

# 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  $h_{FE}$ :  $h_{FE} = 200\sim700$
- Low noise:  $NF(2) = 0.2\text{ dB}$  (typ.),  $3\text{ dB}$  (max) at  $f = 1\text{ kHz}$
- Complementary to 2SC3324
- Small package

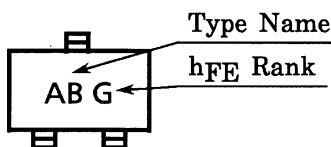
## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| 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 | $^\circ\text{C}$ |

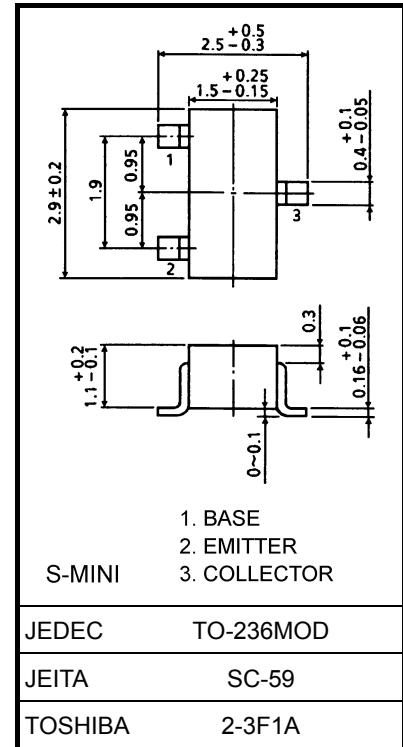
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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



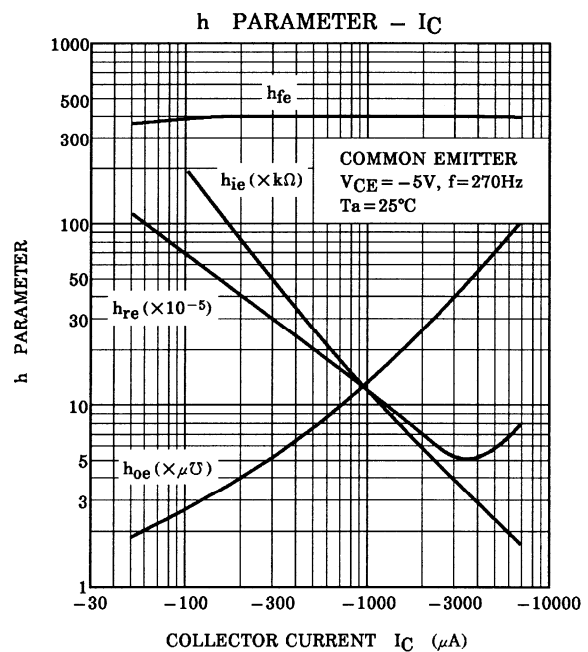
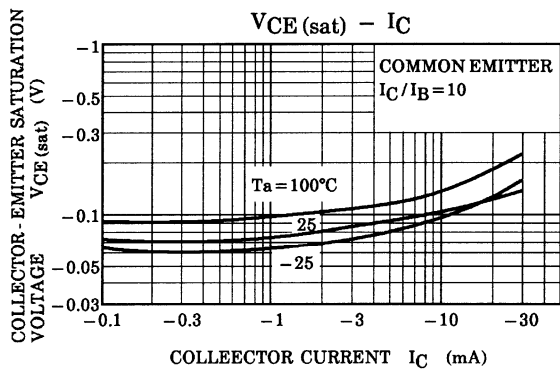
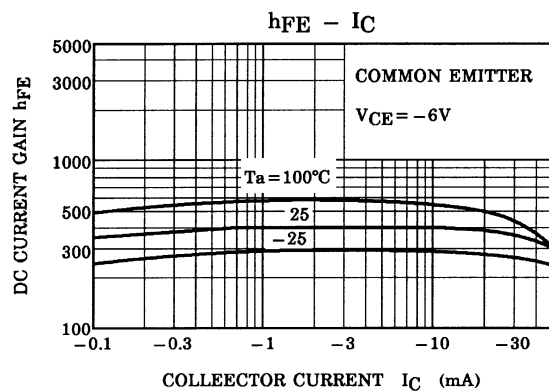
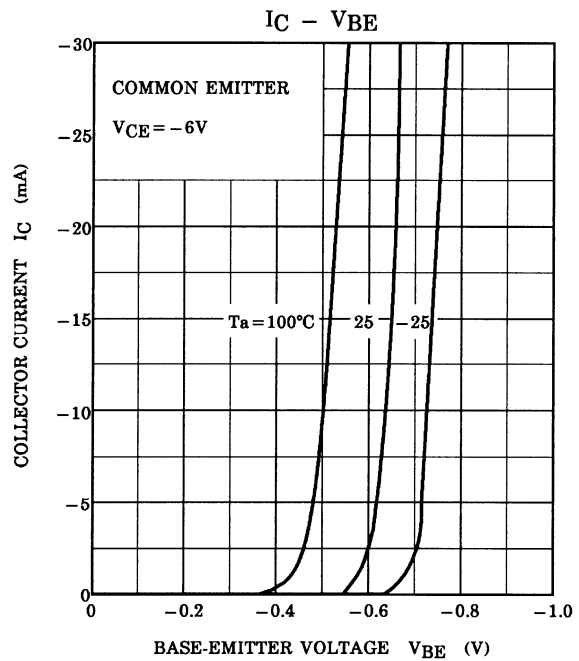
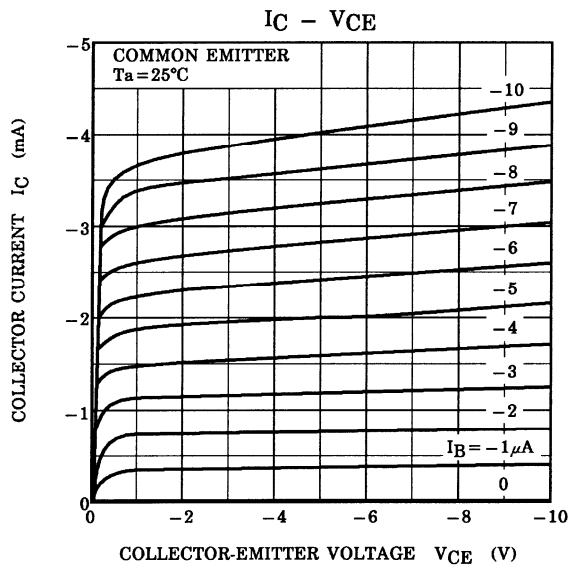
Weight: 0.012 g (typ.)

