



## TO-92 Plastic-Encapsulate Transistors

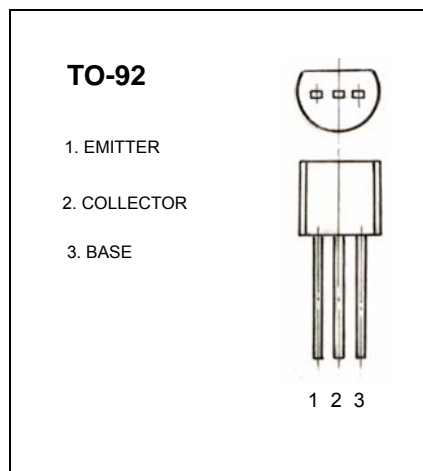
### 13001 TRANSISTOR (NPN)

#### FEATURES

power switching applications

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

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector -Base Voltage	600	V
$V_{CEO}$	Collector-Emitter Voltage	400	V
$V_{EBO}$	Emitter-Base Voltage	7	V
$I_C$	Collector Current -Continuous	0.2	A
$P_C$	Collector Power Dissipation	0.75	W
$T_J$	Junction Temperature	150	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature	-55-150	$^{\circ}\text{C}$



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

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}$ , $I_E = 0$	600			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$ , $I_B = 0$	400			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}$ , $I_C = 0$	7			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = 600\text{V}$ , $I_E = 0$			100	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE} = 400\text{V}$ , $I_B = 0$			200	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 7\text{V}$ , $I_C = 0$			100	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE} = 5\text{V}$ , $I_C = 1\text{mA}$	10		40	
	$h_{FE(2)}$	$V_{CE} = 10\text{V}$ , $I_C = 0.25\text{mA}$	5			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 50\text{mA}$ , $I_B = 10\text{mA}$			0.65	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 50\text{mA}$ , $I_B = 10\text{mA}$			1.2	V
Transition frequency	$f_T$	$V_{CE} = 20\text{V}$ , $I_C = 20\text{mA}$ $f = 1\text{MHz}$	8			MHz
Fall time	$t_f$	$V_{CC} = 45\text{V}$ , $I_C = 50\text{mA}$ $I_{B1} = -I_{B2} = 5\text{mA}$			0.3	$\mu\text{s}$
Storage time	$t_s$				1.5	$\mu\text{s}$

#### CLASSIFICATION OF $h_{FE(1)}$

Range	10-15	15-20	20-25	25-30	30-35	35-40

