



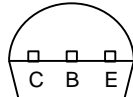
Micro Commercial Components
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 CA 91311
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2N3904

Features

- Through Hole Package
- Capable of 600Watts of Power Dissipation

Pin Configuration
 Bottom View



NPN General Purpose Amplifier

Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter	Min	Max	Units
OFF CHARACTERISTICS				
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage* ($I_C=1.0\text{mA}$, $I_B=0$)	40		Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ($I_C=10\mu\text{A}$, $I_E=0$)	60		Vdc
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ($I_E=10\mu\text{A}$, $I_C=0$)	6.0		Vdc
I_{BL}	Base Cutoff Current ($V_{CE}=30\text{Vdc}$, $V_{BE}=3.0\text{Vdc}$)		50	nAdc
I_{CEX}	Collector Cutoff Current ($V_{CE}=30\text{Vdc}$, $V_{BE}=3.0\text{Vdc}$)		50	nAdc

ON CHARACTERISTICS

h_{FE}	DC Current Gain* ($I_C=0.1\text{mA}$, $V_{CE}=1.0\text{Vdc}$) ($I_C=1.0\text{mA}$, $V_{CE}=1.0\text{Vdc}$) ($I_C=10\text{mA}$, $V_{CE}=1.0\text{Vdc}$) ($I_C=50\text{mA}$, $V_{CE}=1.0\text{Vdc}$) ($I_C=100\text{mA}$, $V_{CE}=1.0\text{Vdc}$)	40 70 100 60 30	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ($I_C=10\text{mA}$, $I_B=1.0\text{mA}$) ($I_C=50\text{mA}$, $I_B=5.0\text{mA}$)		0.2 0.3	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ($I_C=10\text{mA}$, $I_B=1.0\text{mA}$) ($I_C=50\text{mA}$, $I_B=5.0\text{mA}$)	0.65	0.85 0.95	Vdc

SMALL-SIGNAL CHARACTERISTICS

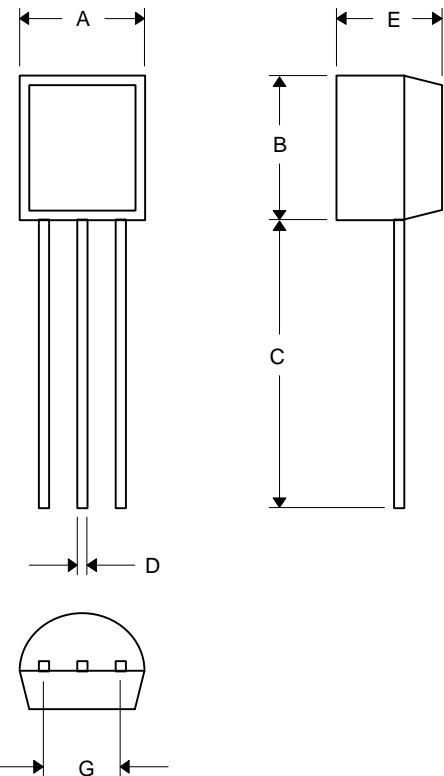
f_T	Current Gain-Bandwidth Product ($I_C=10\text{mA}$, $V_{CE}=20\text{Vdc}$, $f=100\text{MHz}$)	300		MHz
C_{obo}	Output Capacitance ($V_{CB}=5.0\text{Vdc}$, $I_E=0$, $f=1.0\text{MHz}$)		4.0	pF
C_{ibo}	Input Capacitance ($V_{BE}=0.5\text{Vdc}$, $I_C=0$, $f=1.0\text{MHz}$)		8.0	pF
NF	Noise Figure ($I_C=100\mu\text{A}$, $V_{CE}=5.0\text{Vdc}$, $R_S=1.0\text{k}\Omega$, $f=10\text{Hz}$ to 15.7kHz)		5.0	dB

SWITCHING CHARACTERISTICS

t_d	Delay Time	($V_{CC}=3.0\text{Vdc}$, $V_{BE}=0.5\text{Vdc}$)	35	ns
t_r	Rise Time	($I_C=10\text{mA}$, $I_{B1}=1.0\text{mA}$)	35	ns
t_s	Storage Time	($V_{CC}=3.0\text{Vdc}$, $I_C=10\text{mA}$)	200	ns
t_f	Fall Time	($I_{B1}=I_{B2}=1.0\text{mA}$)	50	ns

