100MHz)	250		MHz
C <sub>obo</sub>	Output Capacitance (V <sub>CB</sub> =5.0Vdc, I <sub>E</sub> =0, f=1.0MHz)		4.0	pF
C <sub>ibo</sub>	Input Capacitance (V <sub>BE</sub> =0.5Vdc, I <sub>C</sub> =0, f=1.0MHz)		8.0	pF
NF	Noise Figure (I <sub>C</sub> =100μA, V <sub>CE</sub> =5.0Vdc, R <sub>S</sub> =1.0kΩ f=10Hz to 15.7kHz)		5.0	dB

### SWITCHING CHARACTERISTICS

t <sub>d</sub>	Delay Time	(V <sub>CC</sub> =3.0Vdc, V <sub>BE</sub> =0.5Vdc I <sub>C</sub> =10mA, I <sub>B1</sub> =1.0mA)	35	ns
t <sub>r</sub>	Rise Time	(V <sub>CC</sub> =3.0Vdc, V <sub>BE</sub> =0.5Vdc I <sub>C</sub> =10mA, I <sub>B1</sub> =1.0mA)	35	ns
t <sub>s</sub>	Storage Time	(V <sub>CC</sub> =3.0Vdc, I <sub>C</sub> =10mA)	200	ns
t <sub>f</sub>	Fall Time	(I <sub>B1</sub> =I <sub>B2</sub> =1.0mA)	50	ns

