

GENERAL PURPOSE APPLICATION.  
SWITCHING APPLICATION.

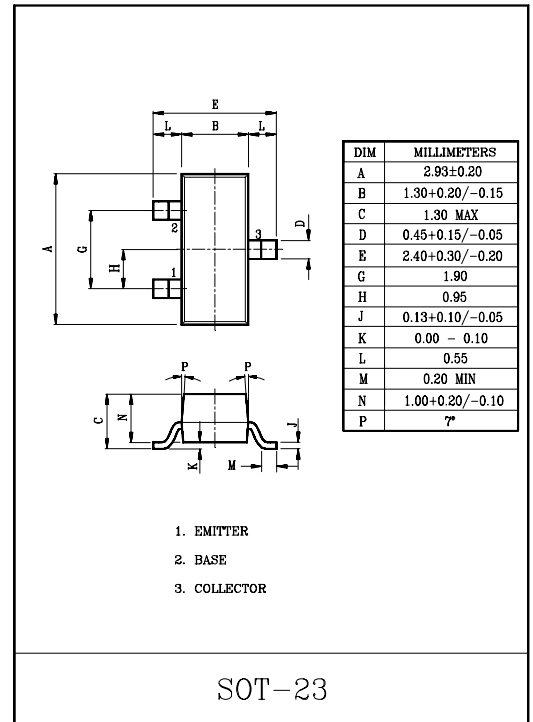
**FEATURES**

- Low Leakage Current  
:  $I_{CEX}=50nA(\text{Max.})$ ,  $I_{BL}=50nA(\text{Max.})$   
@  $V_{CE}=30V$ ,  $V_{EB}=3V$ .
- Excellent DC Current Gain Linearity.
- Low Saturation Voltage  
:  $V_{CE(sat)}=0.3V(\text{Max.})$  @  $I_C=50mA$ ,  $I_B=5mA$ .
- Low Collector Output Capacitance  
:  $C_{ob}=4pF(\text{Max.})$  @  $V_{CB}=5V$ .
- Complementary to 2N3906S.

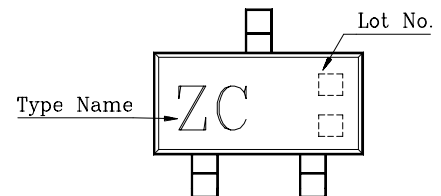
**MAXIMUM RATINGS(Ta=25°C)**

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	$P_C$ *	350	mW
Junction Temperature	$T_j$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C

