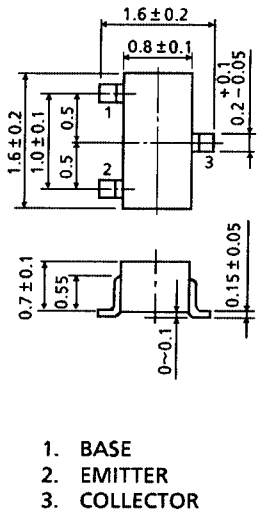
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC4840

VHF~UHF Band Low Noise Amplifier Applications

- Low noise figure, high gain.
- NF = 1.1dB, $|S_{21e}|^2$ = 13dB (f = 1 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	20	mA
Collector current	I_C	40	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)

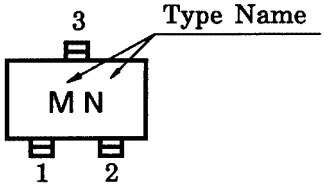
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 8 V, I_C = 20 mA	7	10	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 8 V, I_C = 20 mA, f = 1 GHz	10	13	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 8 V, I_C = 20 mA, f = 2 GHz	—	7	—	
Noise figure	NF (1)	V_{CE} = 8 V, I_C = 5 mA, f = 1 GHz	—	1.1	2.5	dB
	NF (2)	V_{CE} = 8 V, I_C = 5 mA, f = 2 GHz	—	1.7	—	

Electrical Characteristics (Ta = 25°C)

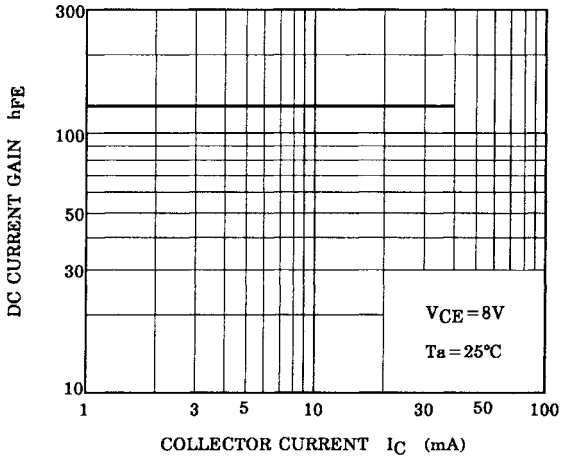
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 8 V, I_C = 20 mA	50	—	250	
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz (Note)	—	0.6	—	pF
Reverse transfer capacitance	C_{re}		—	0.45	0.9	pF

