

## TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

**2 S C 5 1 1 0**

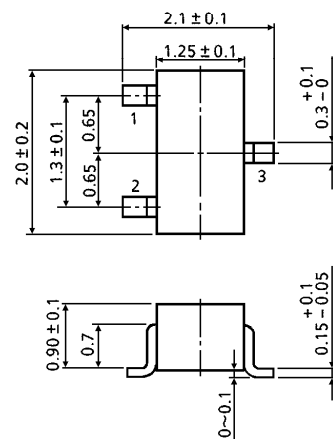
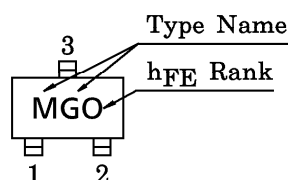
FOR VCO APPLICATION

Unit in mm

MAXIMUM RATINGS (T<sub>a</sub> = 25°C)

| CHARACTERISTIC              | SYMBOL    | RATING  | UNIT |
|-----------------------------|-----------|---------|------|
| Collector-Base Voltage      | $V_{CB0}$ | 20      | V    |
| Collector-Emitter Voltage   | $V_{CEO}$ | 10      | V    |
| Emitter-Base Voltage        | $V_{EB0}$ | 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



1. BASE
2. EMITTER
3. COLLECTOR

USM

JEDEC

EIA.J

SC-70

TOSHIBA

2-2E1A

Weight : 0.006g

### ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25°C)

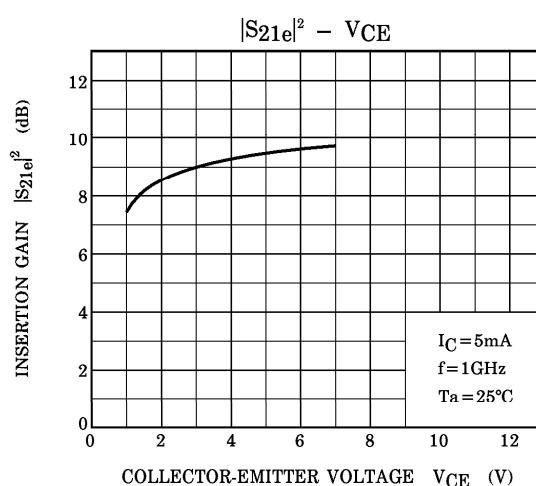
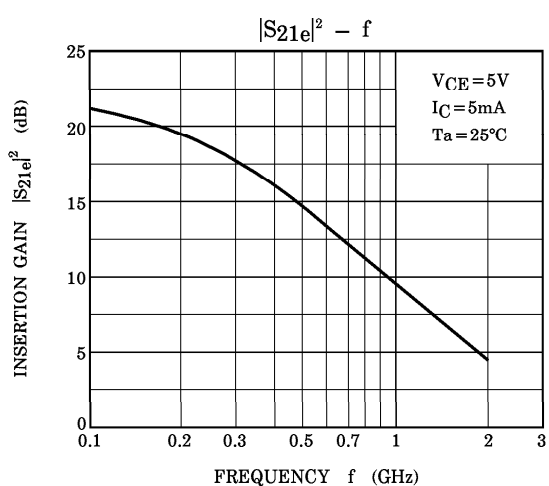
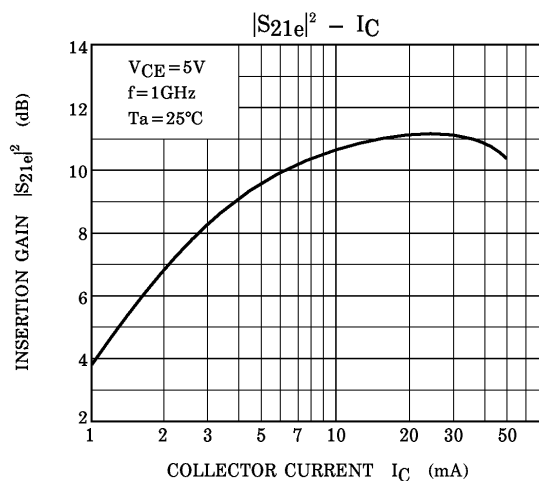
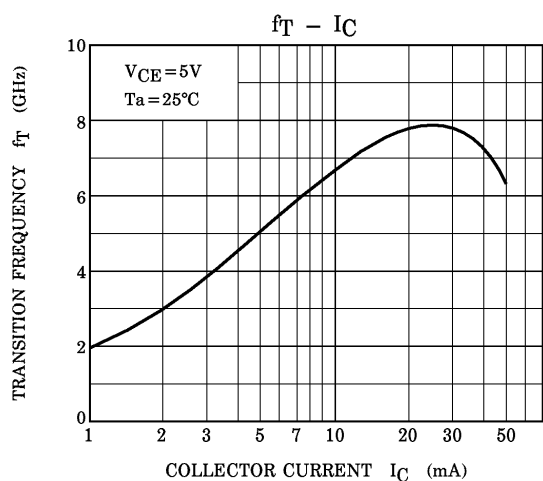
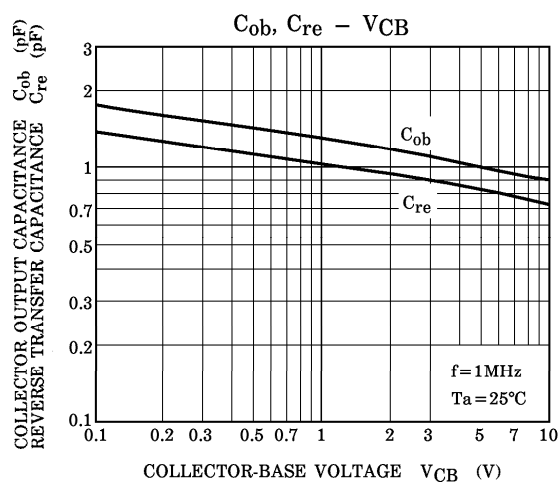
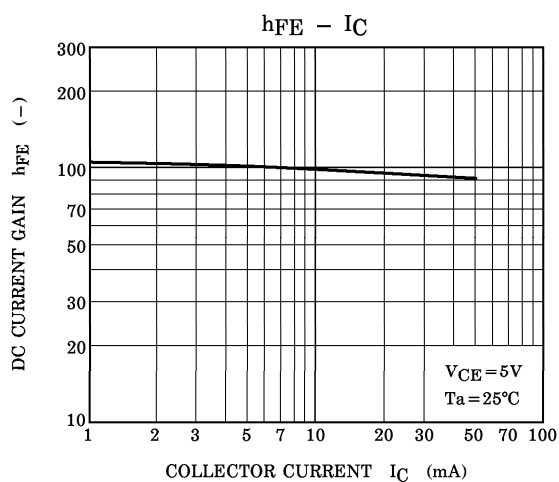
