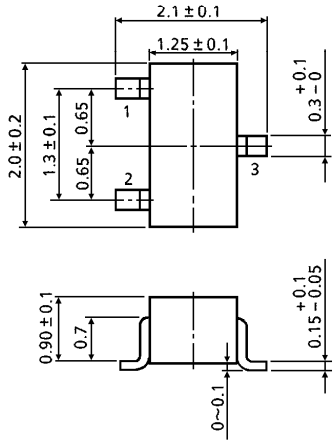
TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC5110

FOR VCO APPLICATION

Unit in mm




1. BASE
2. EMITTER
3. COLLECTOR

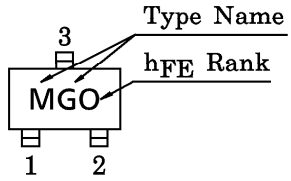
| | |
|---|---|
| USM | |
| JEDEC | — |
| EIAJ | SC-70 |
| TOSHIBA | 2-2E1A |

Weight : 0.006g

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | 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 | $I_B$ | 30 | mA |
| Collector Current | $I_C$ | 60 | mA |
| Collector Power Dissipation | $P_C$ | 100 | mW |
| Junction Temperature | $T_j$ | 125 | °C |
| Storage Temperature Range | $T_{stg}$ | −55~125 | °C |

MARKING




ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$=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 | $C_c$.rbb' | $V_{CB}$=5V, $I_C$=3mA, f=30MHz | — | 5.5 | 10 | ps |

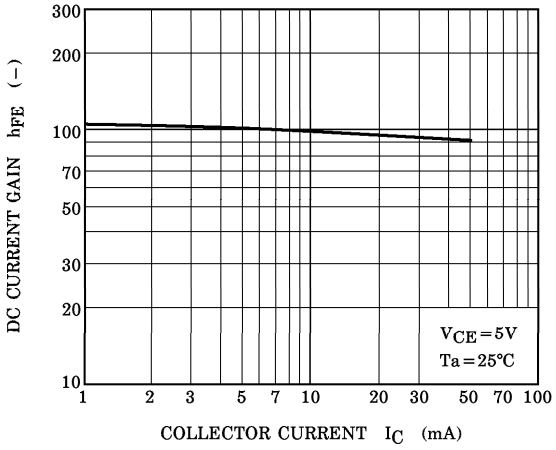
(Note 1) $h_{FE}$ Classification O : 80~160, Y : 120~240

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

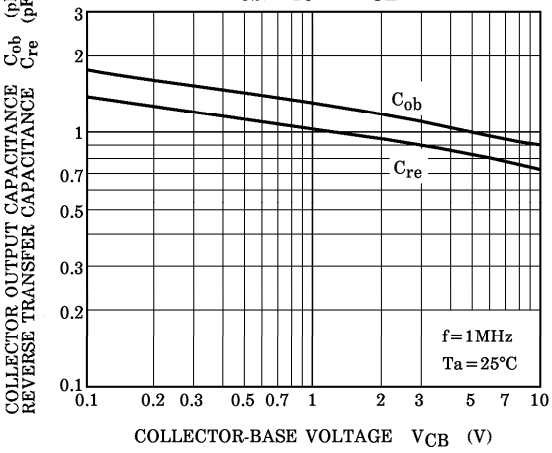
961001EAA1


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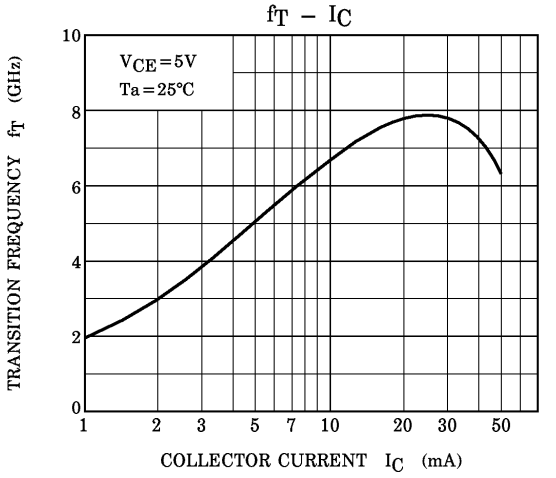
$h_{FE}$ – $I_C$



