

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC4322

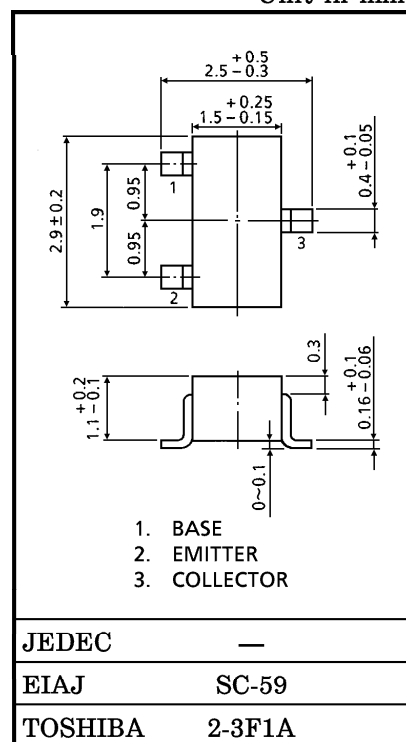
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- $NF = 1.8\text{dB}$, $|S_{21e}|^2 = 7.5\text{dB}$ ($f = 2\text{GHz}$)

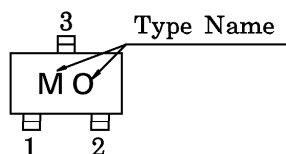
MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------------|-----------|---------|------------------|
| Collector-Base Voltage | V_{CBO} | 20 | V |
| Collector-Emitter Voltage | V_{CEO} | 10 | V |
| Emitter-Base Voltage | V_{EBO} | 1.5 | V |
| Base Current | I_B | 7 | mA |
| Collector Current | I_C | 15 | mA |
| Collector Power Dissipation | P_C | 150 | mW |
| Junction Temperature | T_j | 125 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -55~125 | $^\circ\text{C}$ |



Weight : 0.012g

Marking



MICROWAVE CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------|-------------------|---|------|------|------|------|
| Transition Frequency | f_T | $V_{CE} = 6\text{V}$, $I_C = 7\text{mA}$ | 7 | 10 | — | GHz |
| Insertion Gain | $ S_{21e} ^2 (1)$ | $V_{CE} = 6\text{V}$, $I_C = 7\text{mA}$, $f = 1\text{GHz}$ | — | 13 | — | dB |
| | $ S_{21e} ^2 (2)$ | $V_{CE} = 6\text{V}$, $I_C = 7\text{mA}$, $f = 2\text{GHz}$ | 4.5 | 7.5 | — | |
| Noise Figure | NF (1) | $V_{CE} = 6\text{V}$, $I_C = 3\text{mA}$, $f = 1\text{GHz}$ | — | 1.4 | — | dB |
| | NF (2) | $V_{CE} = 6\text{V}$, $I_C = 3\text{mA}$, $f = 2\text{GHz}$ | — | 1.8 | 3.0 | |

