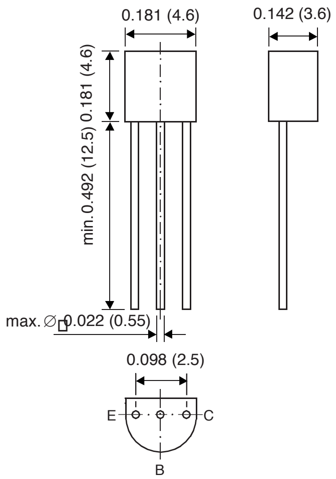
2N3906

SMALL SIGNAL TRANSISTORS (PNP)

TO-92



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°C at T_C = 25°C	P_{tot}	625 1.5	mW Watts
Thermal Resistance Junction to Ambient Air	$R_{\theta JA}$	250(1)	°C/W
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_S	– 65 to +150	°C

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

2N3906

ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

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

2N3906

ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified

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

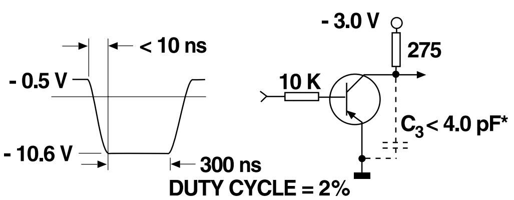


Fig. 1: Test circuit for delay and rise time
* total shunt capacitance of test jig and connectors

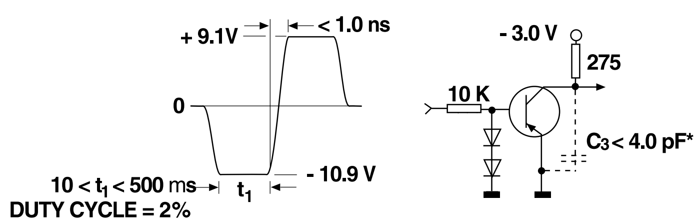


Fig. 2: Test circuit for storage and fall time
* total shunt capacitance of test jig and connectors