

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

# 2SC4841

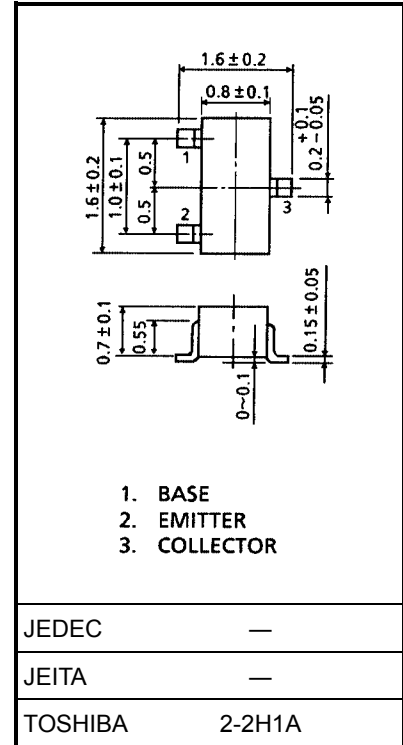
VHF~UHF Band Low Noise Amplifier Applications

Unit: mm

- Low noise figure, high gain.
- $NF = 1.8\text{dB}$ ,  $|S_{21e}|^2 = 8.5\text{dB}$  ( $f = 2\text{GHz}$ )

### Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	20	V
Collector-emitter voltage	$V_{CEO}$	10	V
Emitter-base voltage	$V_{EBO}$	1.5	V
Base current	$I_B$	7	mA
Collector current	$I_C$	15	mA
Collector power dissipation	$P_C$	100	mW
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~125	$^\circ\text{C}$



### Microwave Characteristics ( $T_a = 25^\circ\text{C}$ )

Weight: 2.4 mg (typ.)

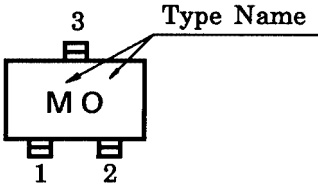
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$	7	10	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$ , $f = 1\text{GHz}$	—	13.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$ , $f = 2\text{GHz}$	4.5	8.5	—	
Noise figure	NF (1)	$V_{CE} = 6\text{V}$ , $I_C = 3\text{mA}$ , $f = 1\text{GHz}$	—	1.4	—	dB
	NF (2)	$V_{CE} = 6\text{V}$ , $I_C = 3\text{mA}$ , $f = 2\text{GHz}$	—	1.8	3.0	

