

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

# 2SC5108

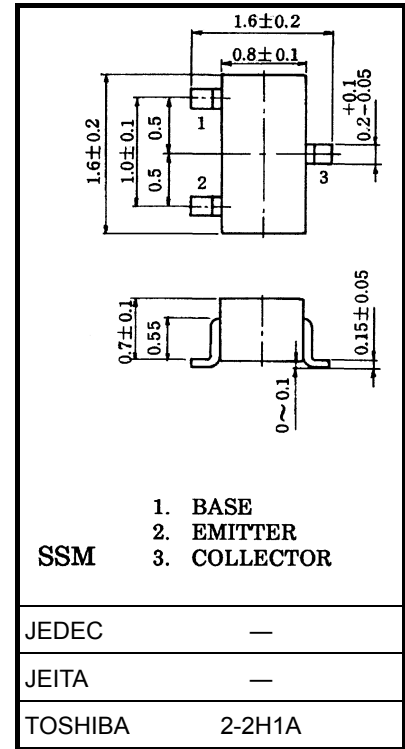
For VCO Application

Unit: mm

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V <sub>CBO</sub>	20	V
Collector-emitter voltage	V <sub>CEO</sub>	10	V
Emitter-base voltage	V <sub>EBO</sub>	3	V
Base current	I <sub>B</sub>	15	mA
Collector current	I <sub>C</sub>	30	mA
Collector power dissipation	P <sub>C</sub>	100	mW
Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range	T <sub>stg</sub>	-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: 2.4 mg (typ.)

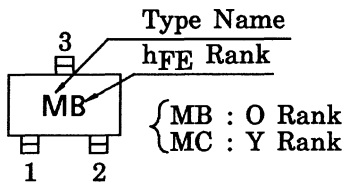
## Electrical Characteristics (Ta = 25°C)

