

TO-92 Plastic-Encapsulate Transistors

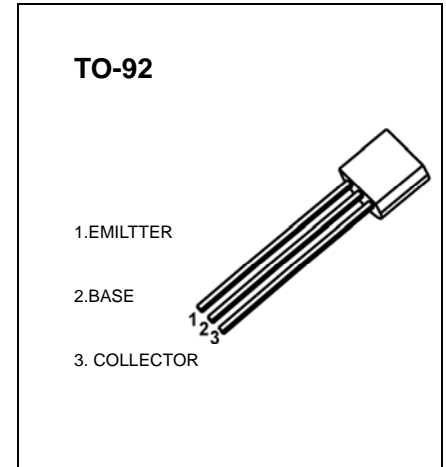
2N4401 TRANSISTOR (NPN)

FEATURES

Power dissipation

MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

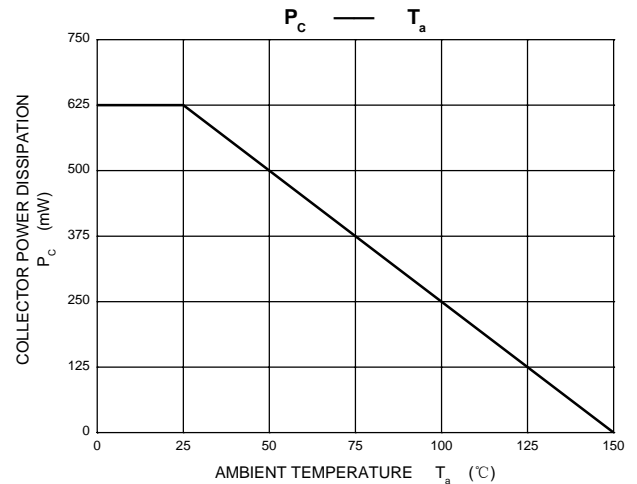
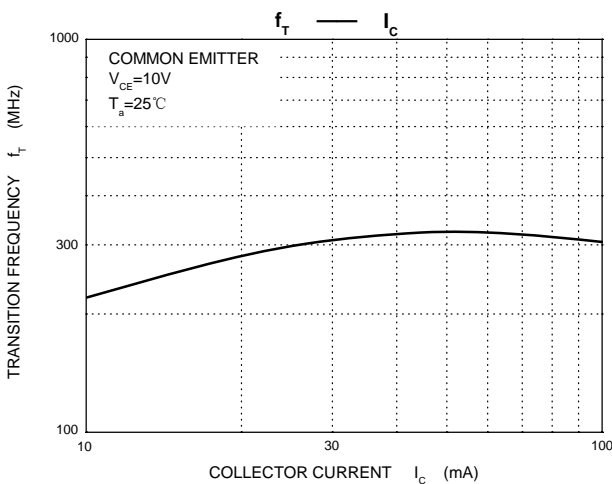
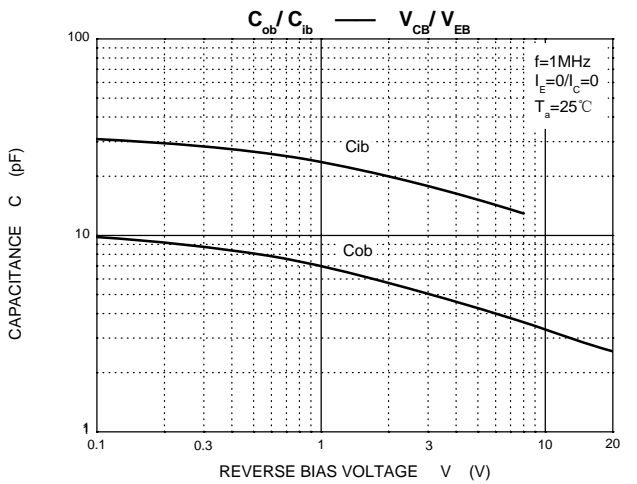
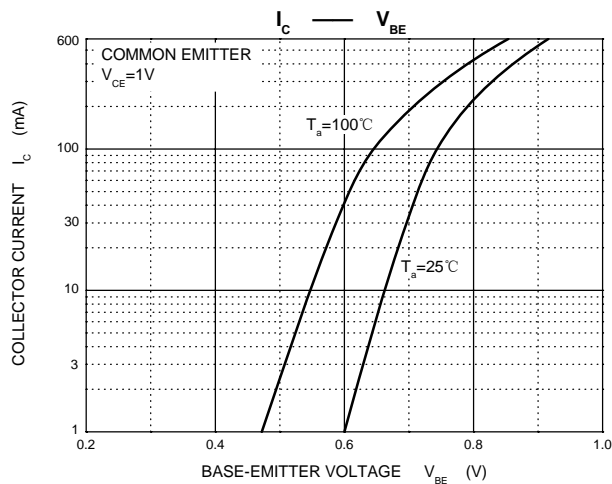
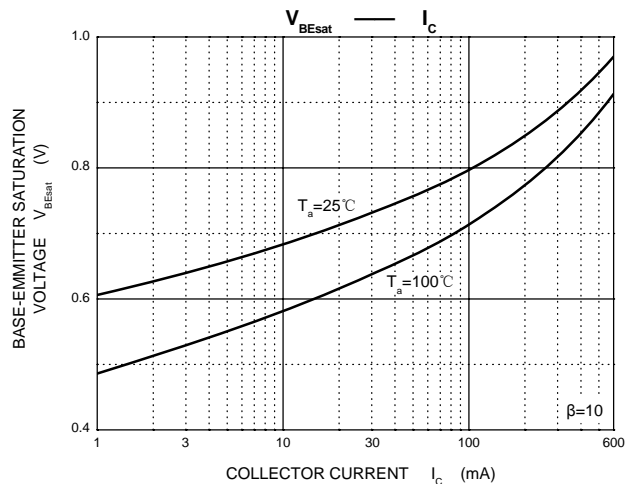
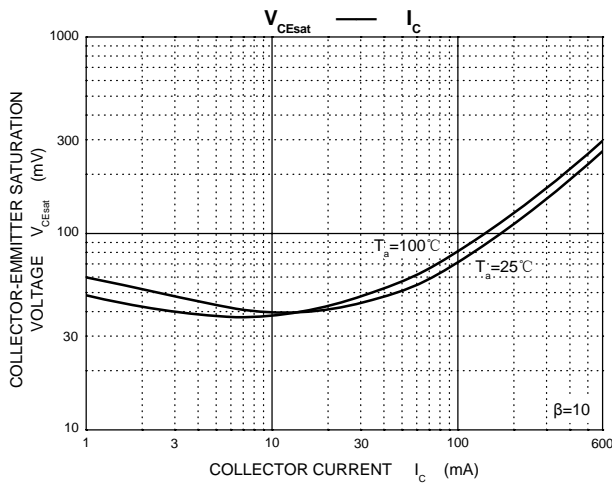
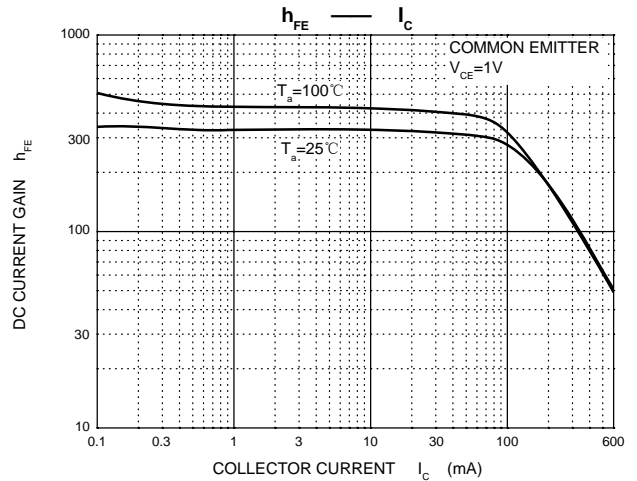
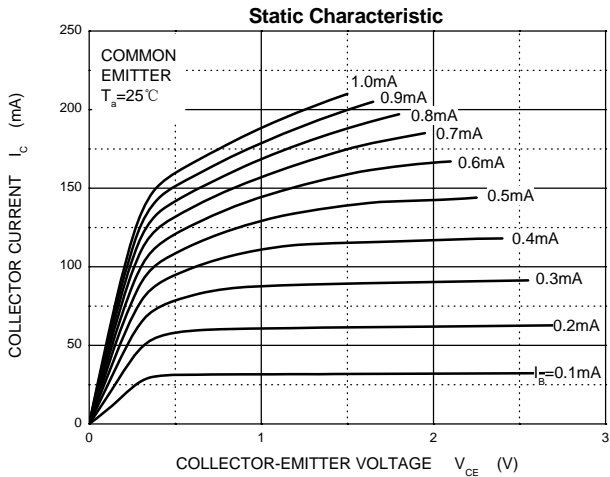
Symbol	Parameter	Value	Unit
V_{CB0}	Collector-Base Voltage	60	V
V_{CEO}	Collector-Emitter Voltage	40	V
V_{EBO}	Emitter-Base Voltage	6	V
I_C	Collector Current -Continuous	600	mA
P_C	Collector Power dissipation	0.625	W
T_J	Junction Temperature	150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-55~+150	$^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance, junction to Ambient	357	$^{\circ}\text{C}/\text{mW}$



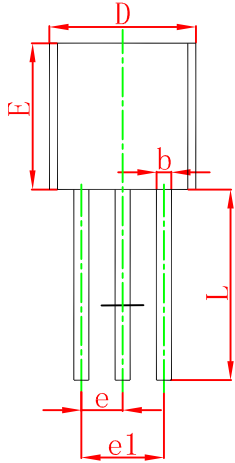
ELECTRICAL CHARACTERISTICS ($T_a=25^{\circ}\text{C}$ unless otherwise specified)

