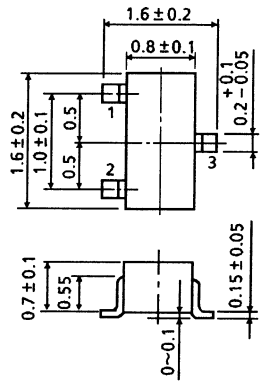
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC4839

VHF~UHF Band Low Noise Amplifier Applications

- Low noise figure, high gain.
- NF = 1.1dB, $|S_{21e}|^2$ = 12dB (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}	12	V
Emitter-base voltage	V_{EBO}	3	V
Collector current	I_C	80	mA
Base current	I_B	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)

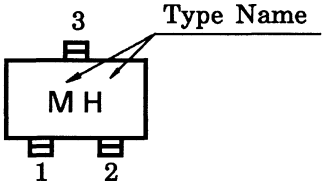
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 10 V, I_C = 20 mA	5	7	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 10 V, I_C = 20 mA, f = 500 MHz	—	18	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 10 V, I_C = 20 mA, f = 1 GHz	7.5	12	—	
Noise figure	NF (1)	V_{CE} = 10 V, I_C = 5 mA, f = 500 MHz	—	1	—	dB
	NF (2)	V_{CE} = 10 V, I_C = 5 mA, f = 1 GHz	—	1.1	2	

Electrical Characteristics (Ta = 25°C)

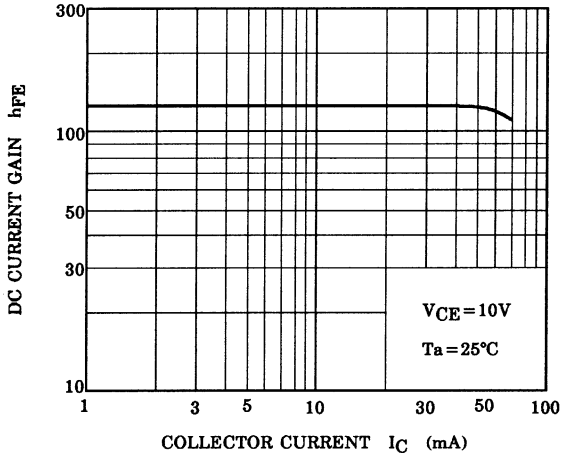
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 10 V, I_C = 20 mA	30	—	250	
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz (Note)	—	0.85	—	pF
Reverse transfer capacitance	C_{re}		—	0.6	1.15	pF

