

# TRANSISTOR(NPN)

## PRODUCT SUMMARY

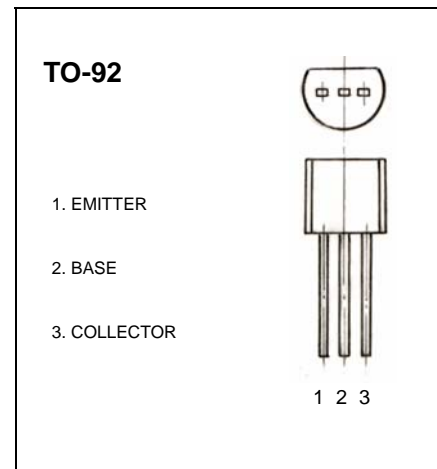
TO-92 Plastic-Encapsulate Transistors

## FEATURES

NPN silicon epitaxial planar transistor for switching and Amplifier applications

As complementary type, the PNP transistor 2N3906 is Recommended

This transistor is also available in the SOT-23 case with the type designation MMBT3904



## MAXIMUM RATINGS (T<sub>A</sub>=25 °C unless otherwise noted)

Symbol	Parameter	Value	Units
V <sub>CB0</sub>	Collector-Base Voltage	60	V
V <sub>CE0</sub>	Collector-Emitter Voltage	40	V
V <sub>EB0</sub>	Emitter-Base Voltage	6	V
I <sub>C</sub>	Collector Current -Continuous	0.2	A
P <sub>C</sub>	Collector Power Dissipation	0.625	W
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>stg</sub>	Storage Temperature	-55-150	°C

## ELECTRICAL CHARACTERISTICS

(Tamb=25 °C unless otherwise specified)

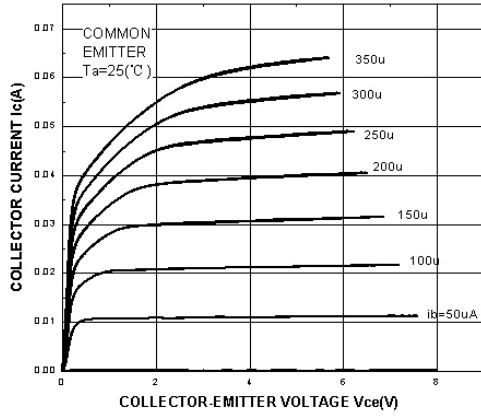
Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1mA, I_B=0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	6			V
Collector cut-off current	$I_{CBO}$	$V_{CB}=60V, I_E=0$			0.1	$\mu A$
Collector cut-off current	$I_{CEO}$	$V_{CE}=40V, I_B=0$			0.1	$\mu A$
Emitter cut-off current	$I_{EBO}$	$V_{EB}=5V, I_C=0$			0.1	$\mu A$
DC current gain	$h_{FE1}$	$V_{CE}=1V, I_C=10mA$	100		400	
	$h_{FE2}$	$V_{CE}=1V, I_C=50mA$	60			
	$h_{FE3}$	$V_{CE}=1V, I_C=100mA$	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=50mA, I_B=5mA$			0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=50mA, I_B=5mA$			0.95	V
Transition frequency	$f_T$	$V_{CE}=20V, I_C=10mA, f=100MHz$	300			MHz
Delay Time	$t_d$	$V_{CC}=3V, V_{BE}=0.5V,$			35	ns
Rise Time	$t_r$	$I_C=10mA, I_{B1}=1mA$			35	ns
Storage Time	$t_s$	$V_{CC}=3V, I_C=10mA$			200	ns
Fall Time	$t_f$	$I_{B1}=I_{B2}=1mA$			50	ns

### CLASSIFICATION OF $h_{FE1}$

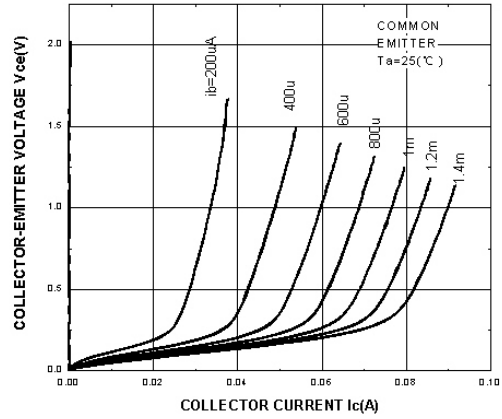
Rank	O	Y	G
Range	100-200	200-300	300-400

# TYPICAL CHARACTERISTICS

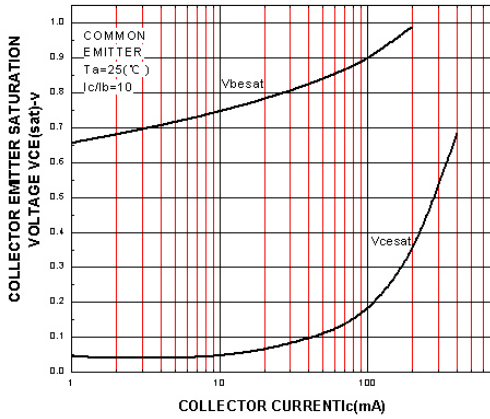
Ic-Vce



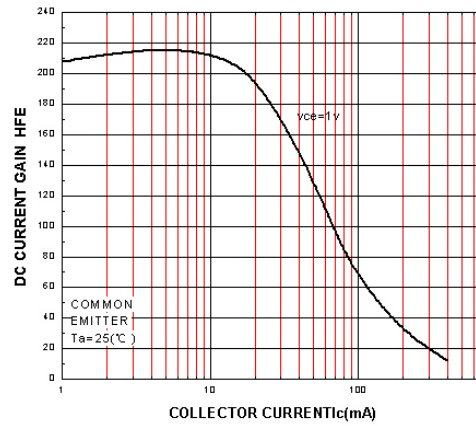
Vce-Ic



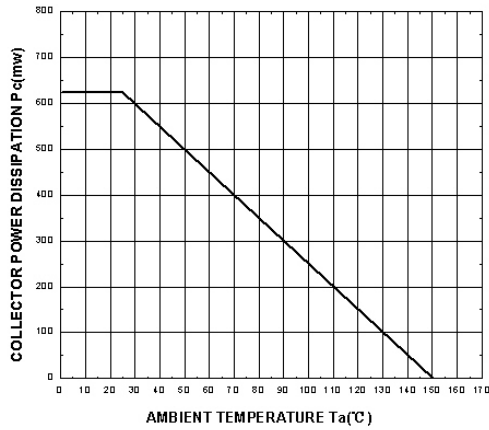
Vcesat-Ic  
Vbesat-Ic



hFE-Ic



Pc-Ta



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