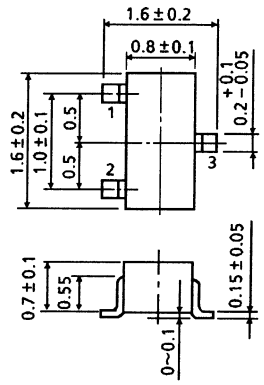
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC4841

VHF~UHF Band Low Noise Amplifier Applications

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

Unit: mm



1. BASE
2. EMITTER
3. COLLECTOR

JEDEC	—
JEITA	—
TOSHIBA	2-2H1A

Weight: 2.4 mg (typ.)

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}	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	°C
Storage temperature range	T_{stg}	−55~125	°C

Microwave Characteristics (Ta = 25°C)

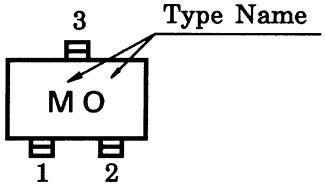
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 6 V, I_C = 7 mA	7	10	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 6 V, I_C = 7 mA, f = 1 GHz	—	13.5	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 6 V, I_C = 7 mA, f = 2 GHz	4.5	8.5	—	
Noise figure	NF (1)	V_{CE} = 6 V,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

Electrical Characteristics (Ta = 25°C)

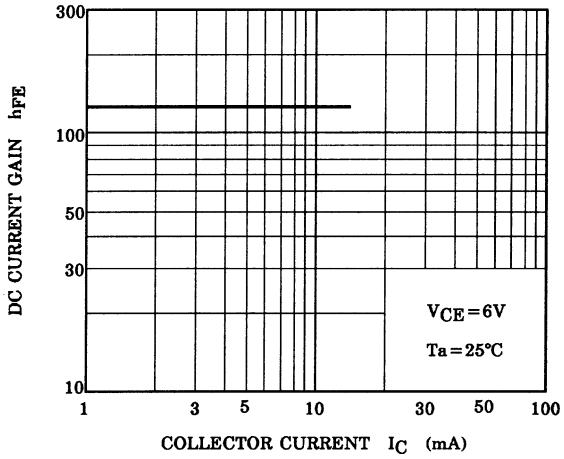
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 6 V, I_C = 7 mA	50	—	250	
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz (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.

