

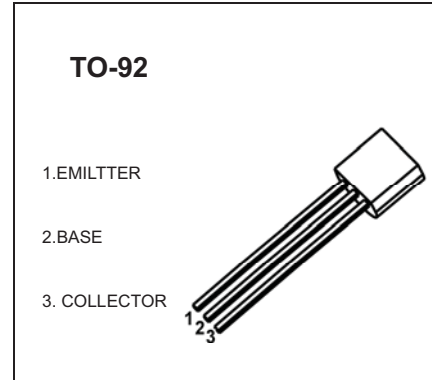


**TO-92 Plastic-Encapsulate Transistors**

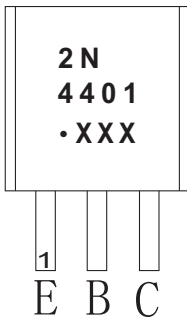
**2N4401** TRANSISTOR (NPN)

**FEATURES**

Power dissipation

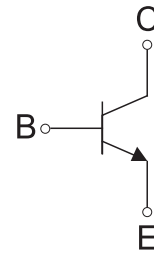


**MARKING**



2N4401=Device code  
 Solid dot=Green molding compound device,  
 if none,the normal device  
 XXX=Code

**Equivalent Circuit**



**ORDERING INFORMATION**

Part Number	Package	Packing Method	Pack Quantity
2N4401	TO-92	Bulk	1000pcs/Bag
2N4401-TA	TO-92	Tape	2000pcs/Box