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

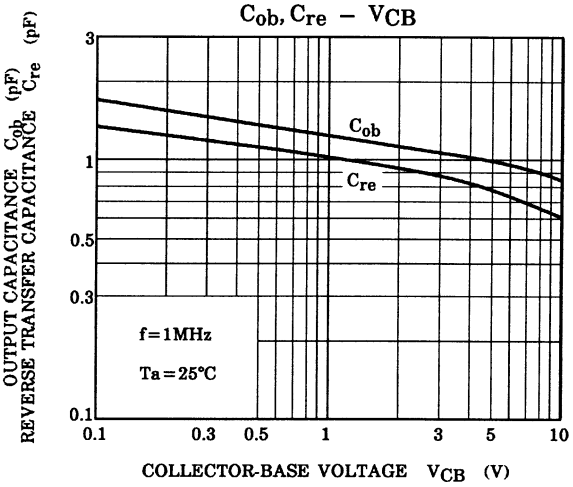
Marking



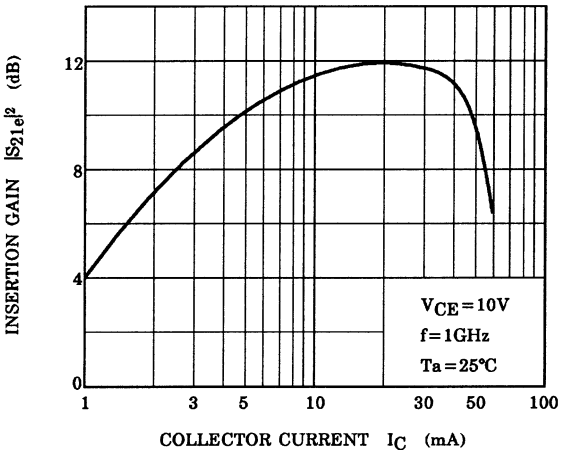
h_{FE} – I_C



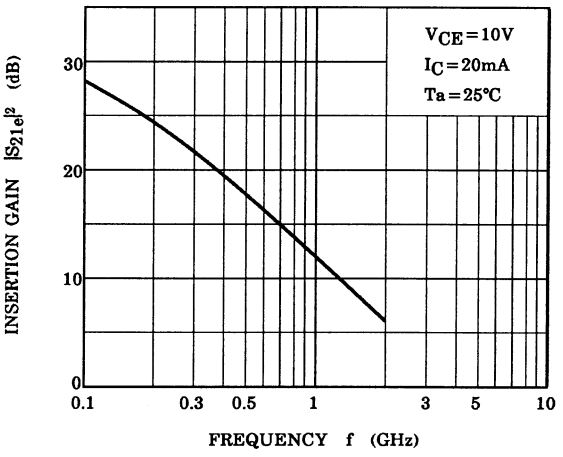
C_{ob}, C_{re} – V_{CB}



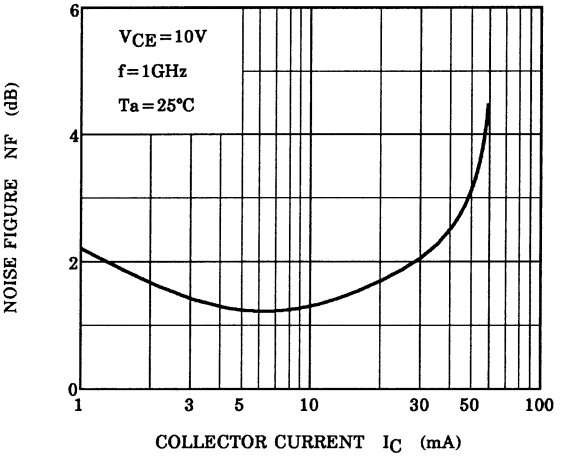
$|S_{21e}|^2$ – I_C



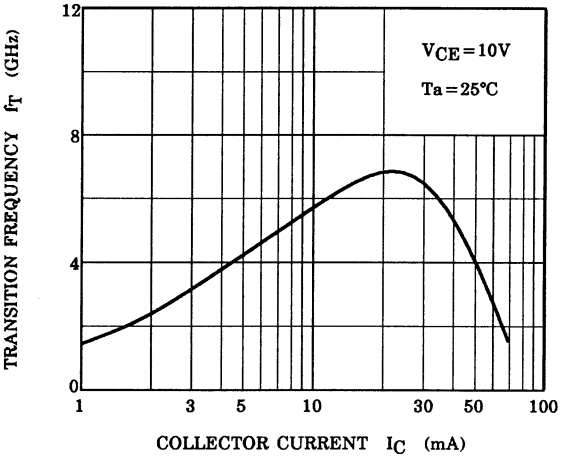
$|S_{21e}|^2$ – f

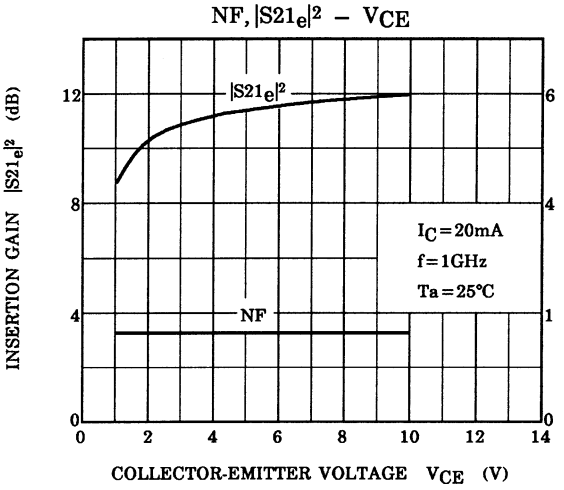


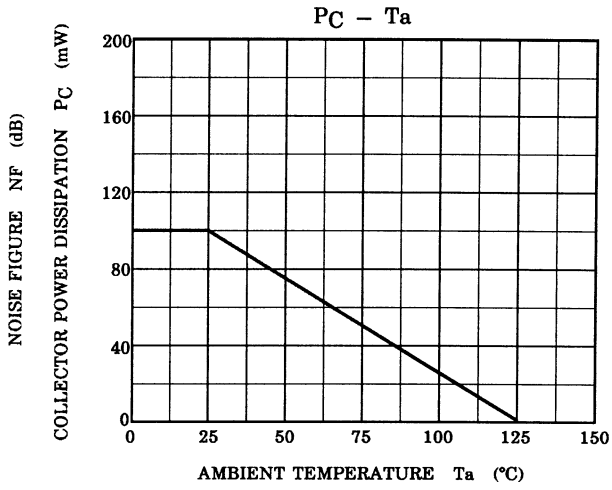
NF – I_C



f_T – I_C







S-Parameter Z_O = 50 Ω, Ta = 25°C

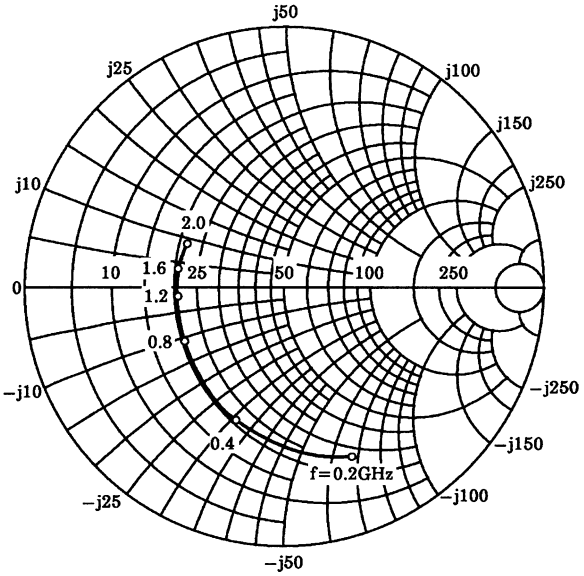
V_{CE} = 10 V, I_C = 5 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.705	–67.0	9.702	132.700	0.048	57.9	0.769	–27.9
400	0.536	–109.6	6.665	109.300	0.066	50.8	0.591	–34.7
600	0.467	–135.0	4.880	96.100	0.077	52.3	0.518	–36.9
800	0.440	–151.6	3.799	87.500	0.088	56.2	0.486	–39.0
1000	0.426	–164.9	3.136	80.600	0.100	60.3	0.475	–41.5
1200	0.417	–175.0	2.668	75.000	0.113	64.2	0.469	–44.5