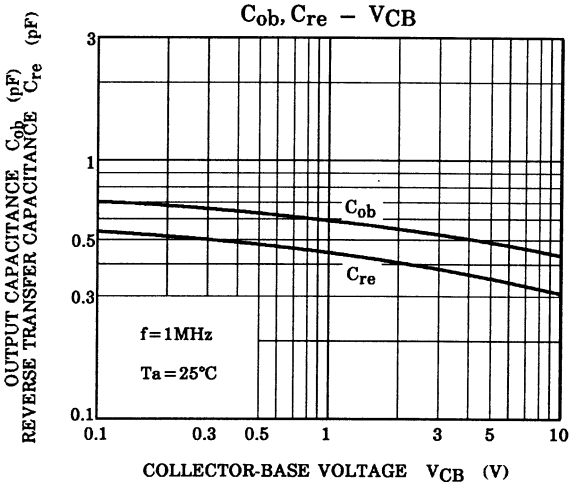
Marking



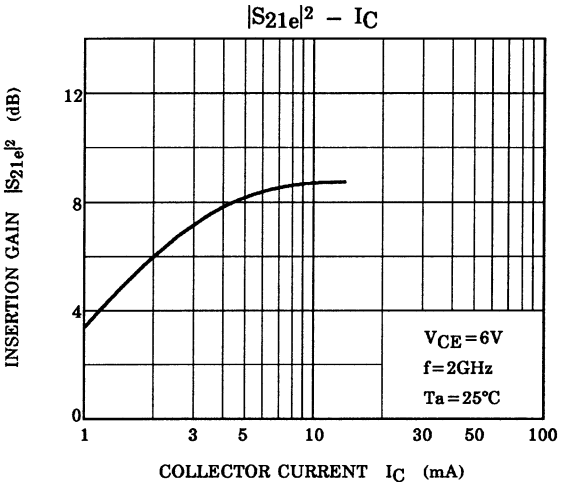
h_{FE} – I_C



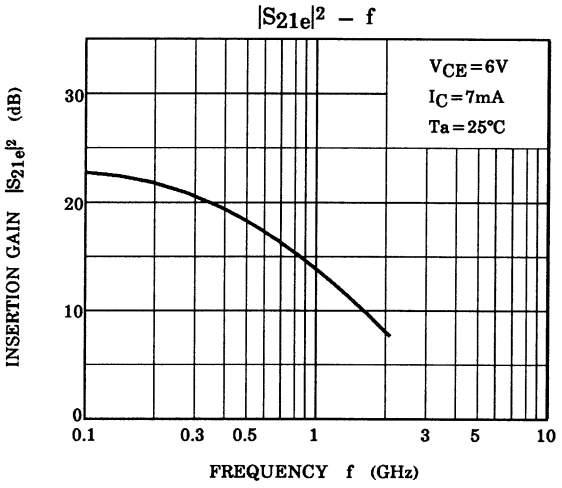
C_{ob}, C_{re} – V_{CB}



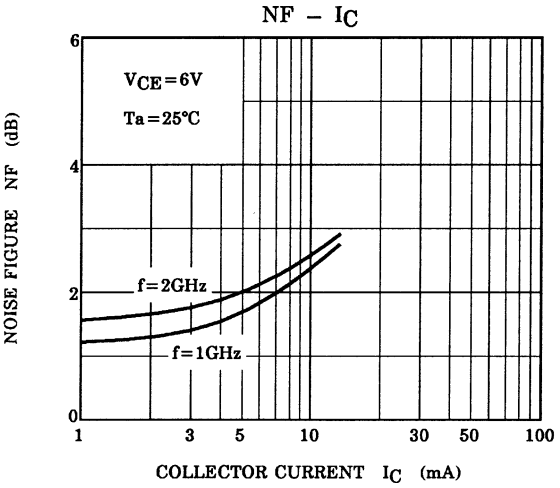
$|S_{21e}|^2$ – I_C



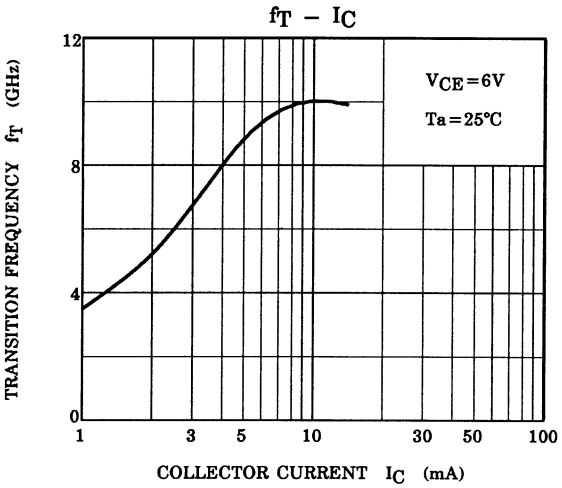
$|S_{21e}|^2$ – f

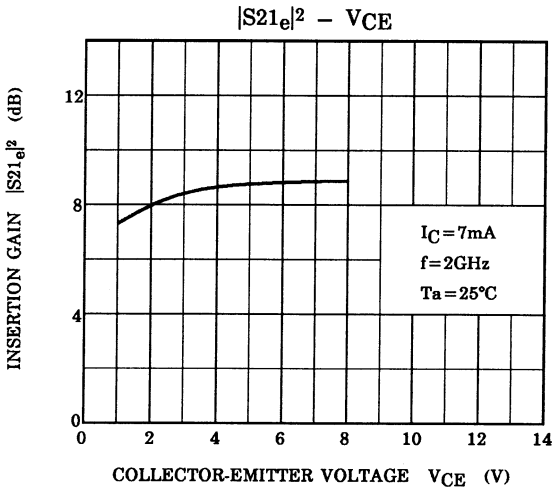


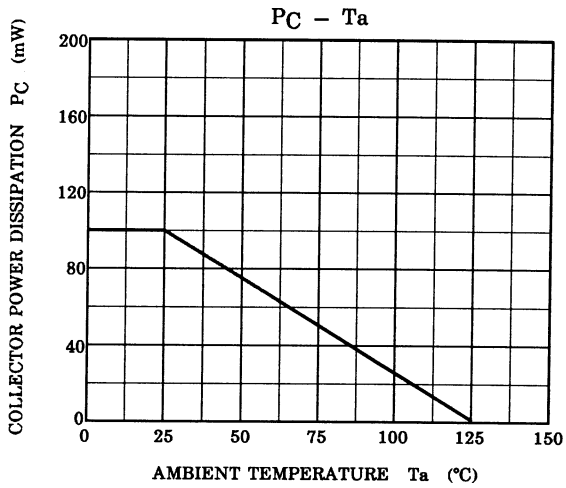
NF – I_C



f_T – I_C







S-Parameter Z_O = 50 Ω, Ta = 25°C

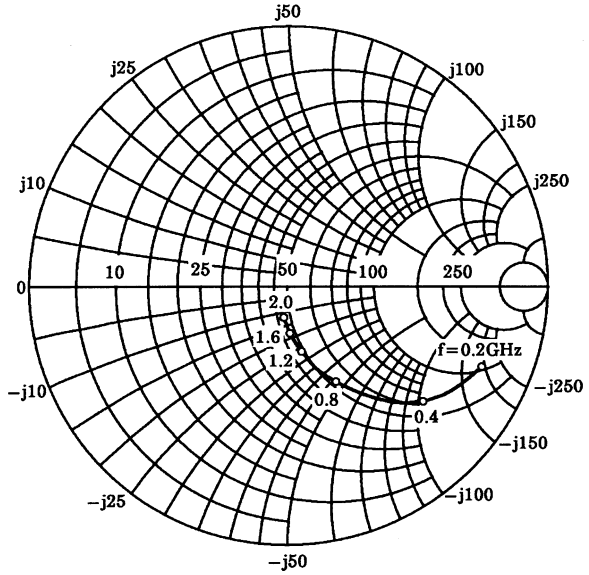
