

<Transistor>

# 2SA1993

For Low Frequency Amplify Application  
Silicon PNP Epitaxial Type Micro(Frame type)

## DESCRIPTION

2SA1993 is a silicon PNP epitaxial type transistor. It is designed for low frequency voltage amplify application.

## FEATURE

- Small collector to emitter saturation voltage.  
 $V_{CE(sat)} = -0.3V$  max (@  $I_C = -100mA, I_B = -10mA$ )
- Excellent linearity of DC forward current gain
- Small package for easy mounting

## APPLICATION

For small machine low frequency voltage amplify application.

## MAXIMUM RATINGS (Ta=25°C)

SYMBOL	PARAMETER	RATINGS	UNIT
V <sub>CB0</sub>	Collector to Base voltage	-50	V
V <sub>EB0</sub>	Emitter to Base voltage	-6	V
V <sub>CE0</sub>	Collector to Emitter voltage	-50	V
I <sub>C</sub>	Collector current	-200	mA
P <sub>C</sub>	Collector dissipation (Ta=25°C)	450	mW
T <sub>J</sub>	Junction temperature	+125	°C
T <sub>stg</sub>	Storage temperature	-55 to +125	°C

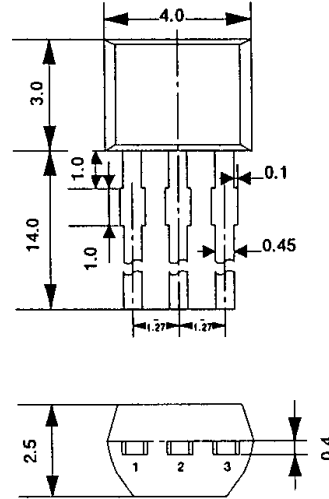
## ELECTRICAL CHARACTERISTICS (Ta=25°C)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
V <sub>(BR)CEO</sub>	C to E break down voltage	I <sub>C</sub> = -100 μA, R <sub>BE</sub> = ∞	-50			V
I <sub>CBO</sub>	Collector cut off current	V <sub>CB</sub> = -50V, I <sub>E</sub> = 0			-0.1	μA
I <sub>EBO</sub>	Emitter cut off current	V <sub>EB</sub> = -6V, I <sub>C</sub> = 0			-0.1	μA
h <sub>FE</sub> *	DC forward current gain	V <sub>CE</sub> = -6V, I <sub>C</sub> = -1mA	150		500	—
h <sub>FE</sub>	DC forward current gain	V <sub>CE</sub> = -6V, I <sub>C</sub> = -0.1mA	50			—
V <sub>CE(sat)</sub>	C to E saturation voltage	I <sub>C</sub> = -100mA, I <sub>B</sub> = -10mA			-0.3	V
f <sub>r</sub>	Gain band width product	V <sub>CE</sub> = -6V, I <sub>E</sub> = 10mA		200		MHz
C <sub>ob</sub>	Collector output capacitance	V <sub>CB</sub> = -6V, I <sub>E</sub> = 0, f = 1MHz		4.0		pF
NF	Noise figure	V <sub>CE</sub> = -6V, I <sub>E</sub> = 0.3mA, f = 100Hz, R <sub>G</sub> = 10kΩ			20	dB

ITEM	E	F
h <sub>FE</sub>	150~300	250~500

## OUTLINE DRAWING

UNIT:mm.



## TERMINAL CONNECTOR

- ① : EMITTER      EIAJ : —  
 ② : COLLECTOR    JEDEC : —  
 ③ : BASE

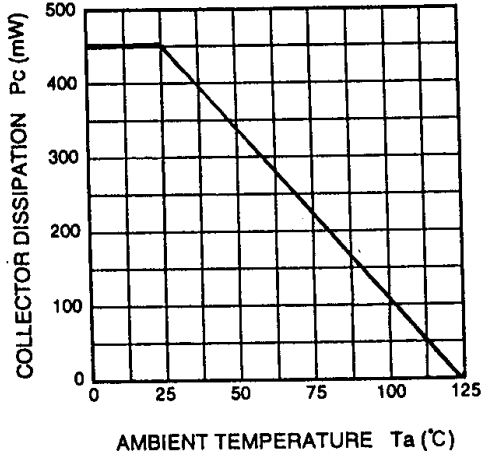
(Transistor)

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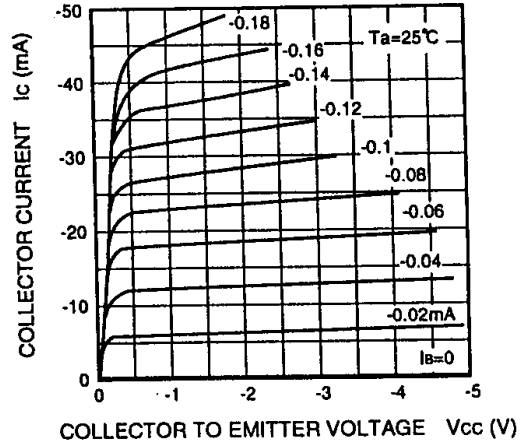
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## TYPICAL CHARACTERISTICS

