



New Product

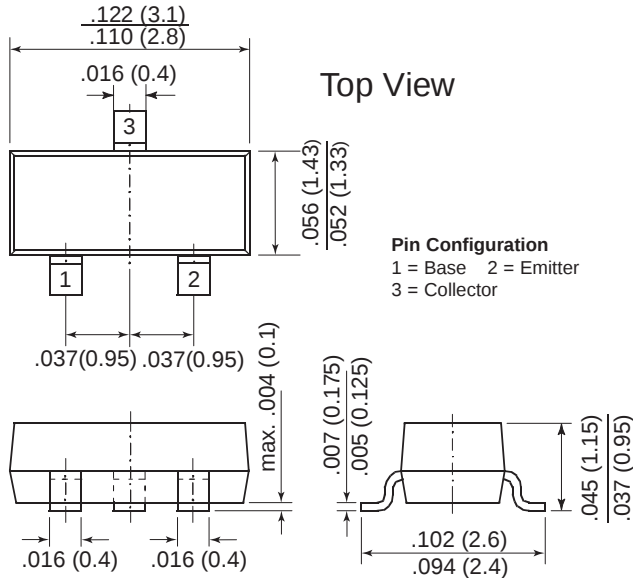
MMBT3906

Vishay Semiconductors
formerly General Semiconductor

Small Signal Transistor (PNP)

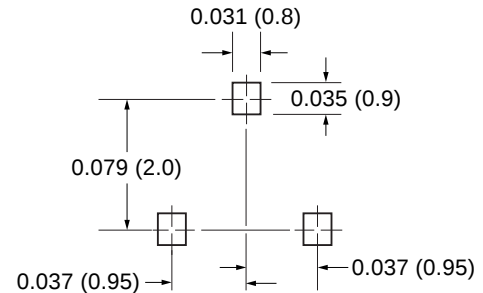


TO-236AB (SOT-23)



Dimensions in inches and (millimeters)

Mounting Pad Layout



Features

- PNP Silicon Epitaxial Planar Transistor for switching and amplifier applications.
- As complementary type, the NPN transistor MMBT3904 is recommended.
- This transistor is also available in the TO-92 case with the type designation 2N3906.

Mechanical Data

Case: SOT-23 Plastic Package

Weight: approx. 0.008g

Marking Code: 2A

Packaging Codes/Options:

E8/10K per 13" reel (8mm tape), 30K/box

E9/3K per 7" reel (8mm tape), 30K/box

Maximum Ratings & Thermal Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Collector-Base Voltage	$-V_{CBO}$	40	V
Collector-Emitter Voltage	$-V_{CEO}$	40	V
Emitter-Base Voltage	$-V_{EBO}$	5.0	V
Collector Current	$-I_C$	200	mA
Power Dissipation at $T_A = 25^\circ\text{C}$	P_{tot}	225 ⁽¹⁾ 300 ⁽²⁾	mW
Thermal Resistance Junction to Ambient Air	$R_{\theta JA}$	450 ⁽¹⁾	$^\circ\text{C/W}$
Thermal Resistance Junction to Substrate Backside	$R_{\theta SB}$	320 ⁽¹⁾	$^\circ\text{C/W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_S	-55 to +150	$^\circ\text{C}$

Notes: (1) Device on fiberglass substrate, see layout.

