TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC4322

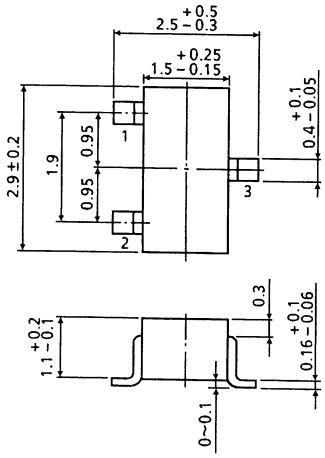
VHF~UHF Band Low Noise Amplifier Applications

- Low noise figure, high gain.
- NF = 1.8dB, $|S_{21e}|^2$ = 7.5dB (f = 2 GHz)

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	150	mW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55~125	°C

Unit: mm



1. BASE
2. EMITTER
3. COLLECTOR

JEDEC	—
JEITA	SC-59
TOSHIBA	2-3F1A

Weight: 0.012 g (typ.)

Microwave Characteristics (Ta = 25°C)

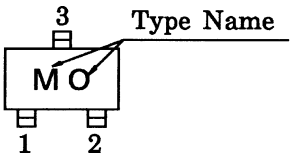
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 6 V, I_C = 7 mA	7	10	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 6 V, I_C = 7 mA, f = 1 GHz	—	13	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 6 V, I_C = 7 mA, f = 2 GHz	4.5	7.5	—	
Noise figure	NF (1)	V_{CE} = 6 V, I_C = 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)

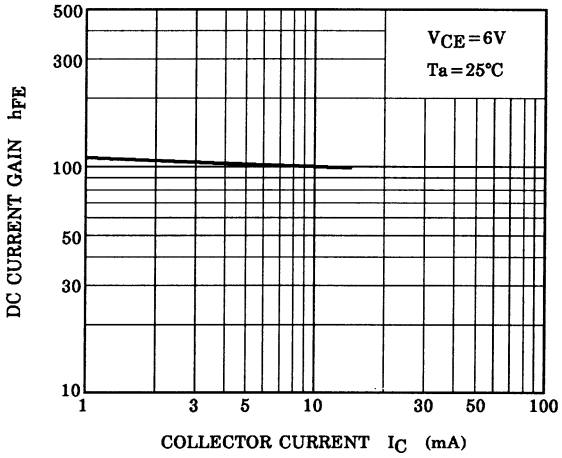
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 6 V, I_C = 7 mA	50	—	250	
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz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

