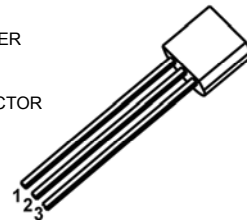


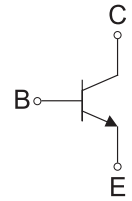
**Features**

- NPN transistor in TO-92 package with excellent power dissipation

1. EMILTTER
2. BASE
3. COLLECTOR



TO-92



Schematic Diagram

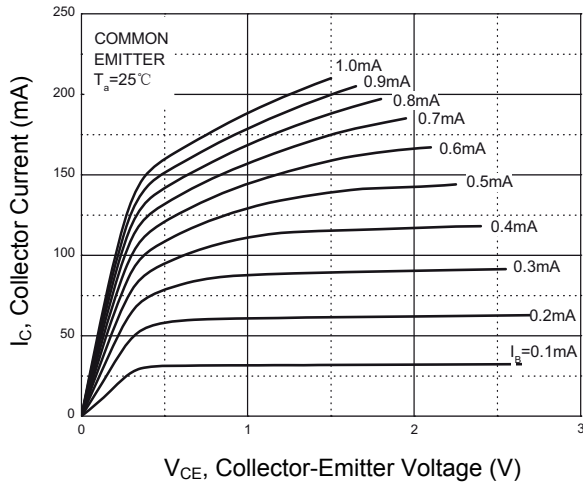
**Absolute Maximum Ratings** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

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-Continuous	$I_C$	600	mA
Collector Power Dissipation	$P_C$	0.625	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	357	$^{\circ}\text{C}/\text{mW}$
Operation Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^{\circ}\text{C}$

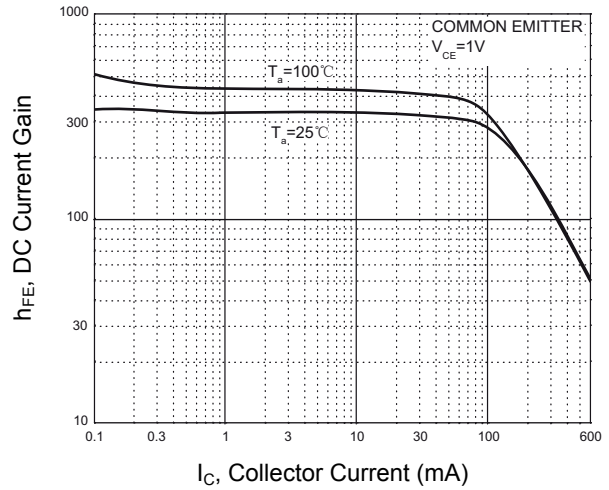
**Electrical Characteristics** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

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	nS
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	nS

