



Micro Commercial Components

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2N3904

NPN General Purpose Amplifier

Features

- Through Hole Package
- Capable of 600mWatts of Power Dissipation and 200mA Ic.
- € 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 |
|----------------------------|---|-----|-----|-------|
| OFF CHARACTERISTICS | | | | |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage* ($I_C=1.0mA$, $I_B=0$) | 40 | | Vdc |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage ($I_C=10\mu A$, $I_E=0$) | 60 | | Vdc |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage ($I_E=10\mu A$, $I_C=0$) | 6.0 | | Vdc |
| I_{BL} | Base Cutoff Current ($V_{CE}=30Vdc$, $V_{BE}=3.0Vdc$) | | 50 | nAdc |
| I_{CEX} | Collector Cutoff Current ($V_{CE}=30Vdc$, $V_{BE}=3.0Vdc$) | | 50 | nAdc |

ON CHARACTERISTICS

| | | | | |
|---------------|---|-----------------------------|--------------|-----|
| h_{FE} | DC Current Gain* ($I_C=0.1mA$, $V_{CE}=1.0Vdc$) ($I_C=1.0mA$, $V_{CE}=1.0Vdc$) ($I_C=10mA$, $V_{CE}=1.0Vdc$) ($I_C=50mA$, $V_{CE}=1.0Vdc$) ($I_C=100mA$, $V_{CE}=1.0Vdc$) | 40 70 100 60 30 | 300 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage ($I_C=10mA$, $I_B=1.0mA$) ($I_C=50mA$, $I_B=5.0mA$) | | 0.2 0.4 | Vdc |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage ($I_C=10mA$, $I_B=1.0mA$) ($I_C=50mA$, $I_B=5.0mA$) | 0.65 | 0.85 0.95 | Vdc |

SMALL-SIGNAL CHARACTERISTICS

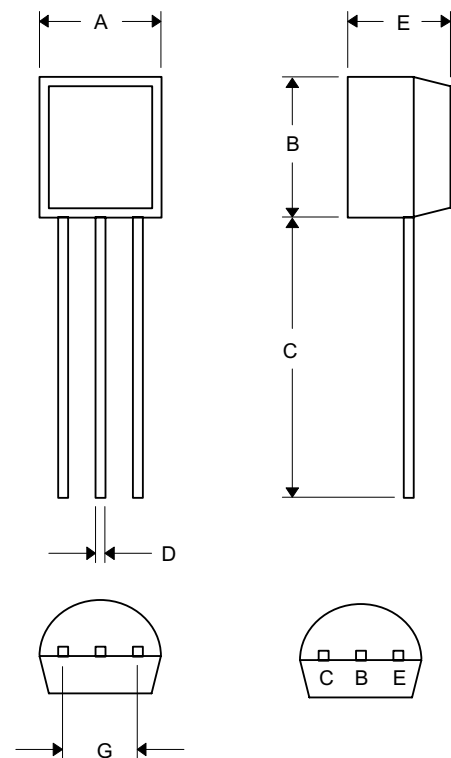
| | | | | |
|-----------|---|-----|-----|-----|
| f_T | Current Gain-Bandwidth Product ($I_C=10mA$, $V_{CE}=20Vdc$, $f=100MHz$) | 250 | | MHz |
| C_{obo} | Output Capacitance ($V_{CB}=5.0Vdc$, $I_E=0$, $f=1.0MHz$) | | 4.0 | pF |
| C_{ibo} | Input Capacitance ($V_{BE}=0.5Vdc$, $I_C=0$, $f=1.0MHz$) | | 8.0 | pF |
| NF | Noise Figure ($I_C=100\mu A$, $V_{CE}=5.0Vdc$, $R_S=1.0k\Omega$, $f=10Hz$ to $15.7kHz$) | | 5.0 | dB |

SWITCHING CHARACTERISTICS

| | | | | |
|-------|--------------|---------------------------------------|-----|----|
| t_d | Delay Time | ($V_{CC}=3.0Vdc$, $V_{BE}=0.5Vdc$) | 35 | ns |
| t_r | Rise Time | ($I_C=10mA$, $I_{B1}=1.0mA$) | 35 | ns |
| t_s | Storage Time | ($V_{CC}=3.0Vdc$, $I_C=10mA$) | 200 | ns |
| t_f | Fall Time | ($I_{B1}=I_{B2}=1.0mA$) | 50 | ns |