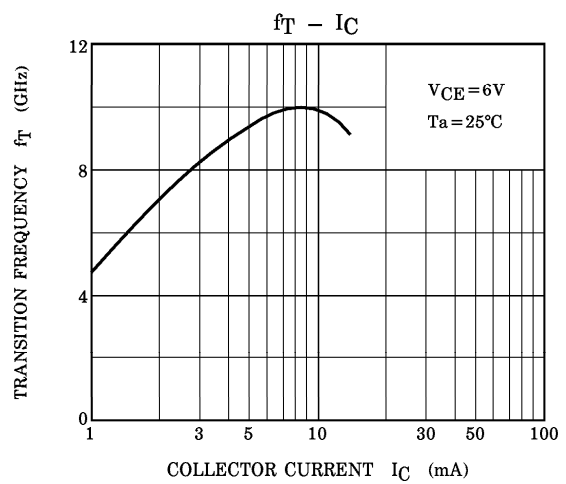
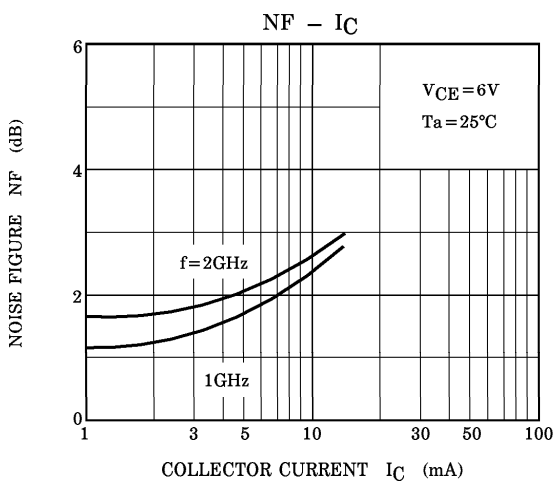
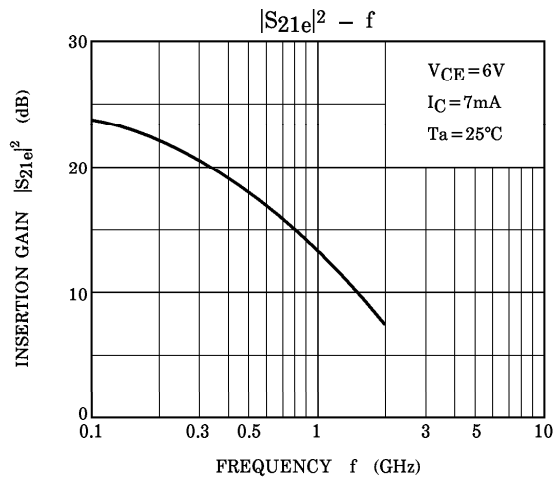
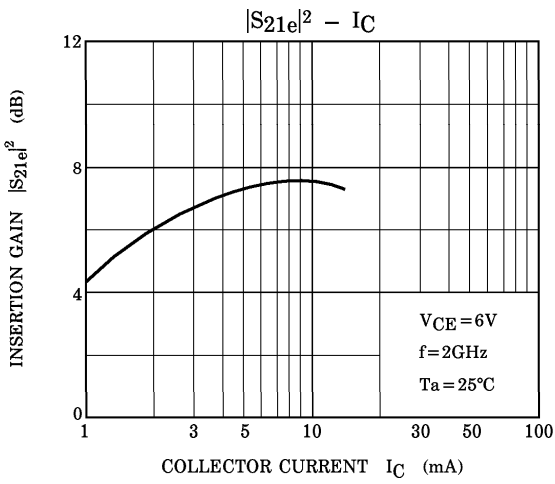
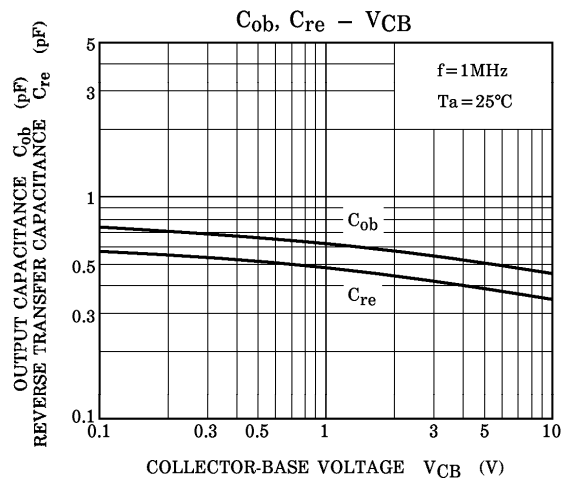
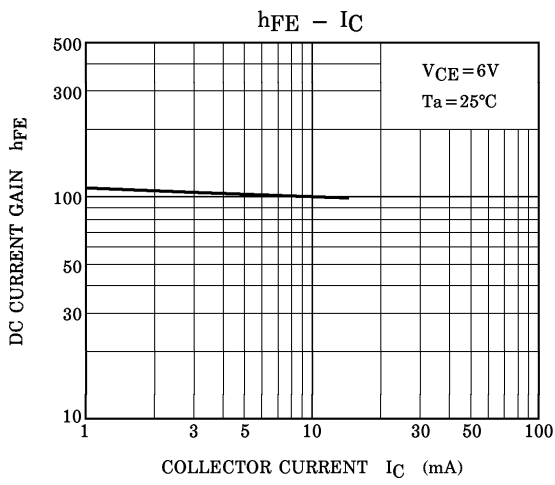
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

