

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC5107

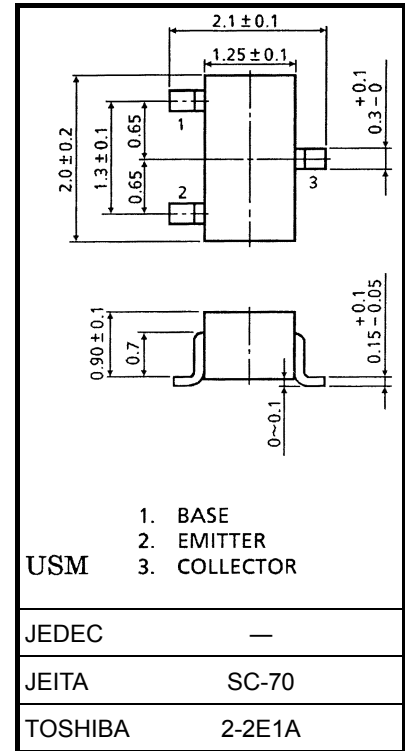
For VCO Application

Unit: mm

Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|-----------------------------|------------------|------------|------|
| Collector-base voltage | V _{CBO} | 20 | V |
| Collector-emitter voltage | V _{CEO} | 10 | V |
| Emitter-base voltage | V _{EBO} | 3 | V |
| Base current | I _B | 15 | mA |
| Collector current | I _C | 30 | mA |
| Collector power dissipation | P _C | 100 | mW |
| Junction temperature | T _j | 125 | °C |
| Storage temperature range | T _{stg} | -55 to 125 | °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).



Weight: 6 mg (typ.)

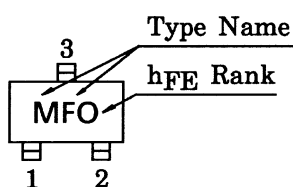
Electrical Characteristics (Ta = 25°C)