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

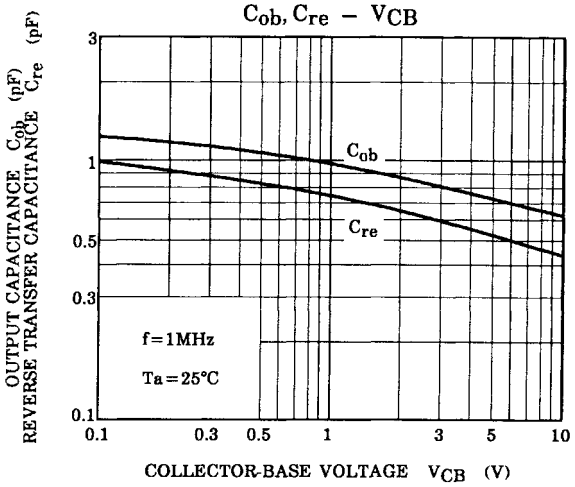
Marking



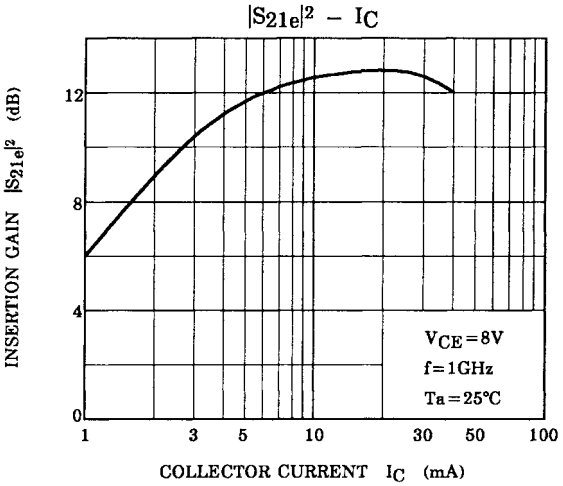
h_{FE} – I_C



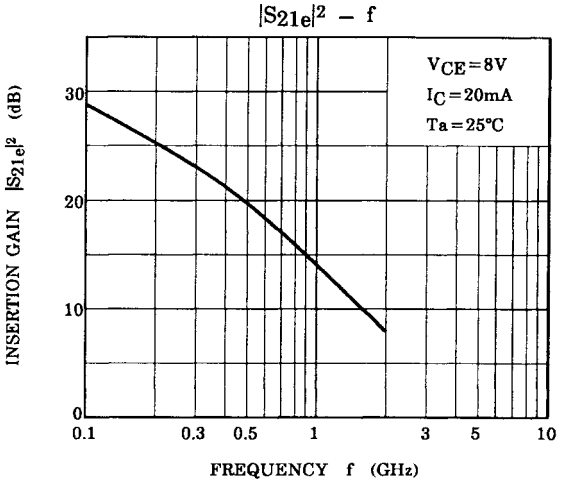
C_{ob}, C_{re} – V_{CB}



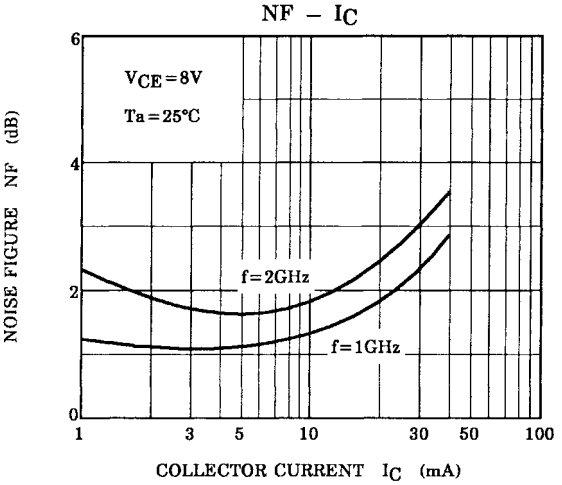
$|S_{21e}|^2$ – I_C



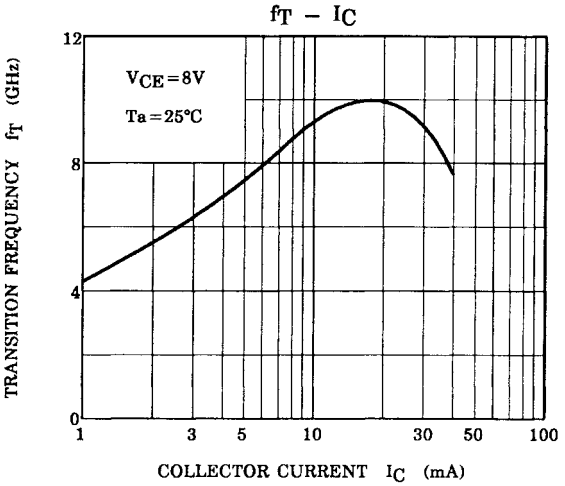
$|S_{21e}|^2$ – f

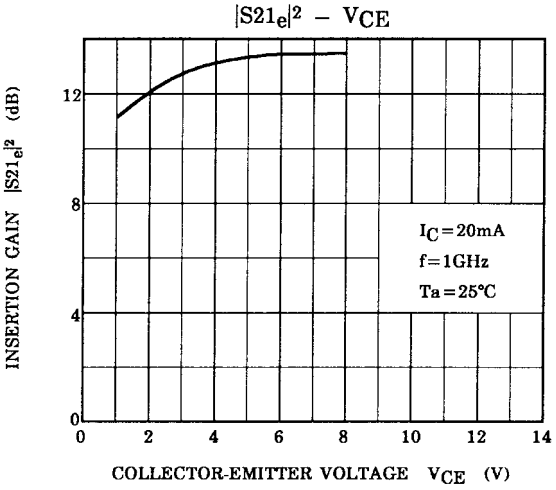


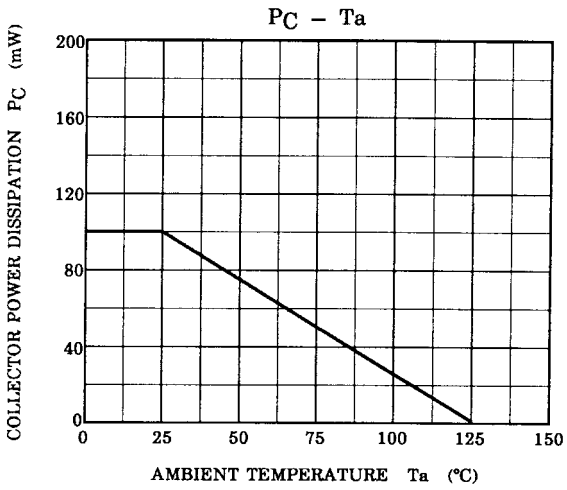
NF – I_C



f_T – I_C







S-Parameter Z_O = 50 Ω, Ta = 25°C

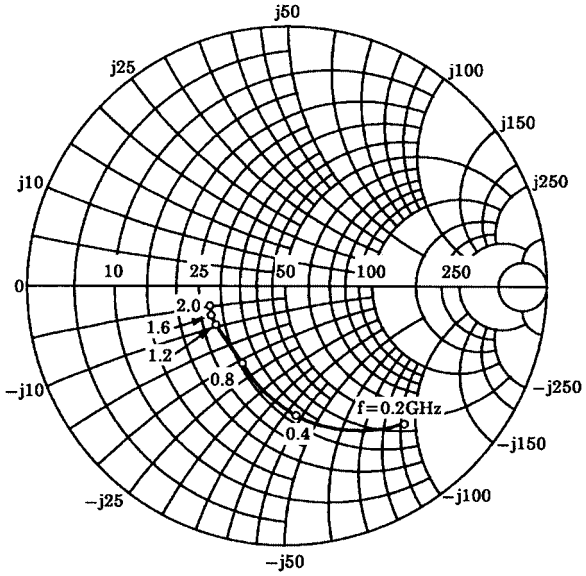
V_{CE} = 8 V, I_C = 5 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.710	–49.8	10.366	140.1	0.043	63.4	0.805	–24.9
400	0.513	–85.6	7.744	118.2	0.063	55.6	0.609	–32.5
600	0.400	–109.8	5.844	105.6	0.076	55.0	0.507	–33.3
800	0.347	–126.2	4.634	97.8	0.087	57.4	0.456	–32.4
1000	0.319	–138.6	3.851	91.9	0.099	60.2	0.427	–31.8