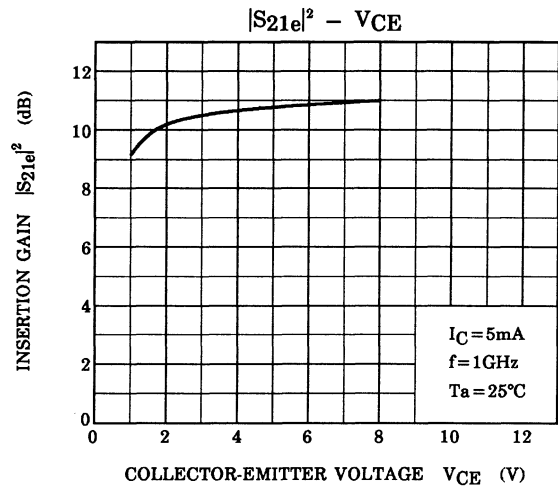
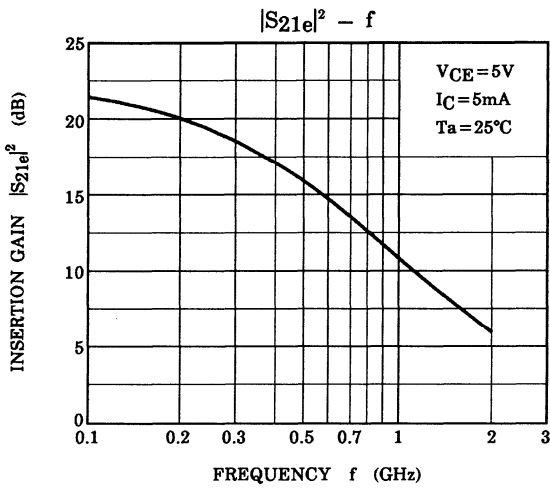
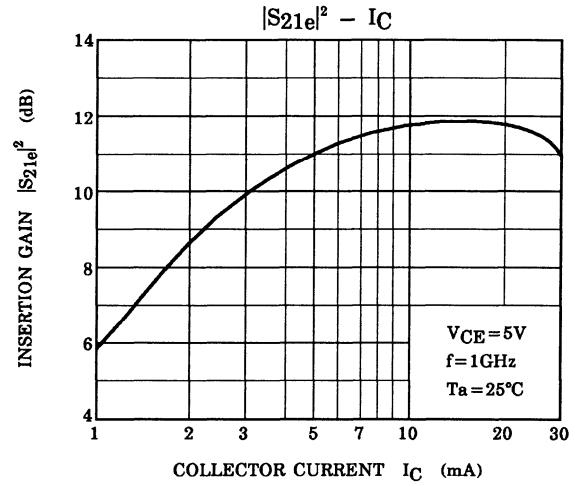
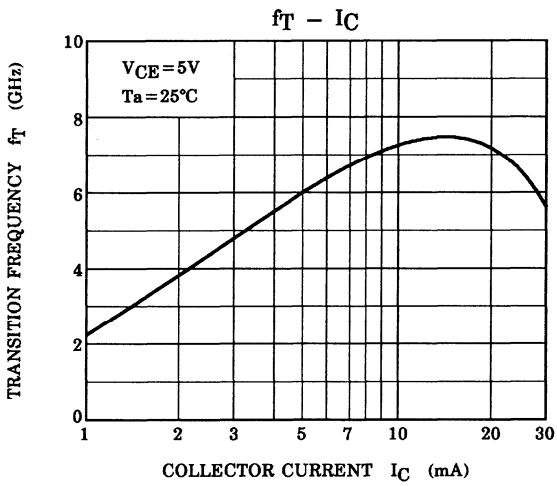
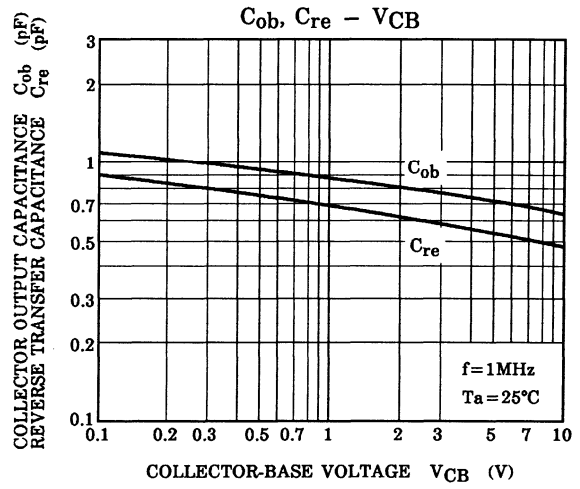
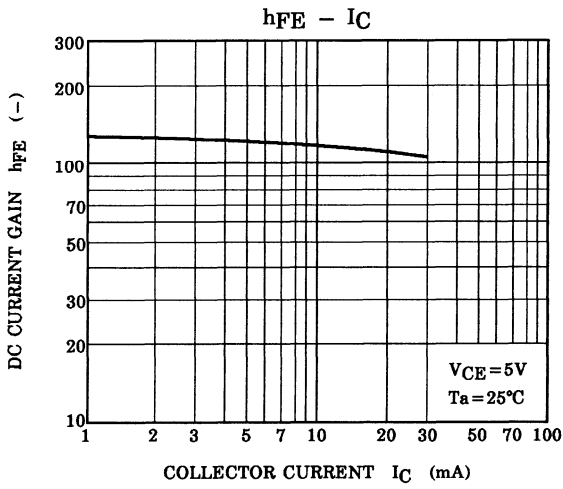
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 10\text{ V}, I_E = 0$	—	—	1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0$	—	—	1	$\mu\text{A}$
DC current gain	$h_{FE}$ (Note 1)	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}$	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

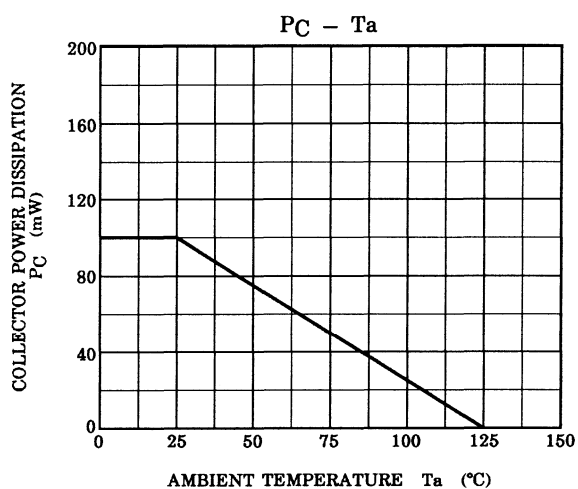
Note 1:  $h_{FE}$  classification O: 80 to 160, Y: 120 to 240