| CHARACTERISTIC               | SYMBOL            | TEST CONDITION                         | MIN. | TYP. | MAX. | UNIT    |
|------------------------------|-------------------|----------------------------------------|------|------|------|---------|
| Collector Cut-off Current    | $I_{CBO}$         | $V_{CB}=10V, I_E=0$                    | —    | —    | 0.1  | $\mu A$ |
| Emitter Cut-off Current      | $I_{EBO}$         | $V_{EB}=1V, I_C=0$                     | —    | —    | 0.1  | $\mu A$ |
| 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           | $C_{ob}$          | $V_{CB}=5V, I_E=0, f=1MHz$<br>(Note 2) | —    | 0.7  | —    | pF      |
| Reverse Transfer Capacitance | $C_{re}$          |                                        | —    | 0.5  | 0.9  | pF      |
| Collector-Base Time Constant | $C_{c,rb b'}$     | $V_{CB}=5V, I_C=3mA, f=30MHz$          | —    | 5.5  | 10   | ps      |

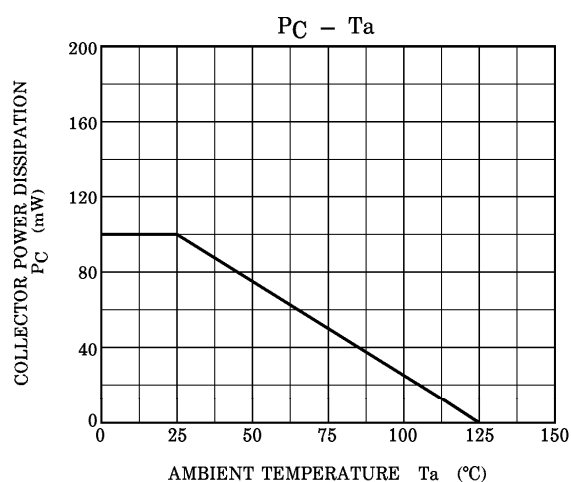
(Note 1) h<sub>FF</sub> Classification      O : 80~160,    Y : 120~240