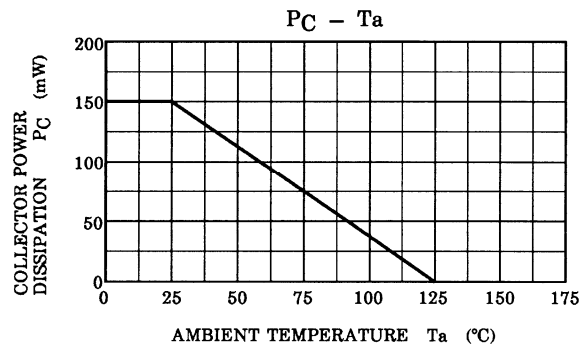
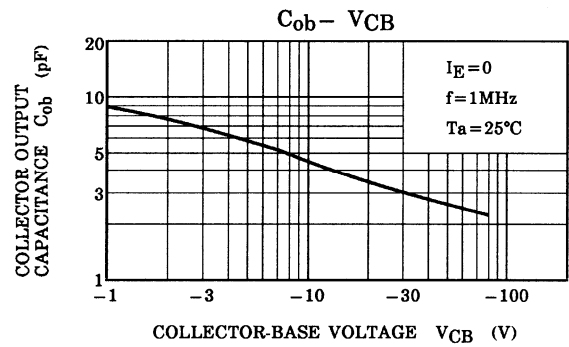
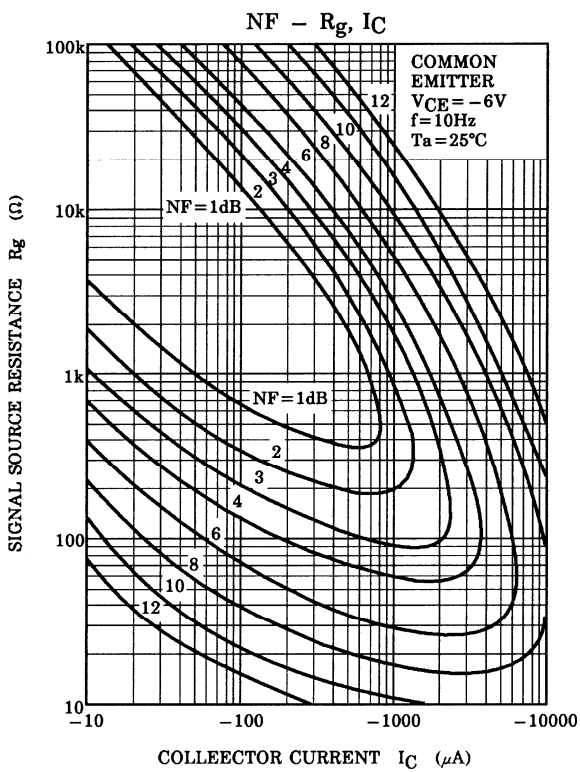
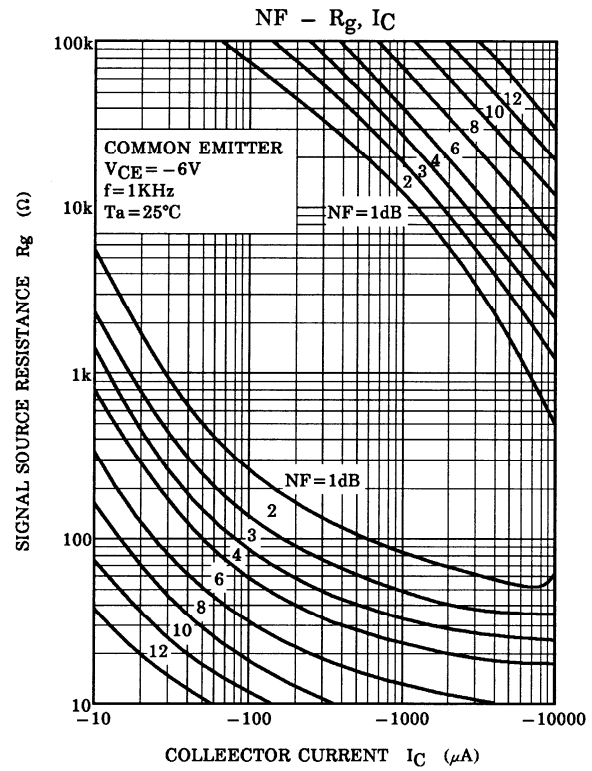
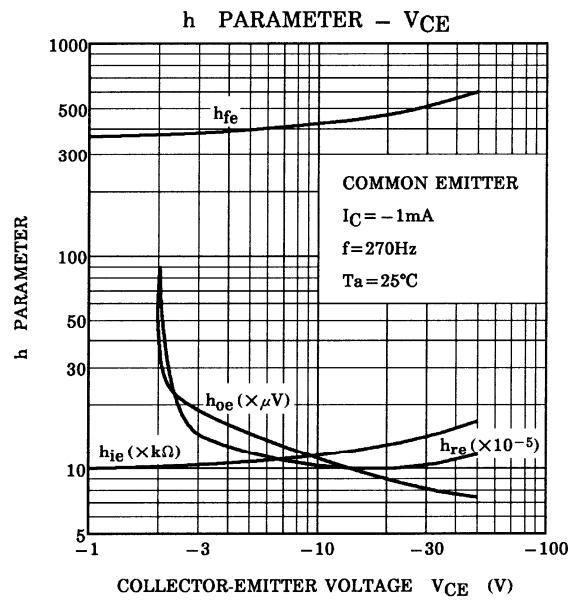
## Electrical Characteristics (Ta = 25°C)

| 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                      | $h_{FE}$<br>(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)             | $V_{CE} = -6\text{ V}$ , $I_C = -0.1\text{ mA}$ , $f = 100\text{ Hz}$ ,<br>$R_g = 10\text{ k}\Omega$ | —   | 0.5  | 6    | dB            |
|                                      | NF (2)             | $V_{CE} = -6\text{ V}$ , $I_C = -0.1\text{ mA}$ , $f = 1\text{ kHz}$ ,<br>$R_g = 10\text{ k}\Omega$  | —   | 0.2  | 3    |               |

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

( ) marking symbol





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Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

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