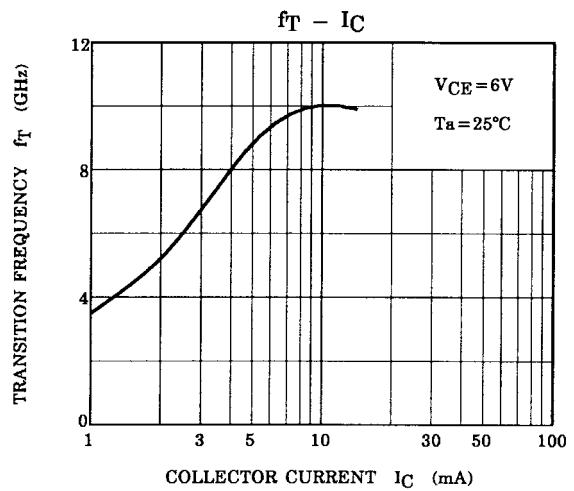
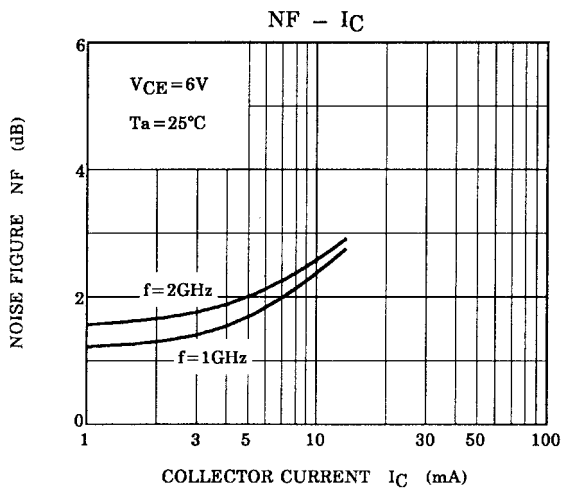
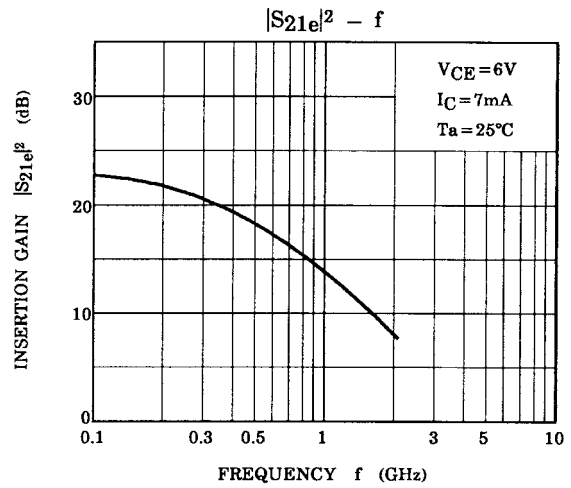
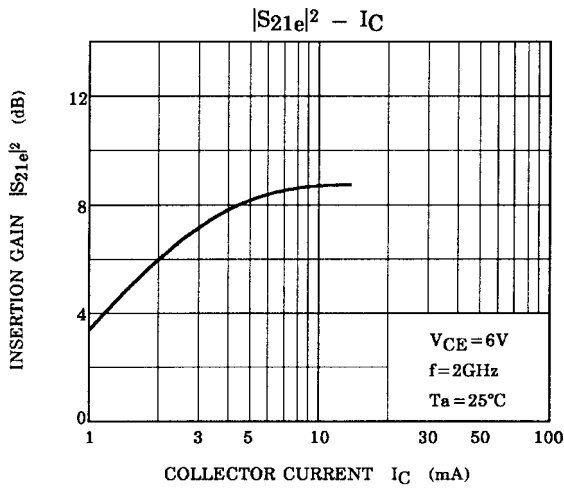
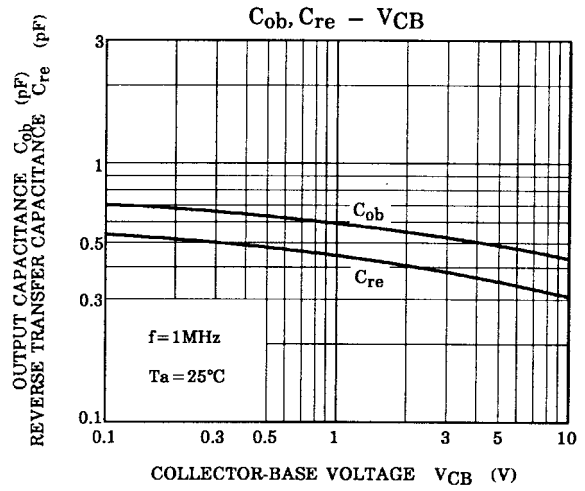
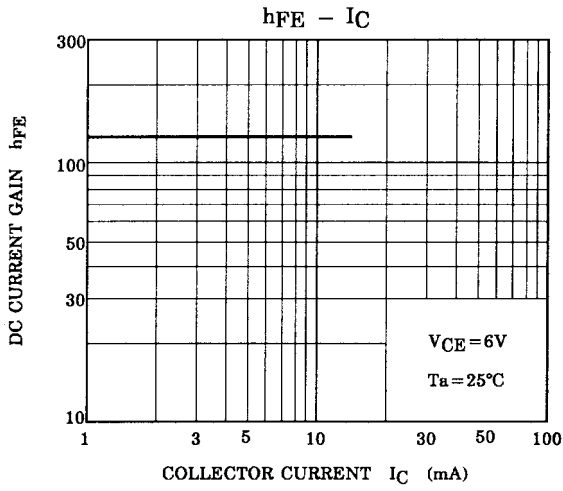
### Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