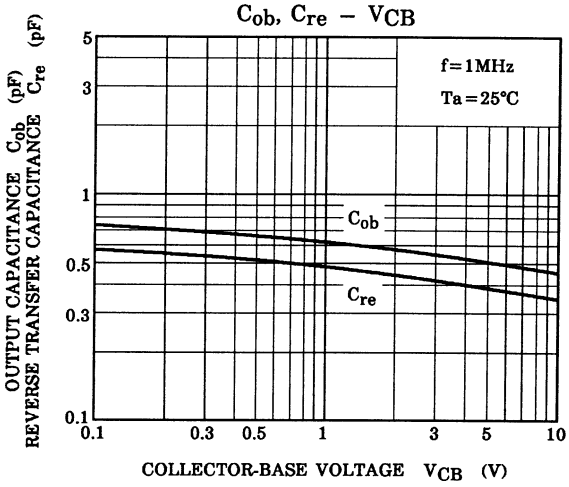
Marking



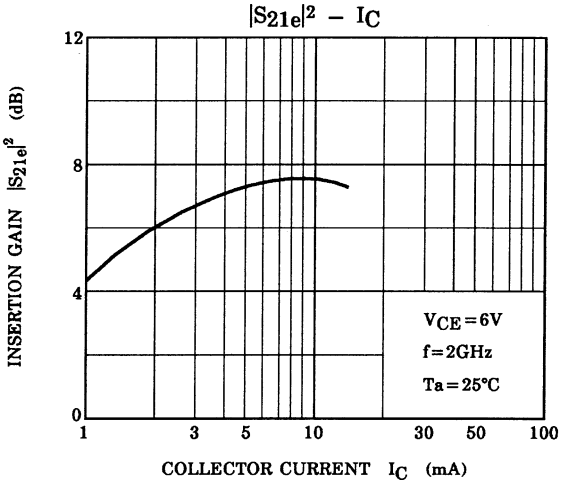
h_{FE} – I_C



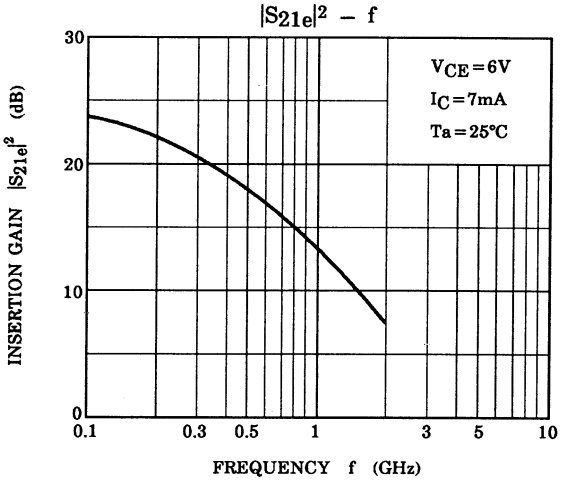
C_{ob}, C_{re} – V_{CB}



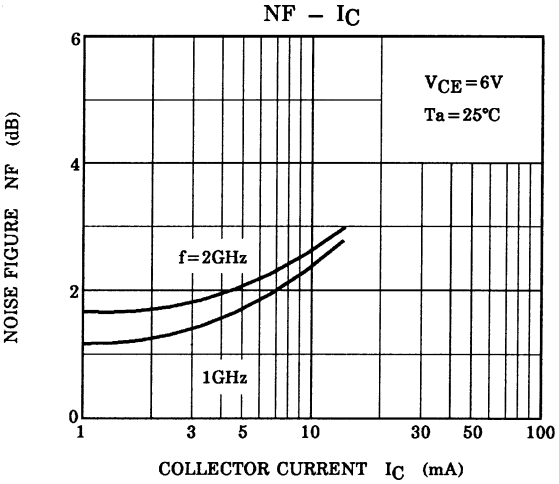
$|S_{21e}|^2$ – I_C



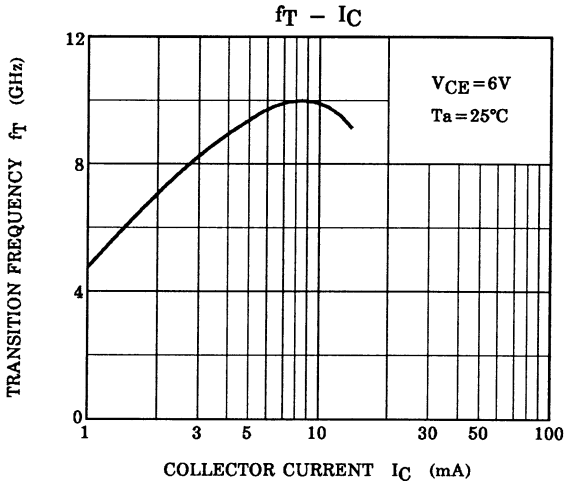
$|S_{21e}|^2$ – f

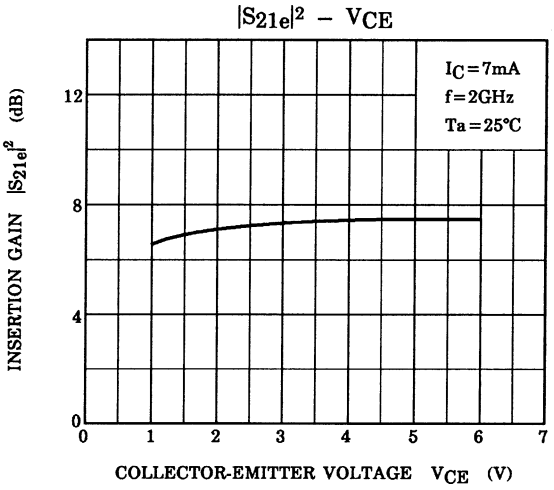


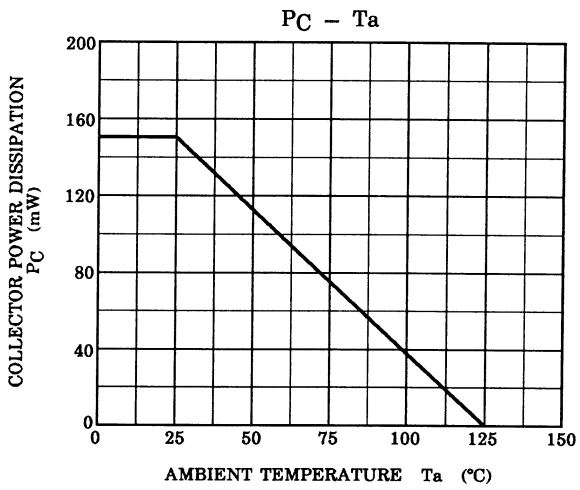
NF – I_C



f_T – I_C







S-Parameter Z_O = 50 Ω, Ta = 25°C

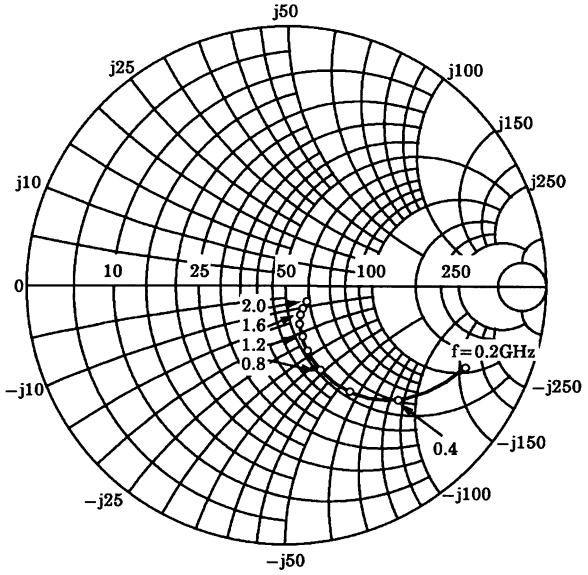
V_{CE} = 6 V, I_C = 3 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.764	–25.0	7.758	153.8	0.037	76.2	0.934	–16.4
400	0.613	–44.9	6.493	132.9	0.065	67.0	0.808	–27.7
600	0.473	–57.9	5.331	117.9	0.085	62.8	0.702	–34.3
800	0.356	–66.9	4.433	106.2	0.102	61.2	0.623	–38.0
1000	0.261	–70.4	3.738	97.7	0.117	60.4	0.575	–40.6
1200	0.198	–71.7	3.266	90.1	0.132	60.2	0.544	–42.4
