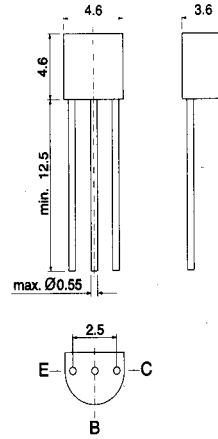


NPN Silicon Expitaxial Planar Transistor
for switching and amplifier applications.

As complementary types the PNP transistors
HN / 2N 3905 and HN / 2N 3906 are recommended.

On special request, these transistors can be manufactured
in different pin configurations. Please refer to the "TO-92
TRANSISTOR PACKAGE OUTLINE" on page 80 for the
available pin options.



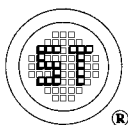
TO-92 Plastic Package
Weight approx. 0.18 g
Dimensions in mm

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

	Symbol	Value	Unit
Collector Base Voltage	V_{CBO}	60	V
Collector Emitter Voltage	V_{CEO}	40	V
Emitter Base Voltage	V_{EBO}	6	V
Collector Current	I_C	100	mA
Peak Collector Current	I_{CM}	200	mA
Power Dissipation at $T_{amb} = 25^\circ\text{C}$	P_{tot}	500 ¹⁾	mW
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_S	-55 to +150	$^\circ\text{C}$

¹⁾ Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

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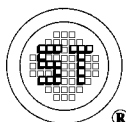
SEMTECH ELECTRONICS LTD.
(wholly owned subsidiary of HONEY TECHNOLOGY LTD.)



Characteristics at $T_{amb} = 25\text{ }^{\circ}\text{C}$

		Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $V_{CE} = 1\text{V}$, $I_C = 0.1\text{ mA}$	HN / 2N 3903	h_{FE}	20	-	-	-
	HN / 2N 3904	h_{FE}	40	-	-	-
at $V_{CE} = 1\text{V}$, $I_C = 1\text{ mA}$	HN / 2N 3903	h_{FE}	35	-	-	-
	HN / 2N 3904	h_{FE}	70	-	-	-
at $V_{CE} = 1\text{V}$, $I_C = 10\text{ mA}$	HN / 2N 3903	h_{FE}	50	-	150	-
	HN / 2N 3904	h_{FE}	100	-	300	-
at $V_{CE} = 1\text{V}$, $I_C = 50\text{ mA}$	HN / 2N 3903	h_{FE}	30	-	-	-
	HN / 2N 3904	h_{FE}	60	-	-	-
at $V_{CE} = 1\text{V}$, $I_C = 100\text{ mA}$	HN / 2N 3903	h_{FE}	15	-	-	-
	HN / 2N 3904	h_{FE}	30	-	-	-
Thermal Resistance Junction to Ambient		R_{thA}	-	-	250 ¹⁾	K/W
Collector Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$ at $I_C = 50\text{ mA}$, $I_B = 5\text{ mA}$		$V_{CE\text{ sat}}$	-	-	0.2	V
		$V_{CE\text{ sat}}$	-	-	0.3	V
Base Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$ at $I_C = 50\text{ mA}$, $I_B = 5\text{ mA}$		$V_{BE\text{ sat}}$	-	-	0.85	V
		$V_{BE\text{ sat}}$	-	-	0.95	V
Collector Cutoff Current $V_{EB} = 3\text{ V}$, $V_{CE} = 30\text{ V}$		I_{CEV}	-	-	50	nA
Emitter Cutoff Current $V_{EB} = 3\text{ V}$, $V_{CE} = 30\text{ V}$		I_{EBV}	-	-	50	nA
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$, $I_E = 0$		$V_{(BR)CBO}$	60	-	-	V
Collector Emitter Breakdown Voltage at $I_C = 1\text{ mA}$, $I_B = 0$		$V_{(BR)CEO}$	40	-	-	V
Emitter Base Breakdown Voltage at $I_E = 10\text{ }\mu\text{A}$, $I_C = 0$		$V_{(BR)EBO}$	6	-	-	V
Gain Bandwidth Product at $V_{CE} = 20\text{ V}$, $I_C = 10\text{ mA}$, $f = 100\text{ MHz}$	HN / 2N 3903	f_T	250	-	-	MHz
	HN / 2N 3904	f_T	300	-	-	MHz
Collector Base Capacitance at $V_{CB} = 5\text{ V}$, $f = 100\text{ kHz}$		C_{CBO}	-	-	4	pF
Emitter Base Capacitance at $V_{EB} = 0.5\text{ V}$, $f = 100\text{ kHz}$		C_{EBO}	-	-	8	pF

¹⁾ Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case.



Characteristics (continued)

	Symbol	Min.	Typ.	Max.	Unit
Rise Time (see Fig. 1) at $I_{B1} = 1 \text{ mA}$, $I_C = 10 \text{ mA}$	t_r	-	-	70	ns
Fall Time (see Fig. 2) at $-I_{B1} = I_{B2} = 1 \text{ mA}$, $I_C = 10 \text{ mA}$	t_f	-	-	200	ns

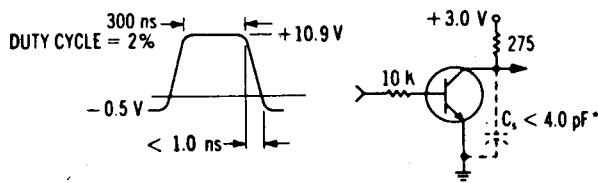


Fig. 1: Test circuit for delay and rise time

* total shunt capacitance of test jig and connectors

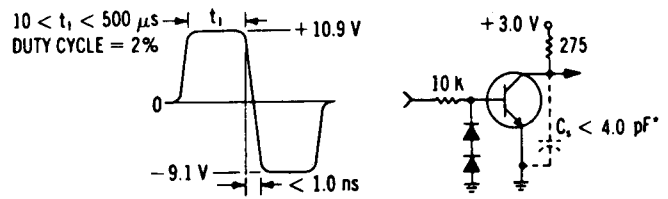


Fig. 2: Test circuit for storage and fall time

* total shunt capacitance of test jig and connectors

