

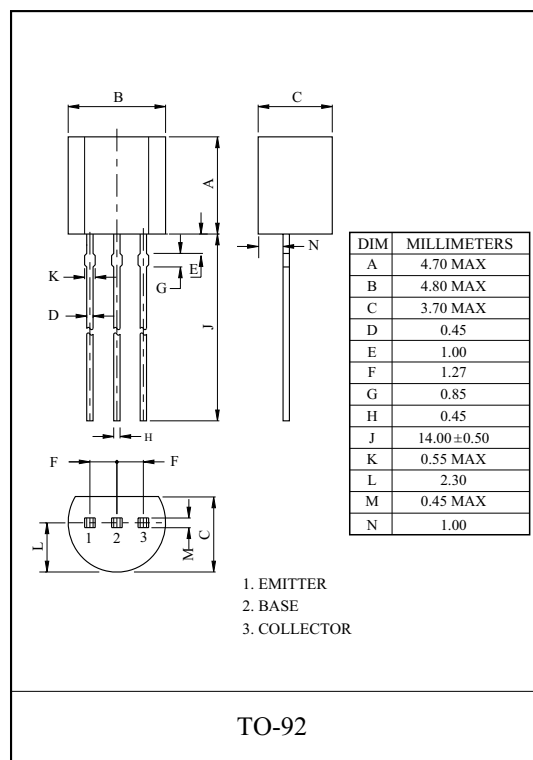
GENERAL PURPOSE APPLICATION.  
SWITCHING APPLICATION.

## FEATURES

- Low Leakage Current  
:  $I_{CEX}=50\text{nA}(\text{Max.})$ ,  $I_{BL}=50\text{nA}(\text{Max.})$   
@  $V_{CE}=30\text{V}$ ,  $V_{EB}=3\text{V}$ .
- Excellent DC Current Gain Linearity.
- Low Saturation Voltage  
:  $V_{CE(\text{sat})}=0.3\text{V}(\text{Max.})$  @  $I_C=50\text{mA}$ ,  $I_B=5\text{mA}$ .
- Low Collector Output Capacitance  
:  $C_{ob}=4\text{pF}(\text{Max.})$  @  $V_{CB}=5\text{V}$ .
- Complementary to 2N3906.

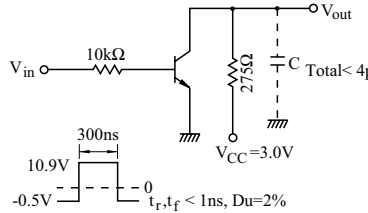
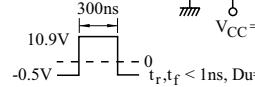
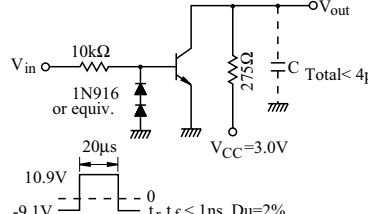
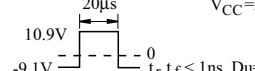
## MAXIMUM RATING ( $T_a=25^\circ\text{C}$ )

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Base Voltage		$V_{CBO}$	60	V
Collector-Emitter Voltage		$V_{CEO}$	40	V
Emitter-Base Voltage		$V_{EBO}$	6	V
Collector Current		$I_C$	200	mA
Base Current		$I_B$	50	mA
Collector Power Dissipation	$T_a=25^\circ\text{C}$	$P_C$	625	mW
	$T_c=25^\circ\text{C}$		1.5	W
Junction Temperature		$T_j$	150	$^\circ\text{C}$
Storage Temperature Range		$T_{\text{stg}}$	-55 ~ 150	$^\circ\text{C}$

