

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

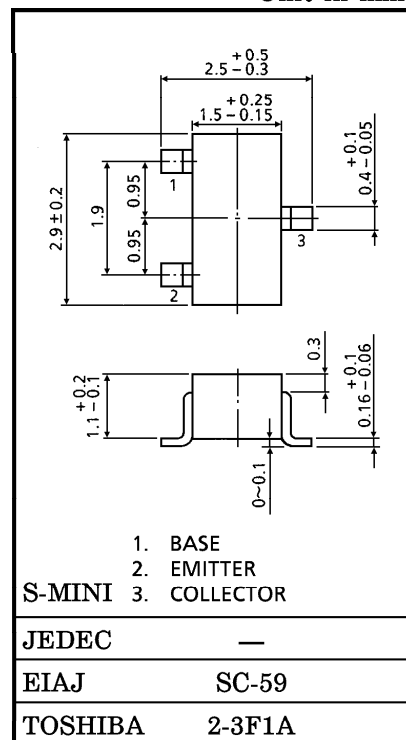
2SC5109

FOR VCO APPLICATION

Unit in mm

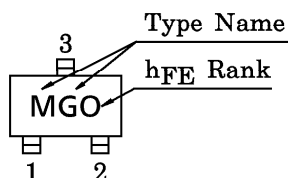
MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------------|------------------|---------|------|
| Collector-Base Voltage | V _{CB0} | 20 | V |
| Collector-Emitter Voltage | V _{CEO} | 10 | V |
| Emitter-Base Voltage | V _{EBO} | 3 | V |
| Base Current | I _B | 30 | mA |
| Collector Current | I _C | 60 | mA |
| Collector Power Dissipation | P _C | 150 | mW |
| Junction Temperature | T _j | 125 | °C |
| Storage Temperature Range | T _{stg} | -55~125 | °C |



Weight : 0.012g

MARKING



ELECTRICAL CHARACTERISTICS (Ta = 25°C)

