

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

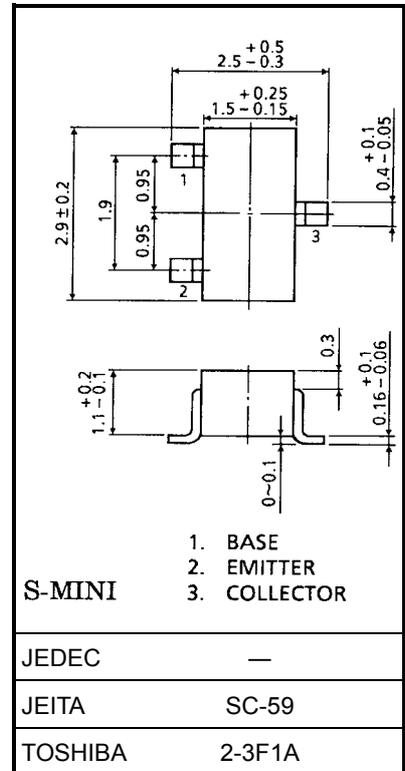
# 2SC5106

For VCO Application

Unit: mm

## Maximum Ratings (Ta = 25°C)

Characteristics	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	$I_B$	15	mA
Collector current	$I_C$	30	mA
Collector power dissipation	$P_C$	150	mW
Junction temperature	$T_j$	125	°C
Storage temperature range	$T_{stg}$	-55~125	°C



Weight: 0.012 g (typ.)

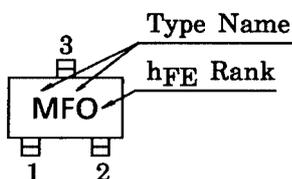
## Electrical Characteristics (Ta = 25°C)

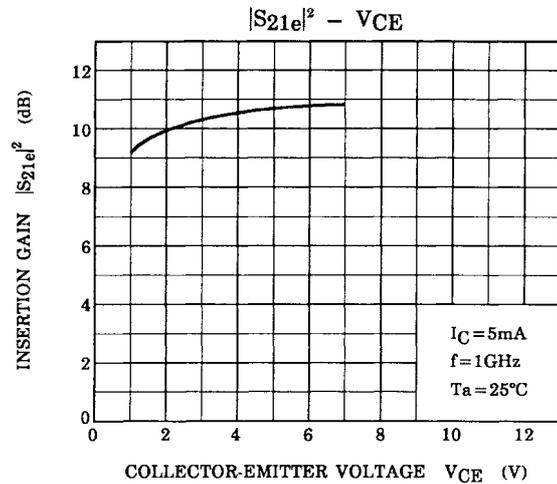