1200	0.303	–148.0	3.310	87.4	0.112	62.9	0.411	–31.5
1400	0.299	–155.5	2.914	83.3	0.126	64.4	0.401	–32.6
1600	0.294	–160.5	2.610	80.0	0.139	65.9	0.389	–33.8
1800	0.296	–160.3	2.367	77.4	0.153	68.7	0.380	–34.8
2000	0.300	–163.9	2.184	75.0	0.171	69.3	0.376	–36.4

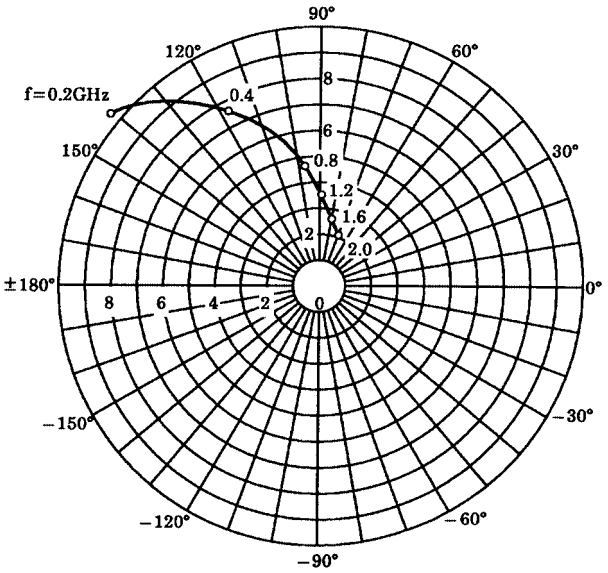
V_{CE} = 8 V, I_C = 20 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.383	–98.8	19.474	117.1	0.043	63.5	0.538	–34.2
400	0.292	–134.7	10.899	100.9	0.063	55.5	0.384	–30.2
600	0.270	–154.3	7.496	93.5	0.076	55.0	0.341	–25.5
800	0.262	–165.3	5.727	88.7	0.087	57.3	0.327	–22.9
1000	0.256	–173.1	4.663	84.6	0.099	60.1	0.321	–21.8
1200	0.254	–178.3	3.972	81.4	0.112	62.7	0.322	–22.3
1400	0.257	178.1	3.462	78.3	0.126	64.4	0.320	–23.7
1600	0.258	176.3	3.088	75.7	0.138	66.0	0.315	–25.3
1800	0.258	176.5	2.786	73.7	0.153	68.5	0.314	–26.2
2000	0.265	177.7	2.569	71.6	0.171	69.4	0.308	–28.3

