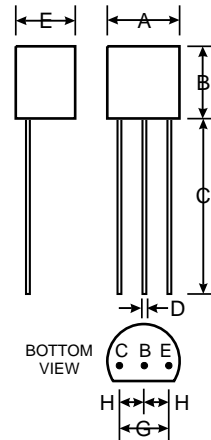




Features

Epitaxial Planar Die Construction
Available in both Through-Hole and Surface Mount Packages
Ideal for Switching and Amplifier Applications
Complementary PNP Type Available (2N3906)



| TO-92 | | |
|----------------------|-------|-------|
| Dim | Min | Max |
| A | 4.32 | 4.83 |
| B | 4.32 | 4.78 |
| C | 12.50 | 15.62 |
| D | 0.36 | 0.56 |
| E | 3.15 | 3.94 |
| G | 2.29 | 2.79 |
| H | 1.14 | 1.40 |
| All Dimensions in mm | | |

Mechanical Data

Case: TO-92, Plastic
Leads: Solderable per MIL-STD-202, Method 208
Terminal Connections: See Diagram
Marking: Type Number
Weight: 0.18 grams (approx.)

Maximum Ratings @ T_A = 25 C unless otherwise specified

| Characteristic | Symbol | 2N3904 | Unit |
|--|-----------------------------------|-------------|------|
| Collector-Base Voltage | V _{CB0} | 60 | V |
| Collector-Emitter Voltage | V _{CE0} | 40 | V |
| Emitter-Base Voltage | V _{EB0} | 5.0 | V |
| Collector Current - Continuous | I _C | 100 | mA |
| Collector Current - Peak | I _{CM} | 200 | mA |
| Power Dissipation (Note 1) | P _d | 500 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | R _{JA} | 250 | K/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | C |

Notes: 1. Leads maintained at a distance of 2.0mm from body at specified ambient temperature.
2. Pulse test: Pulse width 300 μs, duty cycle 2%.

Electrical Characteristics @ $T_A = 25\text{ C}$ unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|-------------------------------------|---------------|-----------------------------|--------------|------|---|
| DC Current Gain | h_{FE} | 50 70 100 60 30 | 300 | | - $V_{CE} = 1.0V$, - $I_C = 0.1mA$ - $V_{CE} = 1.0V$, - $I_C = 1.0mA$ - $V_{CE} = 1.0V$, - $I_C = 10mA$ - $V_{CE} = 1.0V$, - $I_C = 50mA$ - $V_{CE} = 1.0V$, - $I_C = 100mA$ |
| Collector Saturation Voltage | $V_{CE(SAT)}$ | | 0.25 0.40 | V | (Note 2) - $I_C = 10mA$, - $I_B = 1.0mA$ - $I_C = 50mA$, - $I_B = 5.0mA$ |
| Base Saturation Voltage | $V_{BE(SAT)}$ | | 0.85 0.95 | V | (Note 2) - $I_C = 10mA$, - $I_B = 1.0mA$ - $I_C = 50mA$, - $I_B = 5.0mA$ |
| Collector Cutoff Current | I_{CEX} | | 50 | nA | - $V_{EB} = 3.0V$, - $V_{CE} = 30V$ |
| Emitter Cutoff Current | I_{BL} | | 50 | nA | - $V_{EB} = 3.0V$, - $V_{CE} = 30V$ |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 60 | — | V | - $I_C = 10\mu A$, - $I_B = 0$ |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 40 | — | V | - $I_C = 1.0mA$, - $I_E = 0$ (Note 2) |
| Emitter-base Breakdown voltage | $V_{(BR)EBO}$ | 5.0 | — | V | - $I_E = 10\mu A$, - $I_C = 0$ |
| Gain Bandwidth Product | f_T | 250 | — | MHz | $V_{CE} = 20V$, - $I_C = 10mA$, - $f = 100MHz$ |
| Collector-Base Capacitance | C_{CBO} | | 4.5 | pF | - $V_{CB} = 5.0V$, - $I_E = 0$, $f = 100kHz$ |
| Emitter-Base Capacitance | C_{EBO} | | 10 | pF | - $V_{EB} = 0.5V$, - $I_C = 0$, $f = 100kHz$ |
| Noise Figure | | | 5.0 | dB | - $V_{CE} = 5.0V$, - $I_C = 100\text{ A}$, $R_G = 1.0k$, - $f = 10$ to $15000Hz$ |
| Delay Time | t_d | | 35 | ns | - $I_{B1} = 1.0mA$, - $I_C = 10mA$, $V_{CC} = 3.0V$, $V_{BE(off)} = 0.5V$ |
| Rise Time | t_r | | 35 | ns | - $I_{B1} = 1.0mA$, - $I_C = 10mA$, $V_{CC} = 3.0V$, - $V_{BE(off)} = 0.5V$ |
| Storage Time | t_s | | 225 | ns | - $I_{B1} = -I_{B2} = 1.0mA$, - $I_C = 10mA$, - $V_{CC} = 3.0V$ |
| Fall Time | t_f | | 75 | ns | - $I_{B1} = -I_{B2} = 1.0mA$, - $I_C = 10mA$, - $V_{CC} = 3.0V$ |

- Notes: 1. Leads maintained at a distance of 2.0mm from body at specified ambient temperature.
2. Pulse test: Pulse width 300 μs , duty cycle 2%.