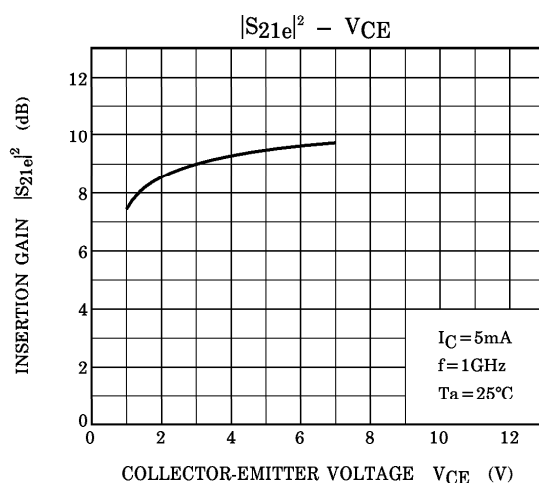
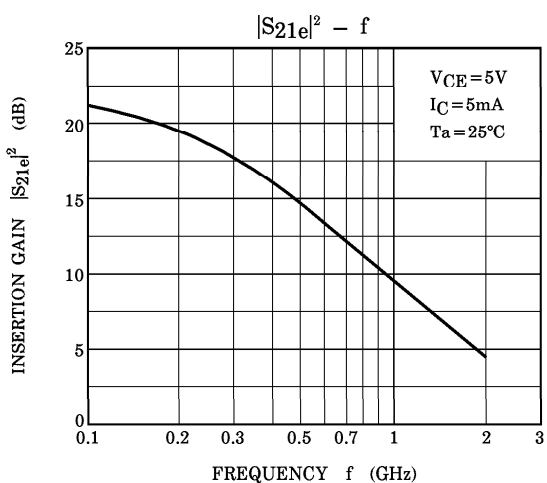
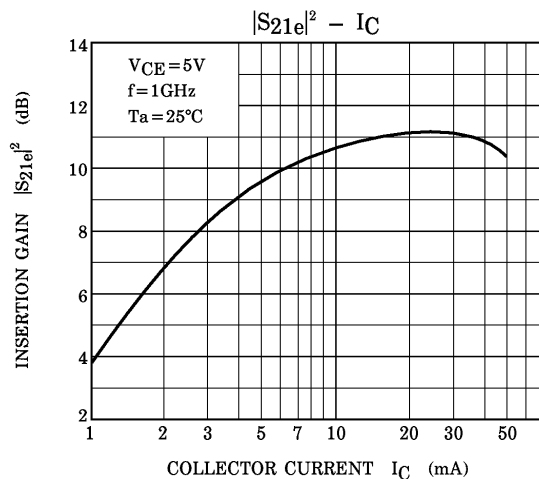
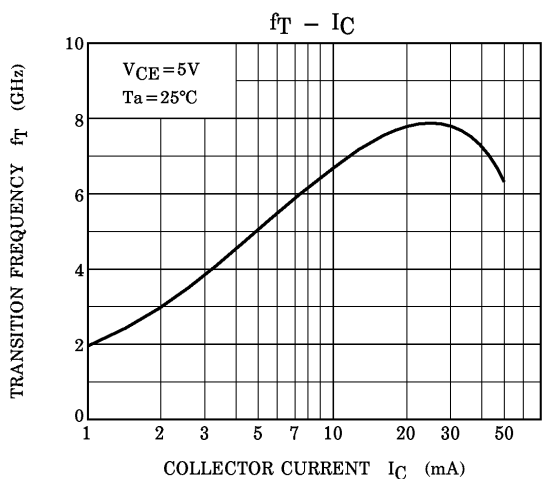
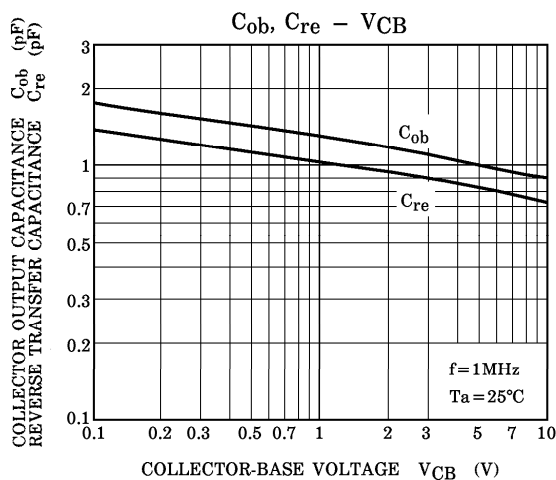
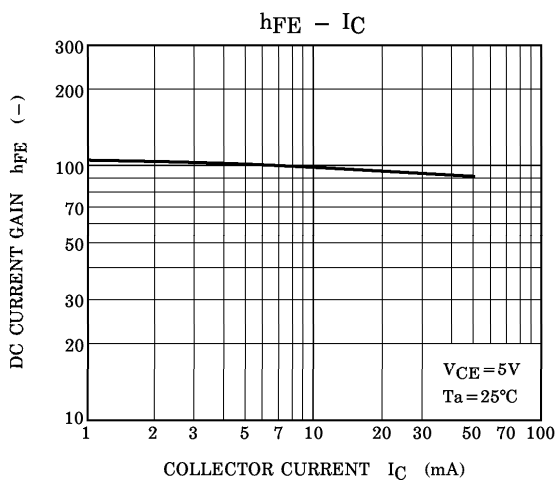
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|------------------------------|-----------------------------------|--|------|------|------|------|
| Collector Cut-off Current | I _{CB0} | V _{CB} = 10V, I _E = 0 | — | — | 0.1 | μA |
| Emitter Cut-off Current | I _{EBO} | V _{EB} = 1V, I _C = 0 | — | — | 0.1 | μA |
| DC Current Gain | h _{FE} (Note 1) | V _{CE} = 5V, I _C = 5mA | 80 | — | 240 | — |
| Transition Frequency | f _T | V _{CE} = 5V, I _C = 5mA | 4 | 6 | — | GHz |
| Insertion Gain | S _{21e} ² | V _{CE} = 5V, I _C = 5mA, f = 1GHz | 7 | 11 | — | dB |
| Output Capacitance | C _{ob} | V _{CB} = 5V, I _E = 0, f = 1MHz (Note 2) | — | 0.7 | — | pF |
| Reverse Transfer Capacitance | C _{re} | | — | 0.5 | 0.9 | pF |
| Collector-Base Time Constant | C _c ·r _{bb} ' | V _{CB} = 5V, I _C = 3mA, f = 30MHz | — | 5.5 | 10 | ps |

