

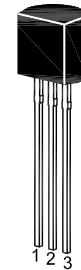


### NPN Silicon Epitaxial Planar Transistor

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	$^\circ\text{C}$

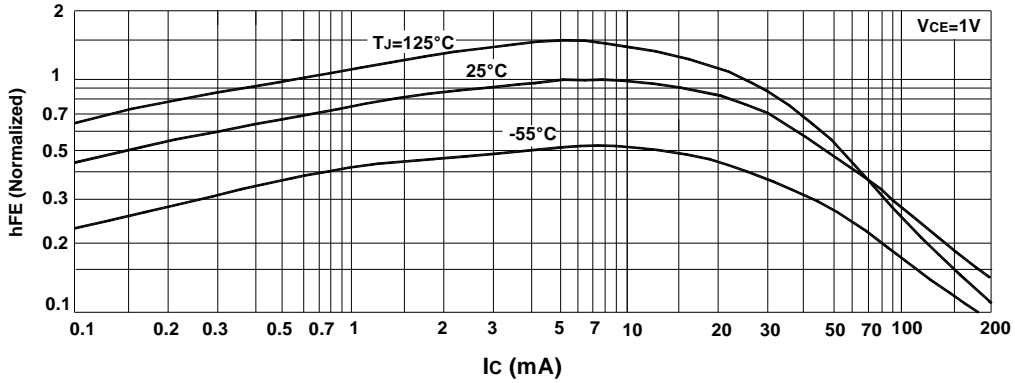


### Characteristics at $T_a = 25\text{ }^\circ\text{C}$

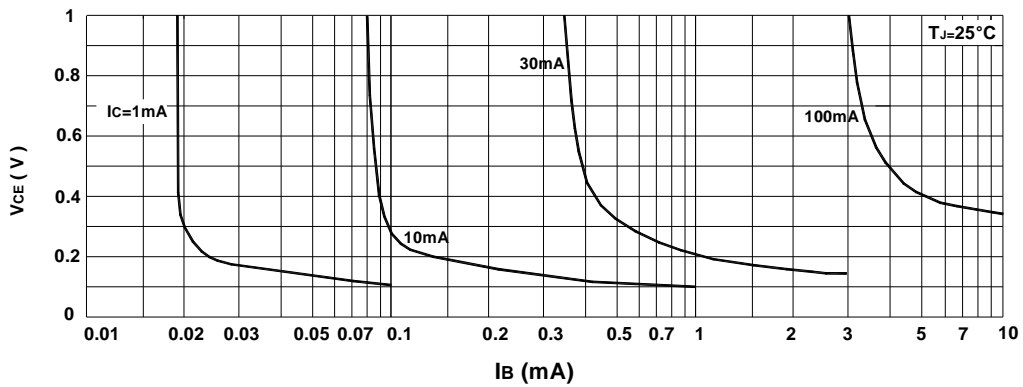
Parameter	Symbol	Min.	Max.	Unit	
DC Current Gain at $V_{CE} = 1\text{ V}$ , $I_C = 0.1\text{ mA}$ at $V_{CE} = 1\text{ V}$ , $I_C = 1\text{ mA}$ at $V_{CE} = 1\text{ V}$ , $I_C = 10\text{ mA}$ at $V_{CE} = 1\text{ V}$ , $I_C = 50\text{ mA}$ at $V_{CE} = 1\text{ V}$ , $I_C = 100\text{ mA}$	2N3903	$h_{FE}$	20	-	-
	2N3904	$h_{FE}$	40	-	-
	2N3903	$h_{FE}$	35	-	-
	2N3904	$h_{FE}$	70	-	-
	2N3903	$h_{FE}$	50	150	-
	2N3904	$h_{FE}$	100	300	-
	2N3903	$h_{FE}$	30	-	-
	2N3904	$h_{FE}$	60	-	-
Collector Base Cutoff Current at $V_{CB} = 30\text{ V}$	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	



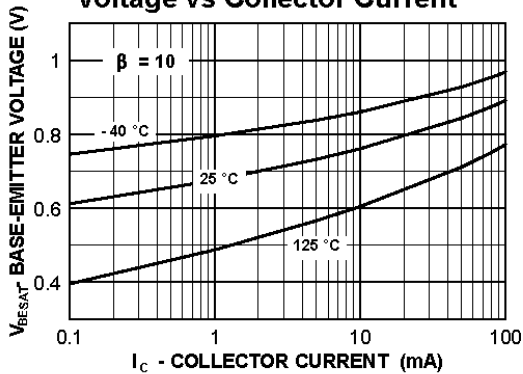
### DC Current Gain



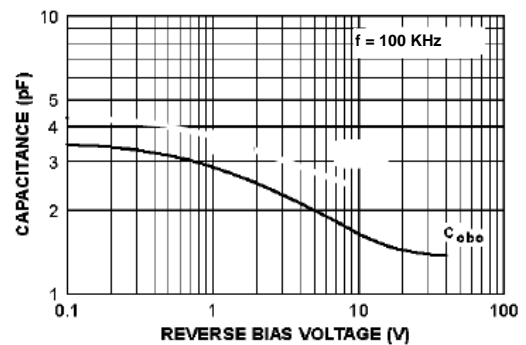
### Collector Saturation Region



### Base-Emitter Saturation Voltage vs Collector Current



### Capacitance vs Reverse Bias Voltage





### TO-92 Package

Package Outline Dimensions (Units: mm)