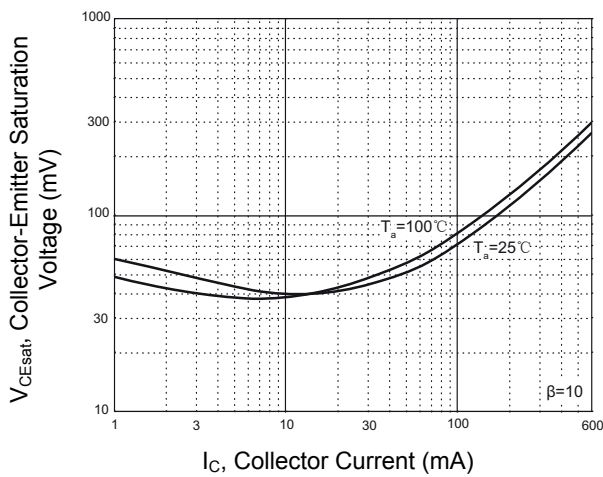
**Typical Characteristic Curves**



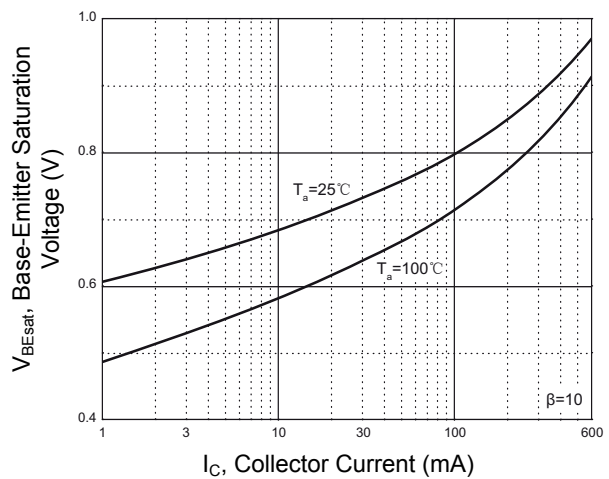
**Figure 1. Static Characteristic**



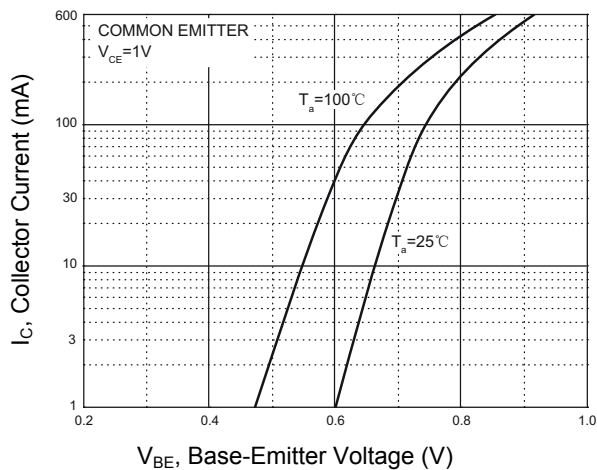
**Figure 2.  $h_{FE} - I_C$**



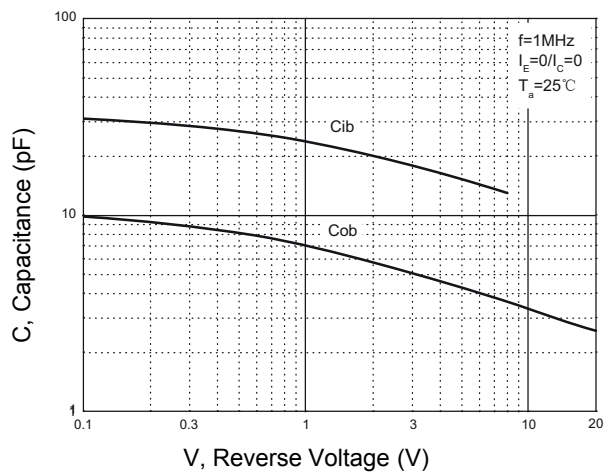
**Figure 3.  $V_{CEsat} - I_C$**



**Figure 4.  $V_{BEsat} - I_C$**

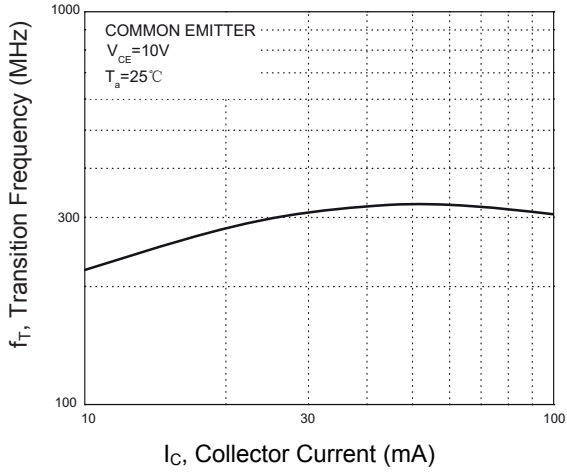


**Figure 5.  $I_C - V_{BE}$**

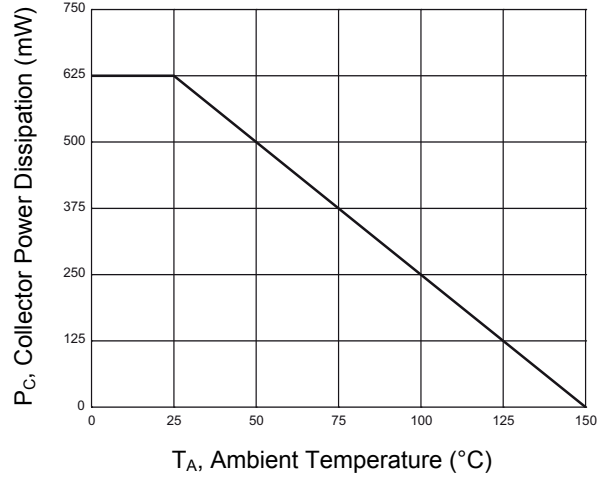


**Figure 6.  $C_{ob}/C_{ib} - V_{CB}/V_{EB}$**

**Typical Characteristic Curves**

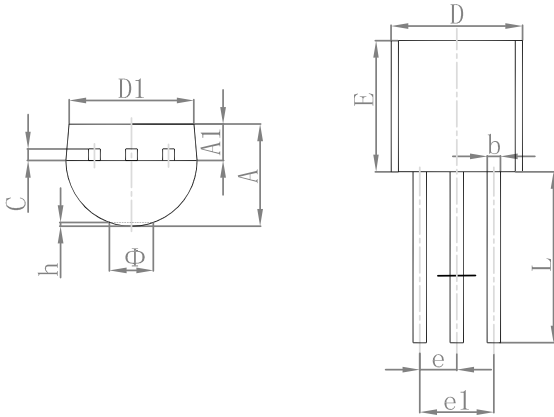


**Figure 7.  $f_T - I_C$**



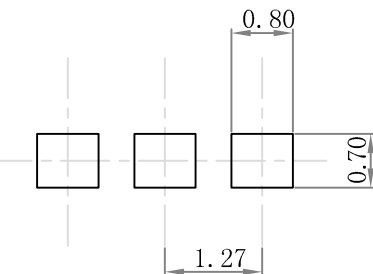
**Figure 8.  $P_C - T_a$**

**Package Outline Dimensions (TO-92)**



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

**Recommended Pad Layout**



**Note:**

1. Controlling dimension: in millimeters
2. General tolerance: ±0.05mm
3. The pad layout is for reference purposes only

**Order Information**

Device	Package	Marking	Quantity	HSF Status
2N4401	TO-92	2N4401	2,000pcs / Box	RoHS Compliant