

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

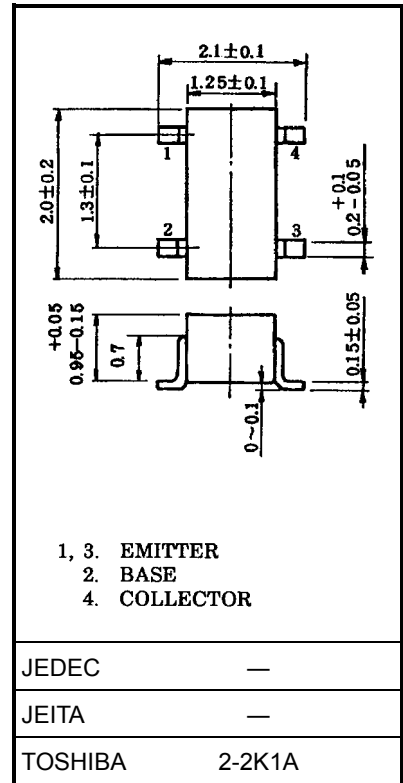
# 2SC4843

## VHF~UHF Band Low Noise Amplifier Applications

- Low noise figure, high gain.
- $NF = 1.1\text{dB}$ ,  $|S_{21e}|^2 = 15.5\text{dB}$  ( $f = 1\text{GHz}$ )

### 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	$I_B$	20	mA
Collector current	$I_C$	40	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: 0.006 g (typ.)

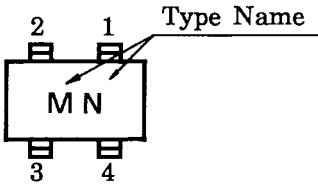
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$	7	10	—	GHz
Insertion gain	$ S_{21e} ^2$ (1)	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$ , $f = 1\text{GHz}$	12	15.5	—	dB
	$ S_{21e} ^2$ (2)	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$ , $f = 2\text{GHz}$	—	9	—	
Noise figure	NF (1)	$V_{CE} = 8\text{V}$ , $I_C = 5\text{mA}$ , $f = 1\text{GHz}$	—	1.1	2.5	dB
	NF (2)	$V_{CE} = 8\text{V}$ , $I_C = 5\text{mA}$ , $f = 2\text{GHz}$	—	1.7	—	

