

TOSHIBA Transistor Silicon-Germanium NPN Epitaxial Planer Type

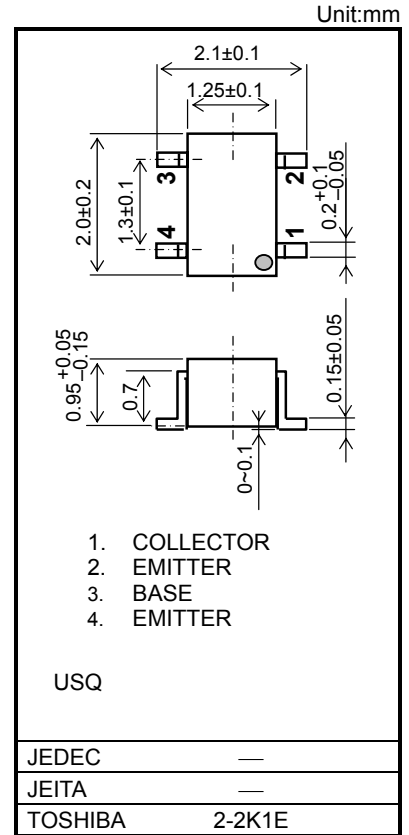
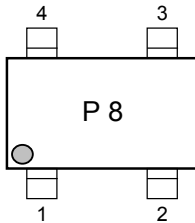
# MT4S102U

UHF-SHF Low Noise Amplifier Application

## FEATURES

- Low Noise Figure :NF=0.58dB (@f=2GHz)
- High Gain:|S21e|<sup>2</sup>=15.0dB (@f=2GHz)

## Marking



Weight: 0.006 g

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics             | Symbol           | Rating  | Unit |
|-----------------------------|------------------|---------|------|
| Collector-Base voltage      | V <sub>CBO</sub> | 6       | V    |
| Collector-Emitter voltage   | V <sub>CEO</sub> | 3       | V    |
| Emitter-Base voltage        | V <sub>EBO</sub> | 1.2     | V    |
| Collector-Current           | I <sub>C</sub>   | 20      | mA   |
| Base-Current                | I <sub>B</sub>   | 10      | mA   |
| Collector Power dissipation | P <sub>C</sub>   | 60      | mW   |
| Junction temperature        | T <sub>j</sub>   | 150     | °C   |
| Storage temperature Range   | T <sub>stg</sub> | -55~150 | °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).

**Microwave Characteristics (Ta = 25°C)**

| Characteristics      | Symbol           | Test Condition                  | Min  | Typ. | Max  | Unit |
|----------------------|------------------|---------------------------------|------|------|------|------|
| Transition Frequency | $f_T$            | $V_{CE}=2V, I_C=15mA, f=2GHz$   | 20   | 24   | —    | GHz  |
| Insertion Gain       | $ S_{21e} ^2(1)$ | $V_{CE}=2V, I_C=15mA, f=2GHz$   | 12.5 | 15.0 | —    | dB   |
|                      | $ S_{21e} ^2(2)$ | $V_{CE}=2V, I_C=15mA, f=5.2GHz$ | —    | 8.0  | —    | dB   |
| Noise Figure         | NF(1)            | $V_{CE}=2V, I_C=10mA, f=2GHz$   | —    | 0.58 | 0.85 | dB   |
|                      | NF(2)            | $V_{CE}=2V, I_C=10mA, f=5.2GHz$ | —    | 1.4  | —    | dB   |