(2) Device on alumina substrate.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
DC Current Gain	h _{FE}	-V _{CE} = 1V, -I _C = 0.1mA	60	—	—	—
		-V _{CE} = 1V, -I _C = 1mA	80	—	—	
		-V _{CE} = 1V, -I _C = 10mA	100	—	300	
		-V _{CE} = 1V, -I _C = 50mA	60	—	—	
		-V _{CE} = 1V, -I _C = 100mA	30	—	—	
Collector-Base Breakdown Voltage	-V _{(BR)CBO}	-I _C = 10μA, I _E = 0	40	—	—	V
Collector-Emitter Breakdown Voltage	-V _{(BR)CEO}	-I _C = 1mA, I _B = 0	40	—	—	V
Emitter-Base Breakdown Voltage	-V _{(BR)EBO}	-I _E = 10μA, I _C = 0	5	—	—	V
Collector Saturation Voltage	-V _{CEsat}	-I _C = 10mA, -I _B = 1mA	—	—	0.25	V
		-I _C = 50mA, -I _B = 5mA	—	—	0.4	
Base Saturation Voltage	-V _{BEsat}	-I _C = 10mA, -I _B = 1mA	—	—	0.85	V
		-I _C = 50mA, -I _B = 5mA	—	—	0.95	
Collector-Emitter Cut-off Current	-I _{CEV}	-V _{EB} = 3V, -V _{CE} = 30V	—	—	50	nA
Emitter-Base Cut-off Current	-I _{EBV}	-V _{EB} = 3V, V _{CE} = 30V	—	—	50	nA
Gain-Bandwidth Product	f _T	-V _{CE} = 20V, -I _C = 10mA f = 100MHz	250	—	—	MHz
Collector-Base Capacitance	C _{CBO}	-V _{CB} = 5V, f = 100kHz	—	—	4.5	pF
Emitter-Base Capacitance	C _{EBO}	-V _{CB} = 0.5V, f = 100kHz	—	—	10	pF
Noise Figure	NF	-V _{CE} = 5V, -I _C = 100μA, R _G = 1kΩ, f = 10...15000Hz	—	—	4	dB
Input Impedance	h _{ie}	-V _{CE} = 10V, -I _C = 1mA f = 1kHz	1	—	10	kΩ
Small Signal Current Gain	h _{fe}	-V _{CE} = 10V, -I _C = 1mA, f = 1kHz	100	—	400	—
Voltage Feedback Ratio	h _{re}	-V _{CE} = 10V, -I _C = 1mA, f = 1kHz	0.5 • 10 ⁻⁴	—	8 • 10 ⁻⁴	—
Output Admittance	h _{oe}	-V _{CE} = 1V, -I _C = 1mA, f = 1kHz	1	—	40	μS

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Delay Time (see fig. 1)	t _d	-I _{B1} = 1mA, -I _C = 10mA	—	—	35	ns
Rise Time (see fig. 1)	t _r	-I _{B1} = 1mA, -I _C = 10mA,	—	—	35	ns
Storage Time (see fig. 2)	t _s	I _{B1} = -I _{B2} = 1mA, -I _C = 10mA	—	—	225	ns
Fall Time (see fig. 2)	t _f	I _{B1} = -I _{B2} = 1mA, -I _C = 10mA	—	—	75	ns

Fig. 1: Test circuit for delay and rise time

* total shunt capacitance of test jig and connectors

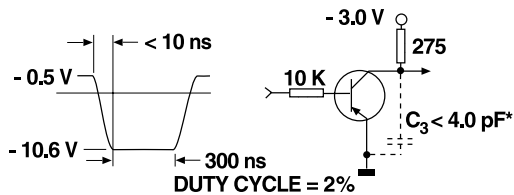
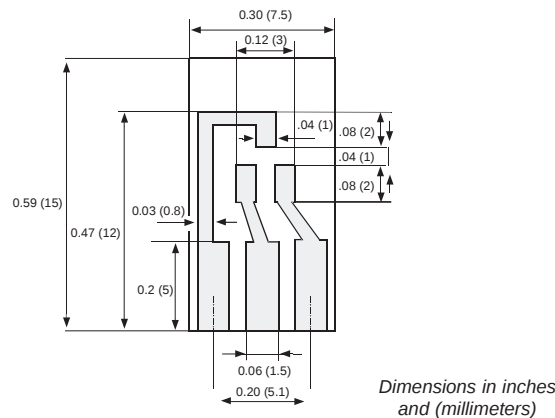
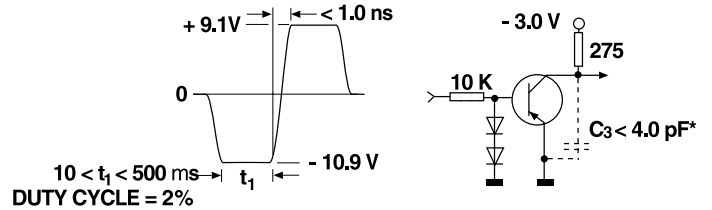


Fig. 2: Test circuit for storage and fall time

* total shunt capacitance of test jig and connectors



Layout for R_{thJA} test

Thickness: Fiberglass 0.059 in (1.5 mm)

Copper leads 0.012 in (0.3 mm)