V_{CE} = 6 V, I_C = 3 mA

Frequency	S11		S21		S12		S22	
MHz	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

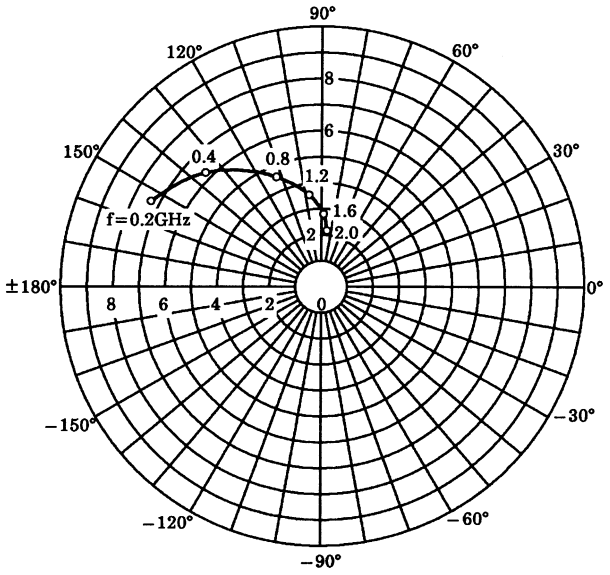
V_{CE} = 6 V, I_C = 7 mA

Frequency	S11		S21		S12		S22	
MHz	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

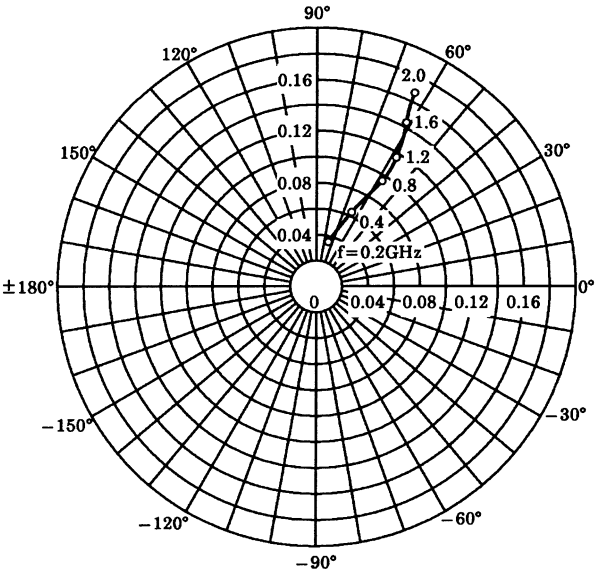
S_{11e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C
(UNIT : Ω)



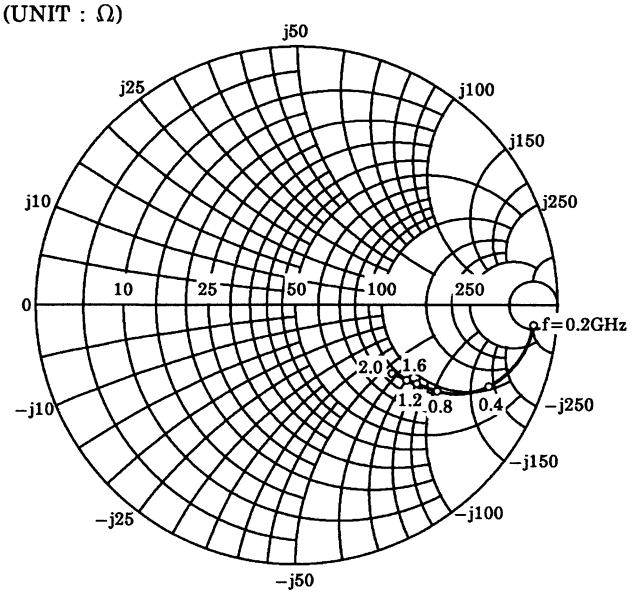
S_{21e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



