

# XN04604 (XN4604)

Silicon NPN epitaxial planar type (Tr1)  
Silicon PNP epitaxial planar type (Tr2)

For amplification of low-frequency output

## ■ Features

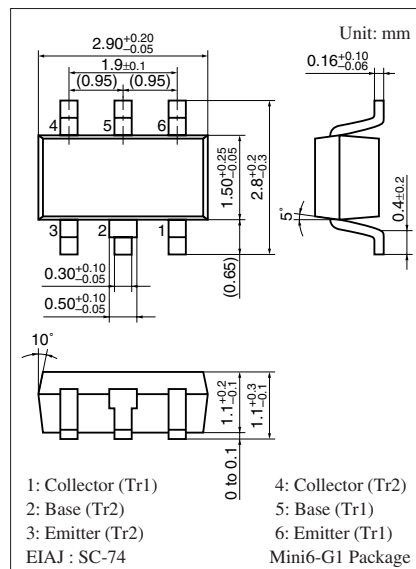
- Two elements incorporated into one package
- Reduction of the mounting area and assembly cost by one half

## ■ Basic Part Number

- 2SD1328 + 2SB0970 (2SB970)

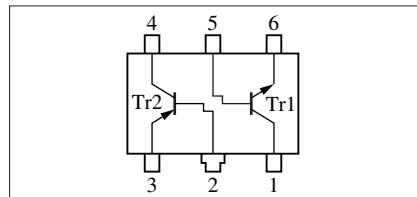
## ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

	Parameter	Symbol	Rating	Unit
Tr1	Collector-base voltage (Emitter open)	$V_{\text{CBO}}$	25	V
	Collector-emitter voltage (Base open)	$V_{\text{CEO}}$	20	V
	Emitter-base voltage (Collector open)	$V_{\text{EBO}}$	12	V
	Collector current	$I_{\text{C}}$	0.5	A
	Peak collector current	$I_{\text{CP}}$	1	A
Tr2	Collector-base voltage (Emitter open)	$V_{\text{CBO}}$	-15	V
	Collector-emitter voltage (Base open)	$V_{\text{CEO}}$	-10	V
	Emitter-base voltage (Collector open)	$V_{\text{EBO}}$	-7	V
	Collector current	$I_{\text{C}}$	-0.5	A
	Peak collector current	$I_{\text{CP}}$	-1	A
Overall	Total power dissipation	$P_{\text{T}}$	300	mW
	Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
	Storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$



Marking Symbol: 51

Internal Connection



(Note) The part number in the parenthesis shows conventional part number.

## ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

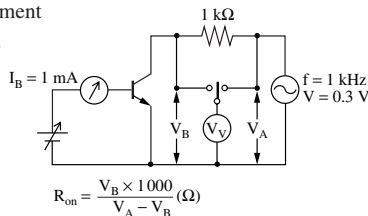
### • Tr1

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	$V_{CBO}$	$I_C = 10 \mu\text{A}, I_E = 0$	25			V
Collector-emitter voltage (Base open)	$V_{CEO}$	$I_C = 1 \text{ mA}, I_B = 0$	20			V
Emitter-base voltage (Collector open)	$V_{EBO}$	$I_E = 10 \mu\text{A}, I_C = 0$	12			V
Collector-base cutoff current (Emitter open)	$I_{CBO}$	$V_{CB} = 25 \text{ V}, I_E = 0$			0.1	$\mu\text{A}$
Forward current transfer ratio *1	$h_{FE1}$	$V_{CE} = 2 \text{ V}, I_C = 0.5 \text{ A}$	200		800	—
	$h_{FE2}$	$V_{CE} = 2 \text{ V}, I_C = 1 \text{ A}$	60			
Collector-emitter saturation voltage *1	$V_{CE(sat)}$	$I_C = 0.5 \text{ A}, I_B = 20 \text{ mA}$		0.13	0.40	V
Base-emitter saturation voltage *1	$V_{BE(sat)}$	$I_C = 0.5 \text{ A}, I_B = 20 \text{ mA}$			1.2	V
Transition frequency	$f_T$	$V_{CB} = 10 \text{ V}, I_E = -50 \text{ mA}, f = 200 \text{ MHz}$		200		MHz
Collector output capacitance (Common base, input open circuited)	$C_{ob}$	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$		10		pF
ON resistance *2	$R_{on}$			1.0		$\Omega$