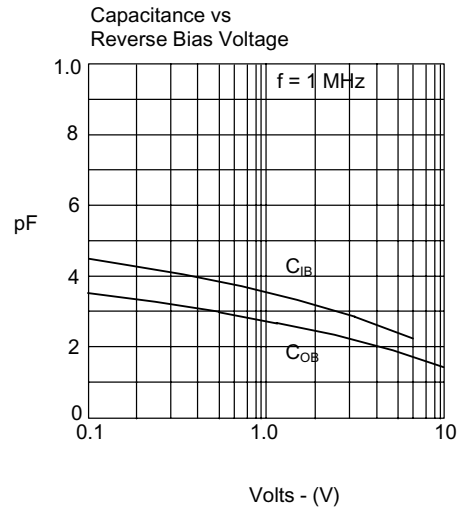
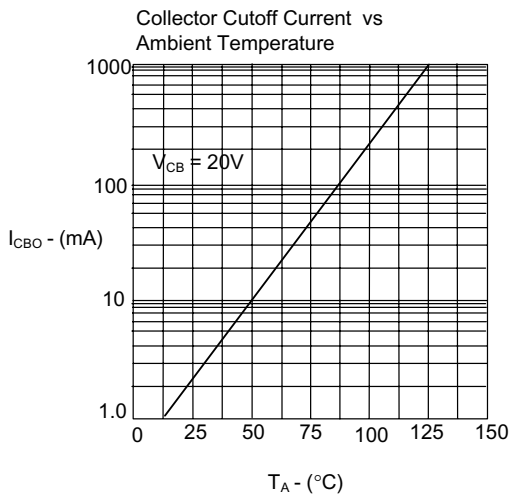
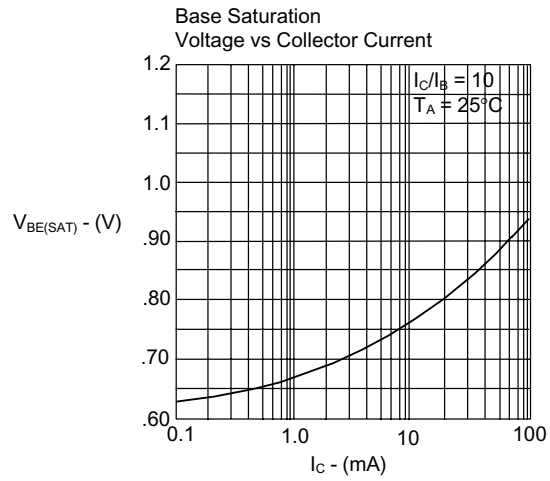
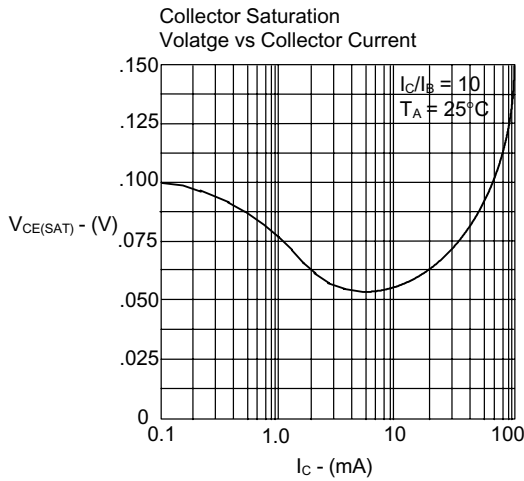
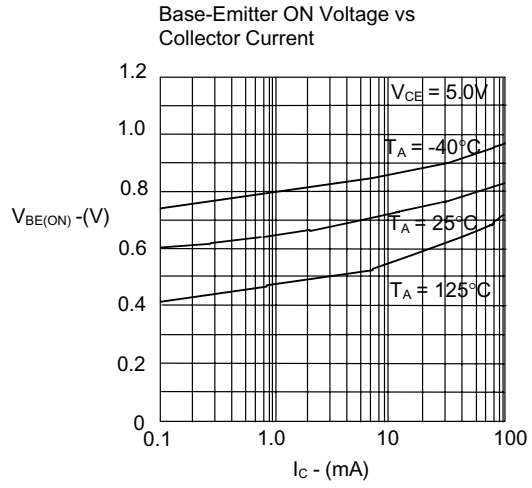
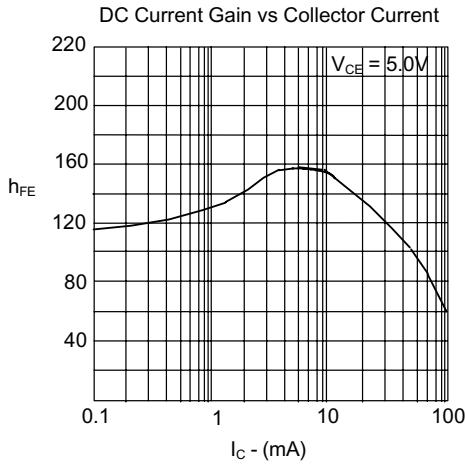
\*Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%

