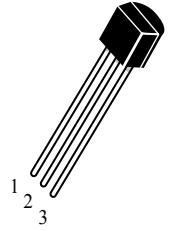


NPN Transistors

 Lead(Pb)-Free

TO-92

1. EMITTER
2. COLLECTOR
3. BASE



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current-Continuous	I_C	150	mAdc
Total Device Dissipation $T_A=25^{\circ}\text{C}$	P_D	0.4	W
Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-40 to + 150	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C=100\text{ }\mu\text{Adc}$, $I_E=0$)	$V_{(BR)CEO}$	50	-	Vdc
Collector-Base Breakdown Voltage ($I_C=1\text{ mAdc}$, $I_E=0$)	$V_{(BR)CBO}$	60	-	Vdc
Emitter-Base Breakdown Voltage ($I_E=100\text{ }\mu\text{Adc}$, $I_C=0$)	$V_{(BR)EBO}$	5.0	-	Vdc
Collector Cutoff Current ($V_{CE}=60\text{ Vdc}$, $I_E=0$)	I_{CEO}	-	0.1	μAdc
Collector Cutoff Current ($V_{CB}=45\text{ Vdc}$, $I_E=0$)	I_{CBO}	-	0.1	μAdc
Emitter Cutoff Current ($V_{EB}=5.0\text{ Vdc}$, $I_C=0$)	I_{EBO}	-	0.1	μAdc

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted) (Continued)

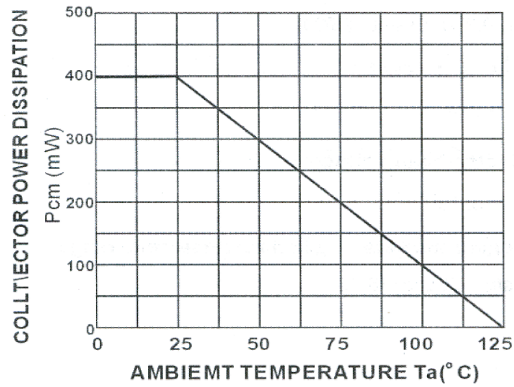
Characteristics	Symbol	Min	Typ	Max	Unit
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ON CHARACTERISTICS

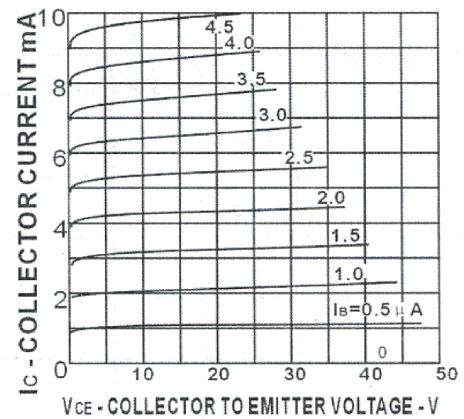
DC Current Gain $V_{CE}=6.0\text{V}$, $I_C=1\text{mA}$ $V_{CE}=6.0\text{V}$, $I_C=0.1\text{mA}$	h_{FE1} h_{FE2}	70 40	-	700	-
Collector-Emitter Saturation Voltage $I_C=100\text{mA}$, $I_B=10\text{mA}$	$V_{CE(sat)}$	-	-	0.3	V
Base-Emitter Voltage $I_C=100\text{mA}$, $I_B=10\text{mA}$	$V_{BE(sat)}$	-	-	1.0	V
Transition Frequency $V_{CE} = 6\text{V}$, $I_C = 10\text{mA}$, $f = 30\text{MHz}$	f_T	200	-	-	MHz
Collector Output Capacitance $V_{CB} = 10\text{V}$, $I_E = 0$, $f = 1\text{MHz}$	Cob	-	-	3.0	pF
Noise figure $V_{CE} = 6\text{V}$, $I_C = 0.1\text{mA}$, $R_g = 10\text{k}\Omega$, $f = 1\text{KHz}$	NF	-	4.0	10	dB

CLASSIFICATION OF h_{FE1}

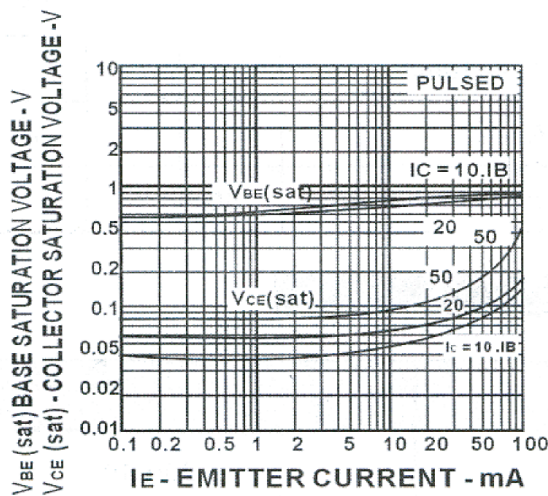
Rank	O	Y	GR	BL
Range	70-140	120-240	200-400	350-700



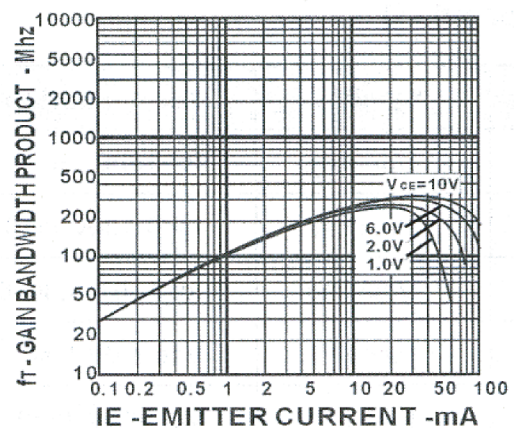
**FIG1. Total Power Dissipation
vs Ambient Temperature**



**FIG.2 Collector Current vs Collector
to Emitter Voltage**



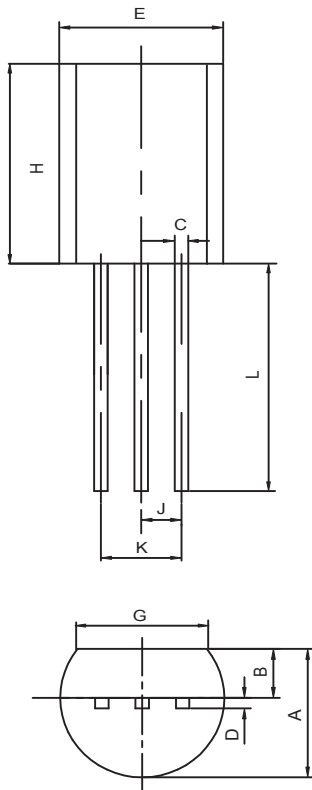
**FIG.3 Collector and Base Saturation Voltage
vs Collector Current**



**FIG.4 Gain Bandwidth Product vs
Emitter Current**

TO-92 Outline Dimensions

unit:mm



TO-92		
Dim	Min	Max
A	3.30	3.70
B	1.10	1.40
C	0.38	0.55
D	0.36	0.51
E	4.40	4.70
G	3.43	-
H	4.30	4.70
J	1.270TYP	
K	2.44	2.64
L	14.10	14.50