1400	0.147	–66.3	2.853	83.0	0.147	60.1	0.529	–44.1
1600	0.129	–54.9	2.555	78.2	0.163	60.3	0.519	–46.4
1800	0.114	–41.8	2.348	72.8	0.179	60.0	0.514	–49.0
2000	0.124	–34.5	2.108	69.2	0.192	60.1	0.513	–52.4

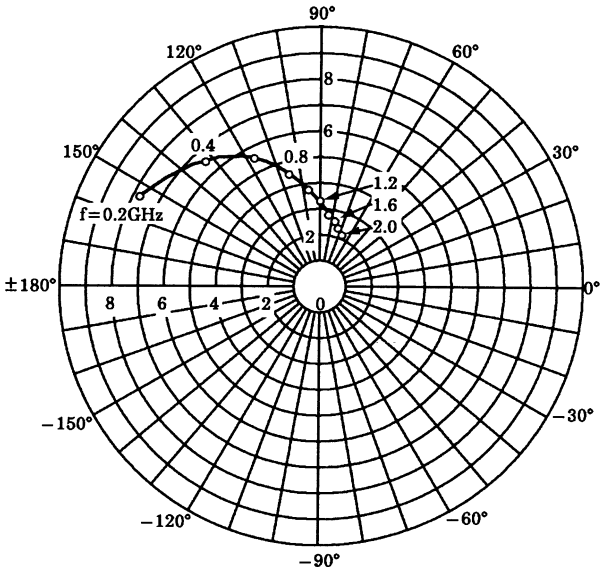
V_{CE} = 6 V, I_C = 7 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.560	–35.3	12.525	142.0	0.032	74.2	0.853	–21.5
400	0.367	–54.1	8.958	118.8	0.055	69.5	0.678	–30.1
600	0.248	–63.4	6.693	105.3	0.073	68.4	0.581	–32.7
800	0.158	–62.4	5.270	95.5	0.091	68.6	0.530	–33.6
1000	0.101	–47.8	4.319	88.5	0.110	68.4	0.506	–34.7
1200	0.088	–27.3	3.687	82.1	0.128	67.9	0.493	–36.0
1400	0.099	–4.3	3.188	76.2	0.146	67.0	0.491	–37.8
1600	0.131	–0.7	2.813	71.9	0.165	66.2	0.492	–40.5
1800	0.152	0.4	2.563	67.4	0.183	65.2	0.498	–43.7
2000	0.167	–1.7	2.276	64.5	0.198	64.5	0.500	–47.5