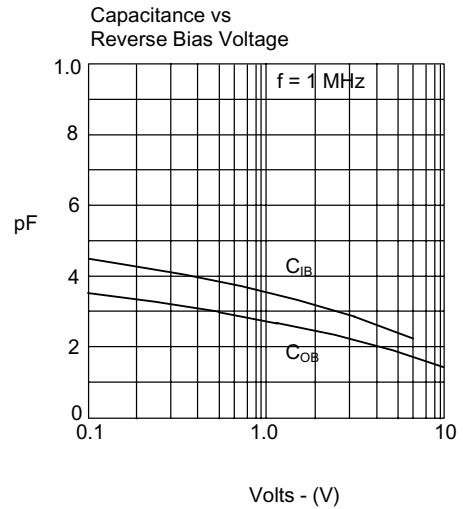
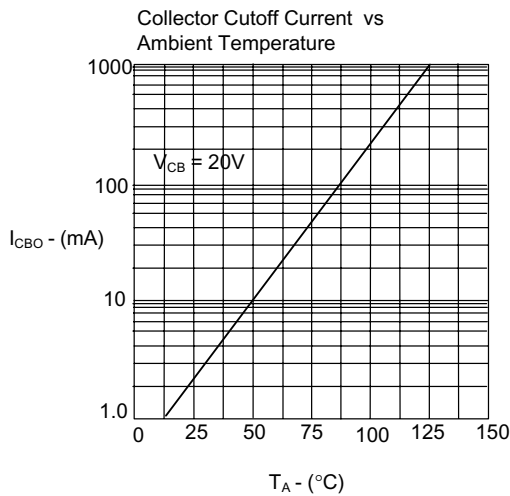
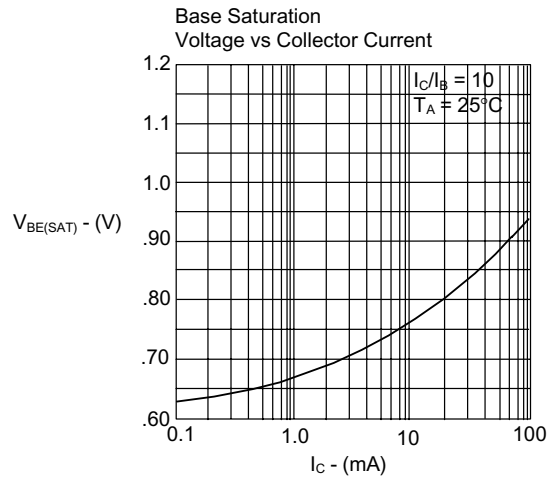
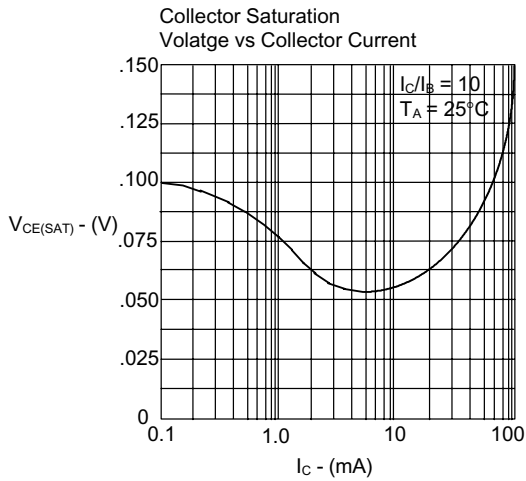
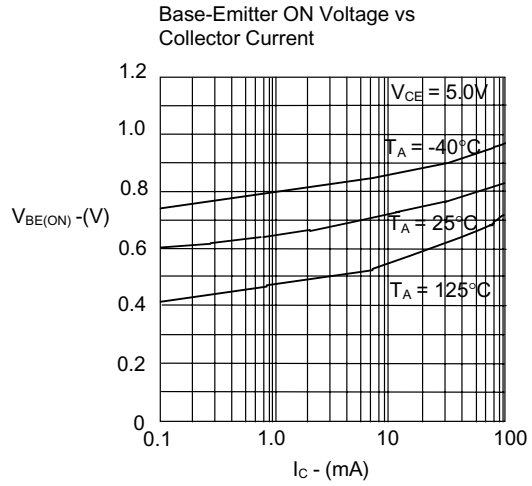
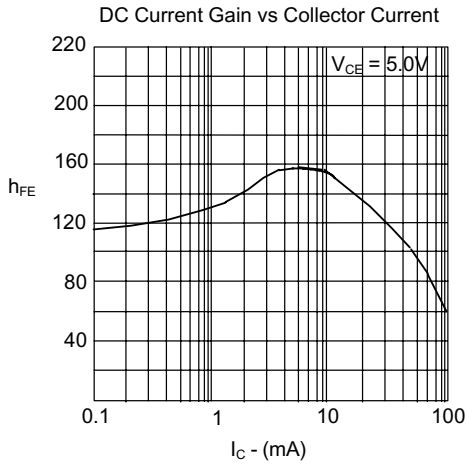
*Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2.0\%$