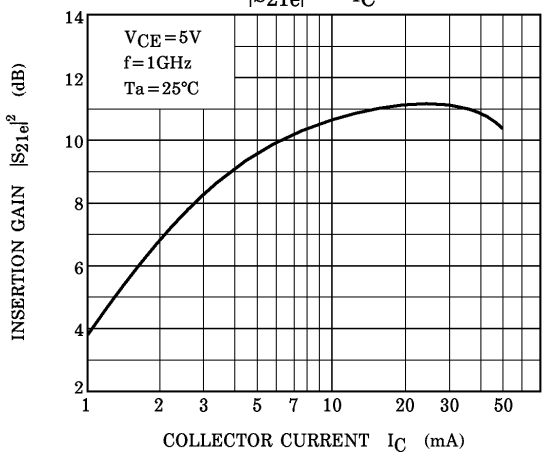

$C_{ob}$, $C_{re}$ – $V_{CB}$



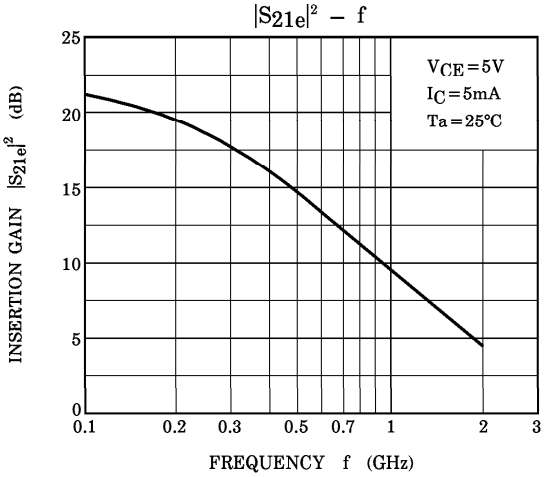

$f_T$ – $I_C$



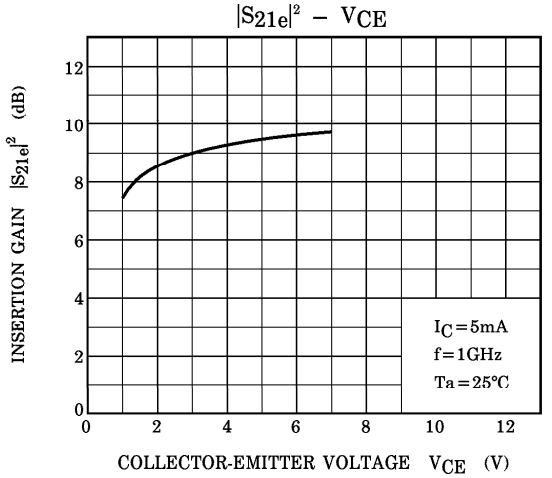

$|S_{21e}|^2$ – $I_C$

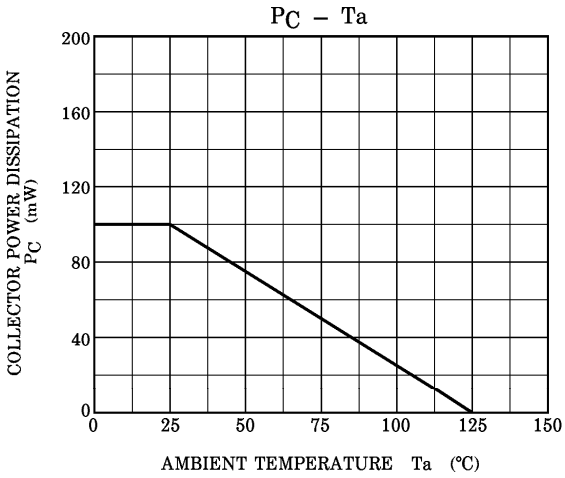



$|S_{21e}|^2$ – f




$|S_{21e}|^2$ – $V_{CE}$

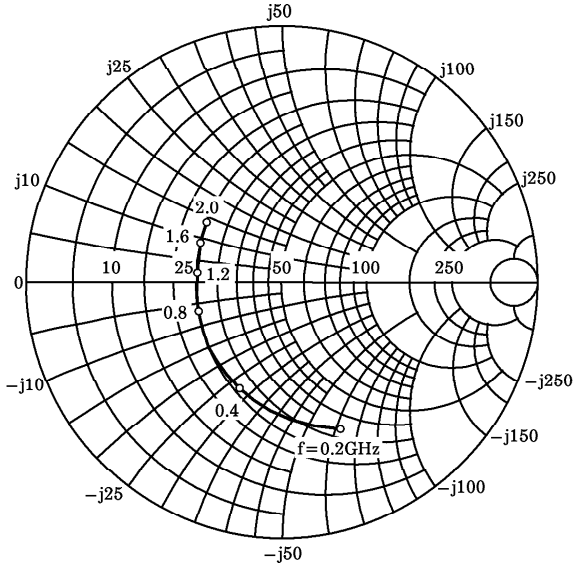




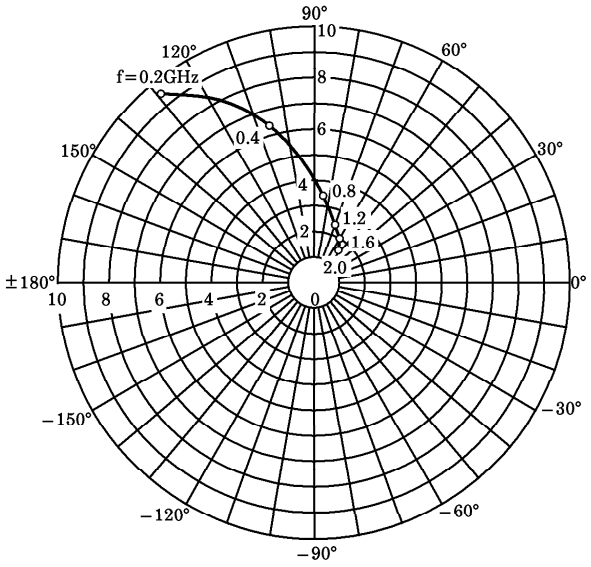

S-Parameter $Z_O = 50\Omega$, Ta = 25°C
