# 2N3906

## SMALL SIGNAL PNP TRANSISTOR

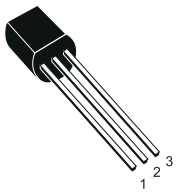
**PRELIMINARY DATA**

| Type | Marking |
|---|---|
| 2N3906 | 2N3906 |

- SILICON EPITAXIAL PLANAR NPN TRANSISTOR
- TO-92 PACKAGE SUITABLE FOR THROUGH-HOLE PCB ASSEMBLY
- THE NPN COMPLEMENTARY TYPE IS 2N3904

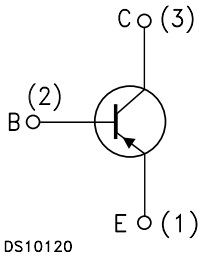
**APPLICATIONS**

- WELL SUITABLE FOR TV AND HOME APPLIANCE EQUIPMENT
- SMALL LOAD SWITCH TRANSISTOR WITH HIGH GAIN AND LOW SATURATION VOLTAGE




**TO-92**

**INTERNAL SCHEMATIC DIAGRAM**




**ABSOLUTE MAXIMUM RATINGS**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage ($I_E$ = 0) | -60 | V |
| $V_{CEO}$ | Collector-Emitter Voltage ($I_B$ = 0) | -40 | V |
| $V_{EBO}$ | Emitter-Base Voltage ($I_C$ = 0) | -6 | V |
| $I_C$ | Collector Current | -200 | mA |
| $P_{tot}$ | Total Dissipation at $T_C$ = 25 $^oC$ | 625 | mW |
| $T_{stg}$ | Storage Temperature | -65 to 150 | $^oC$ |
| $T_j$ | Max. Operating Junction Temperature | 150 | $^oC$ |

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{thj\text{-}amb}$ • | Thermal Resistance Junction-Ambient | Max | 200 | °C/W |
| $R_{thj\text{-}Case}$ • | Thermal Resistance Junction-Case | Max | 83.3 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 °C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CEX}$ | Collector Cut-off Current ($V_{BE}$ = 3 V) | $V_{CE}$ = -30 V | | | -50 | nA |
| $I_{BEX}$ | Base Cut-off Current ($V_{BE}$ = 3 V) | $V_{CE}$ = -30 V | | | -50 | nA |
| $V_{(BR)CEO}$* | Collector-Emitter Breakdown Voltage ($I_B$ = 0) | $I_C$ = -1 mA | -40 | | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage ($I_E$ = 0) | $I_C$ = -10 µA | -60 | | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage ($I_C$ = 0) | $I_E$ = -10 µA | -6 | | | V |
| $V_{CE(sat)}$* | Collector-Emitter Saturation Voltage | $I_C$ = -10 mA $I_B$ = -1 mA<br>$I_C$ = -50 mA $I_B$ = -5 mA | | | -0.25<br>-0.4 | V<br>V |
| $V_{BE(sat)}$* | Base-Emitter Saturation Voltage | $I_C$ = -10 mA $I_B$ = -1 mA<br>$I_C$ = -50 mA $I_B$ = -5 mA | <br>-0.65 | | -0.85<br>-0.95 | V<br>V |
| $h_{FE}$* | DC Current Gain | $I_C$ = -0.1 mA $V_{CE}$ = -1 V<br>$I_C$ = -1 mA $V_{CE}$ = -1 V<br>$I_C$ = -10 mA $V_{CE}$ = -1 V<br>$I_C$ = -50 mA $V_{CE}$ = -1 V<br>$I_C$ = -100 mA $V_{CE}$ = -1 V | 60<br>80<br>100<br>60<br>30 | | 300 | |
| $f_T$ | Transition Frequency | $I_C$ = -10mA $V_{CE}$ = -20 V f = 100 MHz | 250 | | | MHz |
| NF | Noise Figure | $V_{CE}$ = -5 V $I_C$ = -0.1 mA f = 10 Hz to 15.7 KHz $R_G$ = 1 KΩ | | 4 | | dB |
| $C_{CBO}$ | Collector-Base Capacitance | $I_E$ = 0 $V_{CB}$ = -5 V f = 100 KHz | | 6 | | pF |
| $C_{EBO}$ | Emitter-Base Capacitance | $I_C$ = 0 $V_{EB}$ = -0.5 V f = 100 KHz | | 25 | | pF |
| $t_d$ | Delay Time | $I_C$ = -10 mA $I_B$ = -1 mA<br>$V_{CC}$ = -3V | | | 35 | ns |
| $t_r$ | Rise Time | | | | 35 | ns |
| $t_s$ | Storage Time | $I_C$ = -10 mA $I_{B1}$ = -$I_{B2}$ = -1 mA<br>$V_{CC}$ = -3V | | | 225 | ns |
| $t_f$ | Fall Time | | | | 72 | ns |

∗ Pulsed: Pulse duration = 300 µs, duty cycle ≤ 2 %

## TO-92 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.32 | | 4.95 | 0.170 | | 0.195 |
| b | 0.36 | | 0.51 | 0.014 | | 0.020 |
| D | 4.45 | | 4.95 | 0.175 | | 0.194 |
| E | 3.30 | | 3.94 | 0.130 | | 0.155 |
| e | 2.41 | | 2.67 | 0.095 | | 0.105 |
| e1 | 1.14 | | 1.40 | 0.045 | | 0.055 |
| L | 12.70 | | 15.49 | 0.500 | | 0.609 |
| R | 2.16 | | 2.41 | 0.085 | | 0.094 |
| S1 | 1.14 | | 1.52 | 0.045 | | 0.059 |
| W | 0.41 | | 0.56 | 0.016 | | 0.022 |
| V | 4 degree | | 6 degree | 4 degree | | 6 degree |