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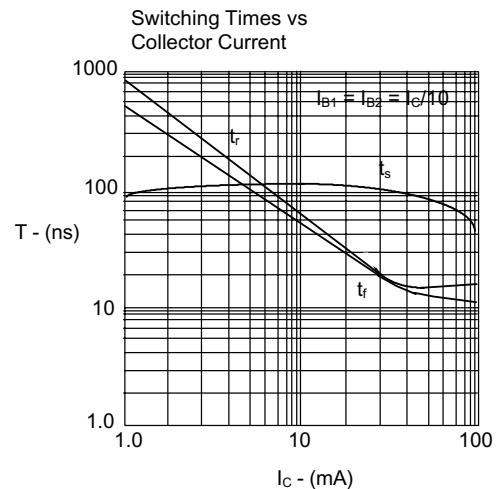
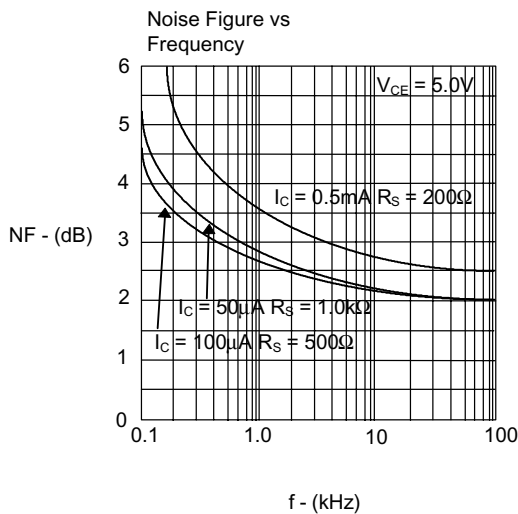
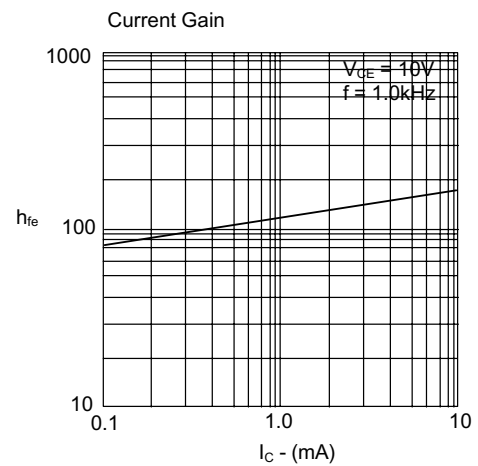
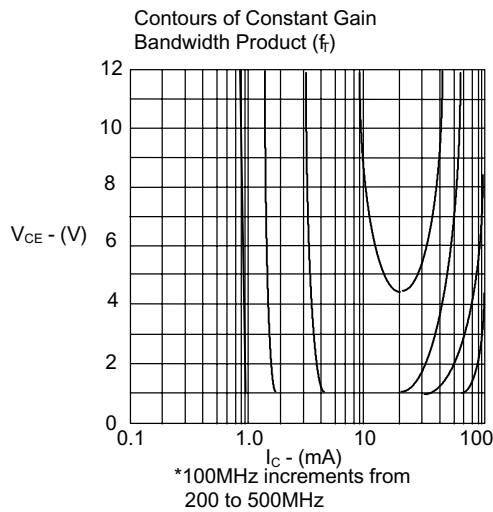
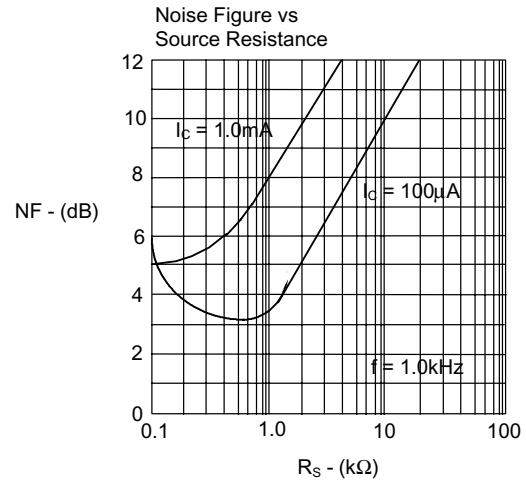
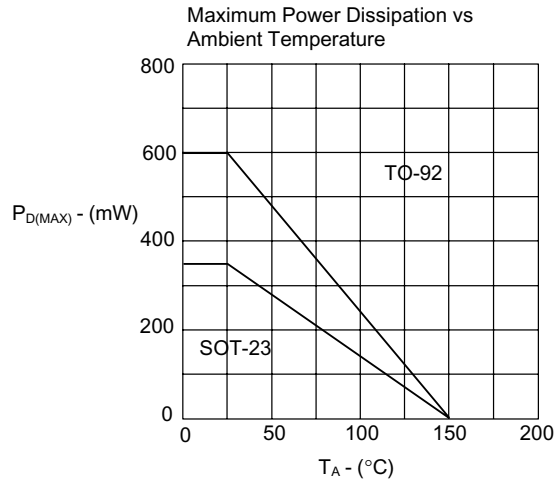