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

2. \*1: Pulse measurement

\*2:  $R_{on}$  test circuit



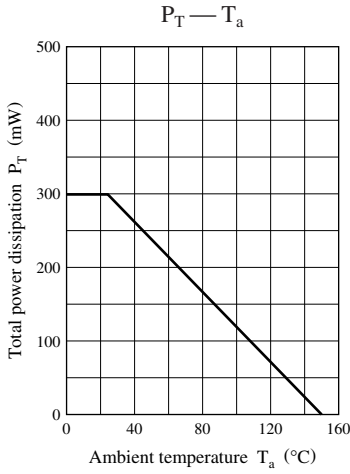
### • Tr2

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	$V_{CBO}$	$I_C = -10 \mu\text{A}, I_E = 0$	-15			V
Collector-emitter voltage (Base open)	$V_{CEO}$	$I_C = -1 \text{ mA}, I_B = 0$	-10			V
Emitter-base voltage (Collector open)	$V_{EBO}$	$I_E = -10 \mu\text{A}, I_C = 0$	-7			V
Collector-base cutoff current (Emitter open)	$I_{CBO}$	$V_{CB} = -10 \text{ V}, I_E = 0$			-0.1	$\mu\text{A}$
Forward current transfer ratio *	$h_{FE1}$	$V_{CE} = -2 \text{ V}, I_C = -0.5 \text{ A}$	100		350	—
	$h_{FE2}$	$V_{CE} = -2 \text{ V}, I_C = -1 \text{ A}$	60			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -0.4 \text{ A}, I_B = -8 \text{ mA}$		-0.16	-0.30	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = -0.4 \text{ A}, I_B = -8 \text{ mA}$		-0.8	-1.2	V
Transition frequency	$f_T$	$V_{CB} = -10 \text{ V}, I_E = 50 \text{ mA}, f = 200 \text{ MHz}$		130		MHz
Collector output capacitance (Common base, input open circuited)	$C_{ob}$	$V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$		22		pF

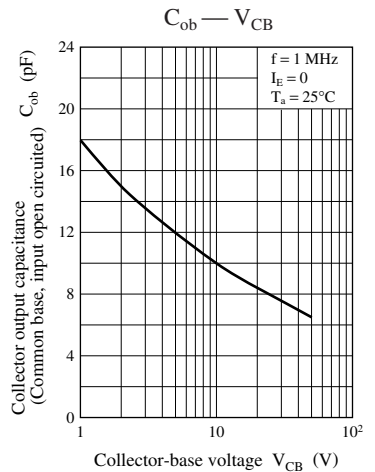
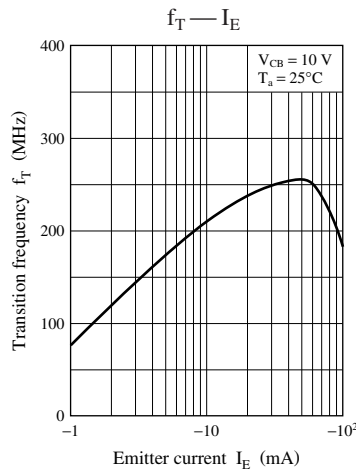
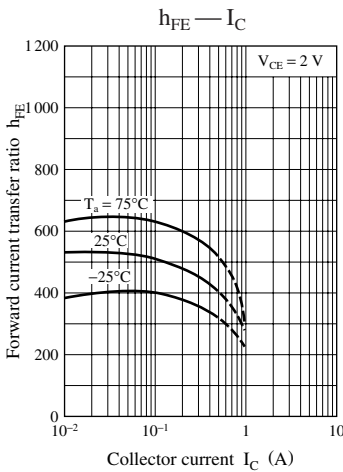
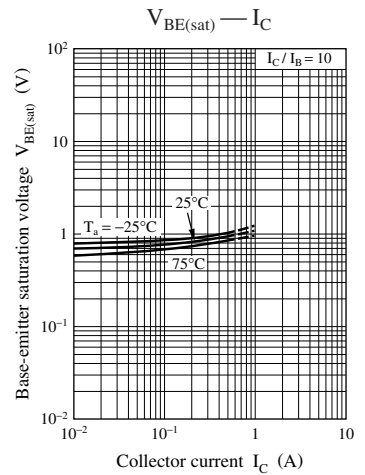
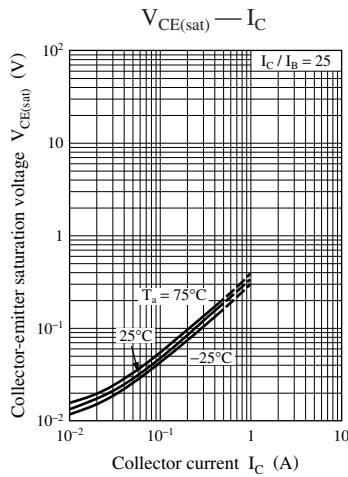
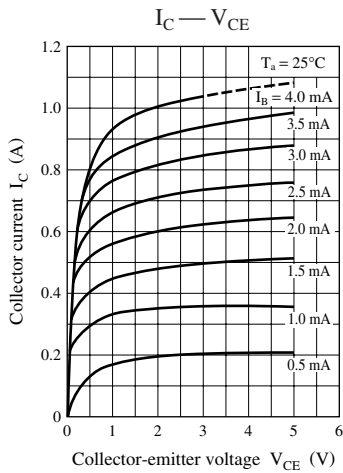
Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

