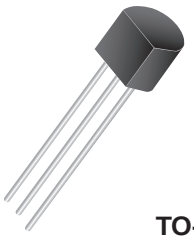
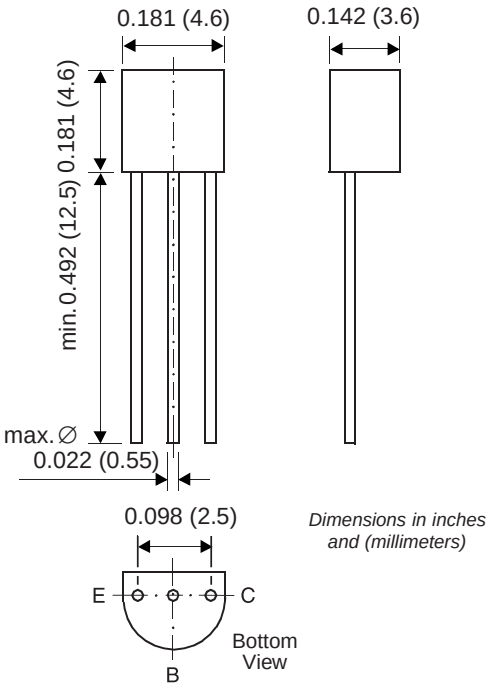
New Product

Vishay Semiconductors
formerly General Semiconductor

Small Signal Transistor (PNP)



TO-226AA (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

Packaging Codes/Options:

E6/Bulk – 5K per container, 20K/box
E7/4K per Ammo mag., 20K/box

Maximum Ratings & Thermal Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter		Symbol	Value	Unit
Collector-Emitter Voltage		$-V_{CEO}$	40	V
Collector-Base Voltage		$-V_{CBO}$	40	V
Emitter-Base Voltage		$-V_{EBO}$	5.0	V
Collector Current		$-I_C$	200	mA
Power Dissipation	T_A = 25°C T_C = 25°C	P_{tot}	625 1.5	mW W
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

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

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
DC Current Gain	h_{FE}	$-V_{CE}$ = 1 V, $-I_C$ = 0.1 mA $-V_{CE}$ = 1 V, $-I_C$ = 1 mA $-V_{CE}$ = 1 V, $-I_C$ = 10 mA $-V_{CE}$ = 1 V, $-I_C$ = 50 mA $-V_{CE}$ = 1 V, $-I_C$ = 100 mA	60 80 100 60 30	— — — — —	— — 300 — —	—
Collector-Emitter Cutoff Current	$-I_{CEV}$	$-V_{EB}$ = 3 V, $-V_{CE}$ = 30 V	—	—	50	nA
Emitter-Base Cutoff Current	$-I_{EBV}$	$-V_{EB}$ = 3 V, $-V_{CE}$ = 30 V	—	—	50	nA
Collector Saturation Voltage	$-V_{CEsat}$	$-I_C$ = 10 mA, $-I_B$ = 1 mA $-I_C$ = 50 mA, $-I_B$ = 5 mA	— —	— —	0.25 0.4	V
Base Saturation Voltage	$-V_{BEsat}$	$-I_C$ = 10 mA, $-I_B$ = 1 mA $-I_C$ = 50 mA, $-I_B$ = 5 mA	— —	— —	0.85 0.95	V
Collector-Emitter Breakdown Voltage	$-V_{(BR)CEO}$	$-I_C$ = 1 mA, I_B = 0	40	—	—	V
Collector-Base Breakdown Voltage	$-V_{(BR)CBO}$	$-I_C$ = 10 µA, I_E = 0	40	—	—	V
Emitter-Base Breakdown Voltage	$-V_{(BR)EBO}$	$-I_E$ = 10 µA, I_C = 0	5	—	—	V
Input Impedance	h_{ie}	$-V_{CE}$ = 10 V, $-I_C$ = 1 mA, f = 1 kHz	1	—	10	kΩ
Voltage Feedback Ratio	h_{re}	$-V_{CE}$ = 10 V, $-I_C$ = 1 mA, f = 1 kHz	$0.5 \cdot 10^{-4}$	—	$8 \cdot 10^{-4}$	—
Current Gain-Bandwidth Product	f_T	$-V_{CE}$ = 20 V, $-I_C$ = 10 mA f = 100 MHz	250	—	—	MHz
Collector-Base Capacitance	C_{CBO}	$-V_{CB}$ = 5 V, f = 100 kHz	—	—	4.5	pF
Emitter-Base Capacitance	C_{EBO}	$-V_{EB}$ = 0.5 V, f = 100 kHz	—	—	10	pF
Small Signal Current Gain	h_{fe}	$-V_{CE}$ = 10 V, $-I_C$ = 1 mA f = 1 kHz	100	—	400	—
Output Admittance	h_{oe}	$-V_{CE}$ = 1 V, $-I_C$ = 1 mA f = 1 kHz	1	—	40	µS

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Noise Figure	F	$-V_{CE}$ = 5 V, $-I_C$ = 100 μA, R_G = 1 kΩ, f = 10..15000 Hz	—	—	4	dB
Delay Time (see fig. 1)	t_d	$-I_{B1}$ = 1 mA, $-I_C$ = 10 mA	—	—	35	ns
Rise Time (see fig. 1)	t_r	$-I_{B1}$ = 1 mA, $-I_C$ = 10 mA,	—	—	35	ns
Storage Time (see fig. 2)	t_s	I_{B1} = $-I_{B2}$ = 1 mA, $-I_C$ = 10 mA	—	—	225	ns
Fall Time (see fig. 2)	t_f	I_{B1} = $-I_{B2}$ = 1 mA, $-I_C$ = 10 mA	—	—	75	ns

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

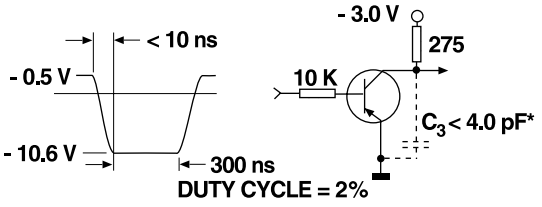


Fig. 2: Test circuit for storage and fall time
* total shunt capacitance of test jig and connectors