(Note 1) h_{FE} Classification O : 80~160, Y : 120~240

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

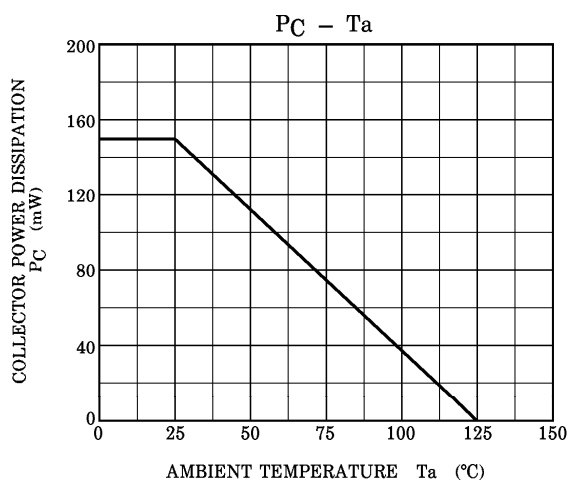
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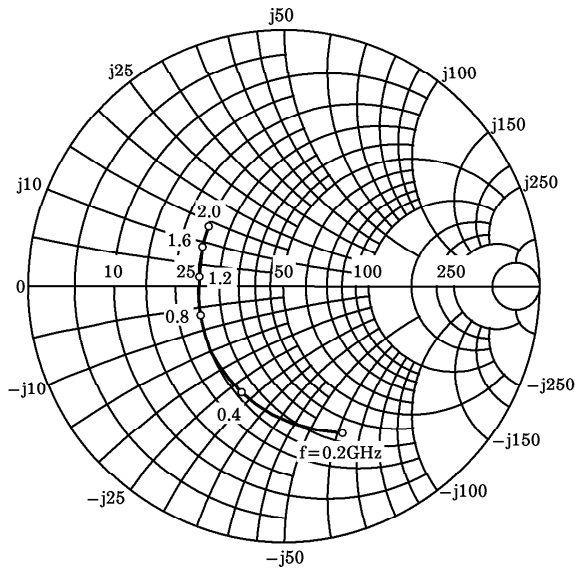
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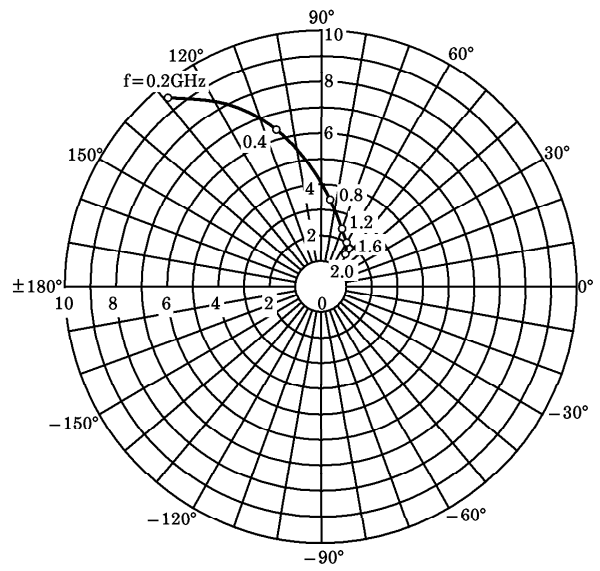
S-Parameter $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 5\text{V}$, $I_C = 5\text{mA}$

| frequency (MHz) | S11 | | S21 | | S12 | | S22 | |
|--------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. |
| 200 | 0.631 | -67.7 | 9.526 | 129.8 | 0.062 | 55.9 | 0.687 | -38.7 |
| 400 | 0.441 | -111.7 | 6.393 | 106.3 | 0.084 | 49.5 | 0.459 | -48.5 |
| 600 | 0.363 | -139.8 | 4.611 | 93.6 | 0.100 | 50.6 | 0.360 | -50.6 |
| 800 | 0.338 | -159.8 | 3.599 | 84.6 | 0.117 | 52.9 | 0.312 | -51.1 |
| 1000 | 0.331 | -175.0 | 2.990 | 77.5 | 0.134 | 55.1 | 0.286 | -51.6 |
| 1200 | 0.337 | 171.9 | 2.556 | 71.2 | 0.152 | 57.2 | 0.271 | -53.0 |
| 1400 | 0.344 | 161.7 | 2.252 | 65.3 | 0.174 | 58.6 | 0.265 | -55.7 |
| 1600 | 0.359 | 152.1 | 2.011 | 60.3 | 0.196 | 58.5 | 0.259 | -59.5 |
| 1800 | 0.373 | 144.6 | 1.845 | 55.4 | 0.217 | 57.9 | 0.254 | -63.6 |
| 2000 | 0.391 | 138.5 | 1.691 | 50.8 | 0.238 | 58.3 | 0.249 | -68.8 |

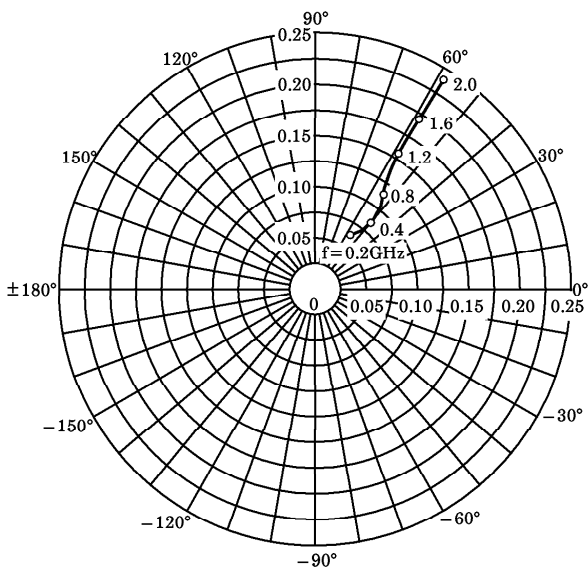
S_{11e}
 V_{CE}=5V
 I_C=5mA
 T_a=25°C
 (UNIT : Ω)



S_{21e}
 V_{CE}=5V
 I_C=5mA
 T_a=25°C



S_{12e}
 V_{CE}=5V
 I_C=5mA
 T_a=25°C



S_{22e}
 V_{CE}=5V
 I_C=5mA
 T_a=25°C
 (UNIT : Ω)

