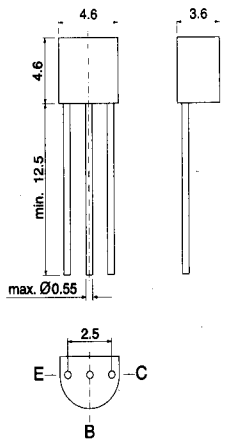
HN / 2N 3903/3904

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°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°C	P_{tot}	500[1)]	mW
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_S	-55 to +150	°C

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

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Characteristics at T_{amb} =25 °C

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

[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 mA, I_C = 10mA	t_r	-	-	70	ns
Fall Time (see Fig. 2) at $-I_{B1} = I_{B2}$ = 1 mA, I_C = 10mA	t_f	-	-	200	ns

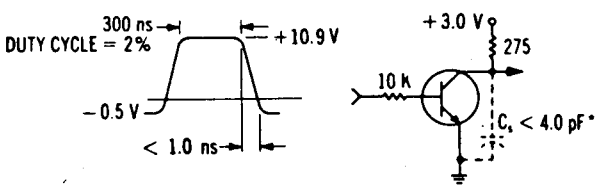

Fig. 1: Test circuit for delay and rise time
* total shunt capacitance of test jig and connectors

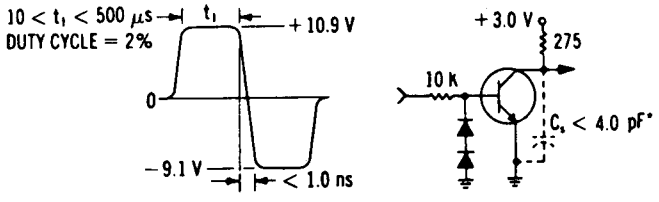

Fig. 2: Test circuit for storage and fall time
* total shunt capacitance of test jig and connectors