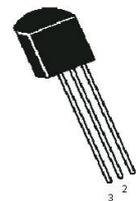


# NPN Transistor TO-92

multicomp **PRO**



#### Pin Configuration:

1. Collector
2. Base
3. Emitter

#### Features:

- NPN silicon planar switching transistors
- Fast switching devices exhibiting short turn-off and low saturation voltage characteristics
- General purpose switching and amplifier applications

#### Absolute Maximum Ratings

Description	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	40	V
Collector-Base Voltage	$V_{CBO}$	60	
Emitter-Base Voltage	$V_{EBO}$	6	
Collector Current Continuous	$I_C$	200	mA
Power Dissipation at $T_a = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625	mW
		5	mW/ $^\circ\text{C}$
Power Dissipation at $T_c = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$		1.5	W
		12	mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_j, T_{stg}$	-55 to +150	$^\circ\text{C}$

#### Thermal Resistance

Junction to Case	$R_{th(j-c)}$	83.3	$^\circ\text{C/W}$
Junction to Ambient	$R_{th(j-a)}$	200	

Newark.com/multicomp-pro  
Farnell.com/multicomp-pro  
Element14.com/multicomp-pro

multicomp **PRO**

# NPN Transistor TO-92

**multicomp** PRO

## Electrical Characteristics ( $T_a = 25^\circ\text{C}$ unless otherwise specified)

Description	Symbol	Test Condition	2N3904	Unit
Collector-Emitter Voltage	$*V_{CEO}$	$I_C = 10\text{mA}, I_B = 0$	>40	V
Collector-Base Voltage	$V_{CBO}$	$I_C = 10\mu\text{A}, I_E = 0$	>60	
Emitter-Base Voltage	$V_{EBO}$	$I_E = 10\mu\text{A}, I_C = 0$	>6	
Collector-Cut off Current	$I_{CEX}$	$V_{CE} = 30\text{V}, V_{EB} = 3\text{V}$	<50	nA
Base Current	$I_{BL}$			
DC Current Gain	$*h_{FE}$	$I_C = 0.1\text{mA}, V_{CE} = 1\text{V}$ $I_C = 1\text{mA}, V_{CE} = 1\text{V}$ $I_C = 10\text{mA}, V_{CE} = 1\text{V}$ $I_C = 50\text{mA}, V_{CE} = 1\text{V}$ $I_C = 100\text{mA}, V_{CE} = 1\text{V}$	>40 >70 100 - 300 >60 >30	-
Collector Emitter Saturation Voltage	$*V_{CE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	<0.2 <0.3	V
Base Emitter Saturation Voltage	$*V_{BE(sat)}$	$I_C = 50\text{mA}, I_B = 5\text{mA}$	0.65 - 0.85 <0.95	

### Small Signal Characteristic

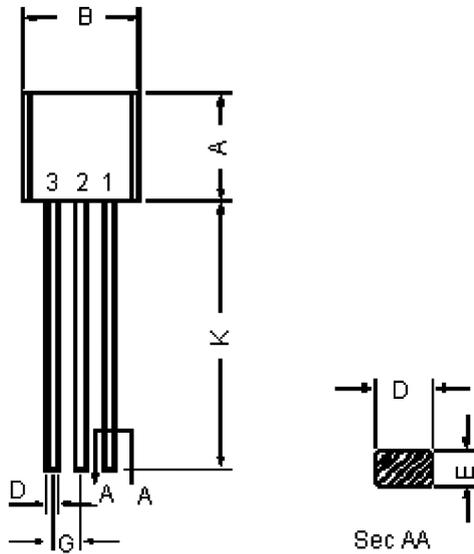
Transistors Frequency	$f_T$	$I_C = 10\text{mA}, V_{CE} = 20\text{V}, f = 100\text{MHz}$	>300	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$	<4	pF
Input Capacitance	$C_{ib}$	$V_{BE} = 0.5\text{V}, I_C = 0, f = 1\text{MHz}$ All $f = \text{kHz}$	<8	
Small Signal Current Gain	$h_{fe}$	$I_C = 1\text{mA}, V_{CE} = 10\text{V}$	100 - 400	-
Input Impedance	$h_{ie}$		1 - 10	k $\Omega$
Output Admittance	$h_{oe}$		1 - 40	$\mu\Omega$
Voltage Feedback Ratio	$h_{re}$		0.5 - 0.8	$\times 10^{-4}$
Noise Figure	NF	$I_C = 100\mu\text{A}, V_{CE} = 5\text{V}$	<5	dB

### Switching Time

Delay Time	$t_d$	$V_{CC} = 3\text{V}, V_{BE} = 0.5\text{V}$	<35	ns
Rise Time	$t_r$	$I_C = 10\text{mA}, I_{B1} = 1\text{mA}$		
Storage Time	$t_s$	$V_{CC} = 3\text{V}, I_C = 10\text{mA}$ $I_{B1} = I_{B2} = 1\text{mA}$	<200	
Fall Time	$t_f$	-	<50	

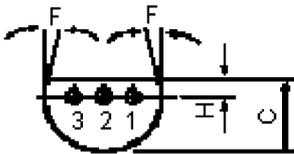
\*Pulse Condition: = 300 $\mu\text{s}$ , Duty Cycle = 2%

# NPN Transistor TO-92



Dimensions	Min.	Max.
A	4.32	5.33
B	4.45	5.2
C	3.18	4.19
D	0.41	0.55
E	0.35	0.5
F	5°	
G	1.14	1.4
H		1.53
K	12.7	-

Dimensions : Millimetres



**Pin Configuration:**

- 1. Collector
- 2. Base
- 3. Emitter

**Part Number Table**

Description	Part Number
Transistor, NPN, TO-92	2N3904

**Important Notice :** This data sheet and its contents (the "Information") belong to the members of the AVNET group of companies (the "Group") or are licensed to it. No licence is granted for the use of it other than for information purposes in connection with the products to which it relates. No licence of any intellectual property rights is granted. The Information is subject to change without notice and replaces all data sheets previously supplied. The Information supplied is believed to be accurate but the Group assumes no responsibility for its accuracy or completeness, any error in or omission from it or for any use made of it. Users of this data sheet should check for themselves the Information and the suitability of the products for their purpose and not make any assumptions based on information included or omitted. Liability for loss or damage resulting from any reliance on the Information or use of it (including liability resulting from negligence or where the Group was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict the Group's liability for death or personal injury resulting from its negligence. Multicomp Pro is the registered trademark of Premier Farnell Limited 2019.