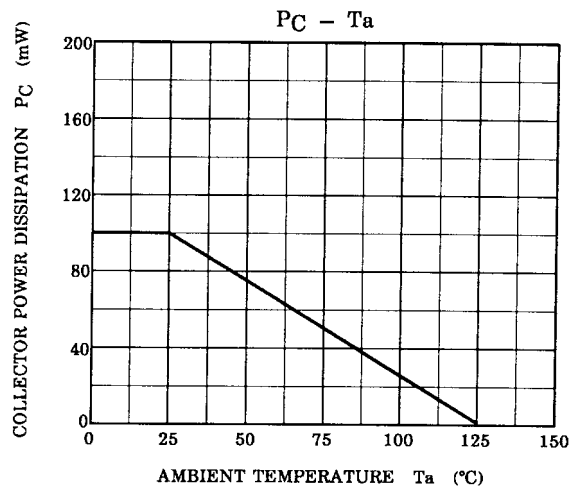
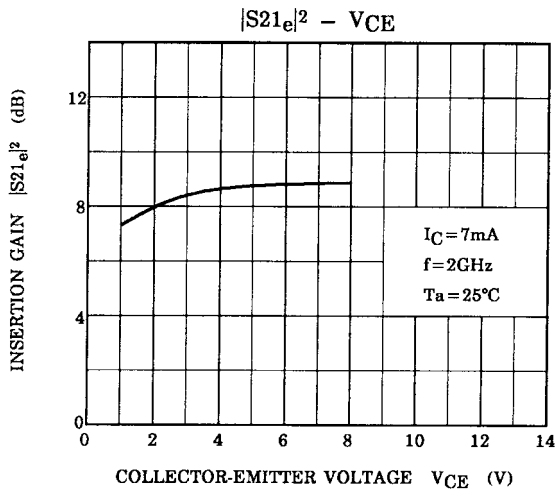
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 10\text{V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$	50	—	250	
Output capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$ (Note)	—	0.45	—	pF
Reverse transfer capacitance	$C_{re}$		—	0.35	0.8	pF

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

**Marking**







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

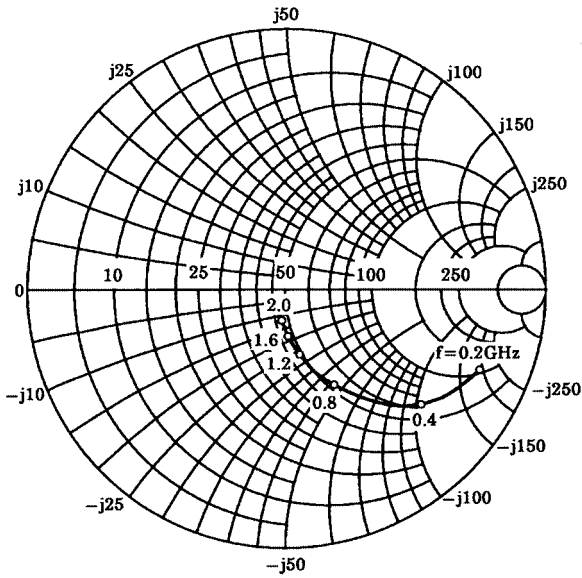
**$V_{CE} = 6 \text{ V}, I_C = 3 \text{ mA}$**

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.823	-22.5	7.186	154.4	0.036	74.8	0.928	-14.5
400	0.685	-40.5	6.252	136.4	0.063	65.5	0.805	-23.6
600	0.537	-54.5	5.378	122.5	0.080	60.8	0.700	-28.1
800	0.428	-64.4	4.567	112.6	0.094	59.3	0.627	-30.0
1000	0.343	-71.9	3.961	104.8	0.107	59.3	0.578	-30.7
1200	0.267	-77.4	3.486	98.6	0.119	59.7	0.544	-31.1
1400	0.227	-83.4	3.104	93.3	0.131	60.2	0.518	-31.8
1600	0.187	-86.9	2.793	88.9	0.141	60.6	0.497	-32.2
1800	0.157	-90.6	2.534	85.1	0.153	62.3	0.481	-32.7
2000	0.130	-94.1	2.336	81.2	0.167	62.7	0.466	-33.2

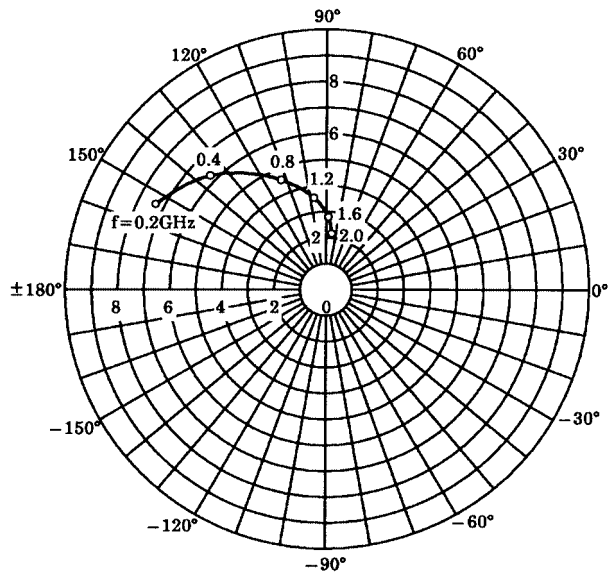
**$V_{CE} = 6 \text{ V}, I_C = 7 \text{ mA}$**

