

# 2SD1993

## Silicon NPN epitaxial planar type

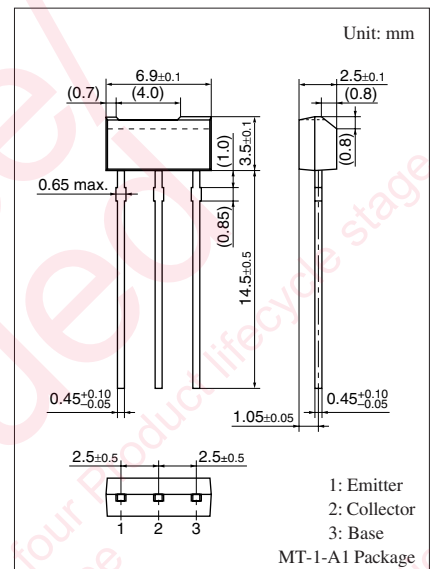
For low-frequency and low-noise amplification

### ■ Features

- Low noise voltage NV
- High forward current transfer ratio  $h_{FE}$
- Allowing supply with the radial taping

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

Parameter	Symbol	Rating	Unit
Collector-base voltage (Emitter open)	$V_{CBO}$	55	V
Collector-emitter voltage (Base open)	$V_{CEO}$	55	V
Emitter-base voltage (Collector open)	$V_{EBO}$	7	V
Collector current	$I_C$	100	mA
Peak collector current	$I_{CP}$	200	mA
Collector power dissipation	$P_C$	400	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$