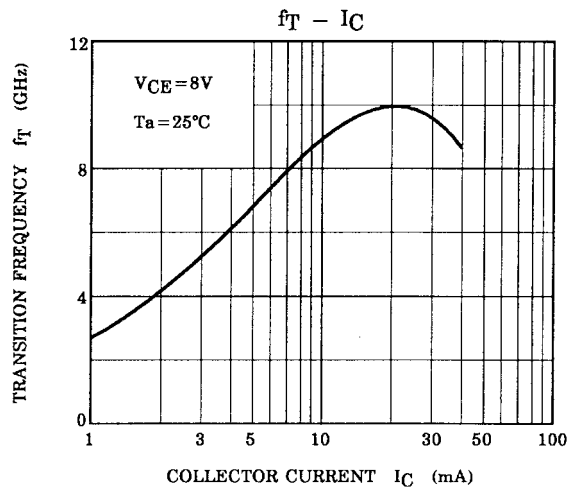
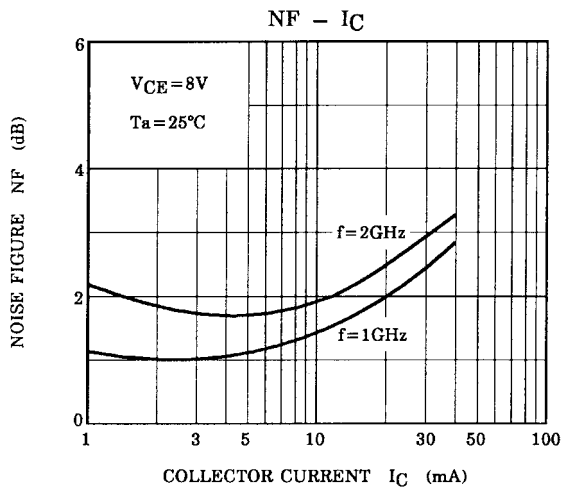
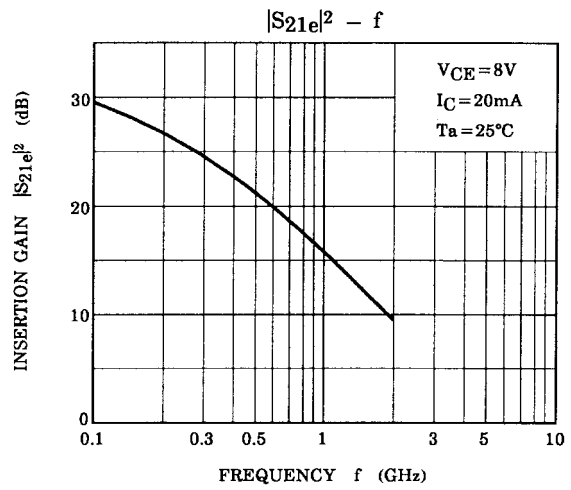
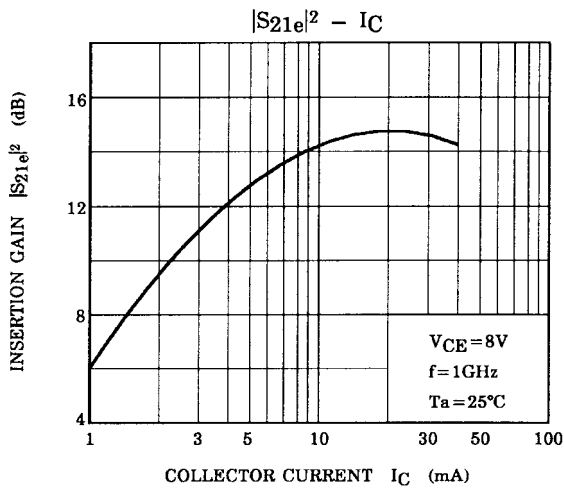
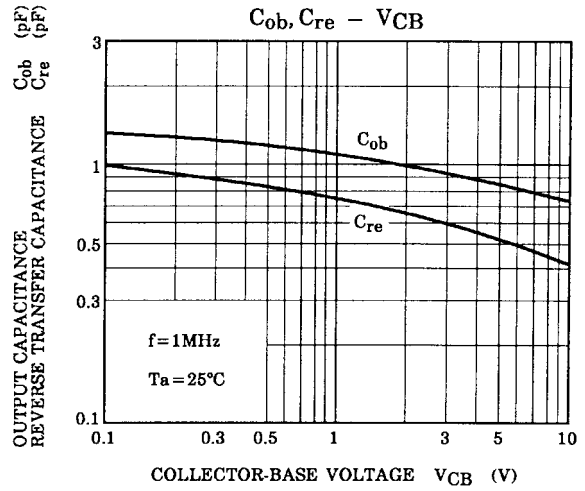
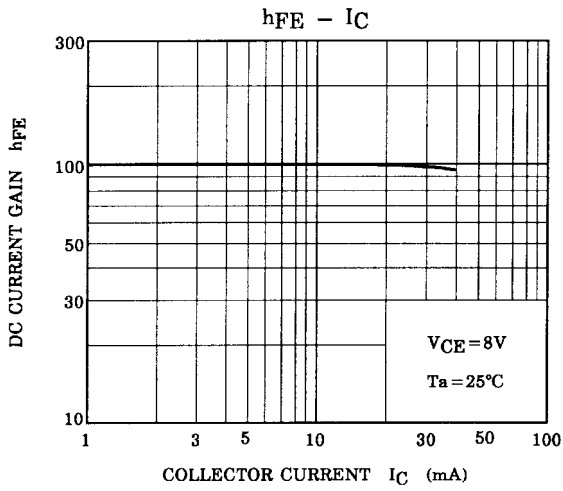
### Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