\*  $P_C$  : Package Mounted On 99.5% Alumina 10x8x0.6mm



**Marking**



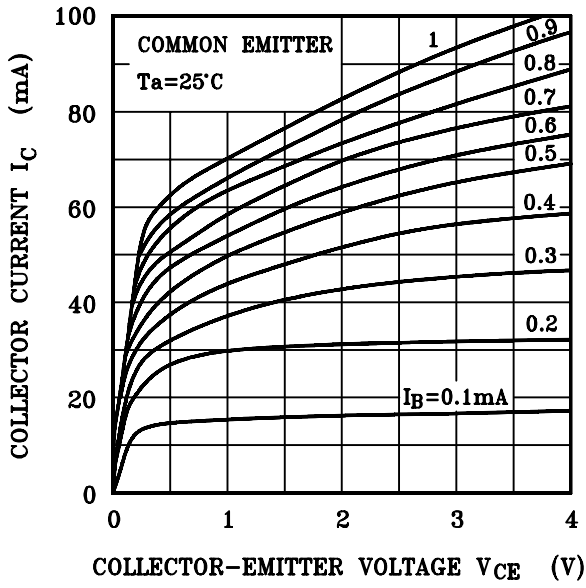
# 2N3904S

## ELECTRICAL CHARACTERISTICS (Ta=25°C)

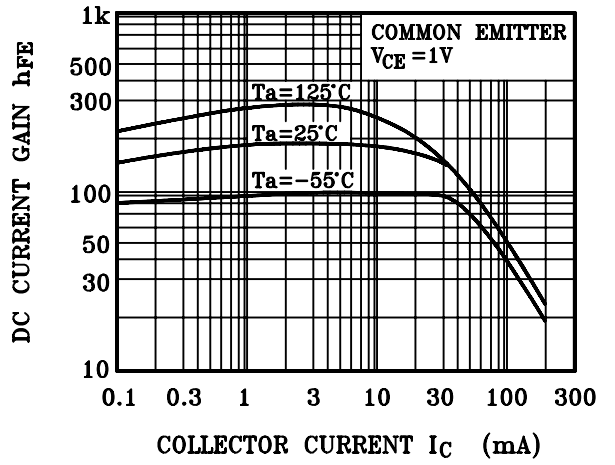
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		$I_{CEX}$	$V_{CE}=30V, V_{EB}=3V$	-	-	50	nA
Base Cut-off Current		$I_{BL}$	$V_{CE}=30V, V_{EB}=3V$	-	-	50	nA
Collector-Base Breakdown Voltage		$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	60	-	-	V
Collector-Emitter Breakdown Voltage *		$V_{(BR)CEO}$	$I_C=1mA, I_B=0$	40	-	-	V
Emitter-Base Breakdown Voltage		$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	6.0	-	-	V
DC Current Gain	*	$h_{FE(1)}$	$V_{CE}=1V, I_C=0.1mA$	40	-	-	
		$h_{FE(2)}$	$V_{CE}=1V, I_C=1mA$	70	-	-	
		$h_{FE(3)}$	$V_{CE}=1V, I_C=10mA$	100	-	300	
		$h_{FE(4)}$	$V_{CE}=1V, I_C=50mA$	60	-	-	
		$h_{FE(5)}$	$V_{CE}=1V, I_C=100mA$	30	-	-	
Collector-Emitter Saturation Voltage *	*	$V_{CE(sat)1}$	$I_C=10mA, I_B=1mA$	-	-	0.2	V
		$V_{CE(sat)2}$	$I_C=50mA, I_B=5mA$	-	-	0.3	
Base-Emitter Saturation Voltage *	*	$V_{BE(sat)1}$	$I_C=10mA, I_B=1mA$	0.65	-	0.85	V
		$V_{BE(sat)2}$	$I_C=50mA, I_B=5mA$	-	-	0.95	
Transition Frequency		$f_T$	$V_{CE}=20V, I_C=10mA, f=100MHz$	300	-	-	MHz
Collector Output Capacitance		$C_{ob}$	$V_{CB}=5V, I_E=0, f=1MHz$	-	-	4.0	pF
Input Capacitance		$C_{ib}$	$V_{BE}=0.5V, I_C=0, f=1MHz$	-	-	8.0	pF
Input Impedance		$h_{ib}$	$V_{CE}=10V, I_C=1mA, f=1kHz$	1.0	-	10	k $\Omega$
Voltage Feedback Ratio		$h_{re}$		0.5	-	8.0	x10
Small-Signal Current Gain		$h_{fe}$		100	-	400	
Collector Output Admittance		$h_{oe}$		1.0	-	40	$\mu S$
Noise Figure		NF		$V_{CE}=5V, I_C=0.1mA$ $R_g=1k\Omega, f=10Hz \sim 15.7kHz$	-	-	5.0
Switching Time	Delay Time	$t_d$		-	-	35	nS
	Rise Time	$t_r$		-	-	35	
	Storage Time	$t_{stg}$		-	-	200	
	Fall Time	$t_f$		-	-	50	

