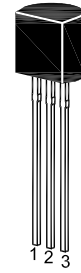


2N3903 / 2N3904

NPN Silicon Epitaxial Planar Transistor

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

Applications

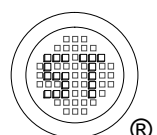
- For switching and amplifier

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

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
Total Power Dissipation	P_{tot}	625	mW
Operating Junction and Storage Temperature Range	$T_{\text{j}}, T_{\text{stg}}$	- 65 to + 150	$^\circ\text{C}$

Thermal Characteristics

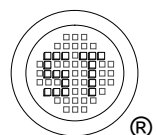
Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient	$R_{\theta\text{JA}}$	200	$^\circ\text{C/W}$



2N3903 / 2N3904

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

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 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 0.95	V
Gain Bandwidth Product at $V_{CE} = 20\text{ V}$, $I_C = 10\text{ mA}$, $f = 100\text{ MHz}$	2N3903 2N3904 f_T	250 300	- -	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



2N3903 / 2N3904

Electrical Characteristics Curves

Fig. 1 Power Derating Curve

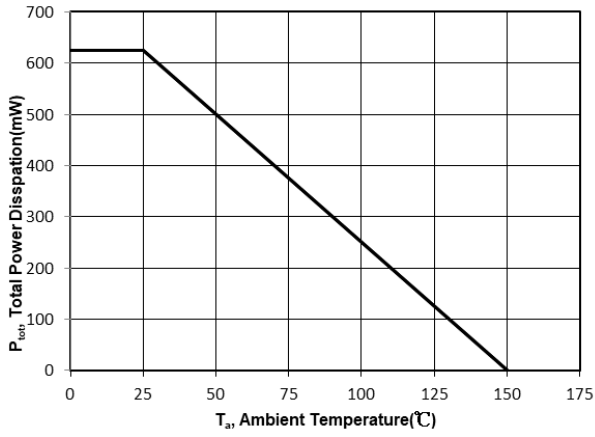


Fig. 2 Output Characteristics Curve

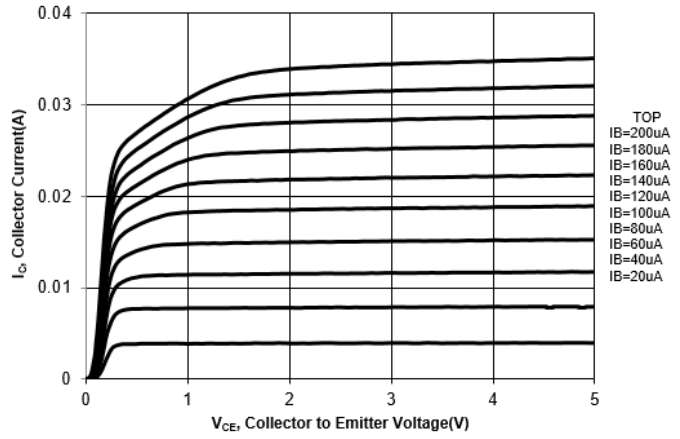


Fig. 3 Collector Current vs. V_{BE}

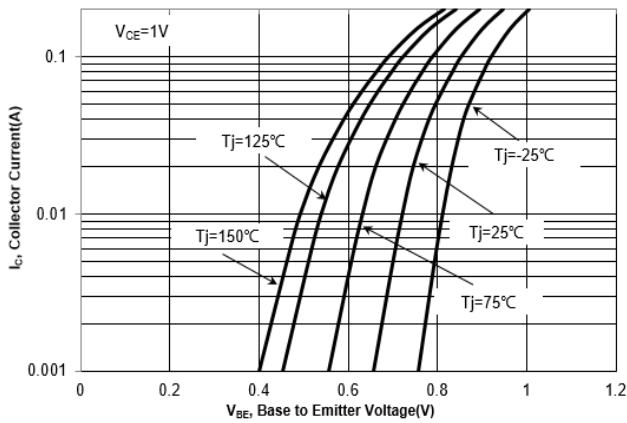
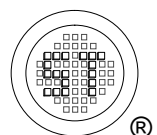
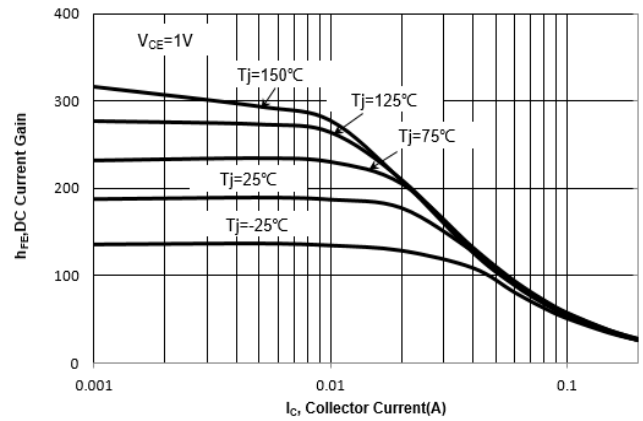