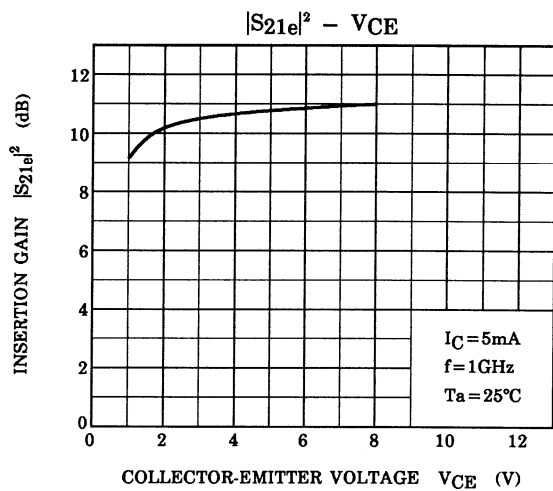
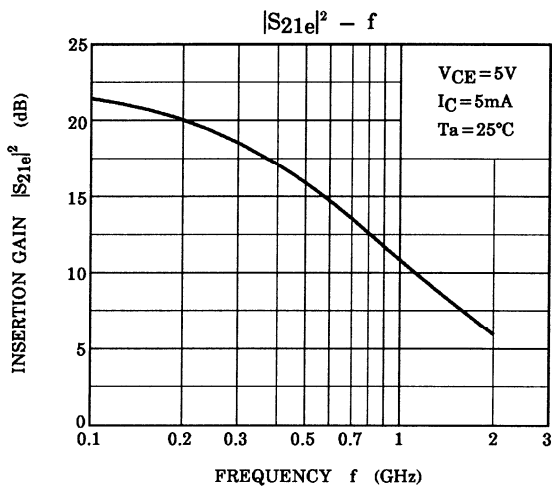
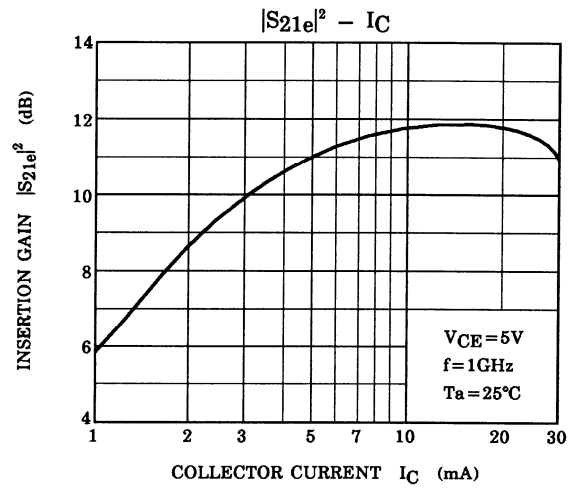
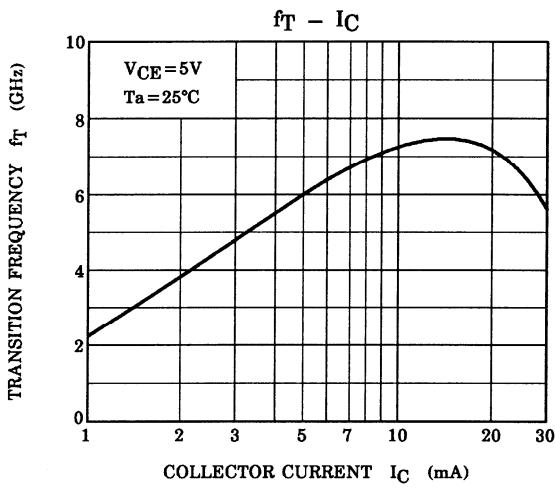
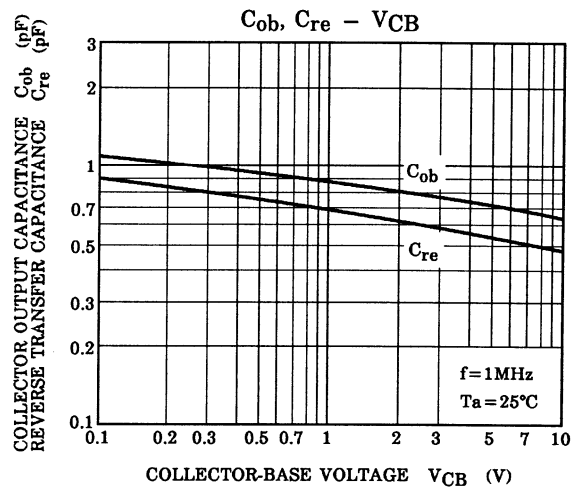
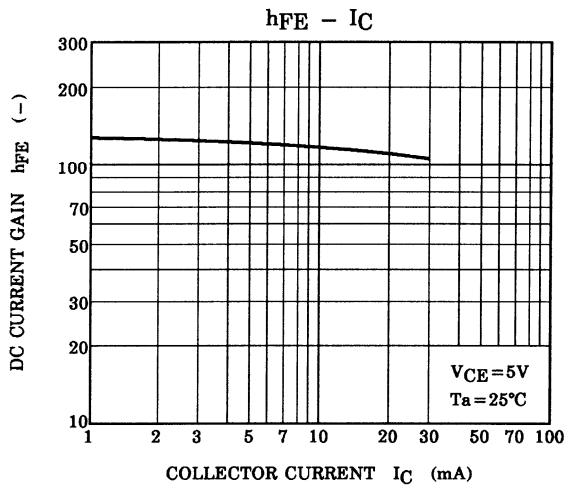
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|------------------------------|----------------------|---|-----|------|-----|---------------|
| Collector cut-off current | I_{CBO} | $V_{CB} = 10\text{ V}, I_E = 0$ | — | — | 0.1 | μA |
| Emitter cut-off current | I_{EBO} | $V_{EB} = 1\text{ V}, I_C = 0$ | — | — | 0.1 | μA |
| DC current gain | h_{FE} (Note 1) | $V_{CE} = 5\text{ V}, I_C = 5\text{ mA}$ | 80 | — | 240 | — |
| Transition frequency | f_T | $V_{CE} = 5\text{ V}, I_C = 5\text{ mA}$ | 4 | 6 | — | GHz |
| Insertion gain | $ S_{21e} ^2$ | $V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$ | 7 | 11 | — | dB |
| Output capacitance | C_{ob} | $V_{CB} = 5\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note 2) | — | 0.7 | — | pF |
| Reverse transfer capacitance | C_{re} | | — | 0.5 | 0.9 | pF |
| Collector-base time constant | $C_c \cdot r_{bb'}$ | $V_{CB} = 5\text{ V}, I_C = 3\text{ mA}, f = 30\text{ MHz}$ | — | 5.5 | 15 | ps |