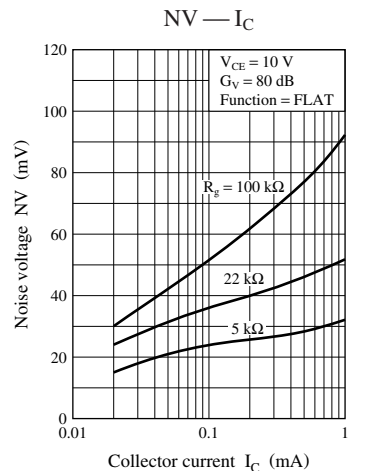
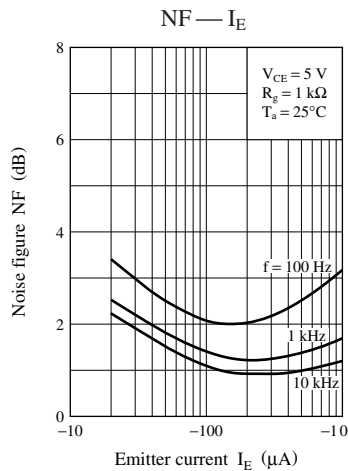
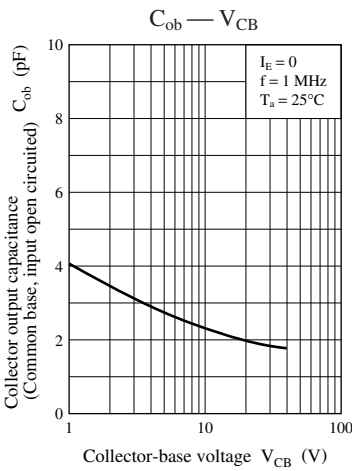
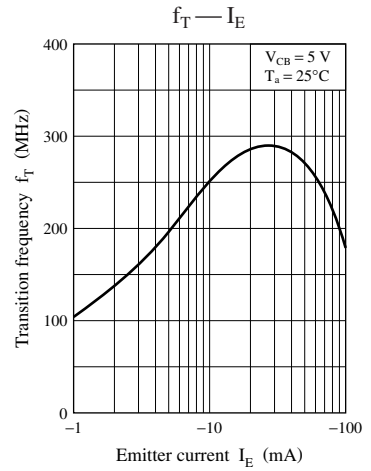
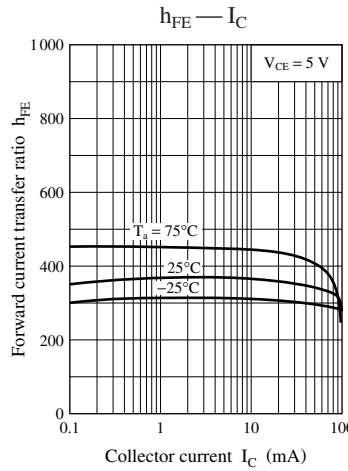
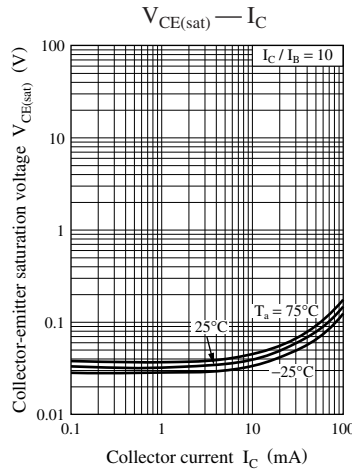
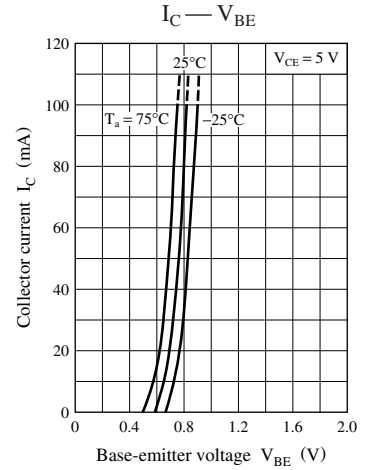
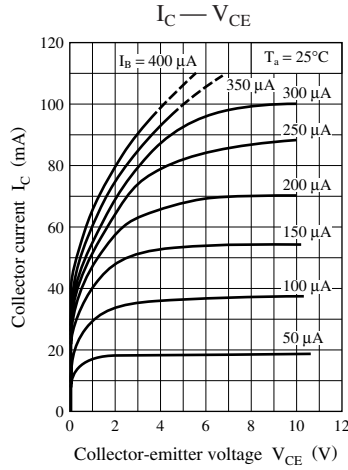
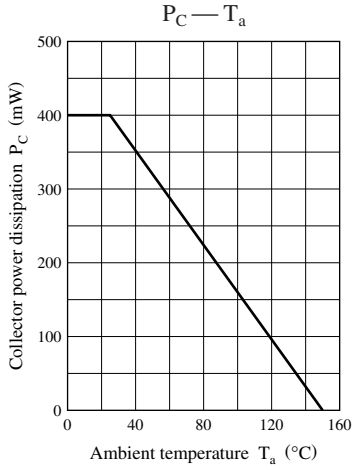
### ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base voltage (Emitter open)	$V_{CBO}$	$I_C = 10 \mu\text{A}, I_E = 0$	55			V
Collector-emitter voltage (Base open)	$V_{CEO}$	$I_C = 2 \text{ mA}, I_B = 0$	55			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)	$I_{CBO}$	$V_{CB} = 20 \text{ V}, I_E = 0$			0.1	$\mu\text{A}$
Collector-emitter cutoff current (Base open)	$I_{CEO}$	$V_{CE} = 20 \text{ V}, I_B = 0$			1	$\mu\text{A}$
Forward current transfer ratio *	$h_{FE}$	$V_{CE} = 10 \text{ V}, I_C = 2 \text{ mA}$	210		650	—
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 100 \text{ mA}, I_B = 10 \text{ mA}$			1	V
Transition frequency	$f_T$	$V_{CB} = 10 \text{ V}, I_E = -2 \text{ mA}, f = 200 \text{ MHz}$		200		MHz
Noise voltage	NV	$V_{CE} = 10 \text{ V}, I_C = 1 \text{ mA}, G_V = 80 \text{ dB}$ $R_g = 100 \text{ k}\Omega, \text{Function} = \text{FLAT}$			150	mV

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

2. \*: Rank classification

Rank	R	S	T
$h_{FE}$	210 to 340	290 to 460	360 to 650



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