

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process)

# 2SA1312

## Audio Frequency Low Noise Amplifier Applications

- High voltage:  $V_{CEO} = -120\text{ V}$
- Excellent  $h_{FE}$  linearity:  $h_{FE}(I_C = -0.1\text{ mA}) / h_{FE}(I_C = -2\text{ mA})$   
 $h = 0.95$  (typ.)
- High  $h_{FE}$ :  $h_{FE} = 200\sim 700$
- Low noise:  $NF(2) = 0.2\text{ dB}$  (typ.),  $3\text{ dB}$  (max) at  $f = 1\text{ kHz}$
- Complementary to 2SC3324
- Small package

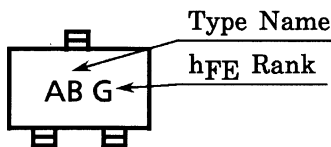
## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-120	V
Collector-emitter voltage	$V_{CEO}$	-120	V
Emitter-base voltage	$V_{EBO}$	-5	V
Collector current	$I_C$	-100	mA
Base current	$I_B$	-20	mA
Collector power dissipation	$P_C$	150	mW
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~125	$^\circ\text{C}$

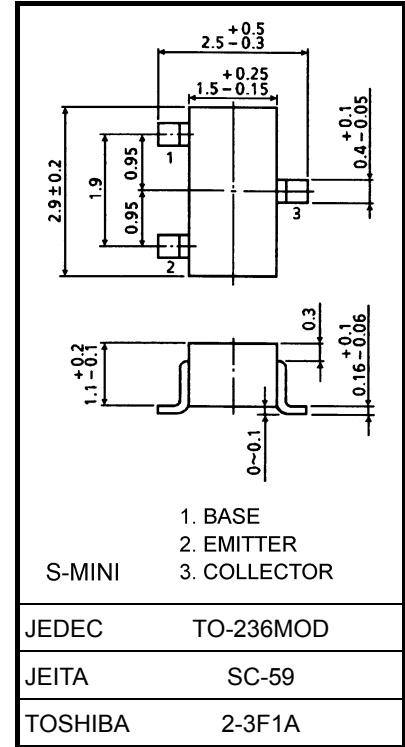
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Marking