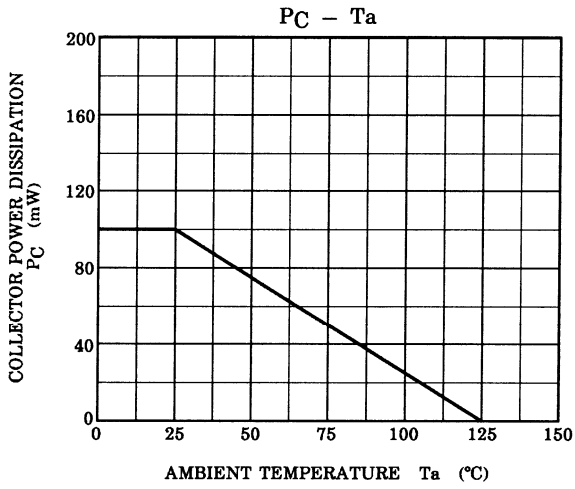
Note 1: h_{FE} classification O: 80 to 160, Y: 120 to 240

Note 2: C_{re} is measured by 3 terminal method with capacitance bridge.

Marking





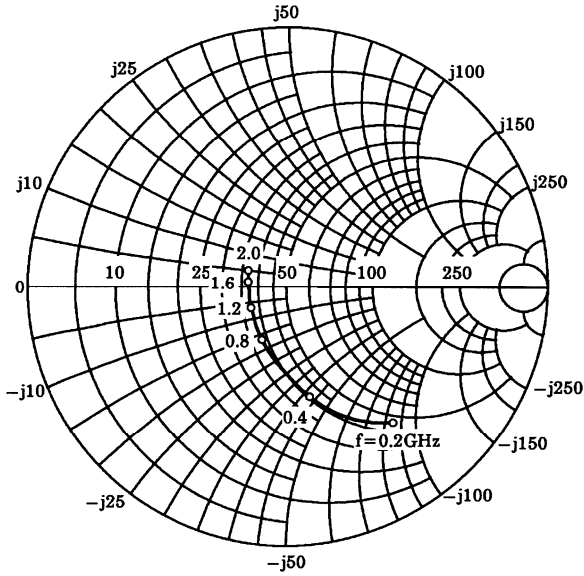


S-Parameter $Z_0 = 50 \Omega$, $T_a = 25^\circ\text{C}$

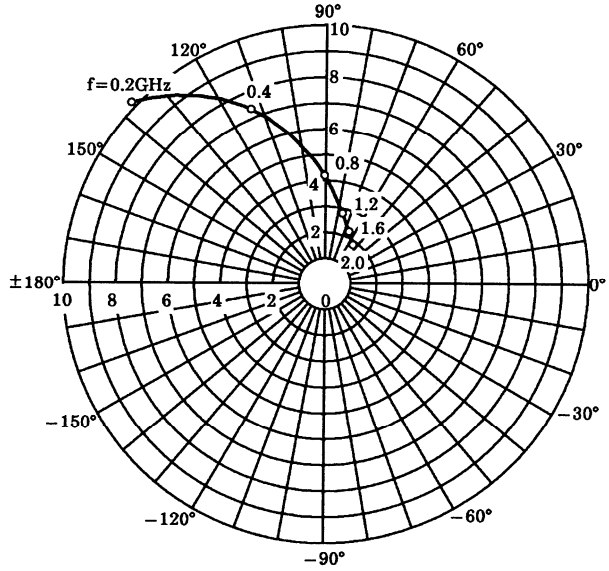
$V_{CE} = 5 \text{ V}$, $I_C = 5 \text{ mA}$