S_{11e}
V_{CE} = 8V
I_C = 5mA
Ta = 25°C
(UNIT : Ω)



S_{21e}
V_{CE} = 8V
I_C = 5mA
Ta = 25°C



S_{12e}
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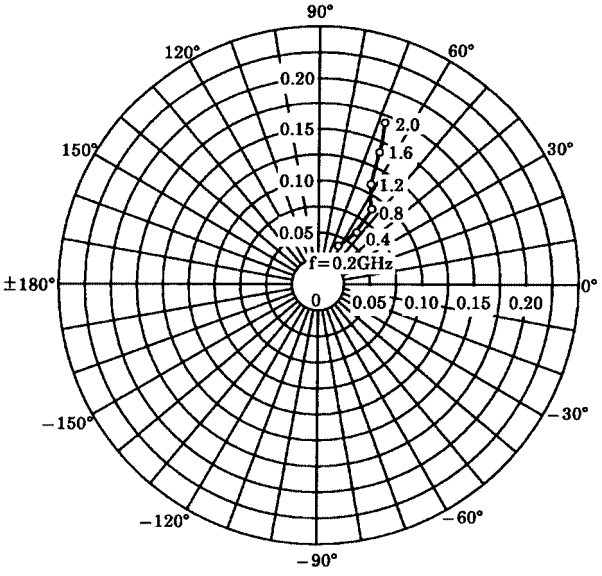

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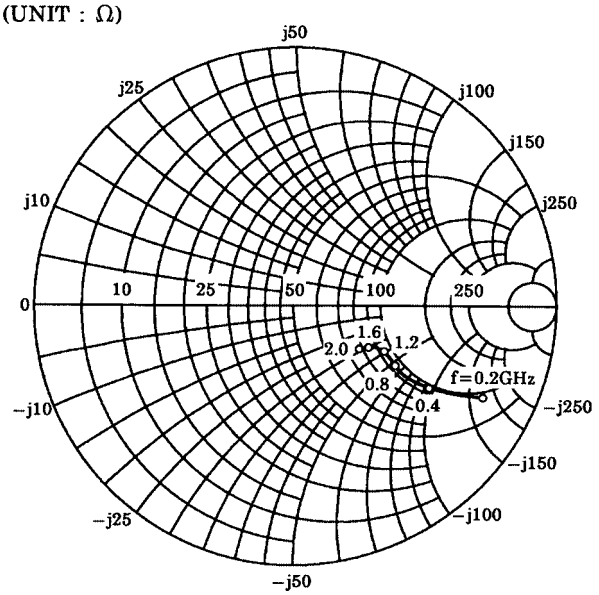
(UNIT : Ω)