$V_{CE}$ = 5V, $I_C$ = 5mA

| frequency | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | 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 |

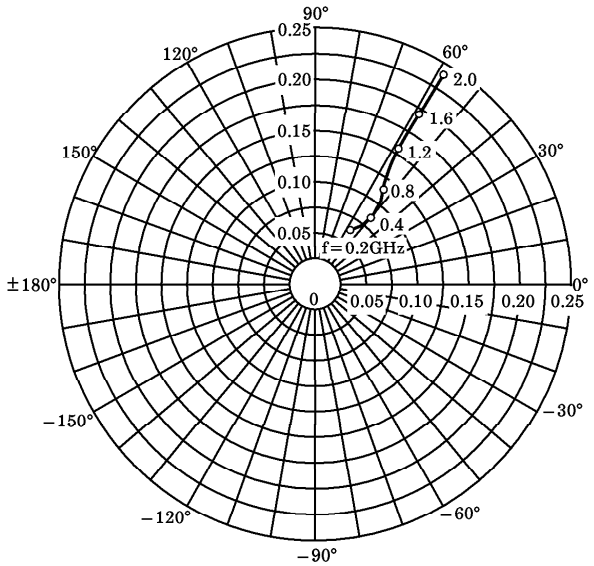
$S_{11e}$
$V_{CE}$ = 5V
$I_C$ = 5mA
Ta = 25°C
(UNIT : Ω)




$S_{21e}$
$V_{CE}$ = 5V
$I_C$ = 5mA
Ta = 25°C




$S_{12e}$
$V_{CE}$ = 5V
$I_C$ = 5mA
Ta = 25°C




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