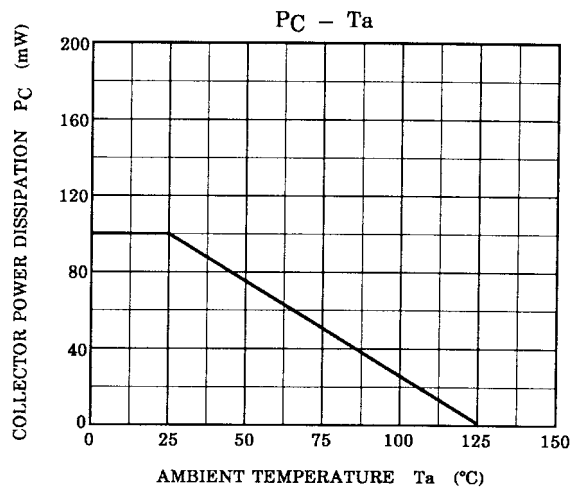
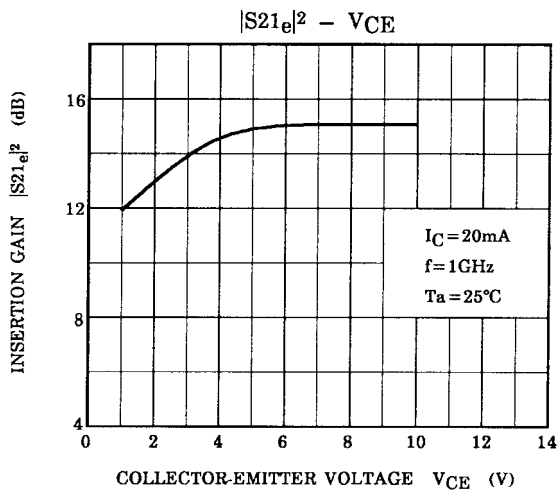
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 10\text{V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$	50	—	250	
Output capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$ (Note)	—	0.8	—	pF
Reverse transfer capacitance	$C_{re}$		—	0.45	0.9	pF

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

**Marking**







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

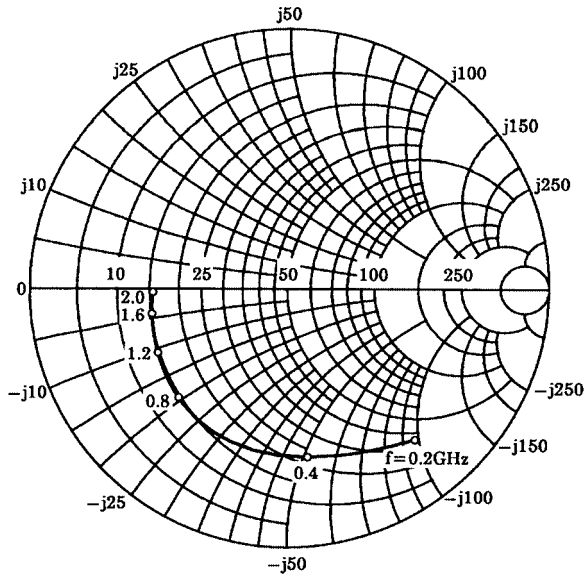
**$V_{CE} = 8 \text{ V}, I_C = 5 \text{ mA}$**

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.760	-47.2	10.933	146.8	0.043	63.8	0.859	-27.2
400	0.651	-83.8	8.697	125.2	0.068	50.1	0.671	-42.8
600	0.629	-112.6	6.938	111.4	0.079	43.6	0.545	-51.3
800	0.590	-132.4	5.621	102.2	0.085	41.6	0.463	-56.5
1000	0.579	-148.9	4.645	94.4	0.091	41.0	0.413	-60.8
1200	0.559	-157.4	3.953	89.1	0.095	41.7	0.382	-64.5
1400	0.547	-166.0	3.457	84.5	0.099	43.3	0.362	-68.1
1600	0.521	-170.2	3.052	80.5	0.103	45.3	0.350	-71.8
1800	0.512	-174.5	2.752	76.9	0.107	47.2	0.344	-75.2
2000	0.536	-177.5	2.534	73.6	0.113	49.3	0.341	-78.7

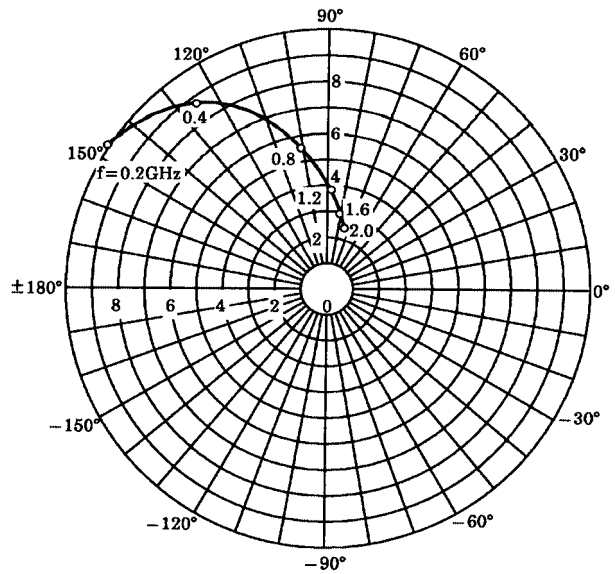
**$V_{CE} = 8 \text{ V}, I_C = 20 \text{ mA}$**