| Frequency (MHz) | S11 | | S21 | | S12 | | S22 | |
|--------------------|-------|--------|--------|-------|-------|------|-------|-------|
| | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. |
| 200 | 0.684 | -47.0 | 10.116 | 136.8 | 0.049 | 63.1 | 0.765 | -29.5 |
| 400 | 0.438 | -79.2 | 7.260 | 112.9 | 0.072 | 56.5 | 0.553 | -37.8 |
| 600 | 0.301 | -101.2 | 5.388 | 99.1 | 0.090 | 56.5 | 0.452 | -39.1 |
| 800 | 0.226 | -119.2 | 4.227 | 90.0 | 0.107 | 57.6 | 0.402 | -39.0 |
| 1000 | 0.182 | -136.2 | 3.494 | 82.7 | 0.124 | 58.8 | 0.374 | -38.9 |
| 1200 | 0.159 | -153.3 | 2.988 | 76.9 | 0.142 | 59.6 | 0.359 | -39.4 |
| 1400 | 0.147 | -170.3 | 2.632 | 71.2 | 0.163 | 59.9 | 0.348 | -40.7 |
| 1600 | 0.145 | 174.4 | 2.345 | 66.0 | 0.182 | 59.2 | 0.339 | -43.2 |
| 1800 | 0.149 | 162.6 | 2.128 | 61.4 | 0.200 | 58.4 | 0.329 | -46.3 |
| 2000 | 0.161 | 150.9 | 1.967 | 57.1 | 0.219 | 58.1 | 0.318 | -49.5 |

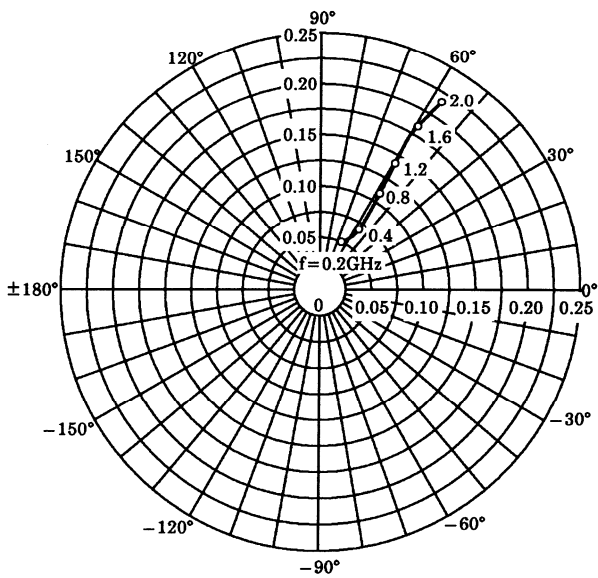
S11e
 VCE=5V
 IC=5mA
 Ta=25°C
 (UNIT : Ω)



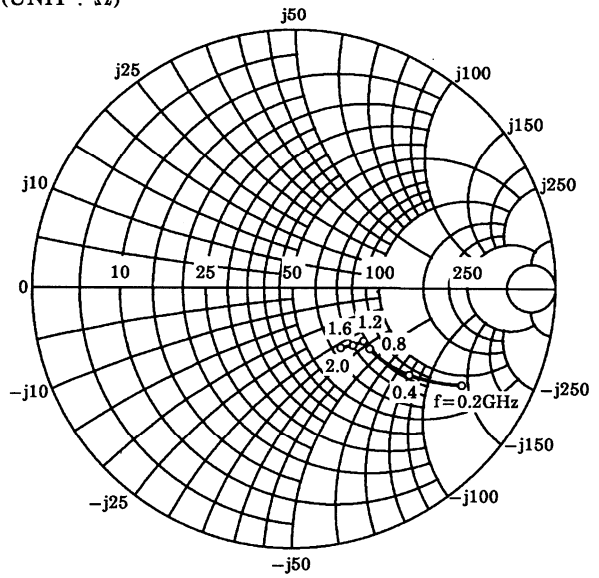
S21e
 VCE=5V
 IC=5mA
 Ta=25°C



S12e
 VCE=5V
 IC=5mA
 Ta=25°C



S22e
 VCE=5V
 IC=5mA
 Ta=25°C
 (UNIT : Ω)



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