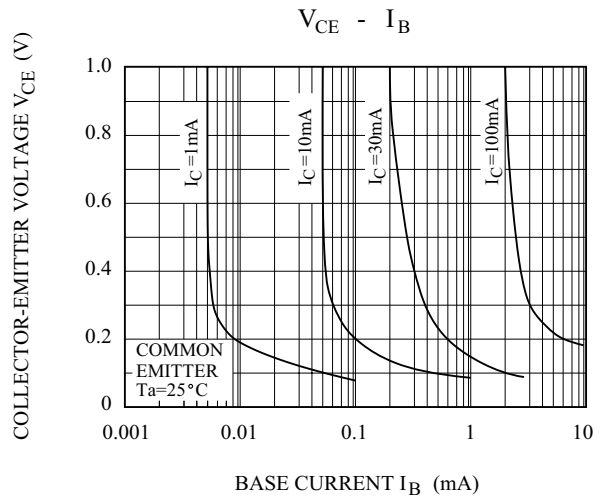
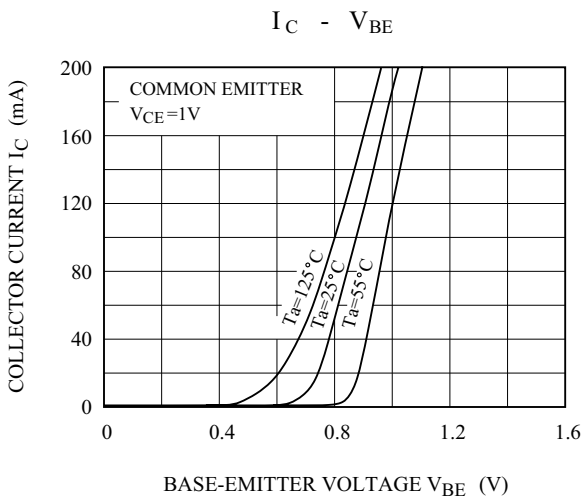
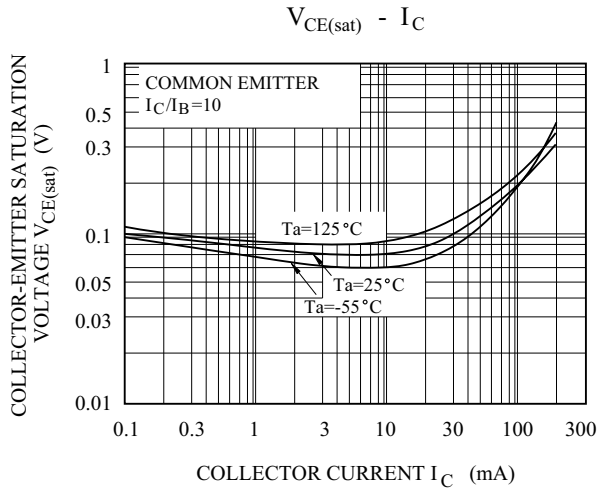
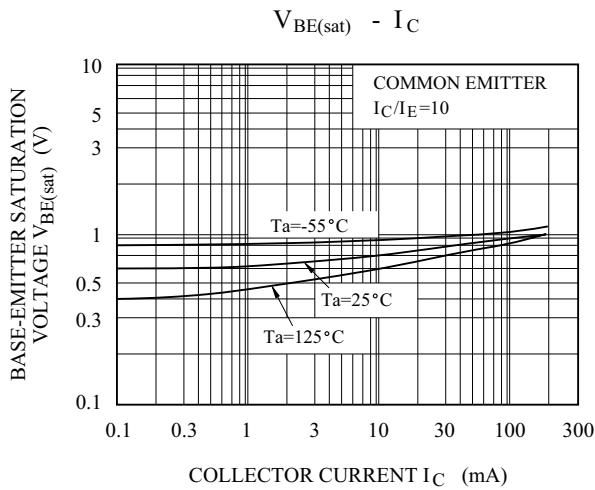
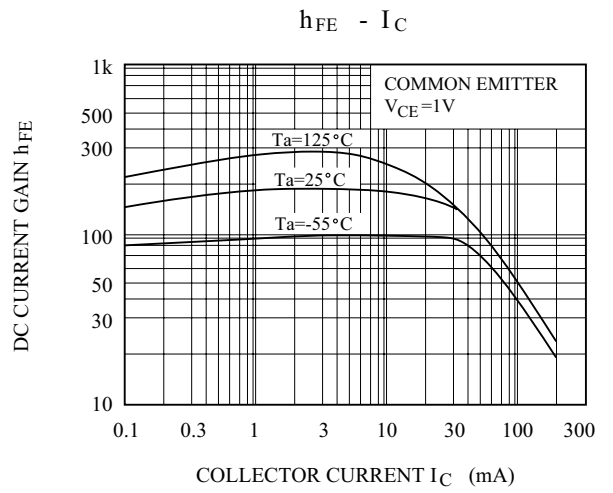
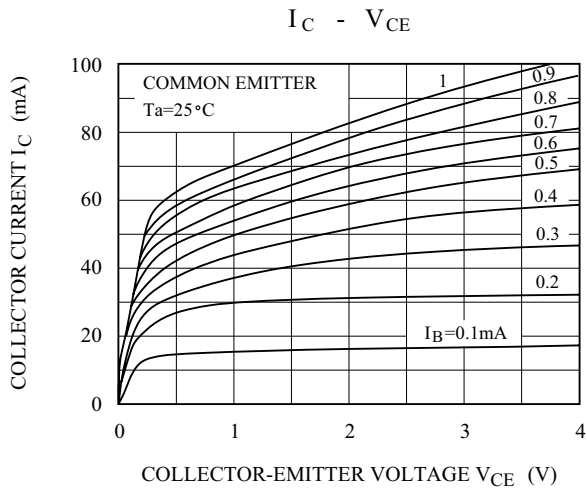