Frequency MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.551	-93.3	22.441	127.0	0.030	55.6	0.622	-46.5
400	0.511	-132.8	13.552	107.5	0.040	52.6	0.393	-59.9
600	0.517	-151.6	9.551	98.0	0.049	55.2	0.299	-65.0
800	0.514	-163.6	7.326	92.1	0.057	58.7	0.250	-68.7
1000	0.520	-172.3	5.966	87.3	0.067	60.8	0.225	-72.2
1200	0.527	-178.0	4.961	84.0	0.077	62.7	0.211	-75.6
1400	0.526	-176.6	4.322	80.6	0.086	64.1	0.206	-80.0
1600	0.528	-172.9	3.820	77.5	0.096	65.4	0.203	-84.1
1800	0.534	-169.3	3.428	74.3	0.105	66.3	0.203	-87.4
2000	0.529	-166.7	3.132	71.6	0.115	67.0	0.209	-91.1

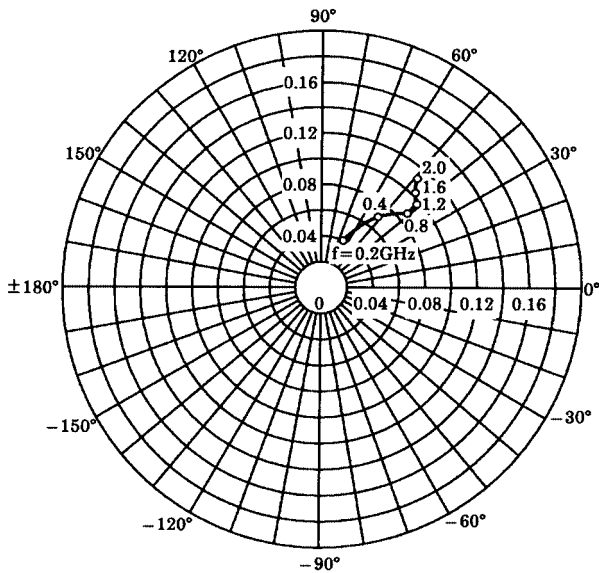
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



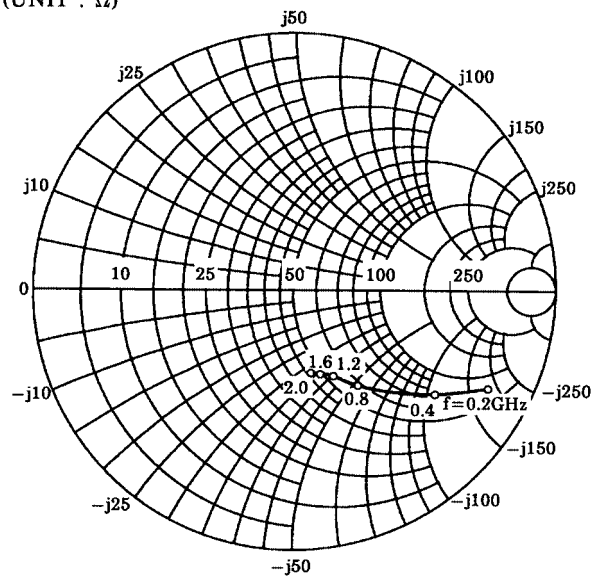
**S<sub>21e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



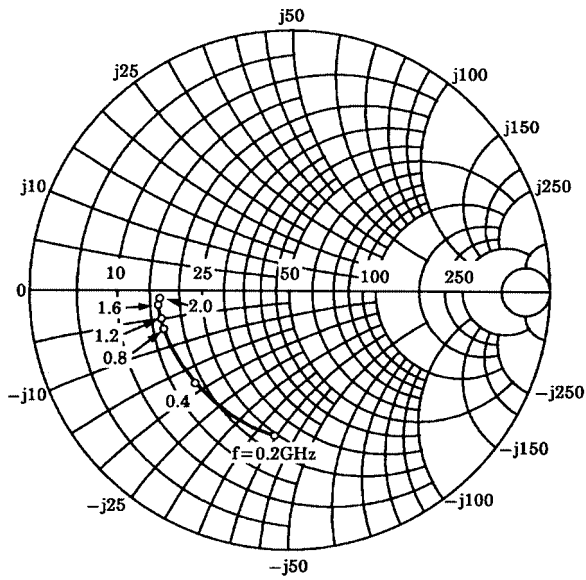
**S<sub>12e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