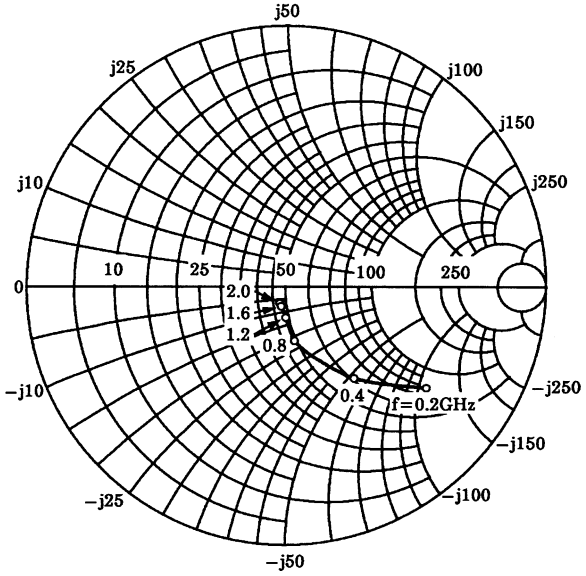
S_{12e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



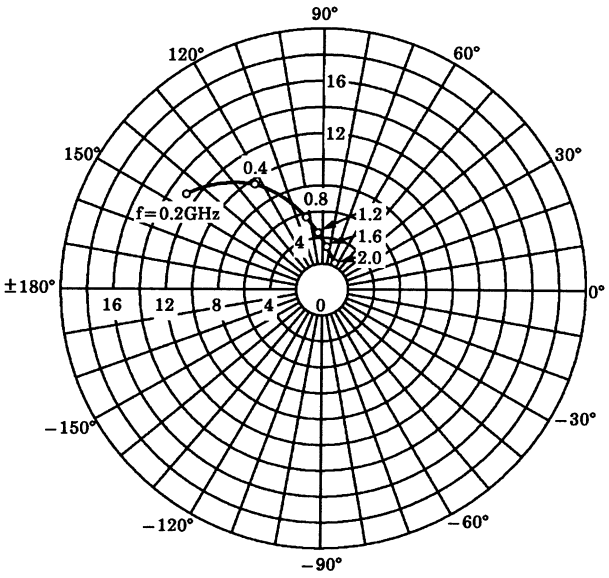
S_{22e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C
(UNIT : Ω)



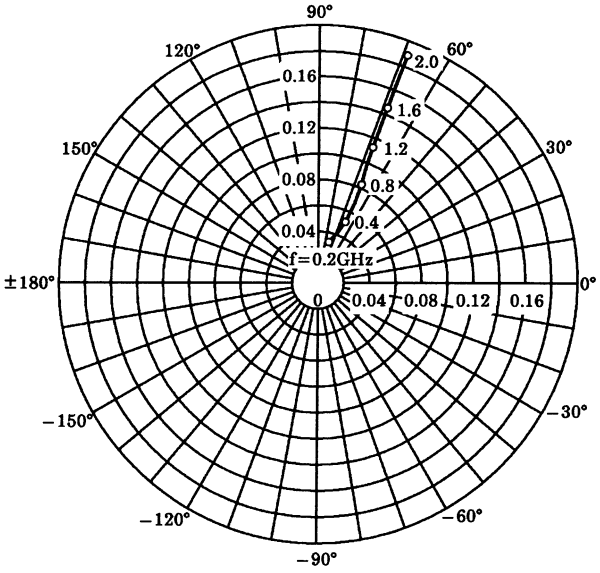
S_{11e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C
(UNIT : Ω)



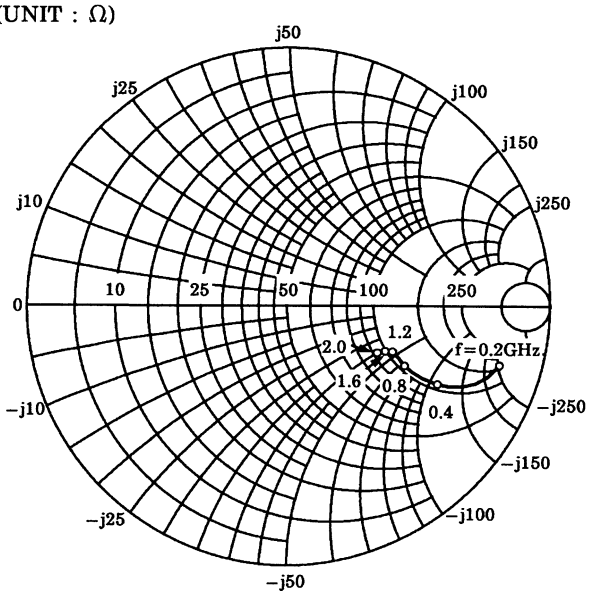
S_{21e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C



S_{12e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C



S_{22e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C
(UNIT : Ω)



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