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

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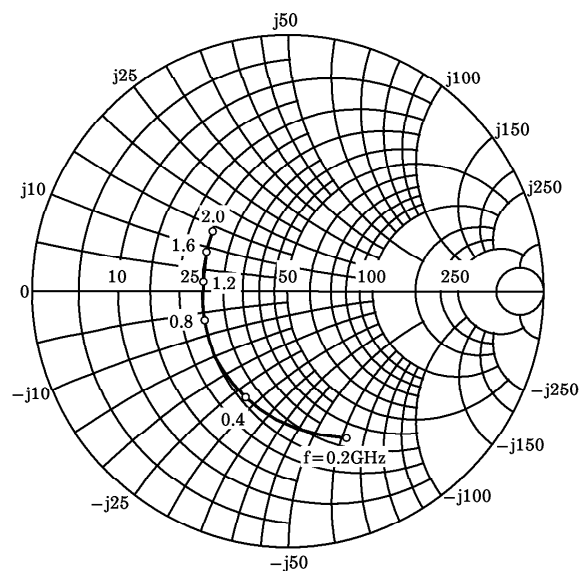


S-Parameter  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$

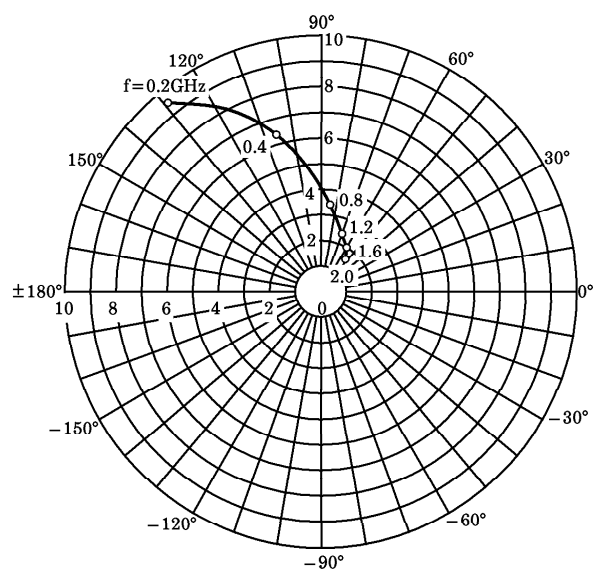
$V_{CE} = 5\text{V}$ ,  $I_C = 5\text{mA}$

| frequency<br>(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 |

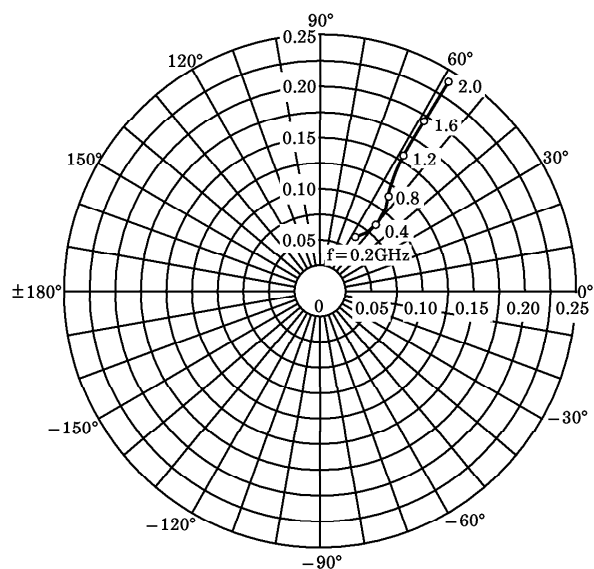
$S_{11e}$   
 $V_{CE}=5V$   
 $I_C=5mA$   
 $T_a=25^\circ C$   
 (UNIT :  $\Omega$ )



$S_{21e}$   
 $V_{CE}=5V$   
 $I_C=5mA$   
 $T_a=25^\circ C$



$S_{12e}$   
 $V_{CE}=5V$   
 $I_C=5mA$   
 $T_a=25^\circ C$



$S_{22e}$   
 $V_{CE}=5V$   
 $I_C=5mA$   
 $T_a=25^\circ C$   
 (UNIT :  $\Omega$ )