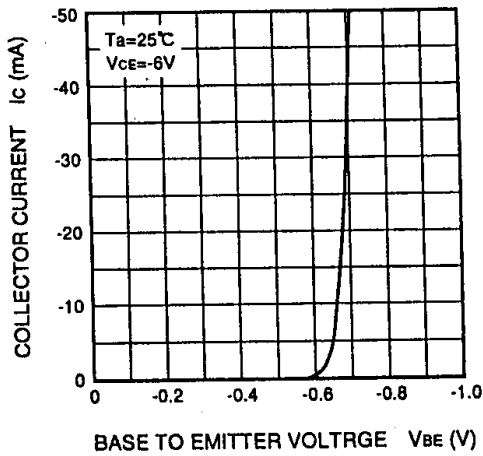
COLLECTOR DISSIPATION  
VS. AMBIENT TEMPERATURE



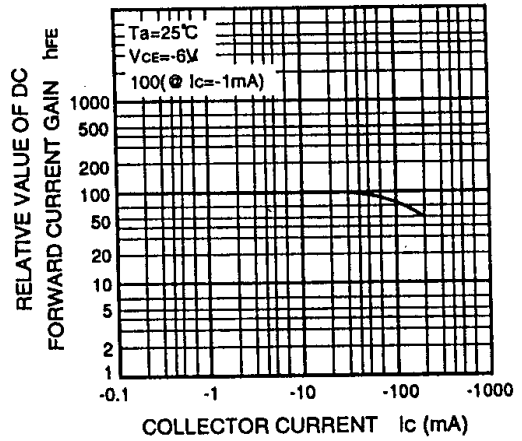
COMMON EMITTER OUTPUT



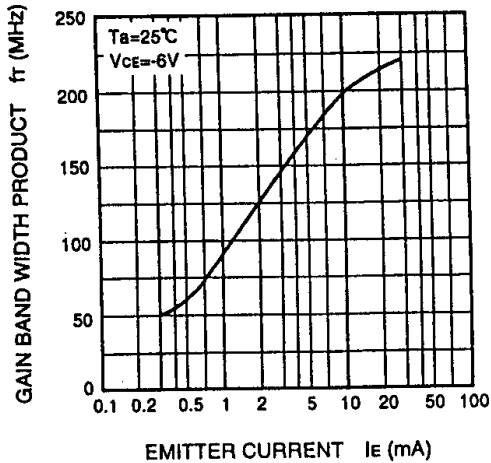
COMMON EMITTER TRANSFER



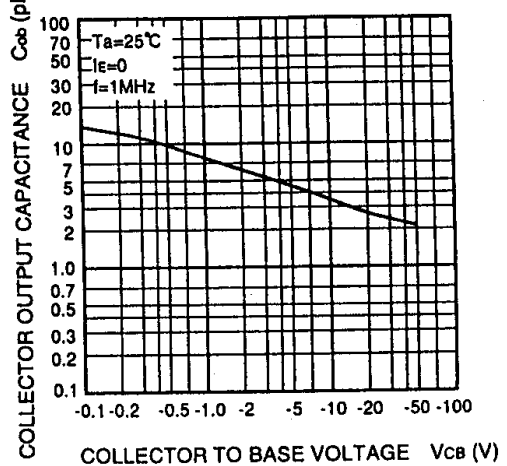
DC FORWARD CURRENT GAIN  
VS. COLLECTOR CURRENT



GAIN BAND WIDTH PRODUCT  
VS. EMITTER CURRENT



COLLECTOR OUTPUT CAPACITANCE  
VS. COLLECTOR TO BASE VOLTAGE

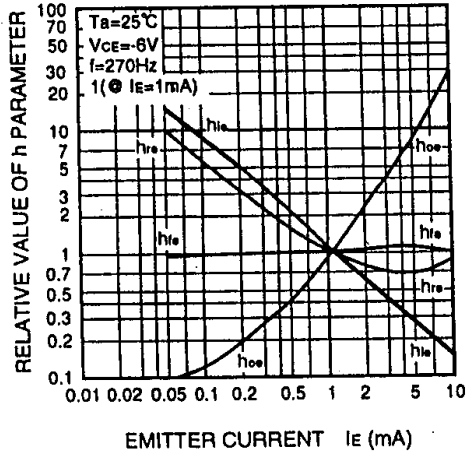


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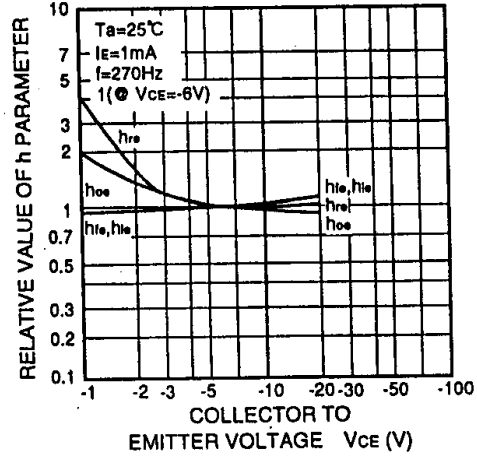
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**h PARAMETER VS. EMITTER CURRENT**



**h PARAMETER VS. COLLECTOR TO EMITTER VOLTAGE**



**COMMON EMITTER h PARAMETER (TYPICAL VALUE)**

Symbol	Parameter	Test conditions	Limits	Unit
$h_{ie}$	Closed loop small signal input impedance	$T_a = 25^\circ\text{C}$ $V_{CE} = -6\text{V}$ $I_E = 1\text{mA}$ $f = 270\text{Hz}$	7.0	$k\Omega$
$h_{re}$	Open loop small signal reverse voltage amplification factor		0.1	$\times 10^{-3}$
$h_{fe}$	Closed loop small signal forward current amplification factor		250	—
$h_{oe}$	Open loop small signal output admittance		18	$\mu\text{S}$

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