1400	0.412	176.5	2.349	69.800	0.129	67.6	0.469	–47.8
1600	0.405	169.0	2.099	65.100	0.147	70.4	0.470	–51.2
1800	0.399	162.8	1.916	61.100	0.168	72.2	0.474	–54.1
2000	0.393	157.9	1.777	56.900	0.190	73.5	0.474	–57.8

V_{CE} = 10 V, I_C = 20 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.416	–111.00	16.818	111.100	0.032	61.30	0.504	–36.4
400	0.352	–145.90	9.121	95.900	0.051	67.10	0.382	–34.9
600	0.343	–163.20	6.289	87.800	0.070	70.90	0.352	–34.7
800	0.341	–174.70	4.772	81.800	0.090	72.80	0.342	–36.3
1000	0.341	–175.50	3.903	76.400	0.111	73.70	0.341	–39.2
1200	0.338	167.80	3.294	72.300	0.132	73.90	0.346	–41.9
1400	0.333	160.90	2.898	67.800	0.154	73.90	0.349	–45.8
1600	0.325	154.60	2.563	63.800	0.176	73.60	0.355	–49.0
1800	0.314	150.30	2.322	60.300	0.200	72.90	0.361	–51.9
2000	0.301	147.30	2.132	56.600	0.223	72.10	0.363	–55.0

S_{11e}
V_{CE} = 10V
I_C = 5mA
Ta = 25°C
(UNIT : Ω)



