2N3903 / 2N3904

NPN Silicon Epitaxial Planar Transistor

for switching and amplifier applications.

As complementary types the PNP transistors 2N3905 and 2N3906 are recommended.

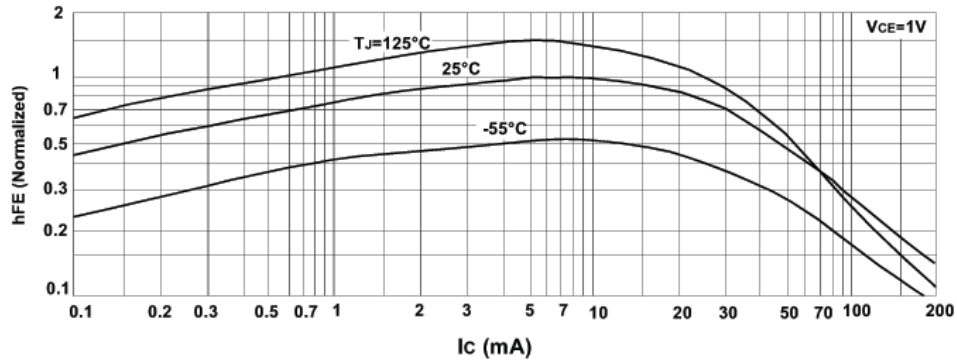
On special request, these transistors can be manufactured in different pin configurations.

1. Emitter 2. Base 3. Collector
TO-92 Plastic Package

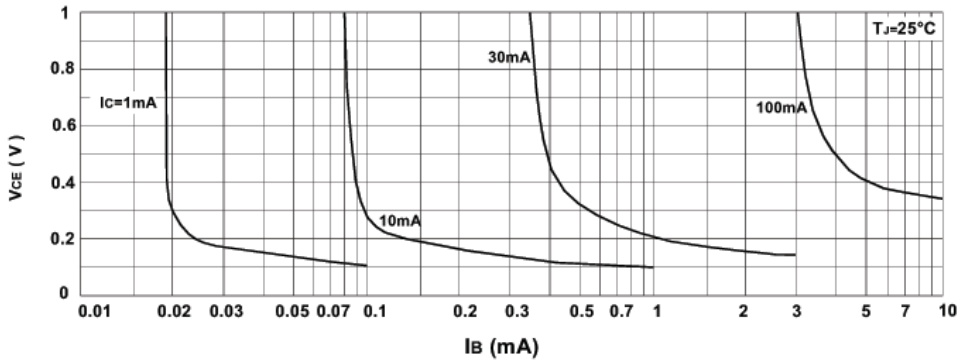
Absolute Maximum Ratings (T_a = 25 °C)

Parameter	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	200	mA
Power Dissipation	P_{tot}	625	mW
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_{stg}	- 55 to + 150	°C

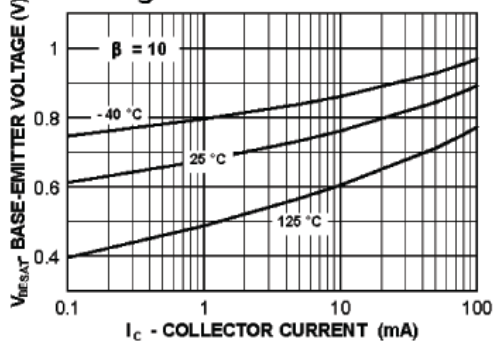
DC Current Gain



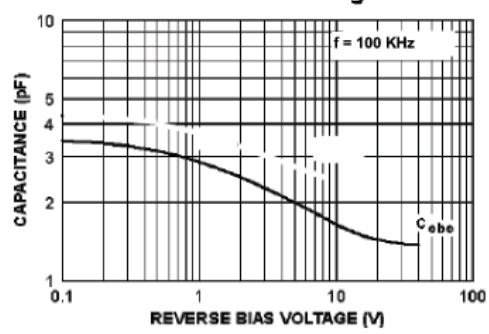
Collector Saturation Region



Base-Emitter Saturation Voltage vs Collector Current



Capacitance vs Reverse Bias Voltage



Characteristics at T_a = 25 °C

Parameter		Symbol	Min.	Max.	Unit
DC Current Gain					
at V_{CE} = 1 V, I_C = 0.1 mA	2N3903	h_{FE}	20	-	-
	2N3904	h_{FE}	40	-	-
at V_{CE} = 1 V, I_C = 1 mA	2N3903	h_{FE}	35	-	-
	2N3904	h_{FE}	70	-	-
at V_{CE} = 1 V, I_C = 10 mA	2N3903	h_{FE}	50	150	-
	2N3904	h_{FE}	100	300	-
at V_{CE} = 1 V, I_C = 50 mA	2N3903	h_{FE}	30	-	-
	2N3904	h_{FE}	60	-	-
at V_{CE} = 1 V, I_C = 100 mA	2N3903	h_{FE}	15	-	-
	2N3904	h_{FE}	30	-	-
Collector Base Cutoff Current at V_{CB} = 30 V		I_{CBO}	-	50	nA
Emitter Base Cutoff Current at V_{EB} = 6 V		I_{EBO}	-	50	nA
Collector Base Breakdown Voltage at I_C = 10 µA		$V_{(BR)CBO}$	60	-	V
Collector Emitter Breakdown Voltage at I_C = 1 mA		$V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at I_E = 10 µA		$V_{(BR)EBO}$	6	-	V
Collector Emitter 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	
Base Emitter 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	
Gain Bandwidth Product					
at V_{CE} = 20 V, I_C = 10 mA, f = 100 MHz	2N3903	f_T	250	-	MHz
	2N3904		300	-	
Collector Base Capacitance at V_{CB} = 5 V, f = 100 KHz		C_{ob}	-	4	pF
Delay Time at V_{CC} = 3 V, V_{BE} = 0.5 V, I_C = 10 mA, I_{B1} = 1 mA		t_d	-	35	ns
Rise Time at V_{CC} = 3 V, V_{BE} = 0.5 V, I_C = 10 mA, I_{B1} = 1 mA		t_r	-	35	ns
Storage Time at V_{CC} = 3 V, I_C = 10 mA, I_{B1} = -I_{B2} = 1 mA		t_s	-	200	ns
Fall Time at V_{CC} = 3 V, I_C = 10 mA, I_{B1} = -I_{B2} = 1 mA		t_f	-	50	ns