Unit: mm



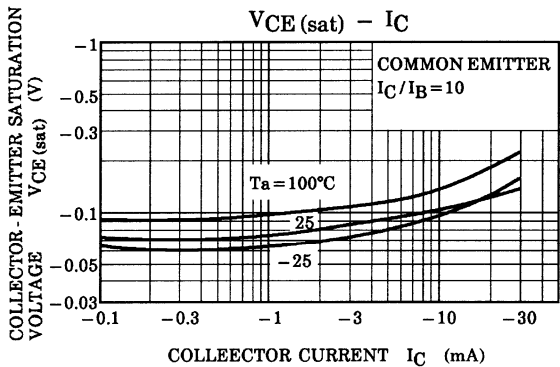
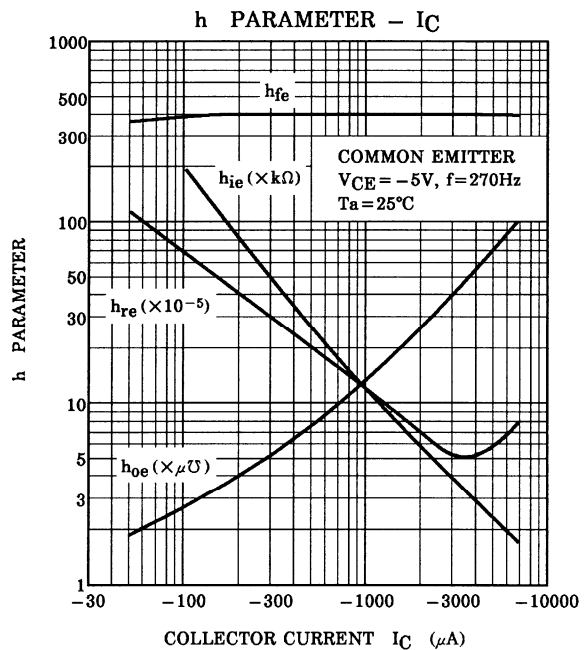
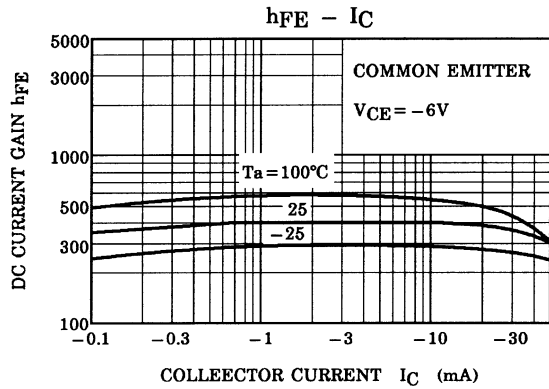
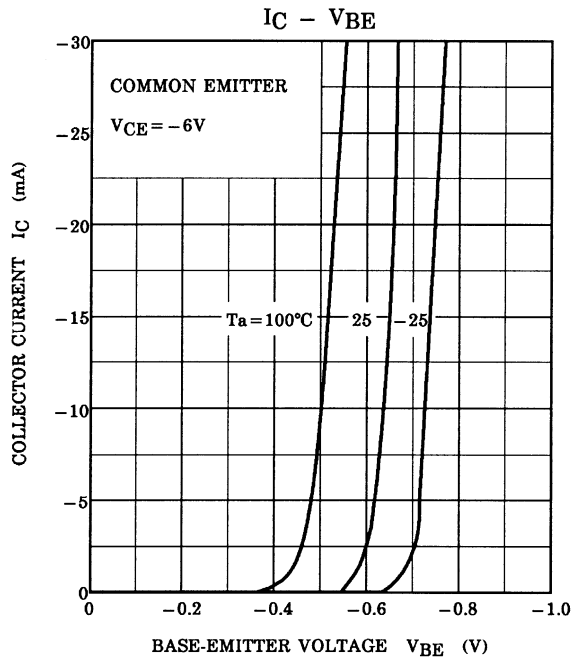
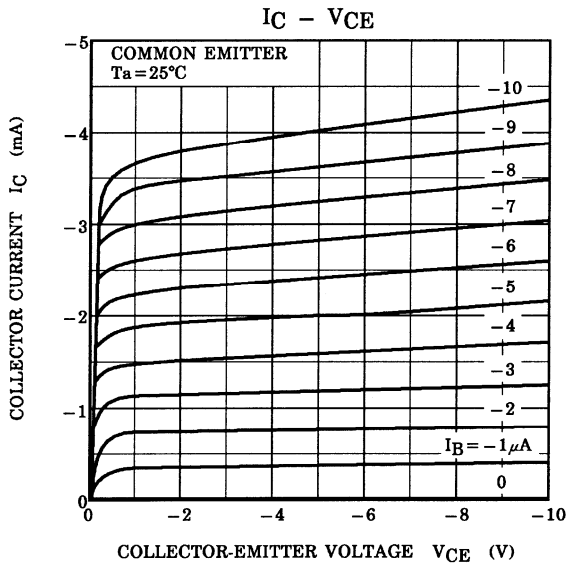
Weight: 0.012 g (typ.)

