

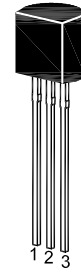
2N3903 / 2N3904

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

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	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 55 to + 150	$^\circ\text{C}$

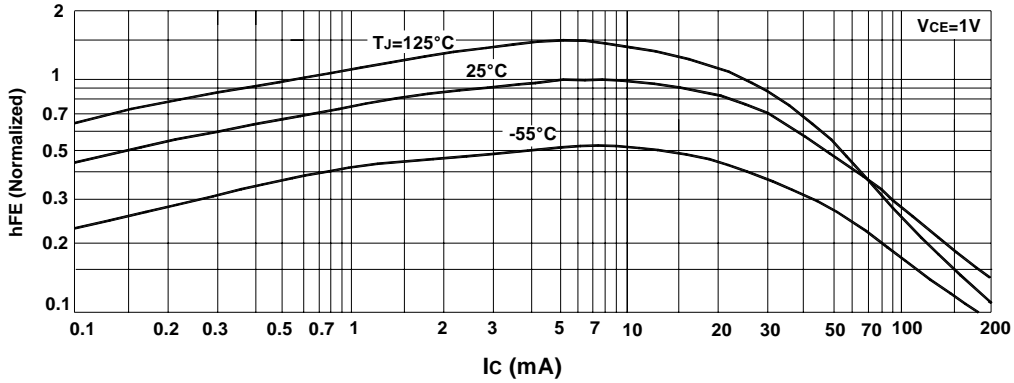
2N3903 / 2N3904

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

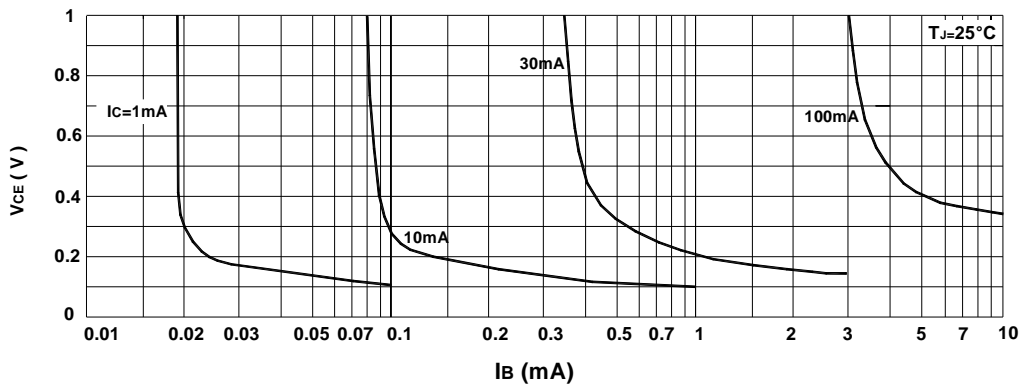
Parameter	Symbol	Min.	Max.	Unit	
DC Current Gain at $V_{CE} = 1\text{ V}$, $I_C = 0.1\text{ mA}$	2N3903	h_{FE}	20	-	-
	2N3904	h_{FE}	40	-	-
at $V_{CE} = 1\text{ V}$, $I_C = 1\text{ mA}$	2N3903	h_{FE}	35	-	-
	2N3904	h_{FE}	70	-	-
at $V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$	2N3903	h_{FE}	50	150	-
	2N3904	h_{FE}	100	300	-
at $V_{CE} = 1\text{ V}$, $I_C = 50\text{ mA}$	2N3903	h_{FE}	30	-	-
	2N3904	h_{FE}	60	-	-
at $V_{CE} = 1\text{ V}$, $I_C = 100\text{ mA}$	2N3903	h_{FE}	15	-	-
	2N3904	h_{FE}	30	-	-
Collector Base Cutoff Current at $V_{CB} = 30\text{ V}$	I_{CBO}	-	50	nA	
Emitter Base Cutoff Current at $V_{EB} = 6\text{ V}$	I_{EBO}	-	50	nA	
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	60	-	V	
Collector Emitter Breakdown Voltage at $I_C = 1\text{ mA}$	$V_{(BR)CEO}$	40	-	V	
Emitter Base Breakdown Voltage at $I_E = 10\text{ }\mu\text{A}$	$V_{(BR)EBO}$	6	-	V	
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$ at $I_C = 50\text{ mA}$, $I_B = 5\text{ mA}$	$V_{CE(sat)}$	-	0.2	V	
	$V_{CE(sat)}$	-	0.3	V	
Base Emitter Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$ at $I_C = 50\text{ mA}$, $I_B = 5\text{ mA}$	$V_{BE(sat)}$	-	0.85	V	
	$V_{BE(sat)}$	-	0.95	V	
Gain Bandwidth Product at $V_{CE} = 20\text{ V}$, $I_C = 10\text{ mA}$, $f = 100\text{ MHz}$	2N3903	f_T	250	-	MHz
	2N3904	f_T	300	-	MHz
Collector Base Capacitance at $V_{CB} = 5\text{ V}$, $f = 100\text{ KHz}$	C_{ob}	-	4	pF	
Delay Time at $V_{CC} = 3\text{ V}$, $V_{BE} = 0.5\text{ V}$, $I_C = 10\text{ mA}$, $I_{B1} = 1\text{ mA}$	t_d	-	35	ns	
Rise Time at $V_{CC} = 3\text{ V}$, $V_{BE} = 0.5\text{ V}$, $I_C = 10\text{ mA}$, $I_{B1} = 1\text{ mA}$	t_r	-	35	ns	
Storage Time at $V_{CC} = 3\text{ V}$, $I_C = 10\text{ mA}$, $I_{B1} = -I_{B2} = 1\text{ mA}$	t_s	-	200	ns	
Fall Time at $V_{CC} = 3\text{ V}$, $I_C = 10\text{ mA}$, $I_{B1} = -I_{B2} = 1\text{ mA}$	t_f	-	50	ns	

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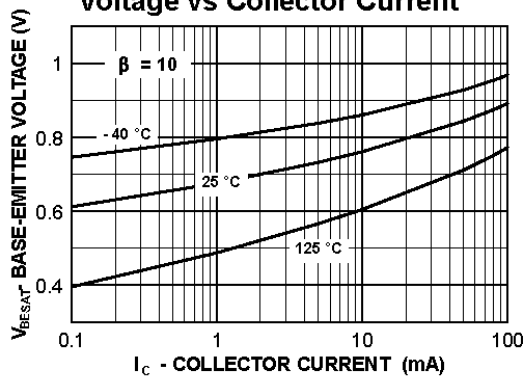
DC Current Gain



Collector Saturation Region



Base-Emitter Saturation Voltage vs Collector Current



Capacitance vs Reverse Bias Voltage