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

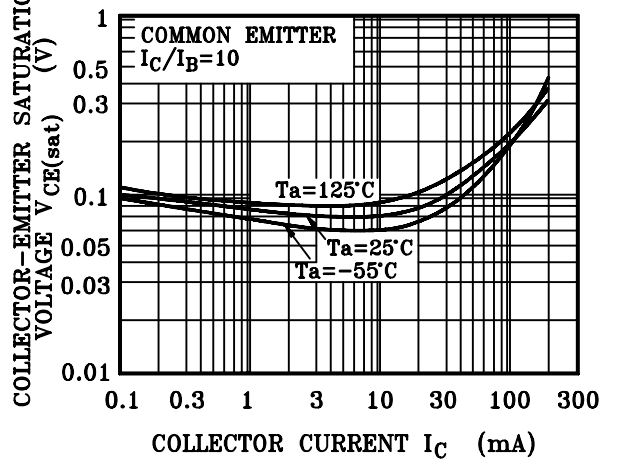
$I_C - V_{CE}$



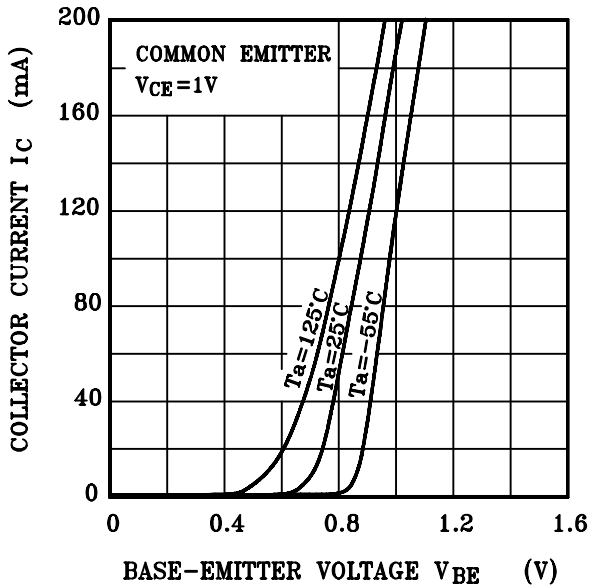
$h_{FE} - I_C$



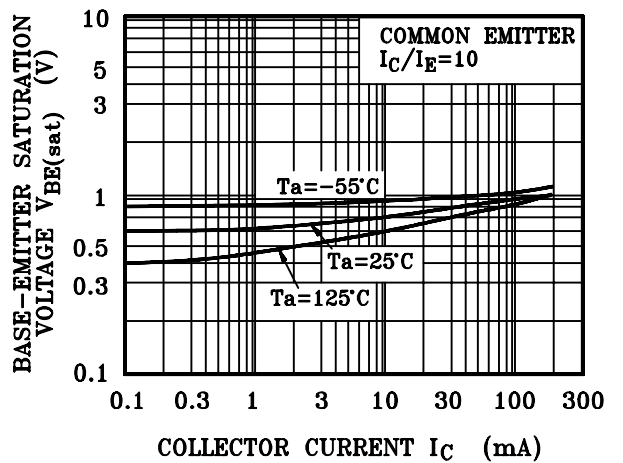
$V_{CE(sat)} - I_C$



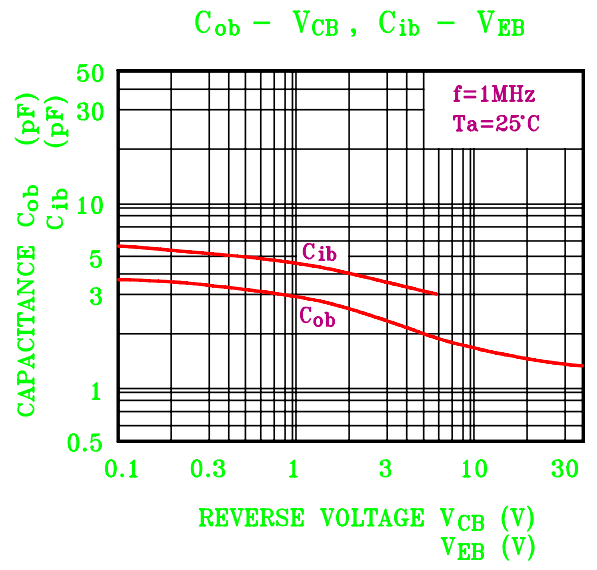
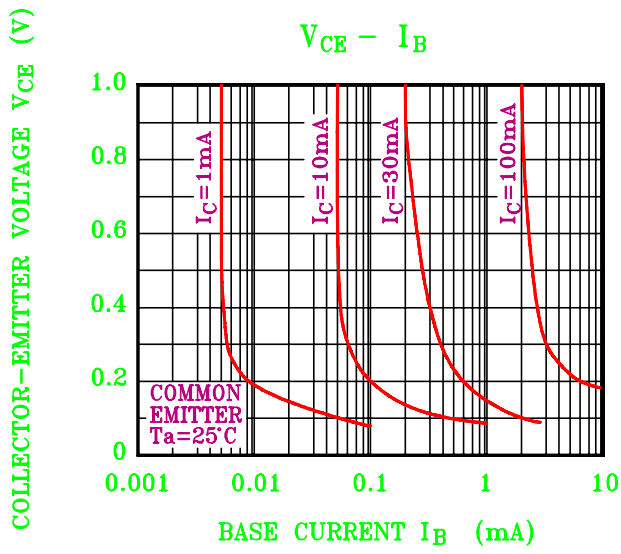
$I_C - V_{BE}$



$V_{BE(sat)} - I_C$



# 2N3904S



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