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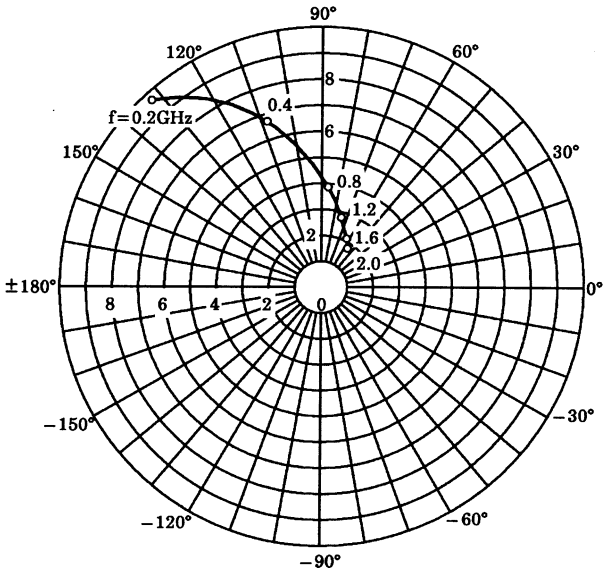

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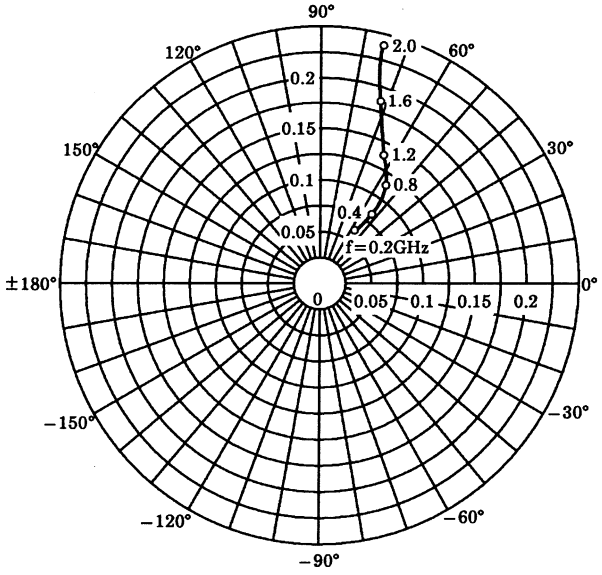

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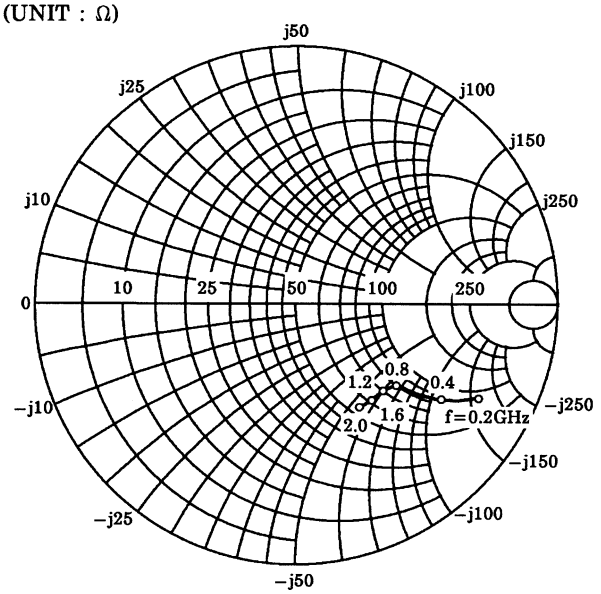
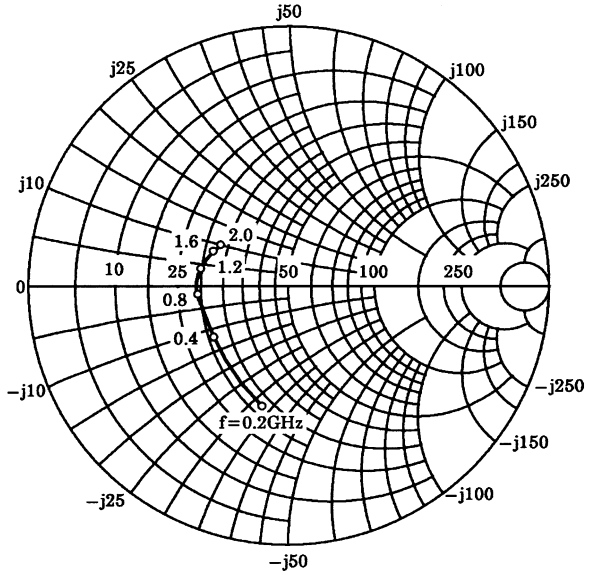