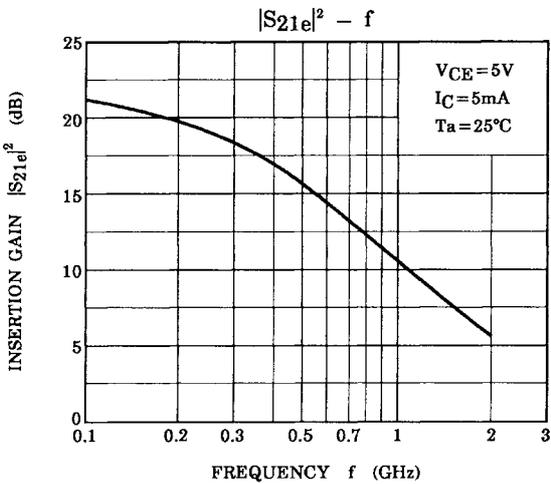
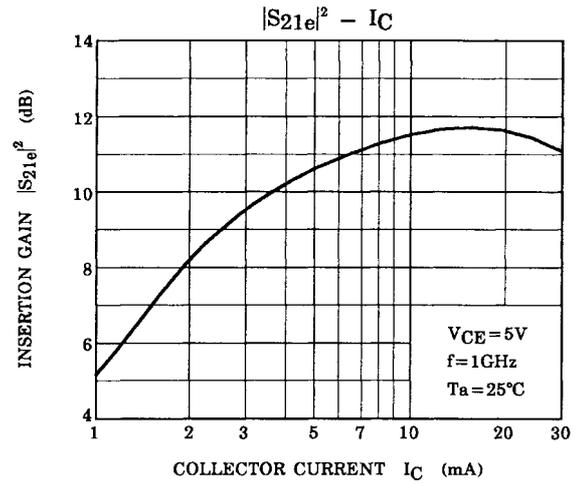
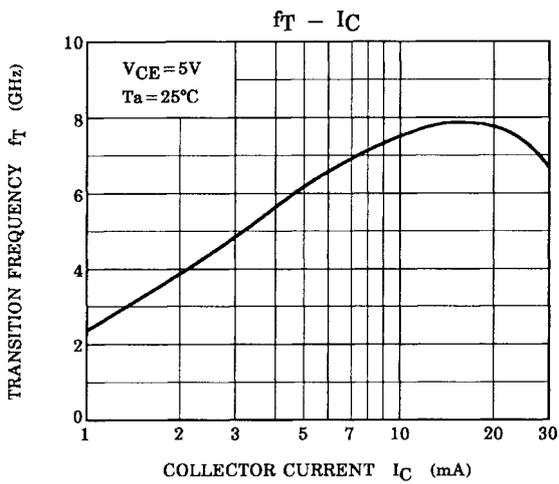
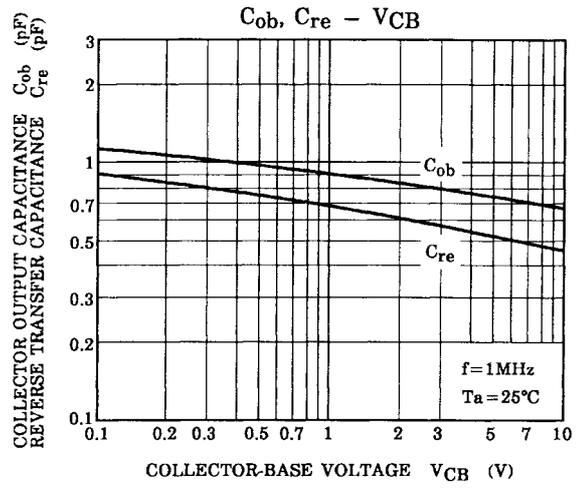
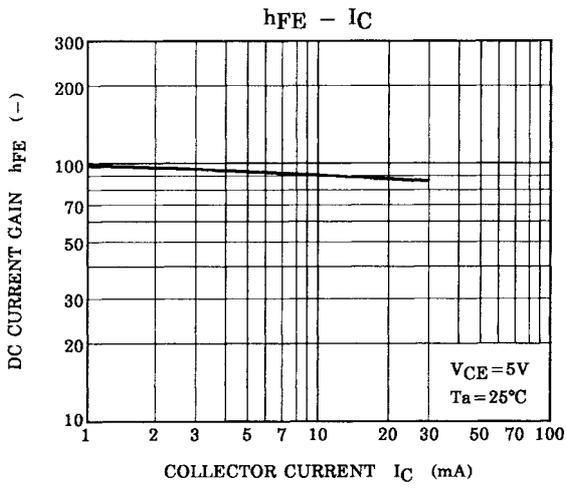
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 10\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0$	—	—	0.1	$\mu\text{A}$
DC current gain	$h_{FE}$ (Note 1)	$V_{CE} = 5\text{ V}, I_C = 5\text{ mA}$	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	$C_{c.rbb'}$	$V_{CB} = 15\text{ V}, I_C = 3\text{ mA}, f = 30\text{ MHz}$	—	5.5	10	ps