| DIM | DIMENSIONS | | | | NOTE |
|-----|------------|------|-------|-------|------|
| | INCHES | | MM | | |
| A | .170 | .190 | 4.33 | 4.83 | |
| B | .170 | .190 | 4.30 | 4.83 | |
| C | .550 | .590 | 13.97 | 14.97 | |
| D | .010 | .020 | 0.36 | 0.56 | |
| E | .130 | .160 | 3.30 | 3.96 | |
| G | .010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

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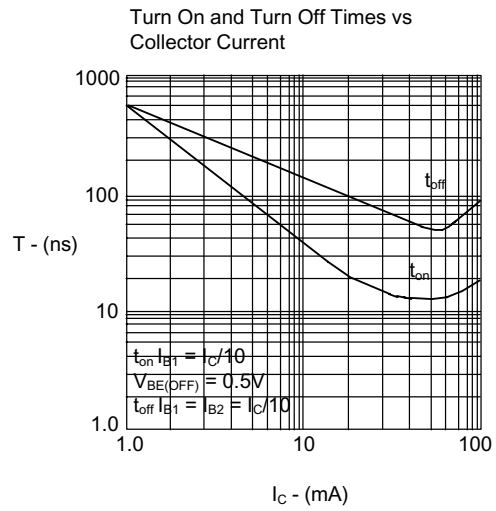
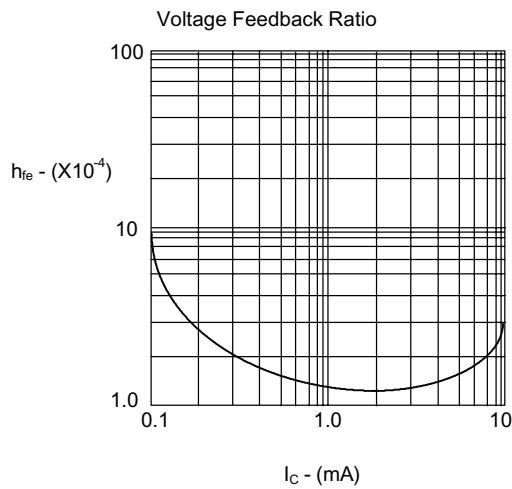
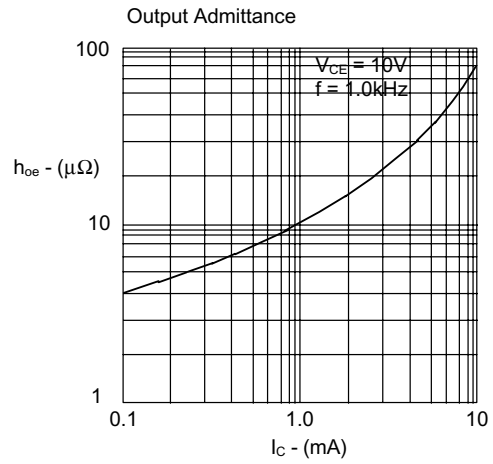
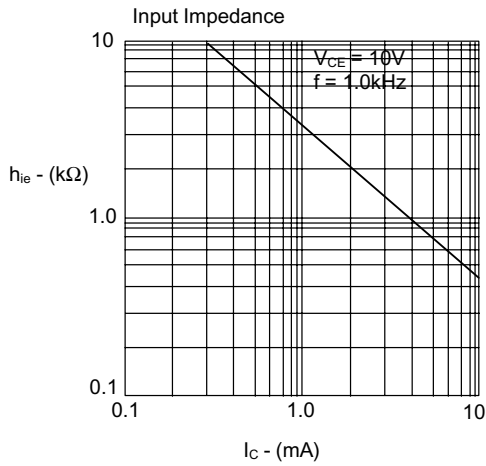
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Ordering Information

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

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