

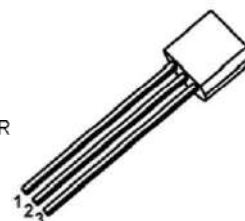
## TO-92 Plastic-Encapsulate Transistors (NPN)

### Features:

- Power dissipation

### TO-92

- 1. EMITTER
- 2. COLLECTOR
- 3. BASE



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

Symbol	Parameter	Value	Unit
$V_{CB0}$	Collector-Base Voltage	60	V
$V_{CE0}$	Collector-Emitter Voltage	50	V
$V_{EB0}$	Emitter-Base Voltage	5	V
$I_C$	Collector Current -Continuous	150	mA
$P_C$	Collector Power Dissipation	400	mW
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	312	$^{\circ}\text{C}/\text{W}$
$T_J$	Junction Temperature	150	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature	-55~+150	$^{\circ}\text{C}$

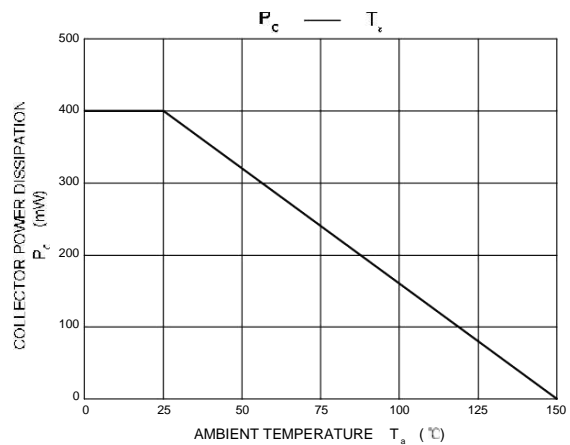
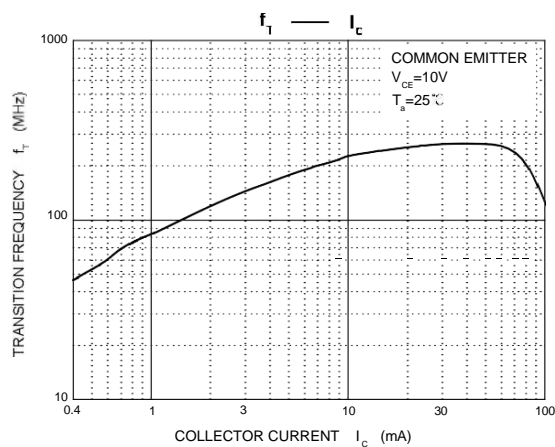
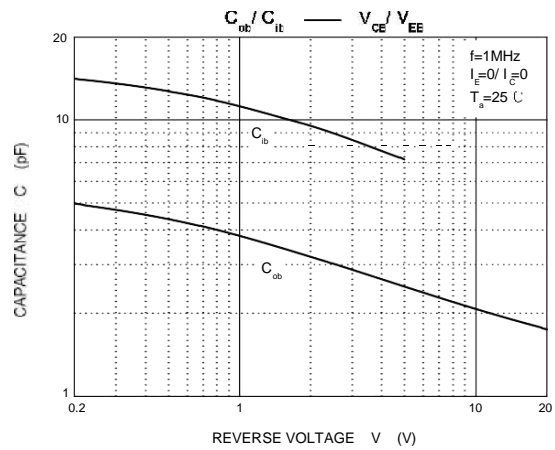
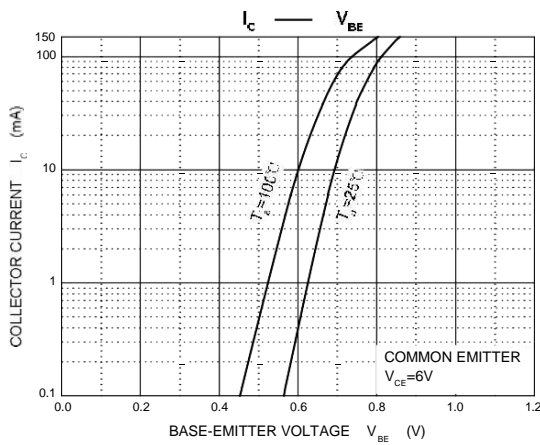
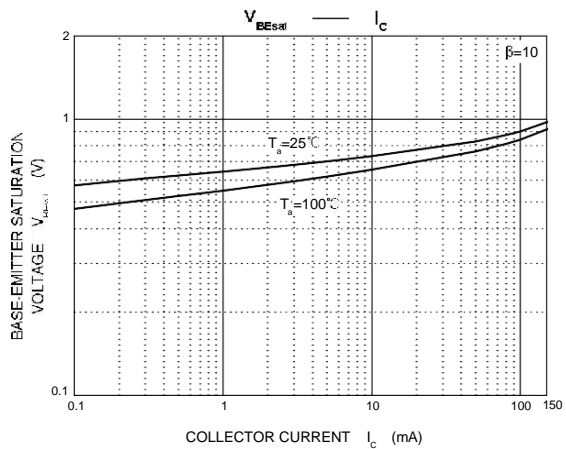
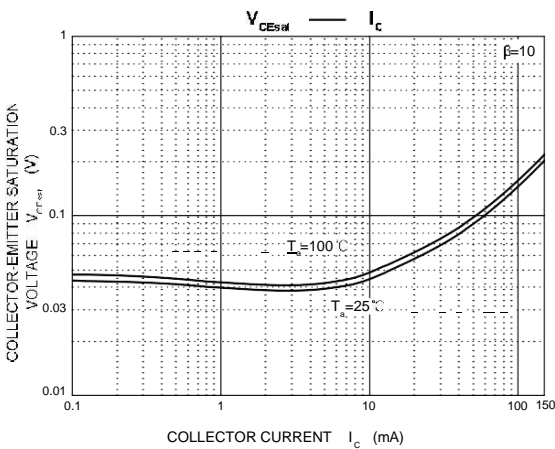
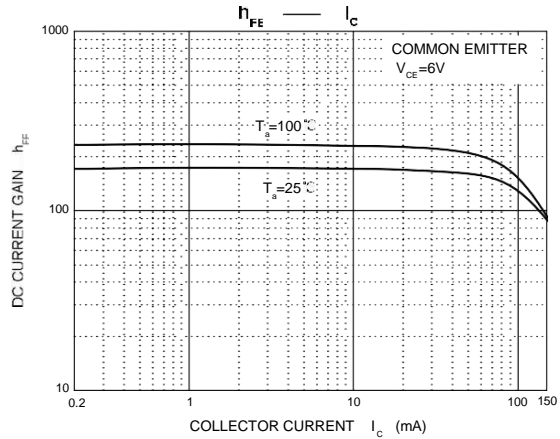
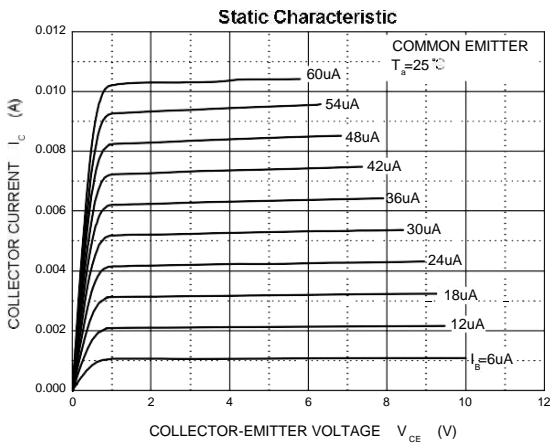
### ELECTRICAL CHARACTERISTICS ( $T_a=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CB0}$	$I_C=100\mu\text{A}, I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CE0}$	$I_C=0.1\text{mA}, I_B=0$	50			V
Emitter-base breakdown voltage	$V_{(BR)EB0}$	$I_E=100\mu\text{A}, I_C=0$	5			V
Collector cut-off current	$I_{CB0}$	$V_{CB}=60\text{V}, I_E=0$			0.1	$\mu\text{A}$
Collector cut-off current	$I_{CE0}$	$V_{CE}=50\text{V}, I_B=0$			0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EB0}$	$V_{EB}=5\text{V}, I_C=0$			0.1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE}=6\text{V}, I_C=2\text{mA}$	70		700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=100\text{mA}, I_B=10\text{mA}$			0.25	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=100\text{mA}, I_B=10\text{mA}$			1	V
Transition frequency	$f_T$	$V_{CE}=10\text{V}, I_C=1\text{mA}$ $f=30\text{MHz}$	80			MHz
Collector Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}, I_E=0$ $f=1\text{MHz}$			3.5	pF
Noise Figure	NF	$V_{CE}=6\text{V}, I_C=0.1\text{mA}$ $f=1\text{KHz}, R_G=10\text{K}$			10	dB