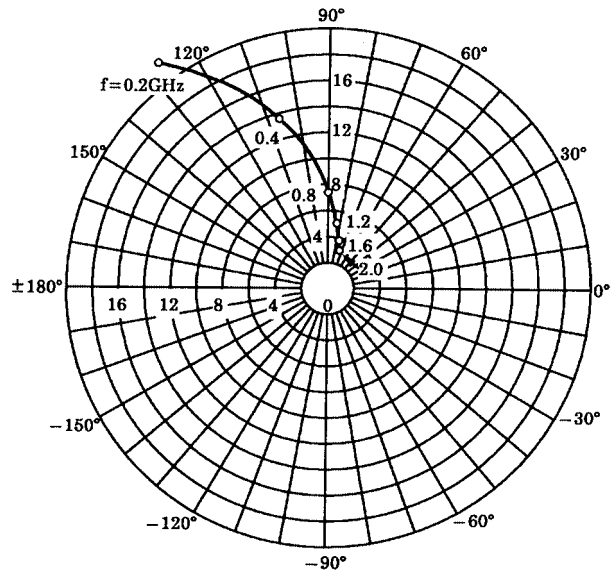
**S<sub>22e</sub>**  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



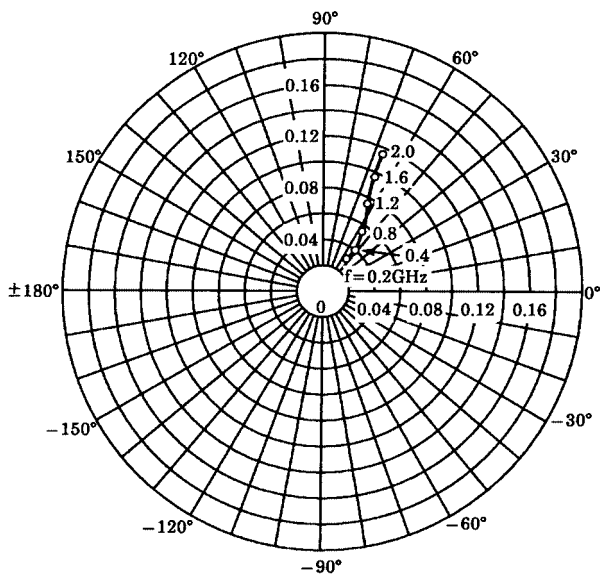
**S11e**  
 $V_{CE} = 8V$   
 $I_C = 20mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



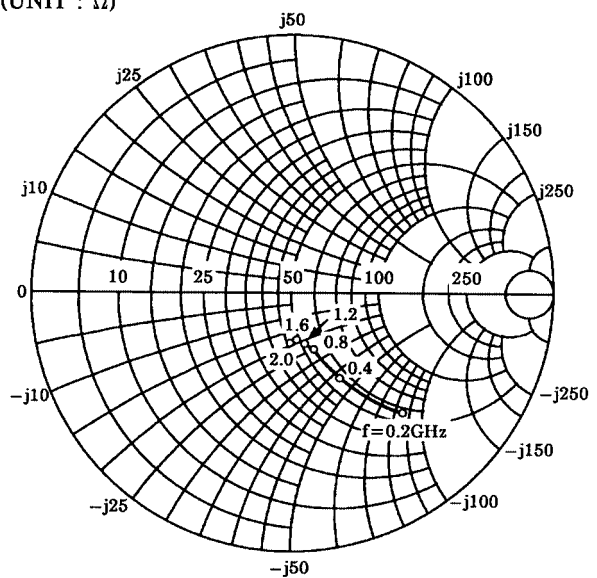
**S21e**  
 $V_{CE} = 8V$   
 $I_C = 20mA$   
 $T_a = 25^\circ C$



**S12e**  
 $V_{CE} = 8V$   
 $I_C = 20mA$   
 $T_a = 25^\circ C$



**S22e**  
 $V_{CE} = 8V$   
 $I_C = 20mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



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