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

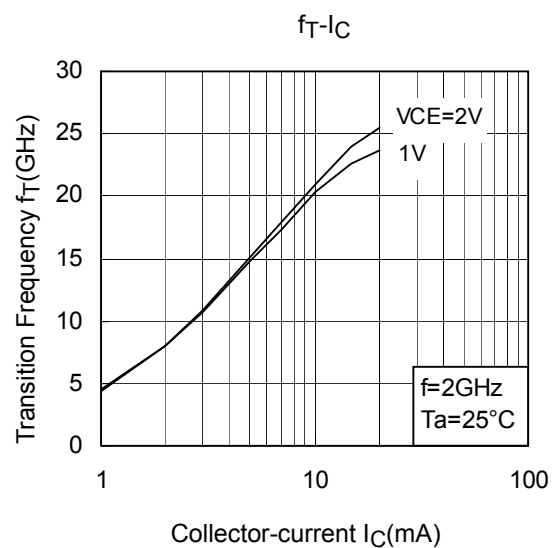
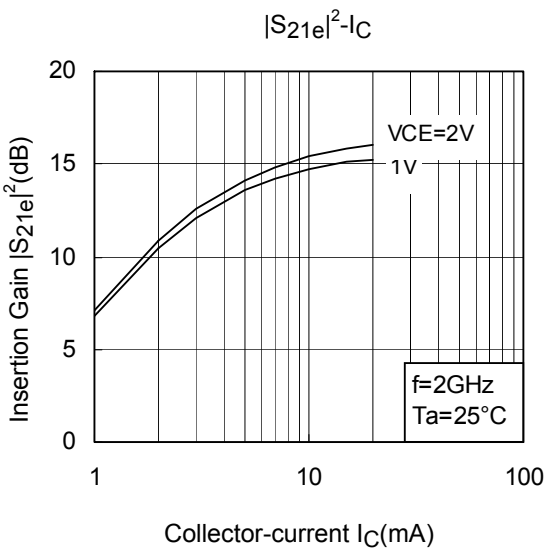
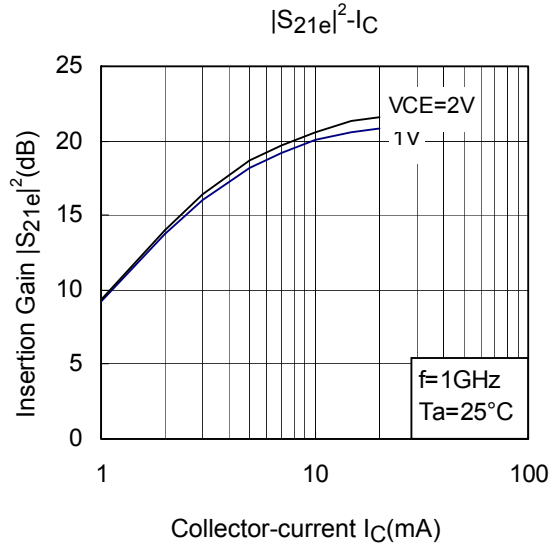
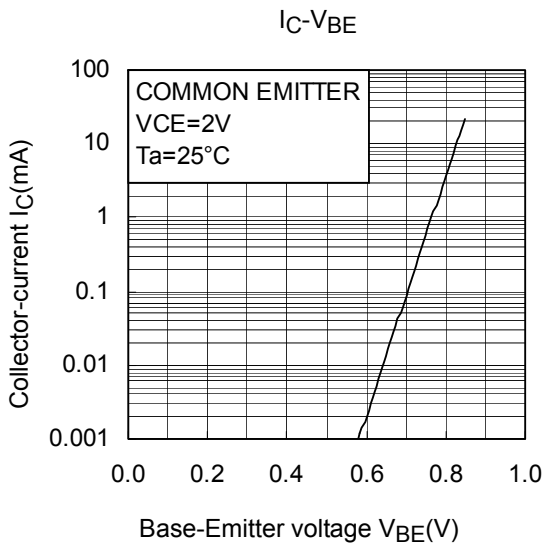
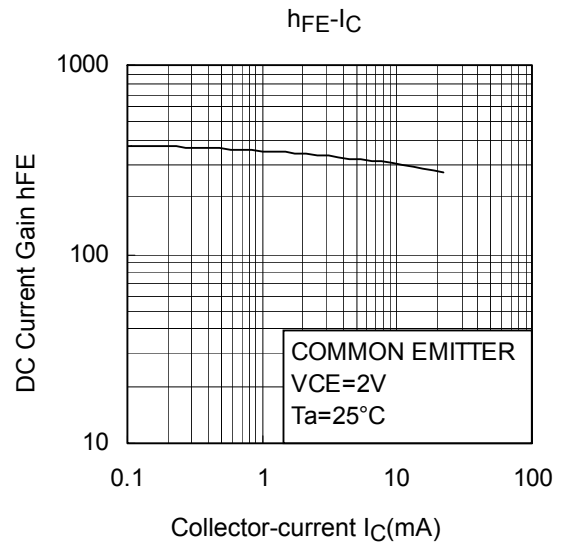
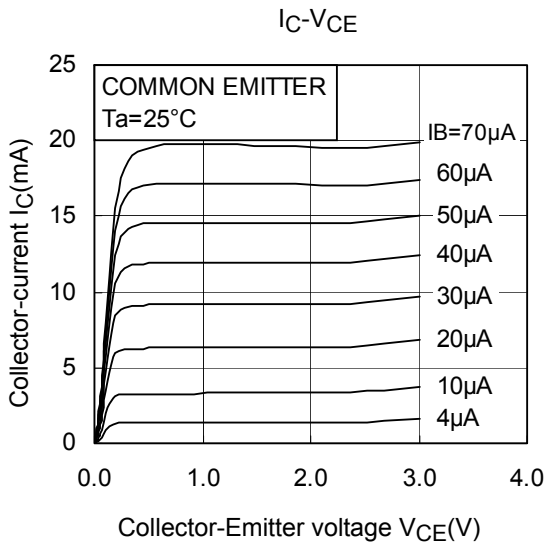
| Characteristics              | Symbol    | Test Condition                      | Min | Typ. | Max  | Unit    |
|------------------------------|-----------|-------------------------------------|-----|------|------|---------|
| Collector Cut-off Current    | $I_{CBO}$ | $V_{CB}=6V, I_E=0$                  | —   | —    | 1    | $\mu A$ |
| Emitter Cut-off Current      | $I_{EBO}$ | $V_{EB}=1V, I_C=0$                  | —   | —    | 1    | $\mu A$ |
| DC Current Gain              | hFE       | $V_{CE}=2V, I_C=15mA$               | 200 | —    | 400  | -       |
| Output Capacitance           | $C_{ob}$  | $V_{CB}=2V, I_E=0, f=1MHz$          | —   | 0.43 | 0.6  | pF      |
| Reverse Transfer Capacitance | $C_{re}$  | $V_{CB}=2V, I_E=0, f=1MHz$ (Note 1) | —   | 0.17 | 0.25 | pF      |