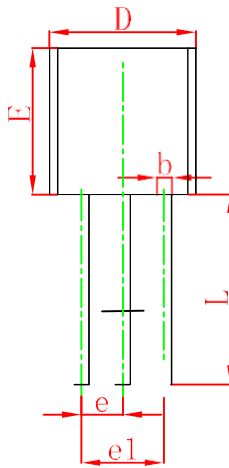
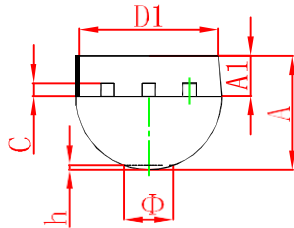
### CLASSIFICATION OF $h_{FE}$

Rank	O	Y	GR	BL
Range	70-140	120-240	200-400	350-700

**Typical Characteristics**

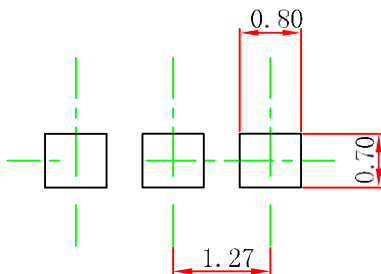


**TO-92 Package Outline Dimensions**



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: ±0.05mm.
  3. The pad layout is for reference purposes only.