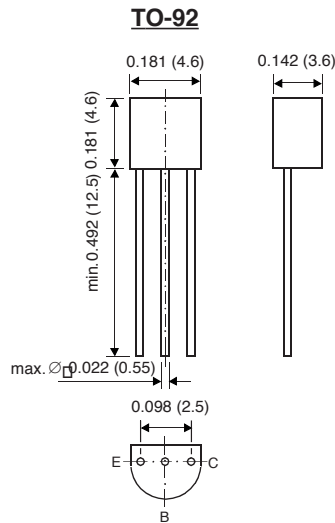


# 2N3906

## SMALL SIGNAL TRANSISTORS (PNP)



Dimensions in inches and (millimeters)

### FEATURES

- ◆ PNP Silicon Epitaxial Planar Transistor for switching and amplifier applications.
- ◆ As complementary type, the NPN transistor 2N3904 is recommended.
- ◆ On special request, this transistor is also manufactured in the pin configuration TO-18.
- ◆ This transistor is also available in the SOT-23 case with the type designation MMBT3906.



### MECHANICAL DATA

**Case:** TO-92 Plastic Package

**Weight:** approx. 0.18g

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	VALUE	UNIT
Collector-Base Voltage	$-V_{CBO}$	40	Volts
Collector-Emitter Voltage	$-V_{CEO}$	40	Volts
Emitter-Base Voltage	$-V_{EBO}$	5.0	Volts
Collector Current	$-I_C$	200	mA
Power Dissipation at $T_A = 25^\circ\text{C}$ at $T_C = 25^\circ\text{C}$	$P_{tot}$	625 1.5	mW Watts
Thermal Resistance Junction to Ambient Air	$R_{\theta JA}$	250 <sup>(1)</sup>	$^\circ\text{C/W}$
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_s$	- 65 to +150	$^\circ\text{C}$

#### NOTES:

(1) Valid provided that leads are kept at ambient temperature.

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## ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

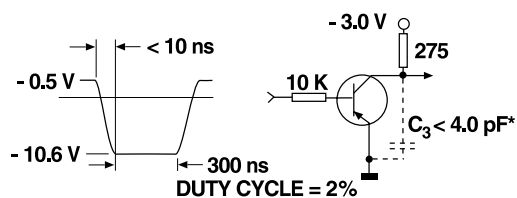
	SYMBOL	MIN.	MAX.	UNIT
Collector-Base Breakdown Voltage at $-I_C = 10 \mu\text{A}$ , $I_E = 0$	$-V_{(BR)CBO}$	40	–	Volts
Collector-Emitter Breakdown Voltage at $-I_C = 1 \text{ mA}$ , $I_B = 0$	$-V_{(BR)CEO}$	40	–	Volts
Emitter-Base Breakdown Voltage at $-I_E = 10 \mu\text{A}$ , $I_C = 0$	$-V_{(BR)EBO}$	5	–	Volts
Collector Saturation Voltage at $-I_C = 10 \text{ mA}$ , $-I_B = 1 \text{ mA}$ at $-I_C = 50 \text{ mA}$ , $-I_B = 5 \text{ mA}$	$-V_{CEsat}$ $-V_{CEsat}$	– –	0.25 0.4	Volts Volts
Base Saturation Voltage at $-I_C = 10 \text{ mA}$ , $-I_B = 1 \text{ mA}$ at $-I_C = 50 \text{ mA}$ , $-I_B = 5 \text{ mA}$	$-V_{BEsat}$ $-V_{BEsat}$	– –	0.85 0.95	Volts Volts
Collector-Emitter Cutoff Current at $-V_{EB} = 3 \text{ V}$ , $-V_{CE} = 30 \text{ V}$	$-I_{CEV}$	–	50	nA
Emitter-Base Cutoff Current at $-V_{EB} = 3 \text{ V}$ , $-V_{CE} = 30 \text{ V}$	$-I_{EBV}$	–	50	nA
DC Current Gain at $-V_{CE} = 1 \text{ V}$ , $-I_C = 0.1 \text{ mA}$ at $-V_{CE} = 1 \text{ V}$ , $-I_C = 1 \text{ mA}$ at $-V_{CE} = 1 \text{ V}$ , $-I_C = 10 \text{ mA}$ at $-V_{CE} = 1 \text{ V}$ , $-I_C = 50 \text{ mA}$ at $-V_{CE} = 1 \text{ V}$ , $-I_C = 100 \text{ mA}$	$h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$ $h_{FE}$	60 80 100 60 30	– – 300 – –	– – – – –
Input Impedance at $-V_{CE} = 10 \text{ V}$ , $-I_C = 1 \text{ mA}$ , $f = 1 \text{ kHz}$	$h_{ie}$	1	10	k $\Omega$
Voltage Feedback Ratio at $-V_{CE} = 10 \text{ V}$ , $-I_C = 1 \text{ mA}$ , $f = 1 \text{ kHz}$	$h_{re}$	$0.5 \cdot 10^{-4}$	$8 \cdot 10^{-4}$	–
Gain-Bandwidth Product at $-V_{CE} = 20 \text{ V}$ , $-I_C = 10 \text{ mA}$ , $f = 100 \text{ MHz}$	$f_T$	250	–	MHz
Collector-Base Capacitance at $-V_{CB} = 5 \text{ V}$ , $f = 100 \text{ kHz}$	$C_{CBO}$	–	4.5	pF
Emitter-Base Capacitance at $-V_{EB} = 0.5 \text{ V}$ , $f = 100 \text{ kHz}$	$C_{EBO}$	–	10	pF