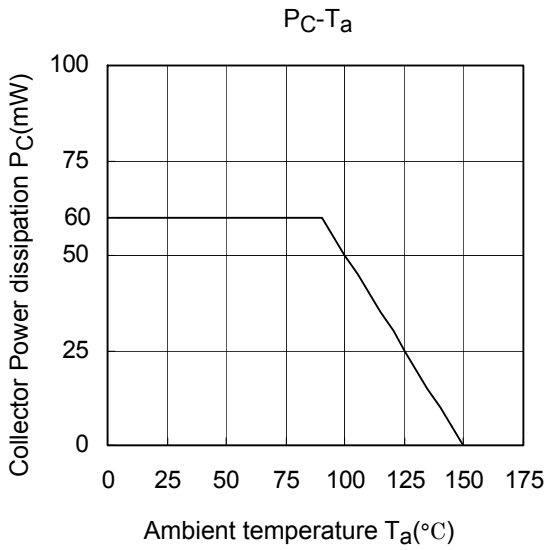
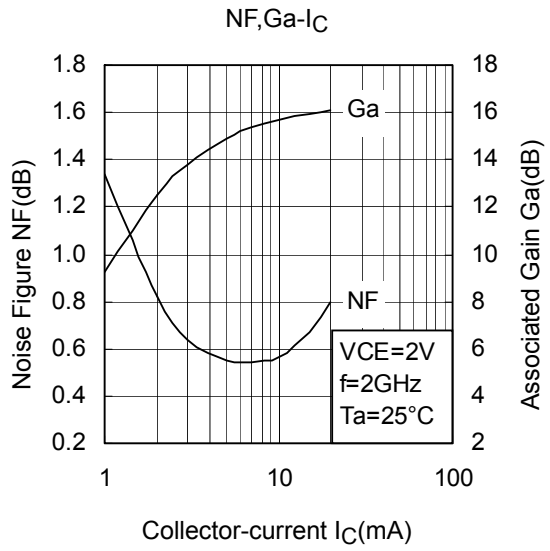
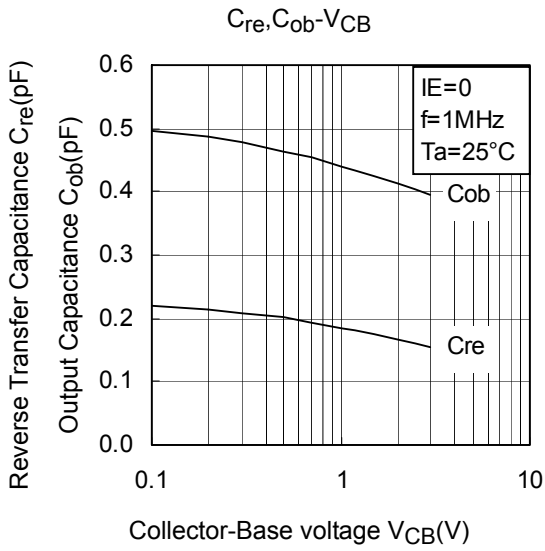
**Note 1:** Cre is measured by 3 terminal method with capacitance bridge.

**Caution:**

This device is sensitive to electrostatic discharge due to applied the high frequency transistor process of  $f_T=60GHz$  class is used for this product.

Please make enough tool and equipment earthed when you handle.





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20070701-EN GENERAL

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