2. \*: Pulse measurement

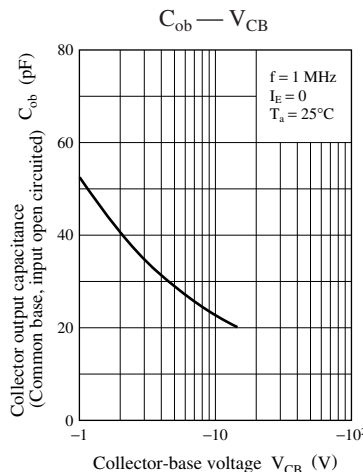
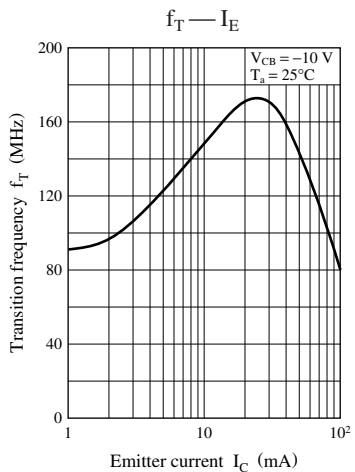
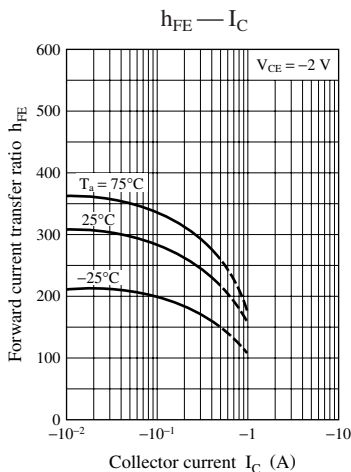
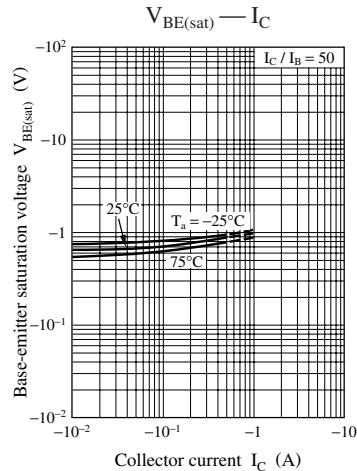
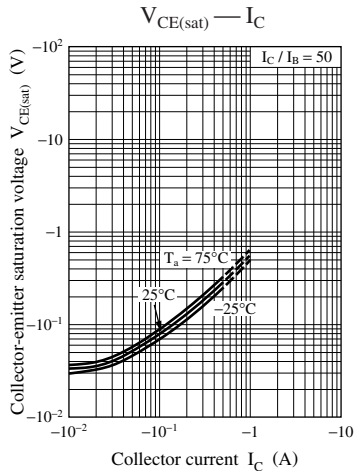
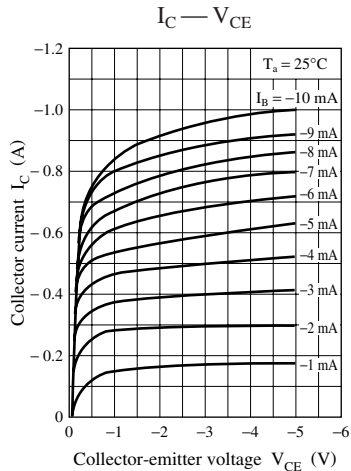
Common characteristics chart



Characteristics charts of Tr1



Characteristics charts of Tr2



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