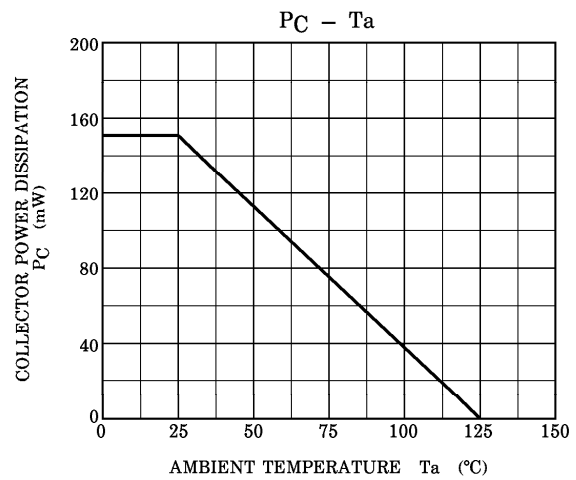
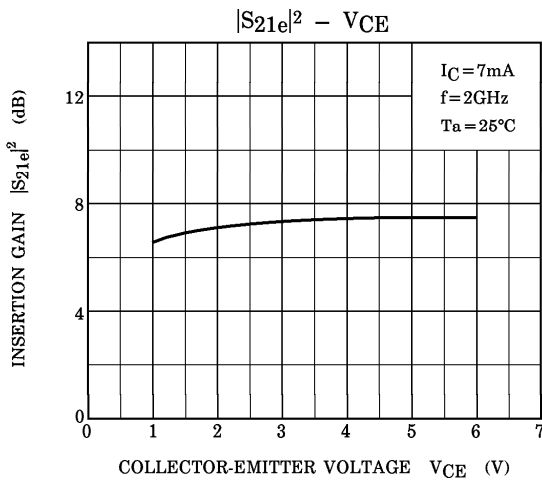
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|------------------------------|-----------|---|------|------|------|---------------|
| Collector Cut-off Current | I_{CBO} | $V_{CB} = 10\text{V}$, $I_E = 0$ | — | — | 1 | μA |
| Emitter Cut-off Current | I_{EBO} | $V_{EB} = 1\text{V}$, $I_C = 0$ | — | — | 1 | μA |
| DC Current Gain | h_{FE} | $V_{CE} = 6\text{V}$, $I_C = 7\text{mA}$ | 50 | — | 250 | — |
| Output Capacitance | C_{ob} | $V_{CB} = 10\text{V}$, $I_E = 0$, $f = 1\text{MHz}$ | — | 0.45 | — | pF |
| Reverse Transfer Capacitance | C_{re} | (Note) | — | 0.35 | 0.8 | pF |

(Note) C_{re} is measured by 3 terminal method with Capacitance Bridge.

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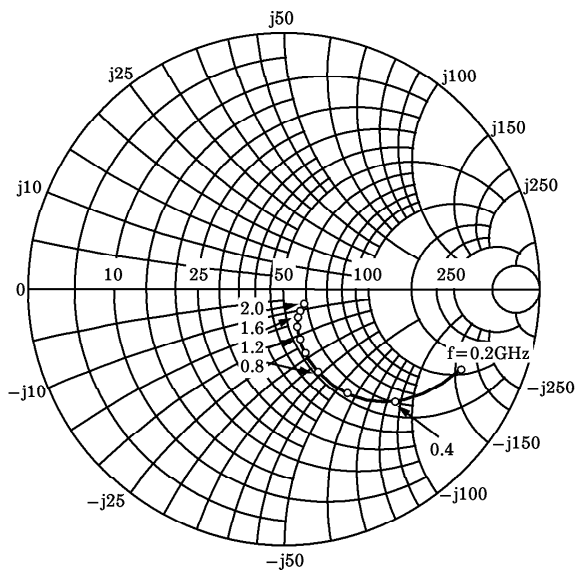
S-PARAMETER Z_O = 50Ω, Ta = 25°C
V_{CE} = 6V, I_C = 3mA

| FREQUENCY MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|-------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 200 | 0.764 | -25.0 | 7.758 | 153.8 | 0.037 | 76.2 | 0.934 | -16.4 |
| 400 | 0.613 | -44.9 | 6.493 | 132.9 | 0.065 | 67.0 | 0.808 | -27.7 |
| 600 | 0.473 | -57.9 | 5.331 | 117.9 | 0.085 | 62.8 | 0.702 | -34.3 |
| 800 | 0.356 | -66.9 | 4.433 | 106.2 | 0.102 | 61.2 | 0.623 | -38.0 |
| 1000 | 0.261 | -70.4 | 3.738 | 97.7 | 0.117 | 60.4 | 0.575 | -40.6 |
| 1200 | 0.198 | -71.7 | 3.266 | 90.1 | 0.132 | 60.2 | 0.544 | -42.4 |
| 1400 | 0.147 | -66.3 | 2.853 | 83.0 | 0.147 | 60.1 | 0.529 | -44.1 |
| 1600 | 0.129 | -54.9 | 2.555 | 78.2 | 0.163 | 60.3 | 0.519 | -46.4 |
| 1800 | 0.114 | -41.8 | 2.348 | 72.8 | 0.179 | 60.0 | 0.514 | -49.0 |
| 2000 | 0.124 | -34.5 | 2.108 | 69.2 | 0.192 | 60.1 | 0.513 | -52.4 |