**MAXIMUM RATINGS (T<sub>a</sub>=25°C unless otherwise noted)**

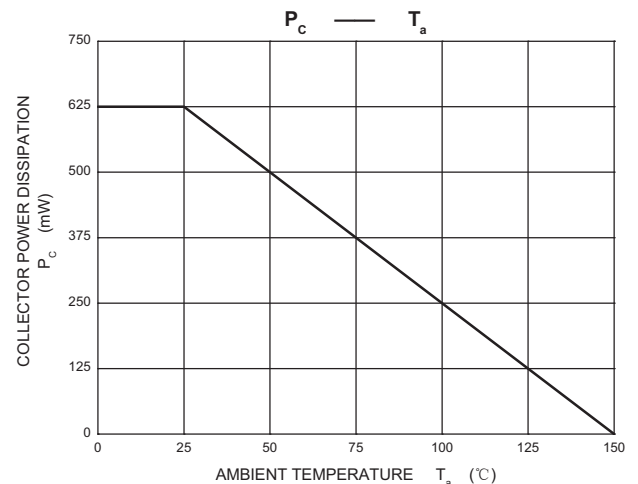
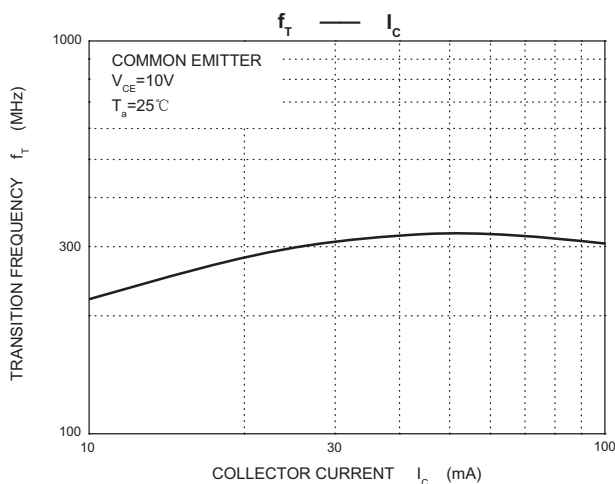
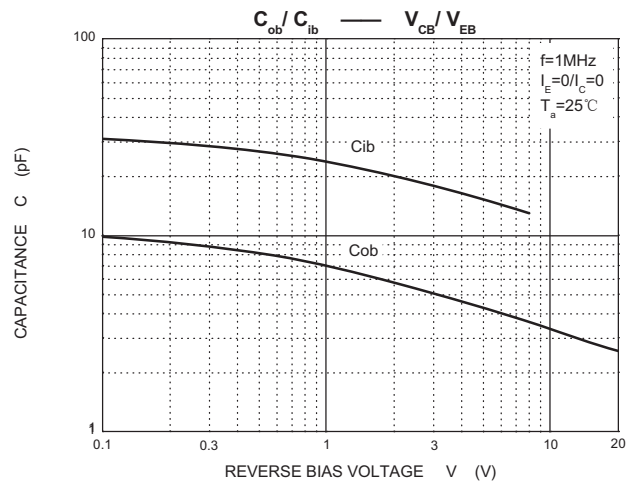
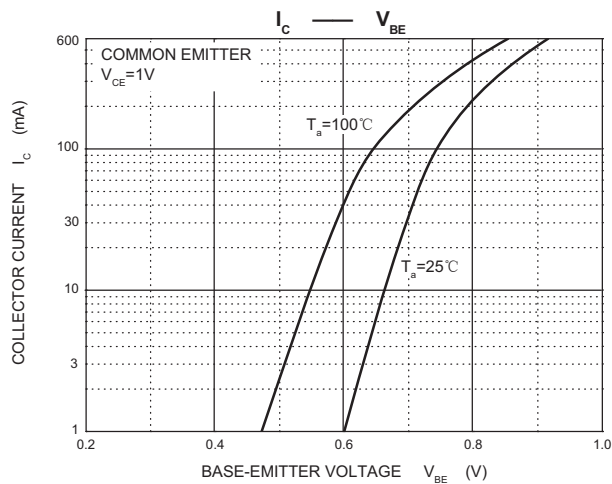
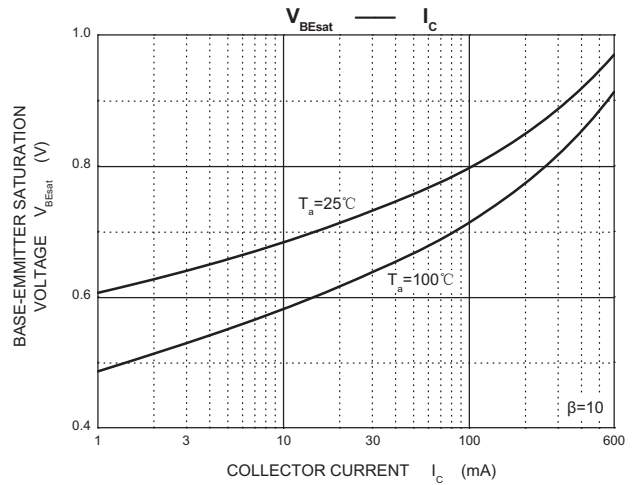
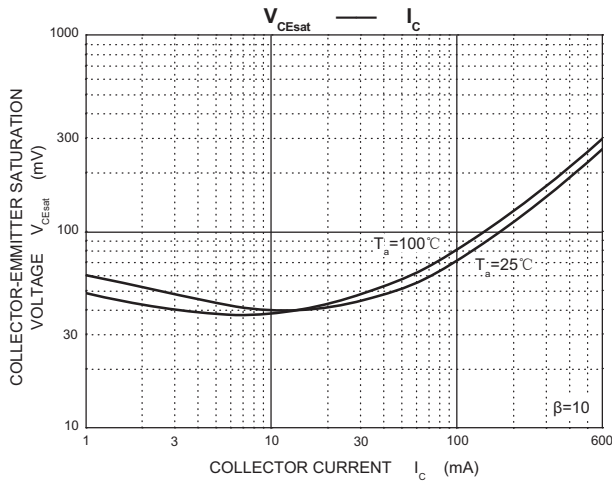
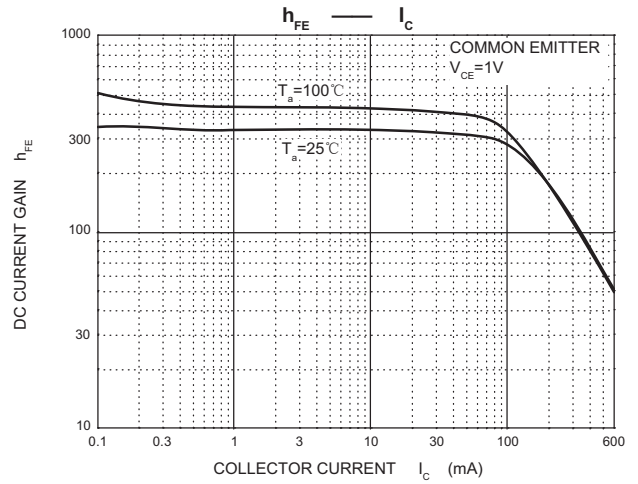
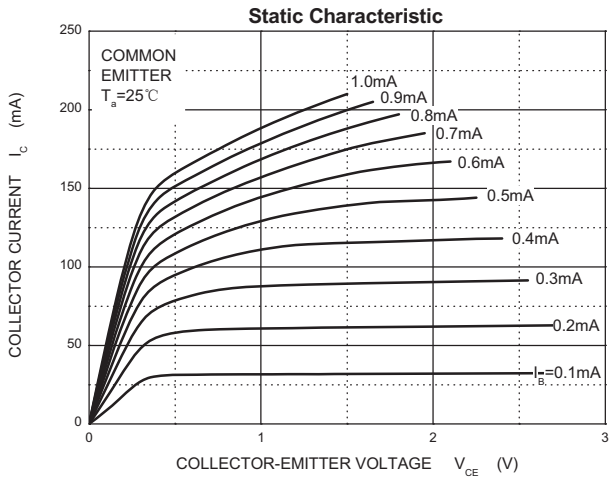
Symbol	Parameter	Value	Unit
V <sub>CB0</sub>	Collector-Base Voltage	60	V
V <sub>CE0</sub>	Collector-Emitter Voltage	40	V
V <sub>EB0</sub>	Emitter-Base Voltage	6	V
I <sub>C</sub>	Collector Current -Continuous	600	mA
P <sub>C</sub>	Collector Power dissipation	0.625	W
T <sub>J</sub> , T <sub>stg</sub>	Operation Junction and Storage Temperature Range	-55 ~ +150	°C
R <sub>θJA</sub>	Thermal Resistance, junction to Ambient	357	°C/mW