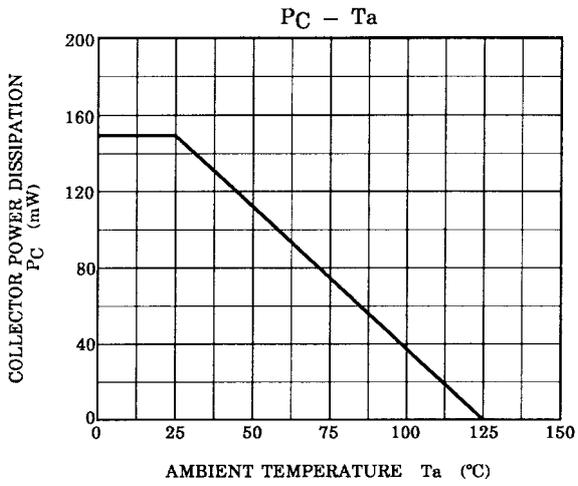
Note 1:  $h_{FE}$  classification O: 80~160, Y: 120~240

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

## Marking





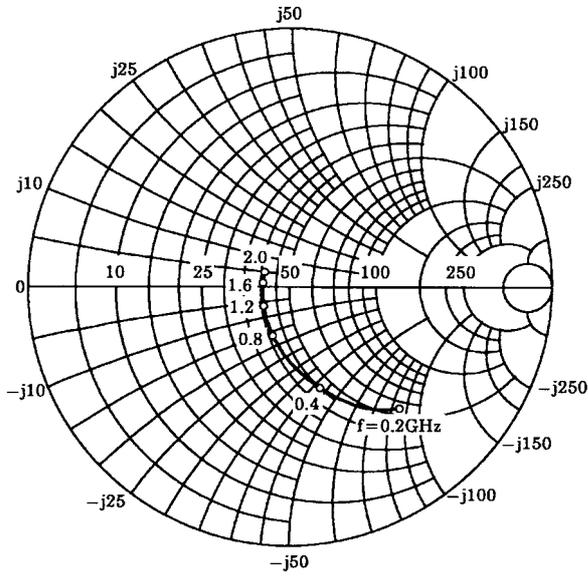


**S-Parameter  $Z_0 = 50 \Omega$ ,  $T_a = 25^\circ\text{C}$**

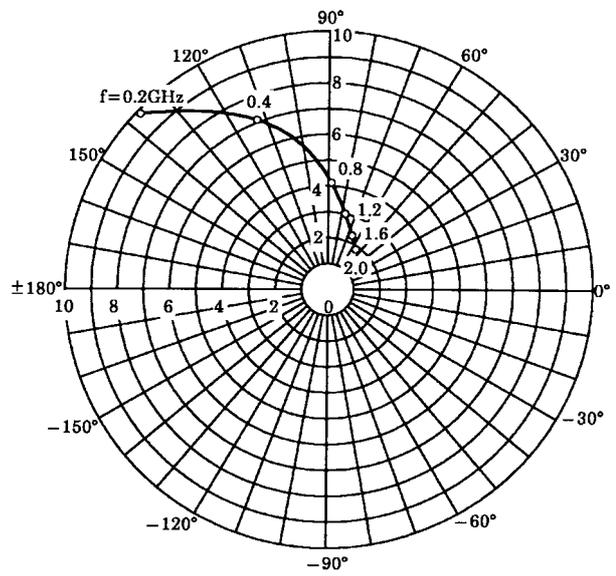
**$V_{CE} = 5 \text{ V}$ ,  $I_C = 5 \text{ mA}$**

Frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.654	-45.3	9.794	136.6	0.047	64.8	0.775	-27.8
400	0.414	-75.6	7.062	112.6	0.071	58.7	0.570	-35.0
600	0.273	-94.9	5.232	98.7	0.090	58.5	0.472	-35.8
800	0.193	-111.7	4.118	89.4	0.108	59.5	0.424	-35.5
1000	0.146	-128.1	3.412	82.0	0.127	60.4	0.398	-35.5
1200	0.116	-147.4	2.927	75.5	0.147	61.0	0.381	-36.2
1400	0.101	-169.6	2.571	69.8	0.169	60.7	0.373	-37.9
1600	0.098	171.6	2.299	64.4	0.189	59.5	0.363	-40.4
1800	0.105	155.8	2.079	59.8	0.208	58.6	0.351	-43.5
2000	0.118	142.1	1.928	55.4	0.230	58.4	0.338	-46.1

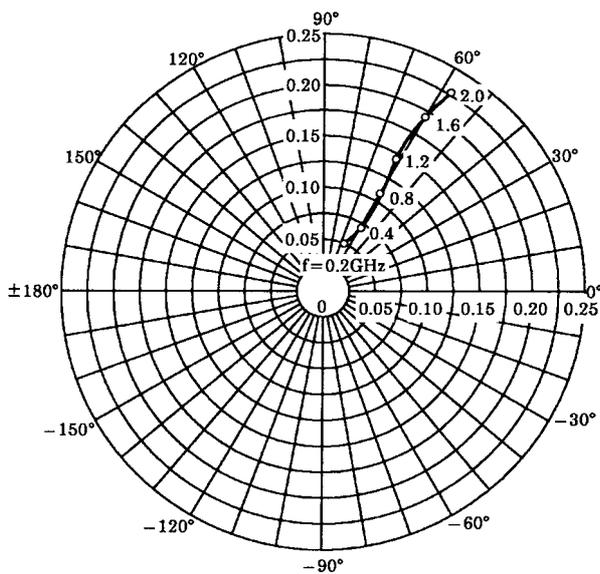
S<sub>11e</sub>  
 V<sub>CE</sub> = 5V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



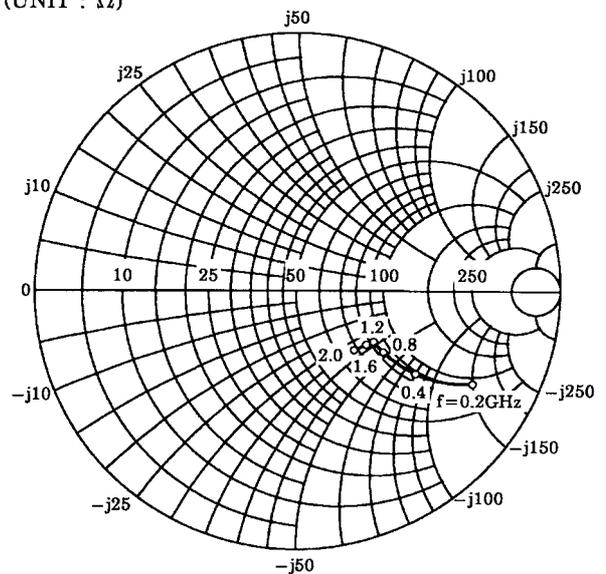
S<sub>21e</sub>  
 V<sub>CE</sub> = 5V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



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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