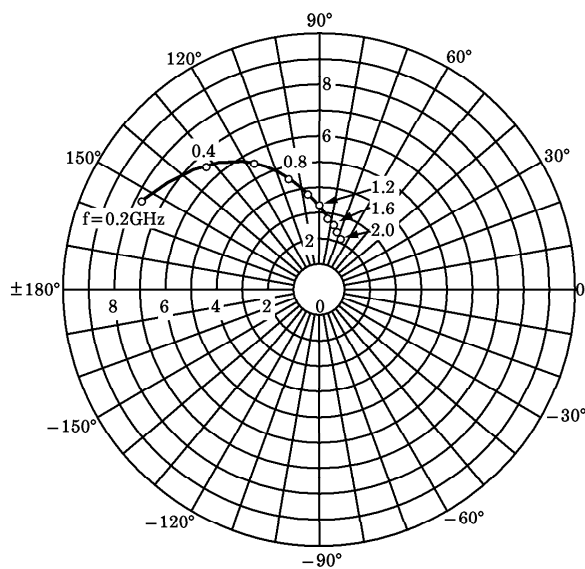
V_{CE} = 6V, I_C = 7mA

| FREQUENCY MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|-------|--------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 200 | 0.560 | -35.3 | 12.525 | 142.0 | 0.032 | 74.2 | 0.853 | -21.5 |
| 400 | 0.367 | -54.1 | 8.958 | 118.8 | 0.055 | 69.5 | 0.678 | -30.1 |
| 600 | 0.248 | -63.4 | 6.693 | 105.3 | 0.073 | 68.4 | 0.581 | -32.7 |
| 800 | 0.158 | -62.4 | 5.270 | 95.5 | 0.091 | 68.6 | 0.530 | -33.6 |
| 1000 | 0.101 | -47.8 | 4.319 | 88.5 | 0.110 | 68.4 | 0.506 | -34.7 |
| 1200 | 0.088 | -27.3 | 3.687 | 82.1 | 0.128 | 67.9 | 0.493 | -36.0 |
| 1400 | 0.099 | -4.3 | 3.188 | 76.2 | 0.146 | 67.0 | 0.491 | -37.8 |
| 1600 | 0.131 | -0.7 | 2.813 | 71.9 | 0.165 | 66.2 | 0.492 | -40.5 |
| 1800 | 0.152 | 0.4 | 2.563 | 67.4 | 0.183 | 65.2 | 0.498 | -43.7 |
| 2000 | 0.167 | -1.7 | 2.276 | 64.5 | 0.198 | 64.5 | 0.500 | -47.5 |

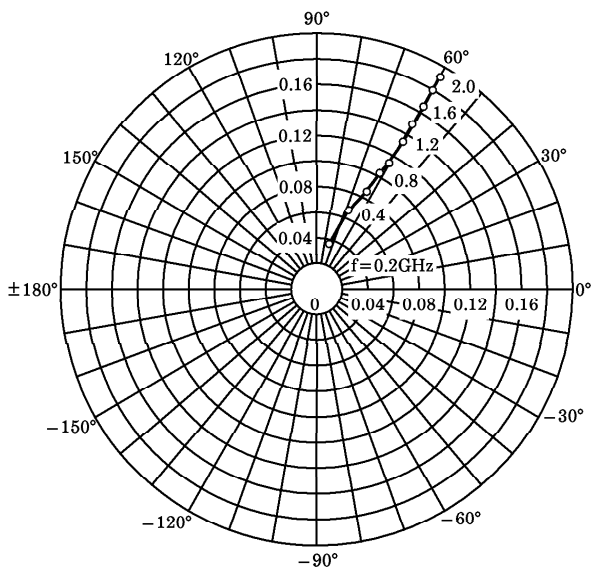
S_{11e}
 $V_{CE} = 6V$
 $I_C = 3mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



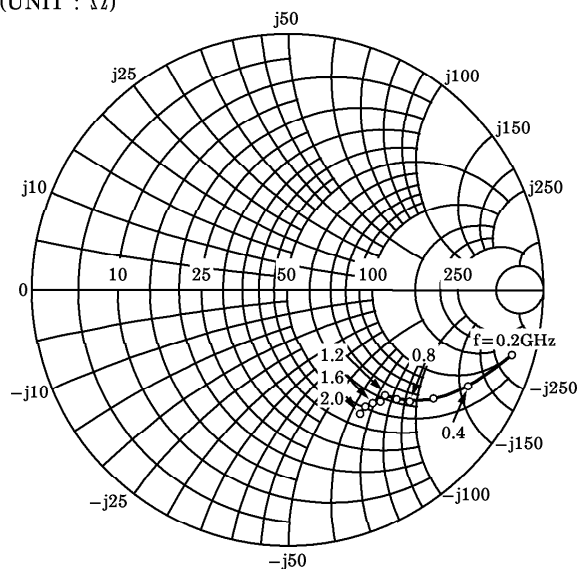
S_{21e}
 $V_{CE} = 6V$
 $I_C = 3mA$
 $T_a = 25^\circ C$