S_{11e}
V_{CE} = 10V
I_C = 20mA
Ta = 25°C
(UNIT : Ω)



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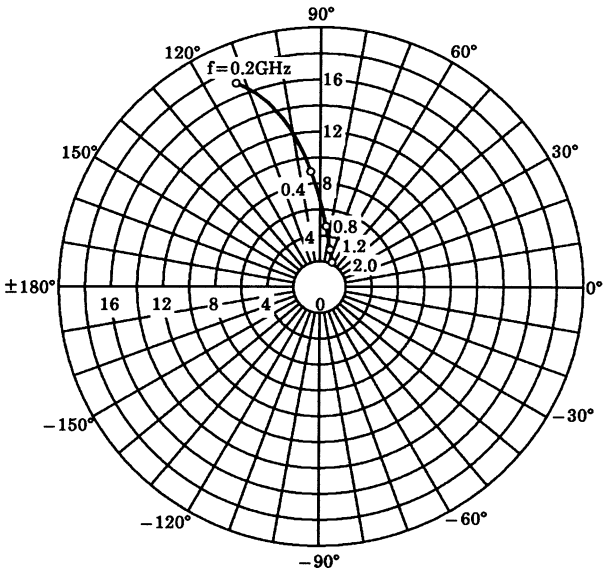

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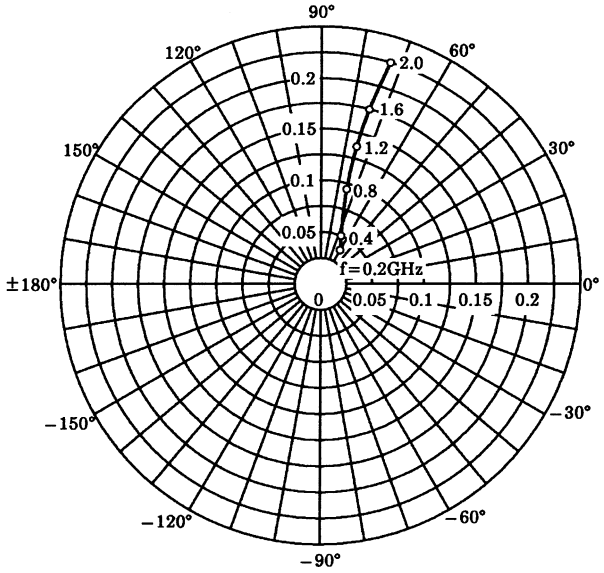

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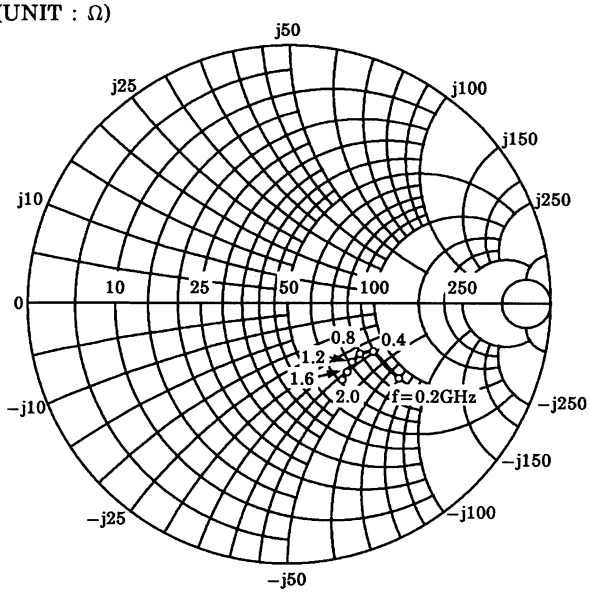

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