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

## Marking





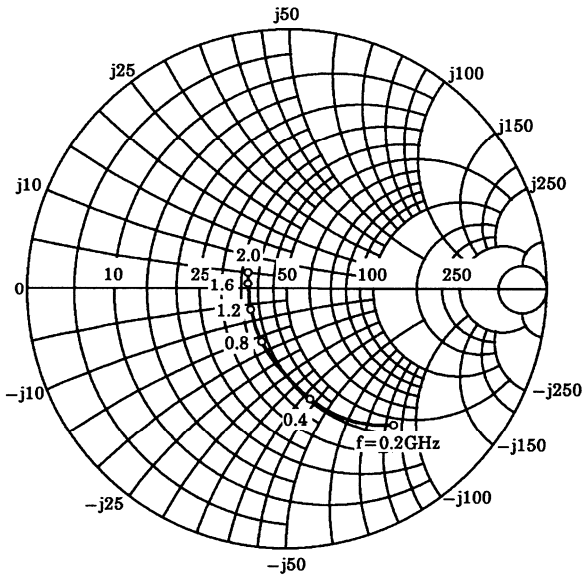


### S-Parameter $Z_0 = 50 \Omega$ , $T_a = 25^\circ\text{C}$

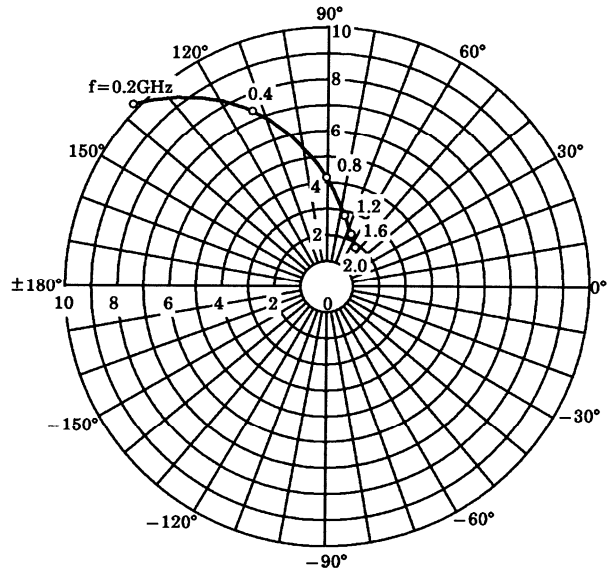
$V_{CE} = 5 \text{ V}$ ,  $I_C = 5 \text{ mA}$

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

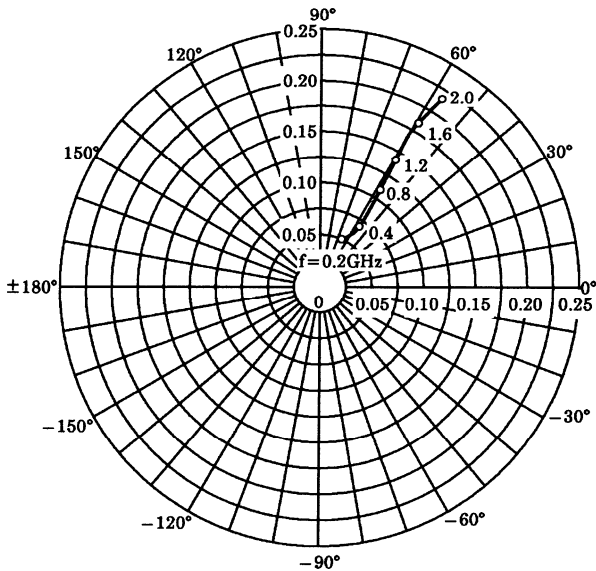
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 5V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



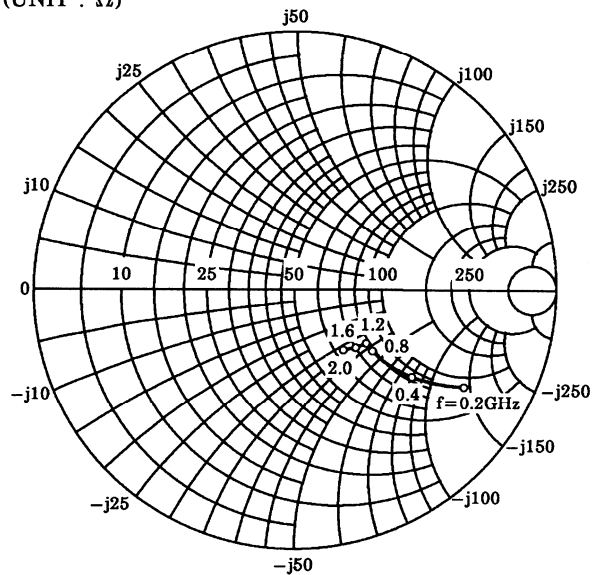
**S<sub>21e</sub>**  
 V<sub>CE</sub> = 5V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



**S<sub>12e</sub>**  
 V<sub>CE</sub> = 5V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



**S<sub>22e</sub>**  
 V<sub>CE</sub> = 5V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



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