

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  $h_{FE}$ :  $h_{FE} = 200$  to  $700$
- 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	$P_C$ (Note 1, 3)	200	mW
	$P_C$ (Note 2)	150	
Junction temperature	$T_j$ (Note 1)	150	°C
	$T_j$ (Note 2)	125	
Storage temperature range	$T_{stg}$ (Note 1)	-55 to 150	°C
	$T_{stg}$ (Note 2)	-55 to 125	

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.

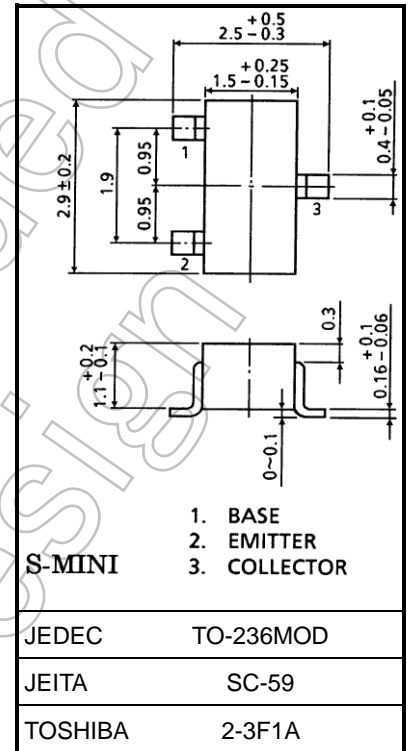
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: For devices with the ordering part number ending in LF(T).

Note 2: For devices with the ordering part number in other than LF(T).

Note 3: Mounted on a FR4 board, (25.4 mm × 25.4 mm × 1.6 mm, Cu pad: 0.8 mm<sup>2</sup> × 3)

Unit: mm



Weight: 0.012 g (typ.)

Start of commercial production  
1982-12

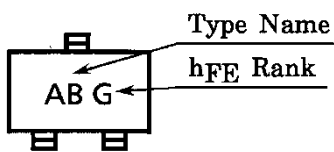
### Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	V <sub>CB</sub> = -120 V, I <sub>E</sub> = 0 A	—	—	-0.1	μA
Emitter cut-off current	IEBO	V <sub>EB</sub> = -5 V, I <sub>C</sub> = 0 A	—	—	-0.1	μA
DC current gain	h <sub>FE</sub> (Note)	V <sub>CE</sub> = -6 V, I <sub>C</sub> = -2 mA	200	—	700	—
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	I <sub>C</sub> = -10 mA, I <sub>B</sub> = -1 mA	—	—	-0.3	V
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> = -6 V, I <sub>C</sub> = -1 mA	—	100	—	MHz
Collector output capacitance	C <sub>ob</sub>	V <sub>CB</sub> = -10 V, I <sub>E</sub> = 0 A, f = 1 MHz	—	4	—	pF
Noise figure	NF (1)	V <sub>CE</sub> = -6 V, I <sub>C</sub> = -0.1 mA, f = 100 Hz, R <sub>G</sub> = 10 kΩ	—	0.5	6	dB
	NF (2)	V <sub>CE</sub> = -6 V, I <sub>C</sub> = -0.1 mA, f = 1 kHz, R <sub>G</sub> = 10 kΩ	—	0.2	3	