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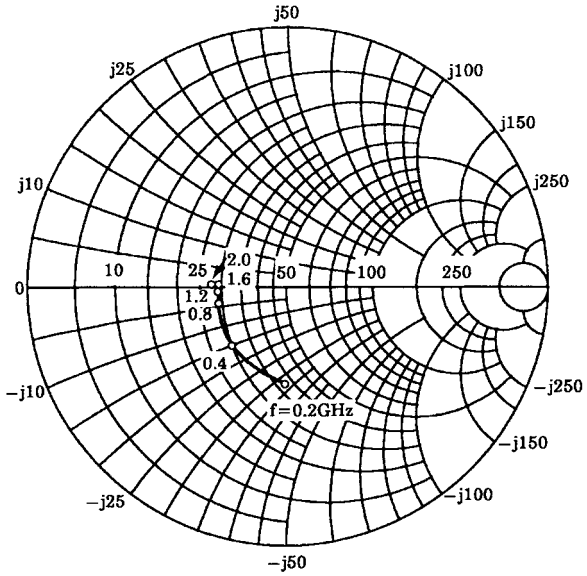
I_C = 20mA
Ta = 25°C
(UNIT : Ω)



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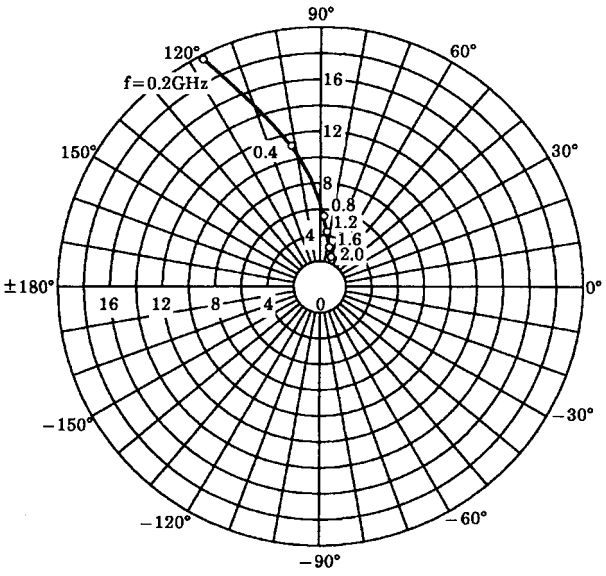

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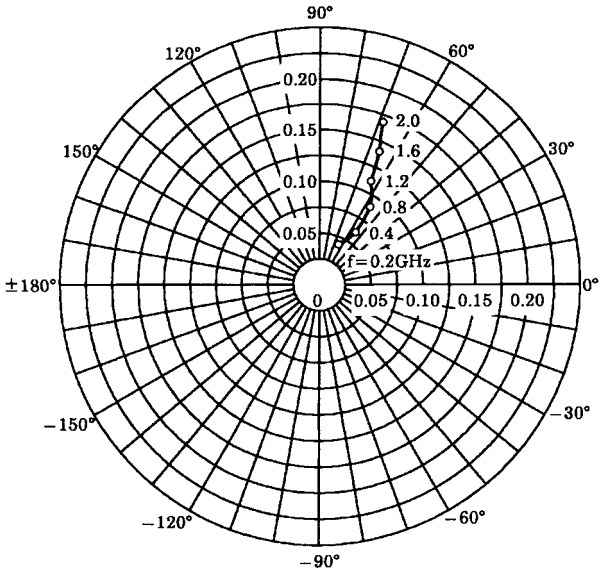

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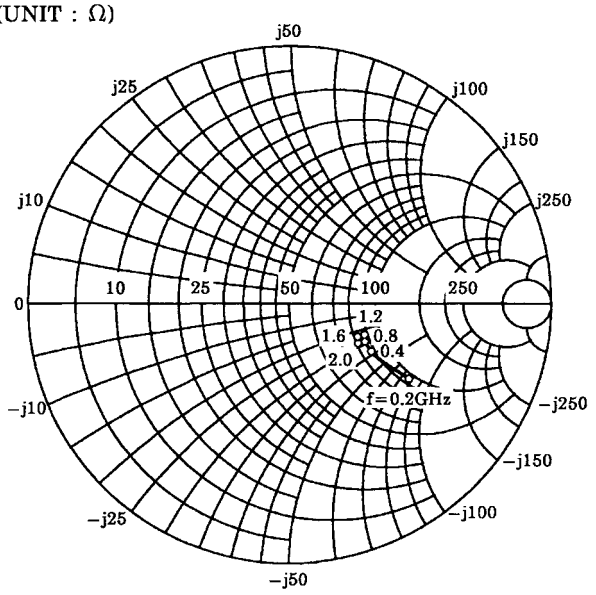

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