## ELECTRICAL CHARACTERISTICS

$T_a=25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Test conditions	Min	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=100\mu\text{A}$ , $I_E=0$	60		V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1\text{mA}$ , $I_B=0$	40		V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=100\mu\text{A}$ , $I_C=0$	6		V
Collector cut-off current	$I_{CBO}$	$V_{CB}=35\text{V}$ , $I_E=0$		0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB}=5\text{V}$ , $I_C=0$		0.1	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE}=1\text{V}$ , $I_C=0.1\text{mA}$	20		
	$h_{FE(2)}$	$V_{CE}=1\text{V}$ , $I_C=1\text{mA}$	40		
	$h_{FE(3)}$	$V_{CE}=1\text{V}$ , $I_C=10\text{mA}$	80		
	$h_{FE(4)}$	$V_{CE}=1\text{V}$ , $I_C=150\text{mA}$	100	300	
	$h_{FE(5)}$	$V_{CE}=2\text{V}$ , $I_C=500\text{mA}$	40		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	$I_C=150\text{mA}$ , $I_B=15\text{mA}$		0.4	V
	$V_{CE(sat)2}$	$I_C=500\text{mA}$ , $I_B=50\text{mA}$		0.75	V
Base-emitter saturation voltage	$V_{BE(sat)1}$	$I_C=150\text{mA}$ , $I_B=15\text{mA}$		0.95	V
	$V_{BE(sat)2}$	$I_C=500\text{mA}$ , $I_B=50\text{mA}$		1.2	V
Transition frequency	$f_T$	$V_{CE}=10\text{V}$ , $I_C=20\text{mA}$ , $f=100\text{MHz}$	250		MHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}$ , $I_E=0$ , $f=100\text{KHz}$		6.5	pF
Delay time	$t_d$	$V_{CC}=30\text{V}$ , $V_{BE(OFF)}=2\text{V}$		15	ns
Rise time	$t_r$		$I_C=150\text{mA}$ , $I_{B1}=15\text{mA}$		20
Storage time	$t_s$	$V_{CC}=30\text{V}$ , $I_C=150\text{mA}$		225	ns
Fall time	$t_f$		$I_{B1}=-I_{B2}=15\text{mA}$		30