### TO-92

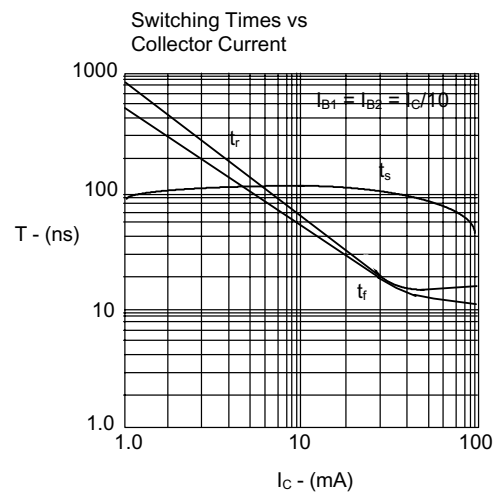
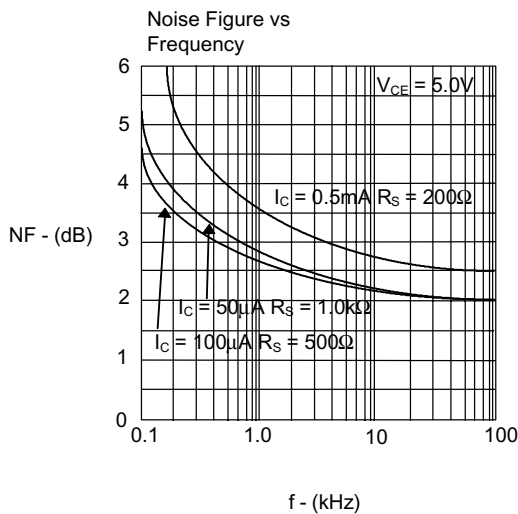
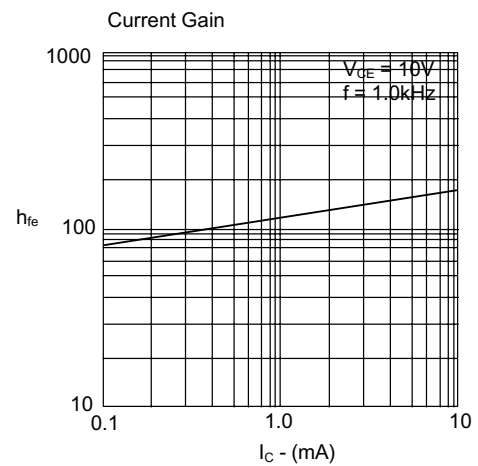
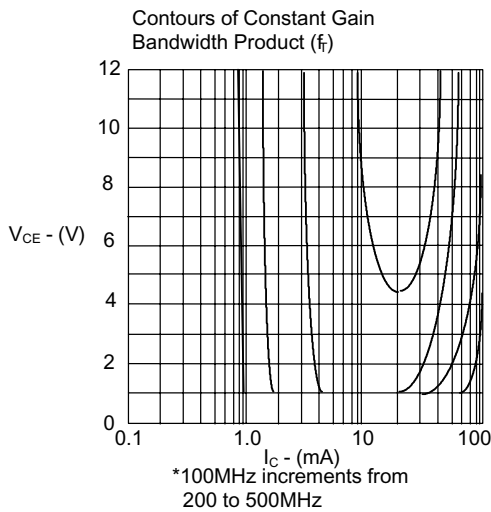
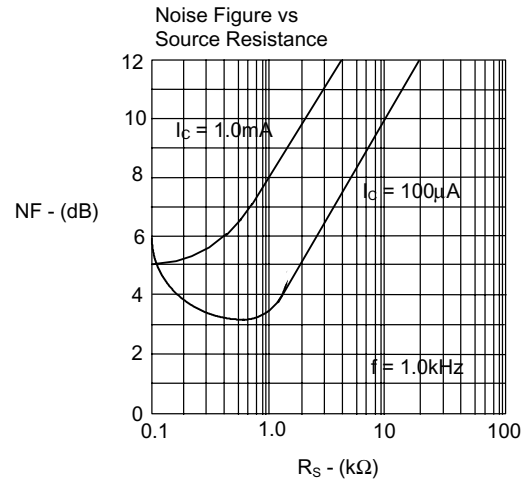
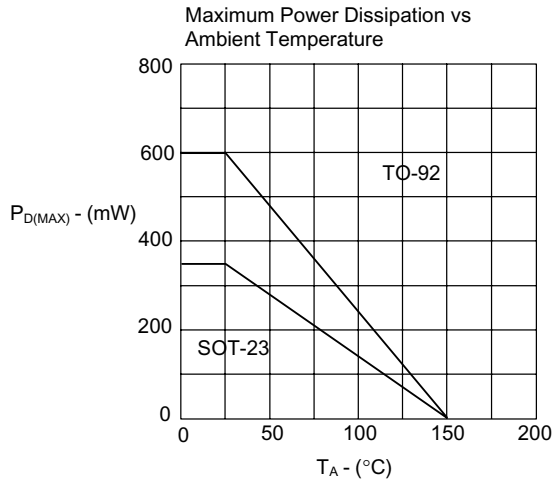