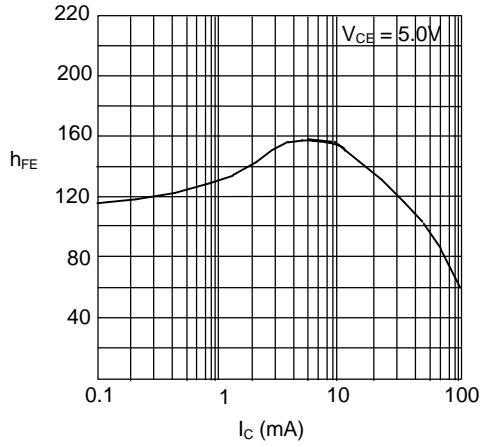
*Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

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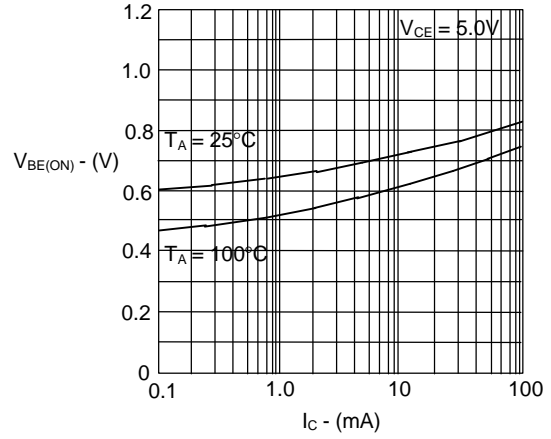


DIM	DIMENSIONS				NOTE
	INCHES		MM		
A	.175	.185	4.45	4.70	
B	.175	.185	4.46	4.70	
C	.500	---	12.7	---	
D	.016	.020	0.41	0.63	
E	.135	.145	3.43	3.68	
G	.095	.105	2.42	2.67	

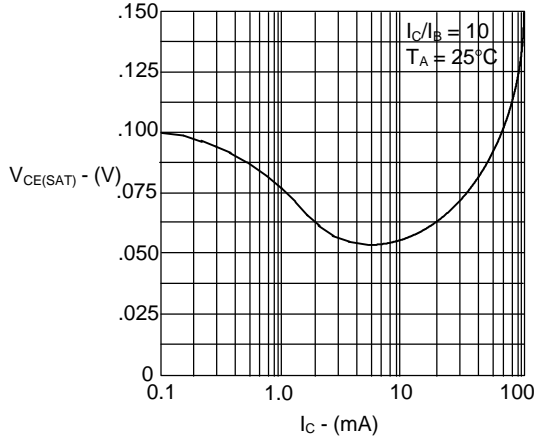
DC Current Gain vs Collector Current



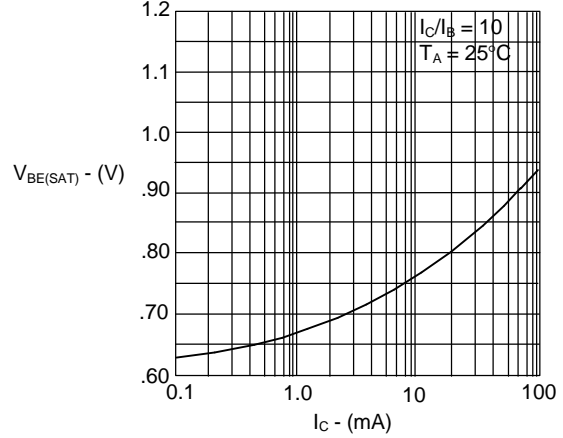
Base-Emitter ON Voltage vs Collector Current



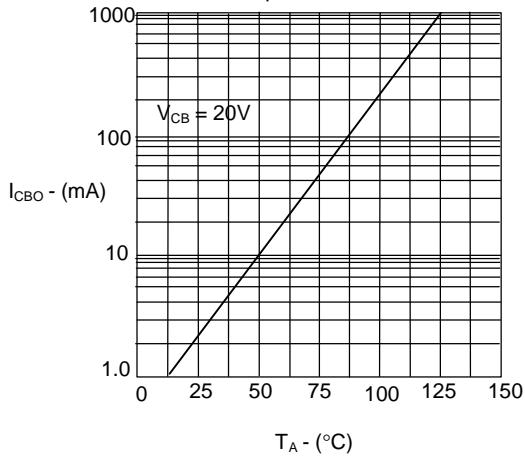
Collector Saturation Voltage vs Collector Current



Base Saturation Voltage vs Collector Current



Collector Cutoff Current vs Ambient Temperature



Capacitance vs Reverse Bias Voltage