# Typical Characteristics



## TO-92 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

## TO-92 Suggested Pad Layout



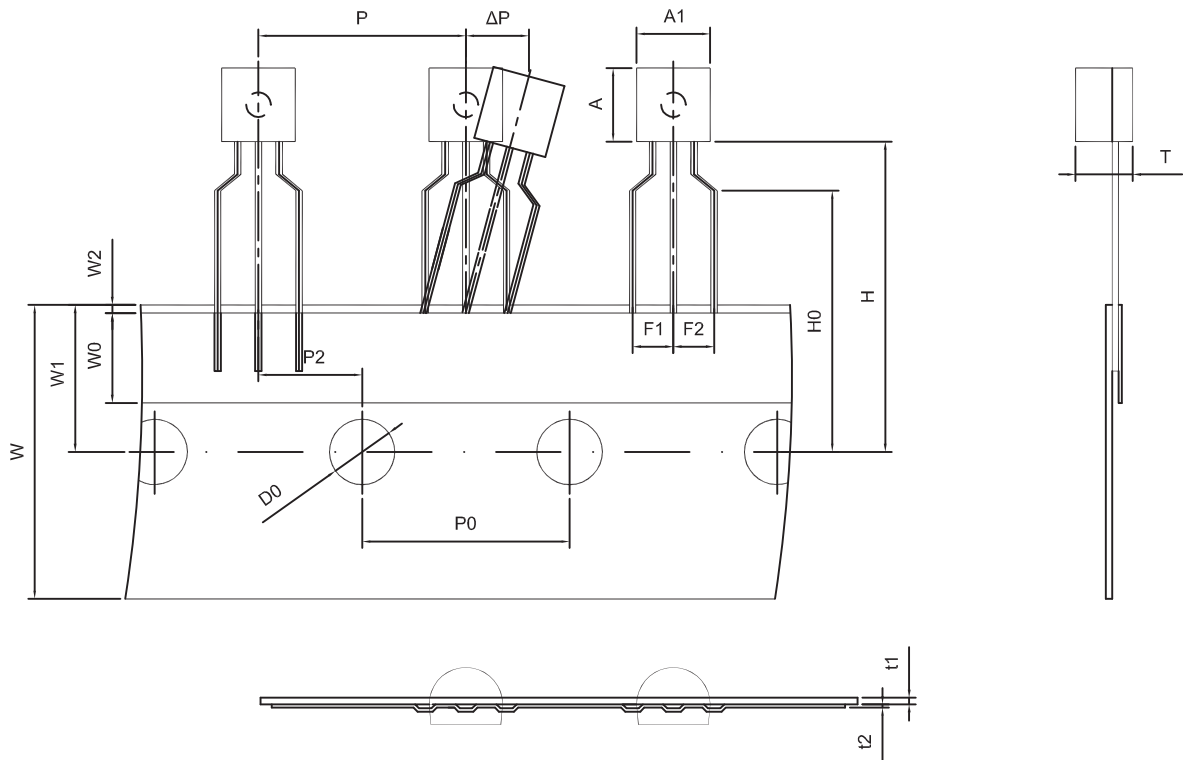
### Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

### NOTICE

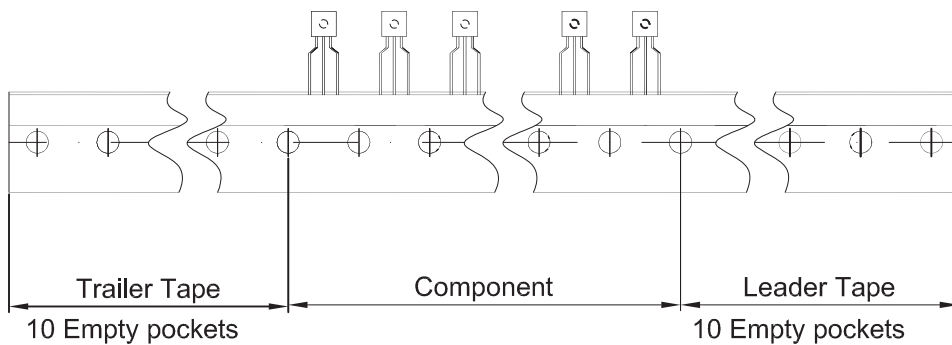
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# TO-92 Tape and Reel



Dimensions are in millimeter

A1	A	T	P	P0	P2	F1	F2	W
4.5	4.5	3.5	12.7	12.7	6.35	2.5	2.5	18.0
W0	W1	W2	H	H0	D0	t1	t2	$\Delta P$
6.0	9.0	1.0 MAX.	19.0	16.0	4.0	0.4	0.2	0



Package	Box	Box Size(mm)	Carton	Carton Size(mm)
TO-92	2000 pcs	333×162×43	20,000 pcs	350×340×250

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