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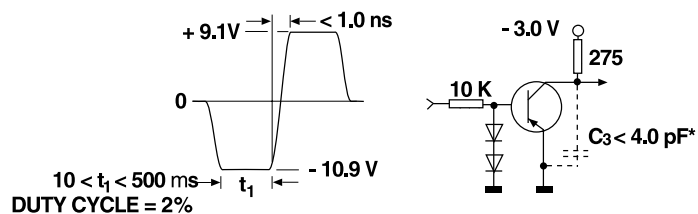
## ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

	SYMBOL	MIN.	MAX.	UNIT
Small Signal Current Gain at $-V_{CE} = 10\text{ V}$ , $-I_C = 1\text{ mA}$ , $f = 1\text{ kHz}$	$h_{fe}$	100	400	–
Output Admittance at $-V_{CE} = 1\text{ V}$ , $-I_C = 1\text{ mA}$ , $f = 1\text{ kHz}$	$h_{oe}$	1	40	$\mu\text{S}$
Noise Figure at $-V_{CE} = 5\text{ V}$ , $-I_C = 100\text{ }\mu\text{A}$ , $R_G = 1\text{ k}\Omega$ , $f = 10 \dots 15000\text{ Hz}$	NF	–	4	dB
Delay Time (see Fig. 1) at $-I_{B1} = 1\text{ mA}$ , $-I_C = 10\text{ mA}$	$t_d$	–	35	ns
Rise Time (see Fig. 1) at $-I_{B1} = 1\text{ mA}$ , $-I_C = 10\text{ mA}$	$t_r$	–	35	ns
Storage Time (see Fig. 2) at $I_{B1} = -I_{B2} = 1\text{ mA}$ , $-I_C = 10\text{ mA}$	$t_s$	–	225	ns
Fall Time (see Fig. 2) at $I_{B1} = -I_{B2} = 1\text{ mA}$ , $-I_C = 10\text{ mA}$	$t_f$	–	75	ns



**Fig. 1:** Test circuit for delay and rise time  
\* total shunt capacitance of test jig and connectors



**Fig. 2:** Test circuit for storage and fall time  
\* total shunt capacitance of test jig and connectors