Fig. 4 h_{FE} vs. Collector Current



Electrical Characteristics Curves

Fig. 5 $V_{BE(sat)}$ vs. Collector Current

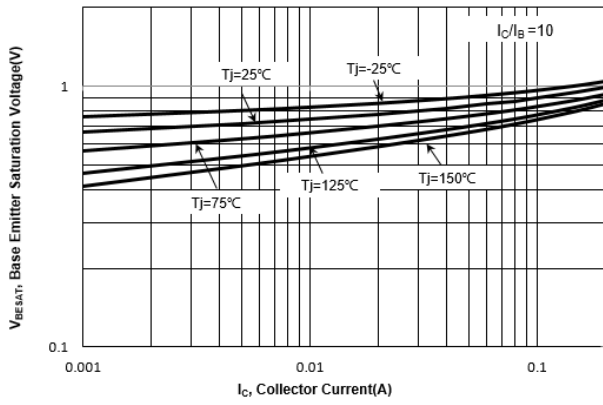


Fig. 6 $V_{CE(sat)}$ vs. Collector Current

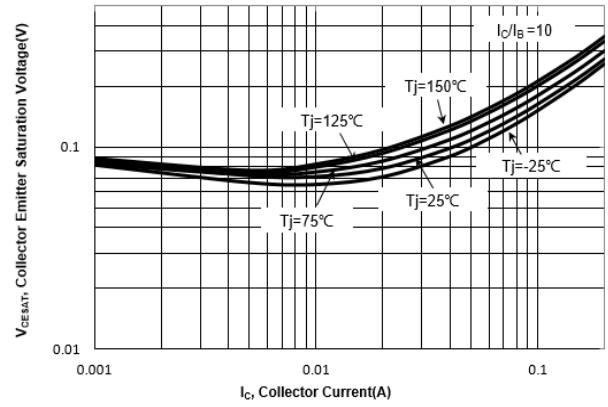
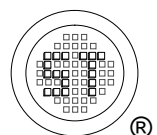
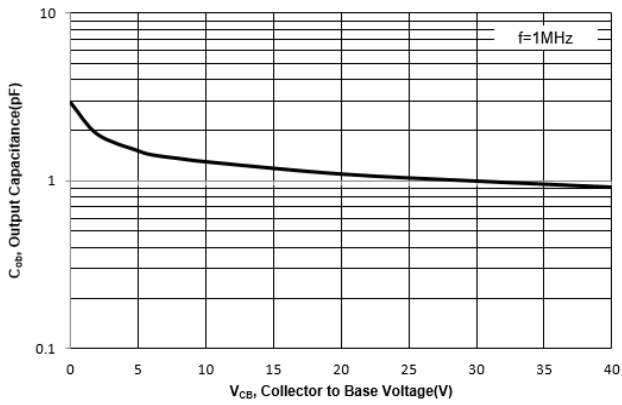
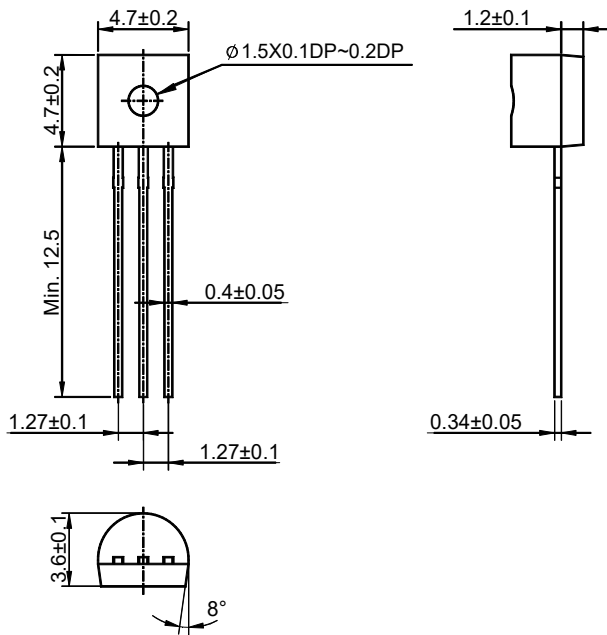


Fig 7. Output Capacitance

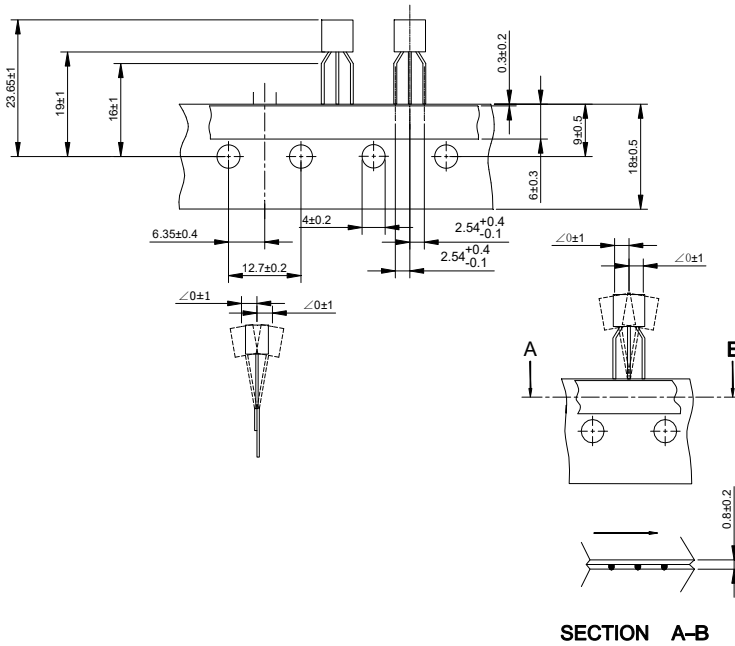


2N3903 / 2N3904

TO-92 Package Outline (Dimensions in millimeters)



TO-92 Ammo-Pack Outline (Dimensions in millimeters)



Packing information

Package	Bulk Packing			Ammo-Packing	
	Per Bag Qty	Per Box Qty	Per Carton Qty	Per Box Qty	Per Carton Qty
TO-92	1,000	5,000	50,000	4,000	20,000

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