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.653	-34.3	12.924	144.3	0.032	71.8	0.840	-20.9
400	0.447	-57.1	9.858	122.7	0.051	66.3	0.657	-28.3
600	0.304	-70.0	7.513	109.8	0.066	66.0	0.552	-28.9
800	0.220	-77.9	5.971	101.8	0.081	67.2	0.500	-27.9
1000	0.164	-83.4	4.955	95.6	0.096	68.5	0.470	-26.9
1200	0.123	-87.1	4.225	91.0	0.112	69.1	0.454	-26.3
1400	0.094	-93.7	3.721	86.8	0.127	69.2	0.441	-26.4
1600	0.070	-97.1	3.302	83.3	0.142	69.1	0.430	-26.8
1800	0.054	-102.8	2.974	80.2	0.156	70.1	0.423	-27.0
2000	0.039	-115.8	2.732	76.9	0.174	69.5	0.414	-27.7

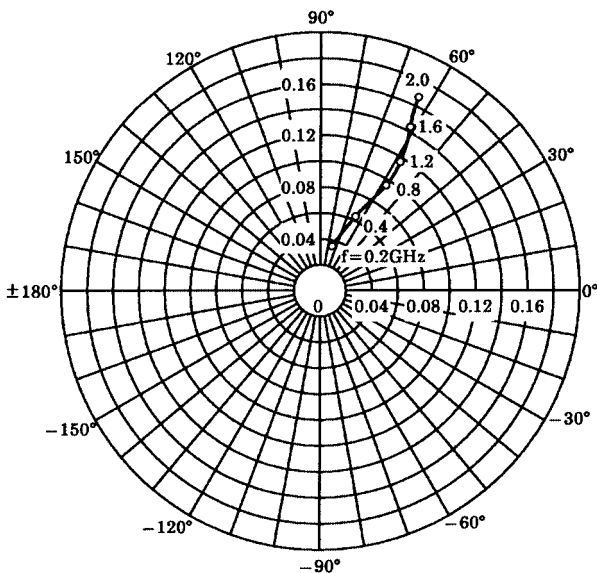
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



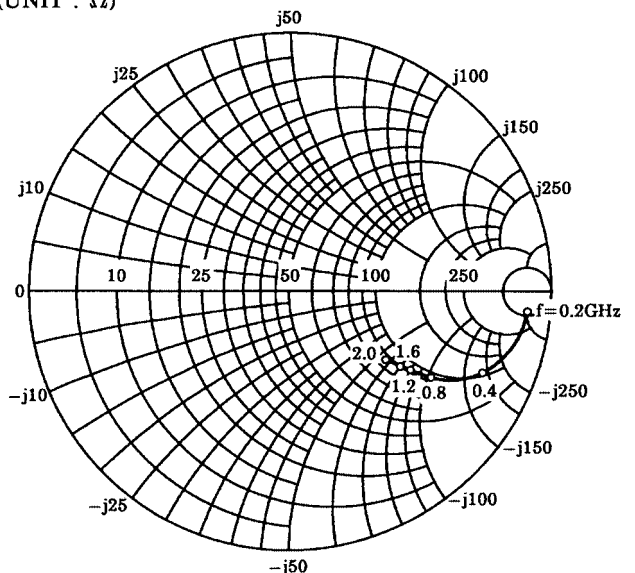
**S<sub>21e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C