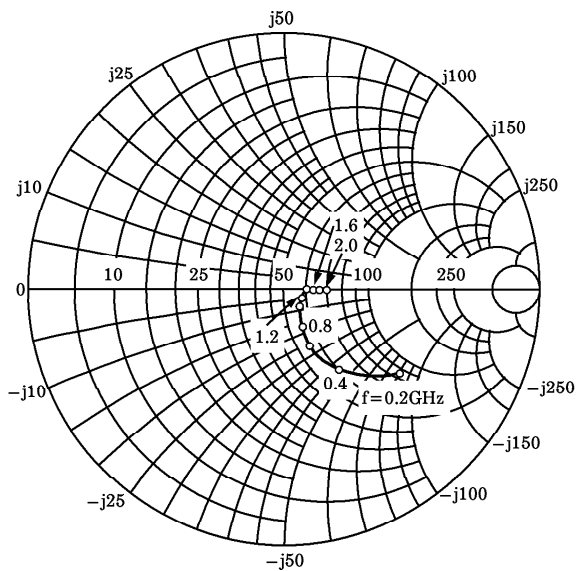
S_{12e}
 $V_{CE} = 6V$
 $I_C = 3mA$
 $T_a = 25^\circ C$



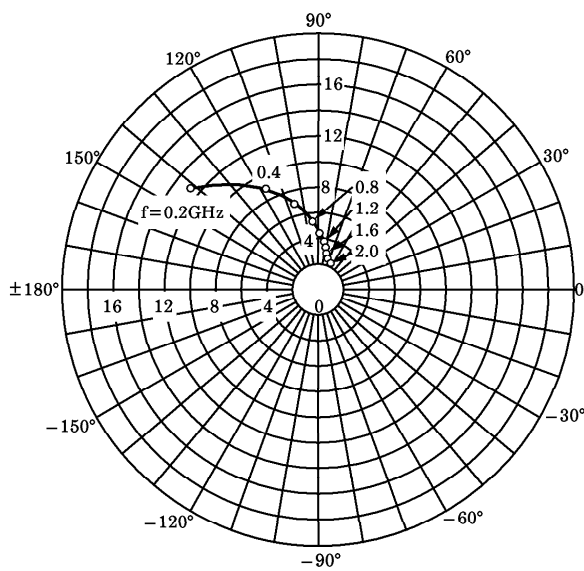
S_{22e}
 $V_{CE} = 6V$
 $I_C = 3mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



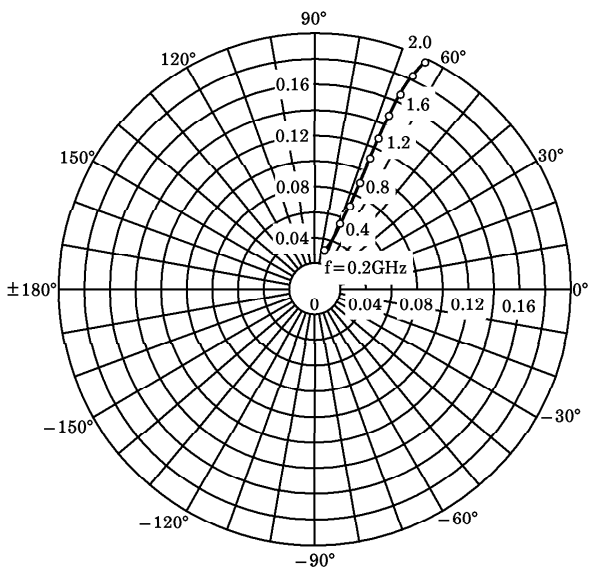
S_{11e}
 V_{CE}=6V
 I_C=7mA
 T_a=25°C
 (UNIT : Ω)



S_{21e}
 V_{CE}=6V
 I_C=7mA
 T_a=25°C



S_{12e}
 V_{CE}=6V
 I_C=7mA
 T_a=25°C



S_{22e}
 V_{CE}=6V
 I_C=7mA
 T_a=25°C
 (UNIT : Ω)