DIM	DIMENSIONS				NOTE
	INCHES		MM		
A	.170	.190	4.33	4.83	
B	.170	.190	4.30	4.83	
C	.550	.590	13.97	14.97	
D	.010	.020	0.36	0.56	
E	.130	.160	3.30	3.96	
G	.096	.104	2.44	2.64	

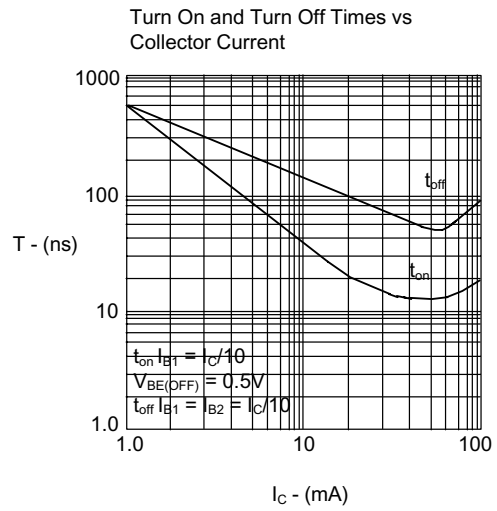
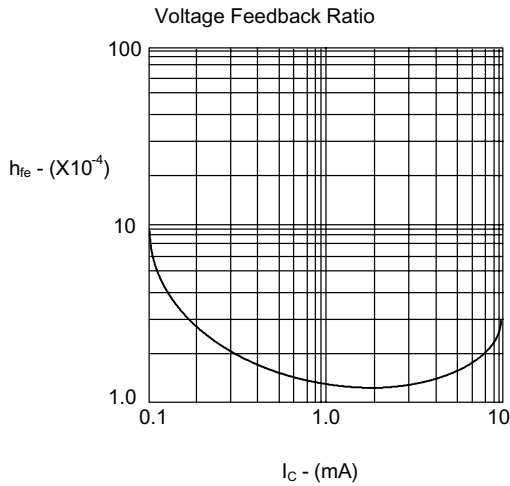
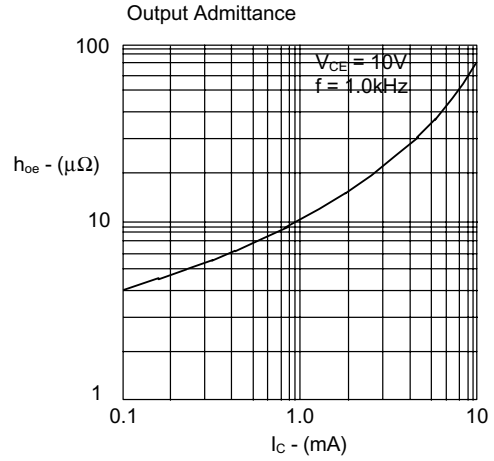
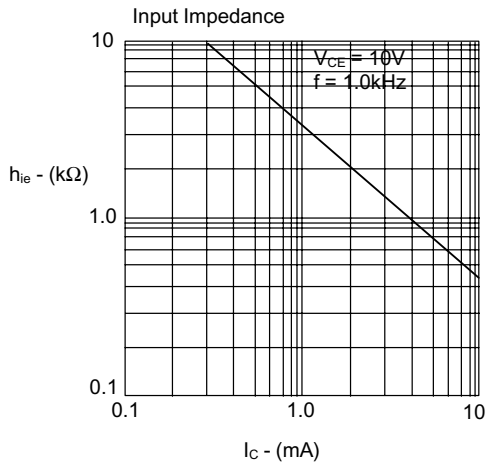
[www.mccsemi.com](http://www.mccsemi.com)



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## Ordering Information

Device	Packing
(Part Number)-AP	Ammo Packing; 2Kpcs/AmmoBox
(Part Number)-BP	Bulk; 1Kpcs/Bag

### \*\*\*IMPORTANT NOTICE\*\*\*

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