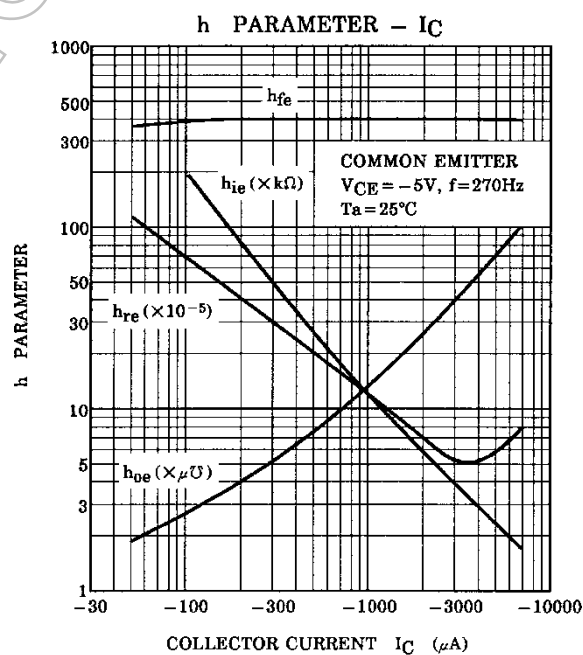
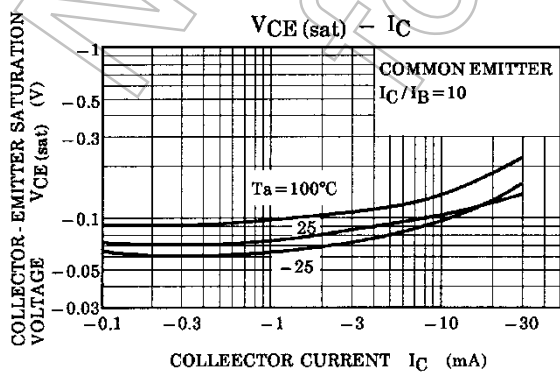
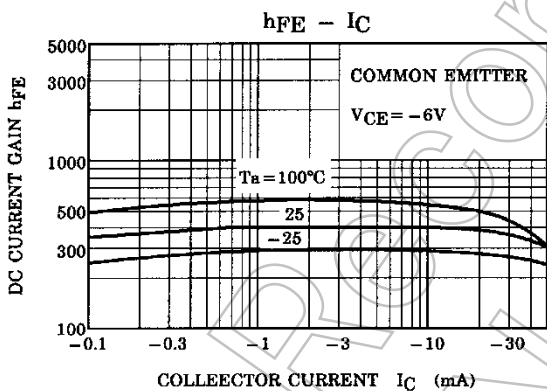
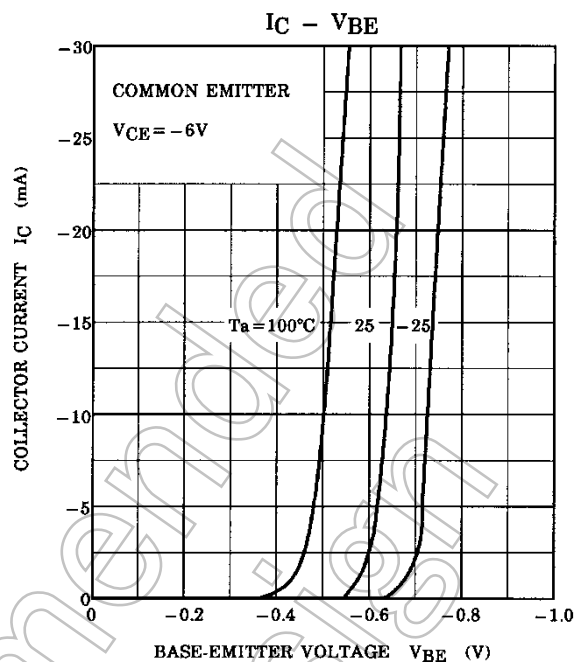
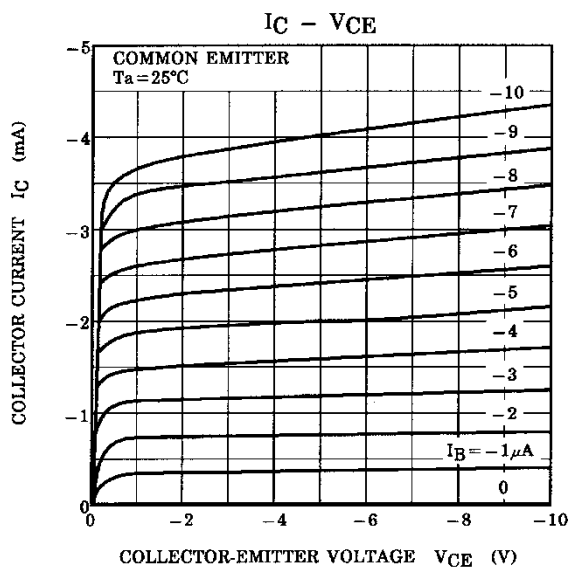
Note: h<sub>FE</sub> classification GR (G): 200 to 400, BL (L): 350 to 700