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	μA
Emitter cut-off current	I_{EBO}	$V_{EB}=5\text{V}$, $I_C=0$		0.1	μA
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	$V_{CC}=30\text{V}$, $V_{BE(OFF)}=2\text{V}$ $I_C=150\text{mA}$, $I_{B1}=15\text{mA}$		15	nS
Rise time	t_r			20	nS
Storage time	t_s	$V_{CC}=30\text{V}$, $I_C=150\text{mA}$ $I_{B1}=-I_{B2}=15\text{mA}$		225	nS
Fall time	t_f			30	nS

Typical Characteristics

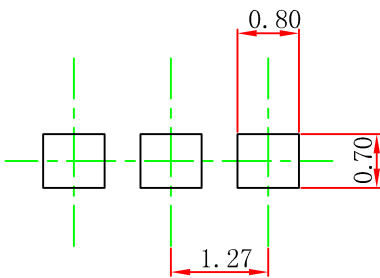


TO-92 Package Outline Dimensions



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



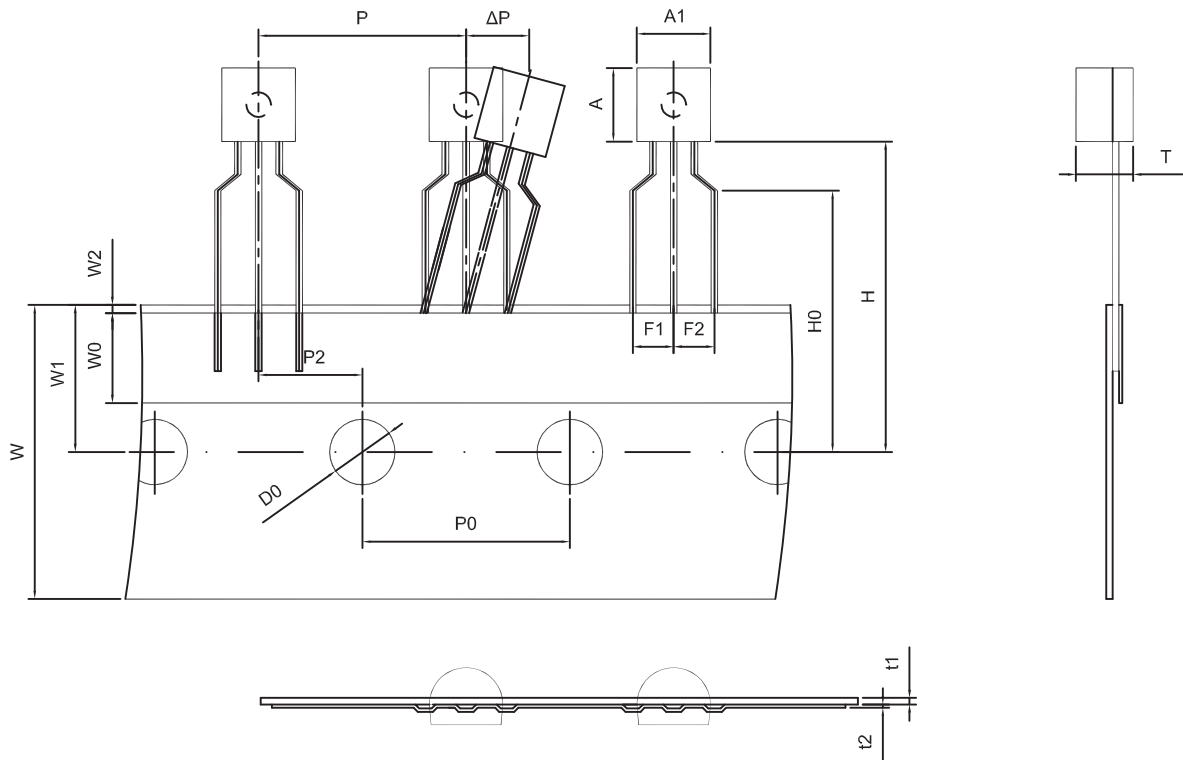
Note:

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

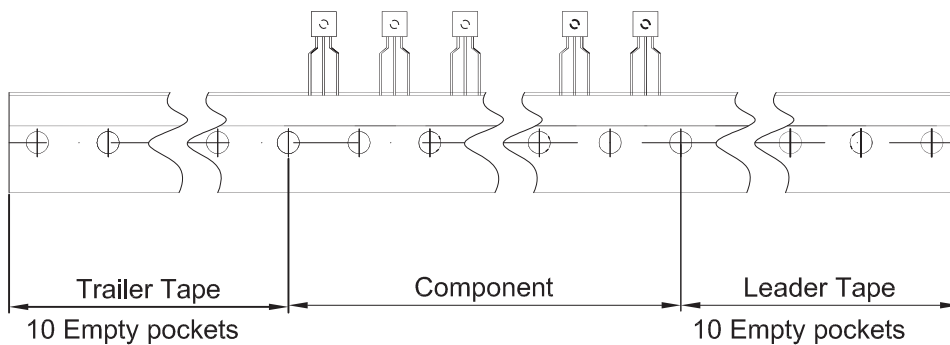
NOTICE

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TO-92 PACKAGE TAPEING DIMENSION



Dimiensions 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	ΔP
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