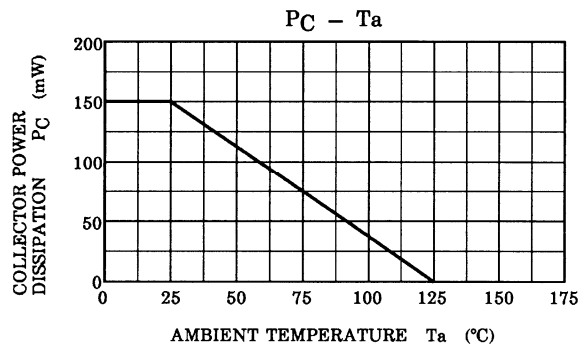
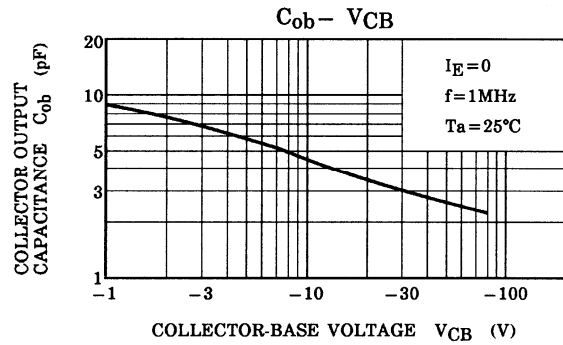
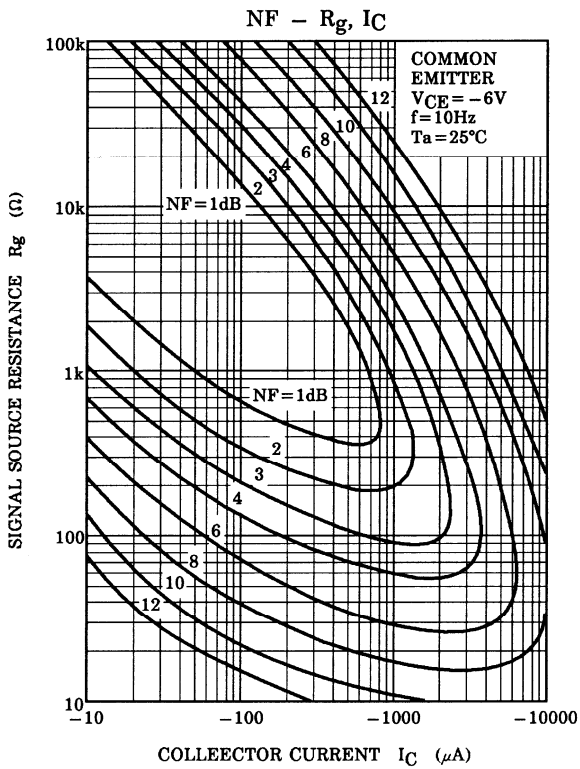
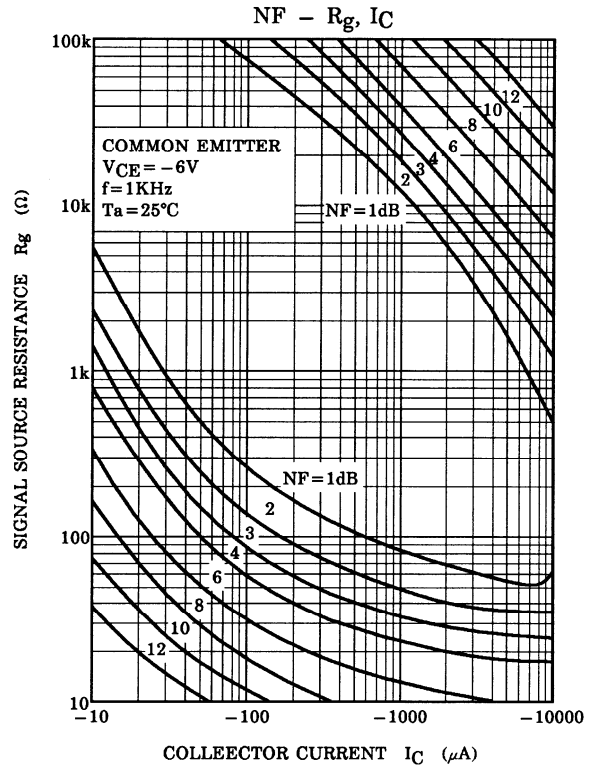
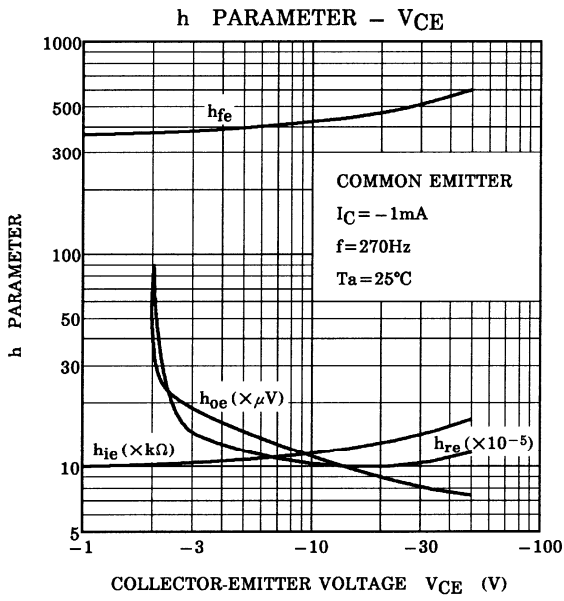
## Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -120\text{ V}, I_E = 0$	—	—	-0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0$	—	—	-0.1	$\mu\text{A}$
DC current gain	$h_{FE}$ (Note)	$V_{CE} = -6\text{ V}, I_C = -2\text{ mA}$	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -10\text{ mA}, I_B = -1\text{ mA}$	—	—	-0.3	V
Transition frequency	$f_T$	$V_{CE} = -6\text{ V}, I_C = -1\text{ mA}$	—	100	—	MHz
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	4	—	pF
Noise figure	NF (1)	$V_{CE} = -6\text{ V}, I_C = -0.1\text{ mA}, f = 100\text{ Hz}, R_g = 10\text{ k}\Omega$	—	0.5	6	dB
	NF (2)	$V_{CE} = -6\text{ V}, I_C = -0.1\text{ mA}, f = 1\text{ kHz}, R_g = 10\text{ k}\Omega$	—	0.2	3	

Note:  $h_{FE}$  classification GR (G): 200~400, BL (L): 350~700

( ) marking symbol





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