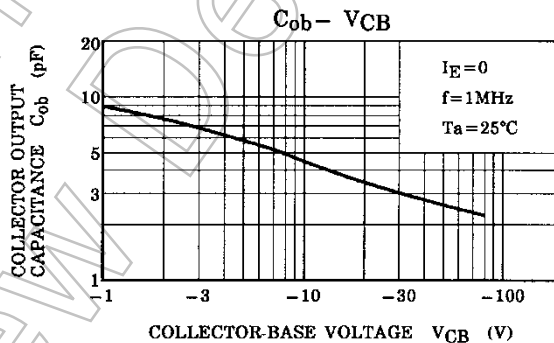
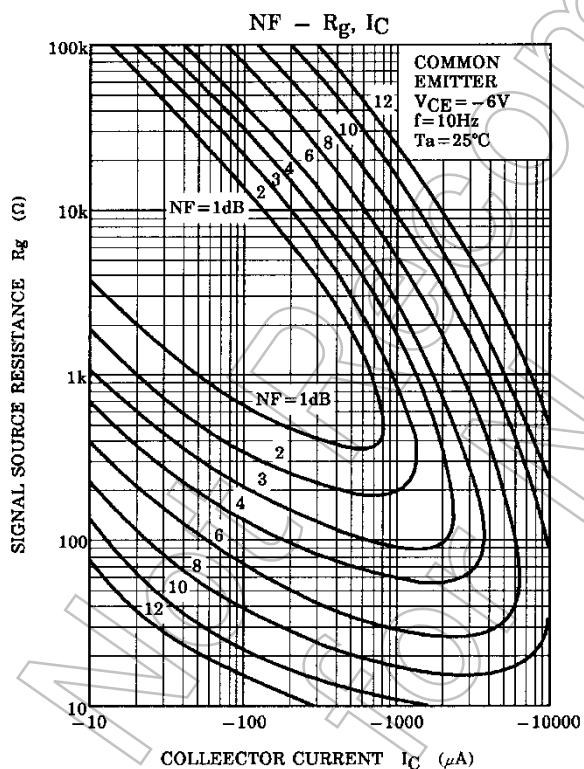
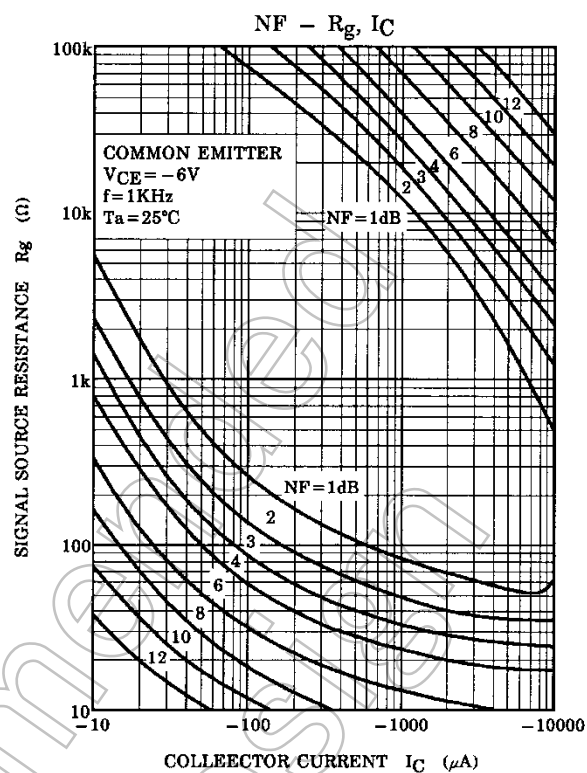
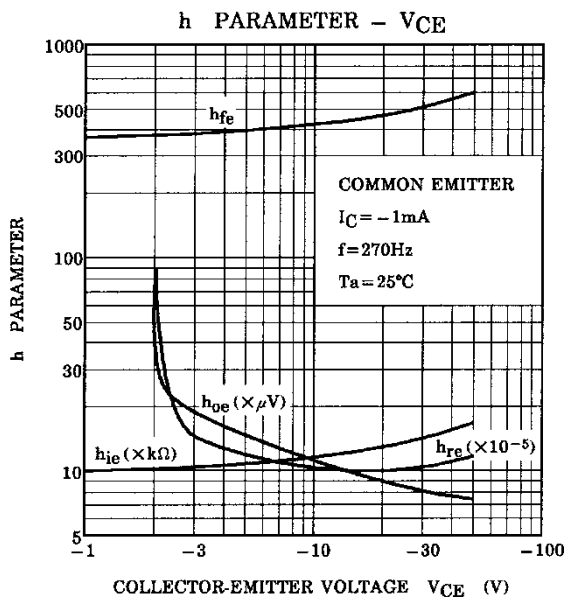
( ) marking symbol

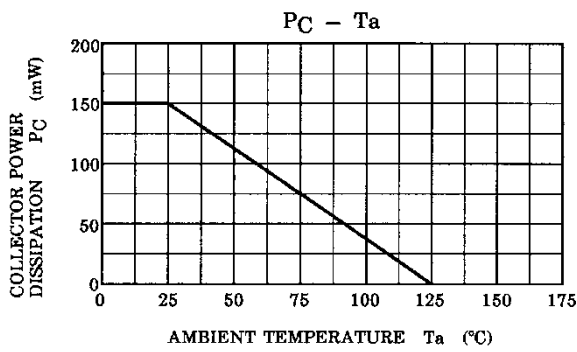
### Marking



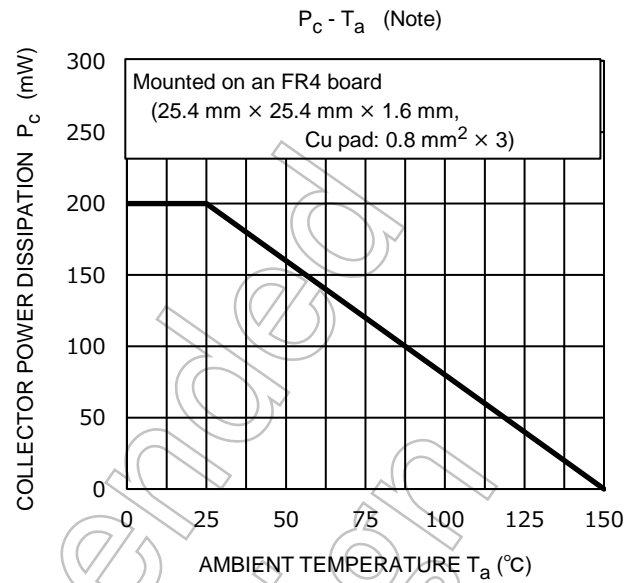
### Characteristics Curves







Note: Reference only with  $T_j$  of 125 °C.



Note: Reference only with  $T_j$  of 150 °C.

The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Not Recommended for New Design

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