# 2N3904

## ELECTRICAL CHARACTERISTICS (Ta=25 °C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		I <sub>CEX</sub>	V <sub>CE</sub> =30V, V <sub>EB</sub> =3V	-	-	50	nA
Base Cut-off Current		I <sub>BL</sub>	V <sub>CE</sub> =30V, V <sub>EB</sub> =3V	-	-	50	nA
Collector-Base Breakdown Voltage		V <sub>(BR)CBO</sub>	I <sub>C</sub> =10μA, I <sub>E</sub> =0	60	-	-	V
Collector-Emitter Breakdown Voltage *		V <sub>(BR)CEO</sub>	I <sub>C</sub> =1mA, I <sub>B</sub> =0	40	-	-	V
Emitter-Base Breakdown Voltage		V <sub>(BR)EBO</sub>	I <sub>E</sub> =10μA, I <sub>C</sub> =0	6.0	-	-	V
DC Current Gain	*	h <sub>FE</sub> (1)	V <sub>CE</sub> =1V, I <sub>C</sub> =0.1mA	40	-	-	
		h <sub>FE</sub> (2)	V <sub>CE</sub> =1V, I <sub>C</sub> =1mA	70	-	-	
		h <sub>FE</sub> (3)	V <sub>CE</sub> =1V, I <sub>C</sub> =10mA	100	-	300	
		h <sub>FE</sub> (4)	V <sub>CE</sub> =1V, I <sub>C</sub> =50mA	60	-	-	
		h <sub>FE</sub> (5)	V <sub>CE</sub> =1V, I <sub>C</sub> =100mA	30	-	-	
Collector-Emitter Saturation Voltage *	*	V <sub>CE(sat)</sub> 1	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA	-	-	0.2	V
		V <sub>CE(sat)</sub> 2	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA	-	-	0.3	
Base-Emitter Saturation Voltage *	*	V <sub>BE(sat)</sub> 1	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA	0.65	-	0.85	V
		V <sub>BE(sat)</sub> 2	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA	-	-	0.95	
Transition Frequency		f <sub>T</sub>	V <sub>CE</sub> =20V, I <sub>C</sub> =10mA, f=100MHz	300	-	-	MHz
Collector Output Capacitance		C <sub>ob</sub>	V <sub>CB</sub> =5V, I <sub>E</sub> =0, f=1MHz	-	-	4.0	pF
Input Capacitance		C <sub>ib</sub>	V <sub>BE</sub> =0.5V, I <sub>C</sub> =0, f=1MHz	-	-	8.0	pF
Input Impedance		h <sub>ie</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =1mA, f=1kHz	1.0	-	10	kΩ
Voltage Feedback Ratio		h <sub>re</sub>		0.5	-	8.0	x10 <sup>-4</sup>
Small-Signal Current Gain		h <sub>fe</sub>		100	-	400	
Collector Output Admittance		h <sub>oe</sub>		1.0	-	40	μS
Noise Figure		NF	V <sub>CE</sub> =5V, I <sub>C</sub> =0.1mA R <sub>g</sub> =1kΩ, f=10Hz ~ 15.7kHz	-	-	5.0	dB
Switching Time	Delay Time	t <sub>d</sub>		-	-	35	nS
	Rise Time	t <sub>r</sub>		-	-	35	
	Storage Time	t <sub>stg</sub>		-	-	200	
	Fall Time	t <sub>f</sub>		-	-	50	

\* Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .



# 2N3904