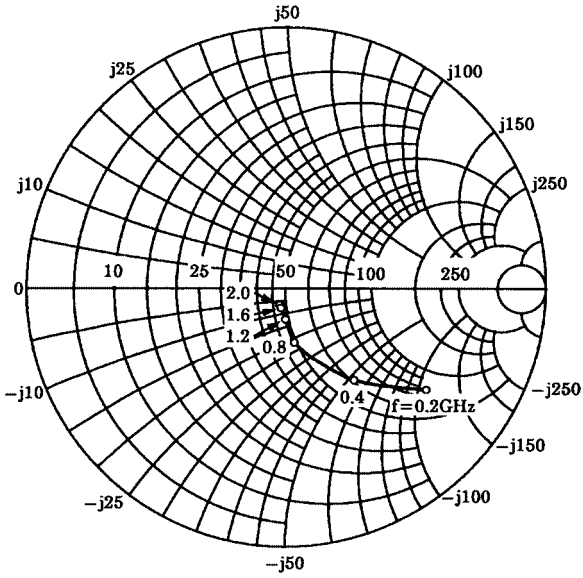
**S<sub>12e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C



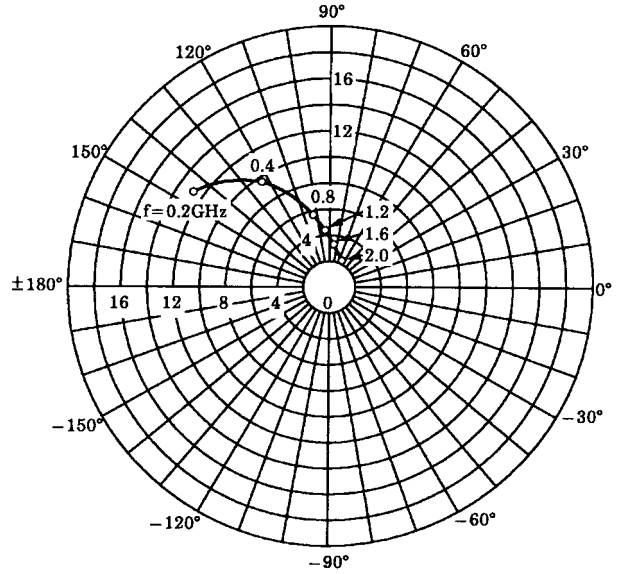
**S<sub>22e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



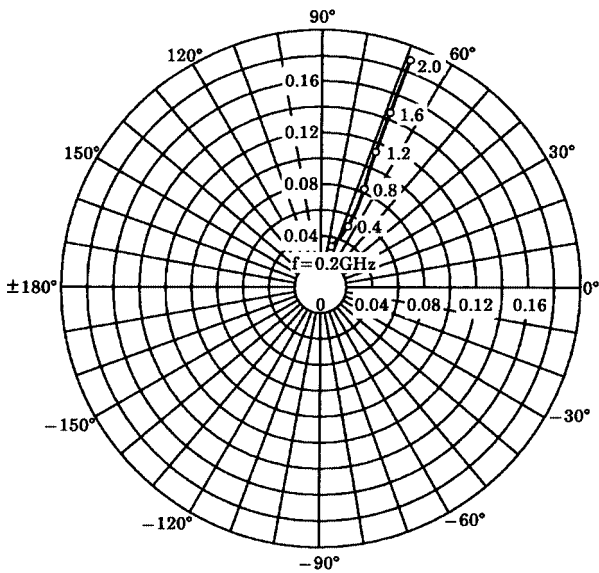
**S11e**  
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



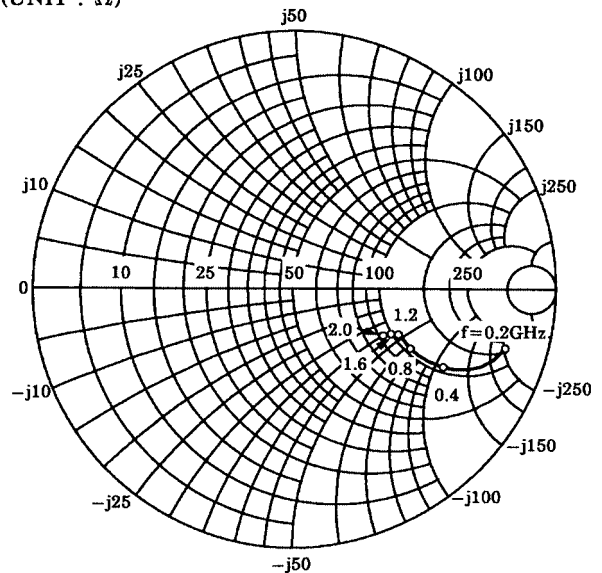
**S21e**  
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$



**S12e**  
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$



**S22e**  
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



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