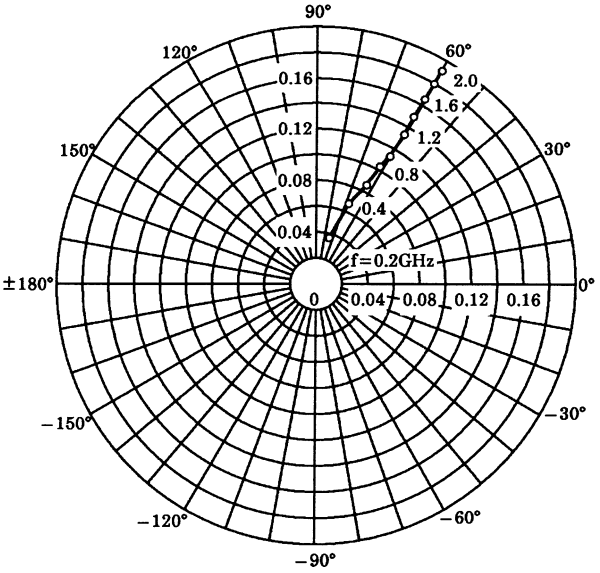
S_{11e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C
(UNIT : Ω)



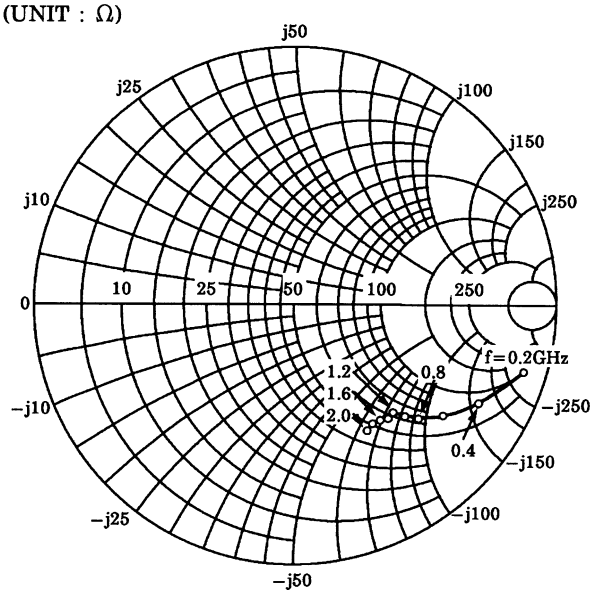
S_{21e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



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}
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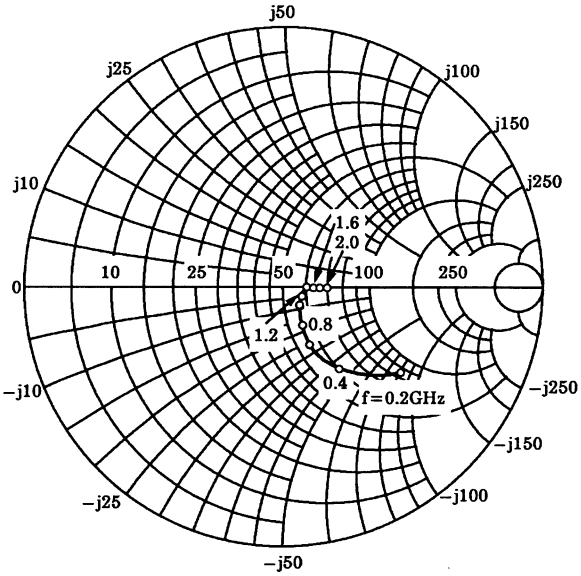
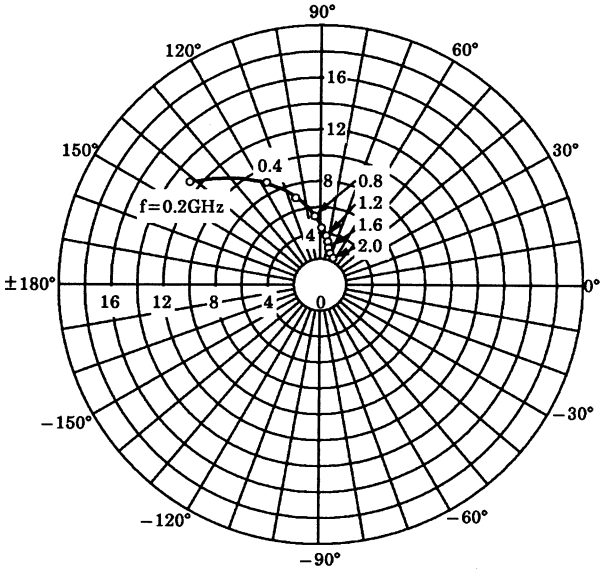
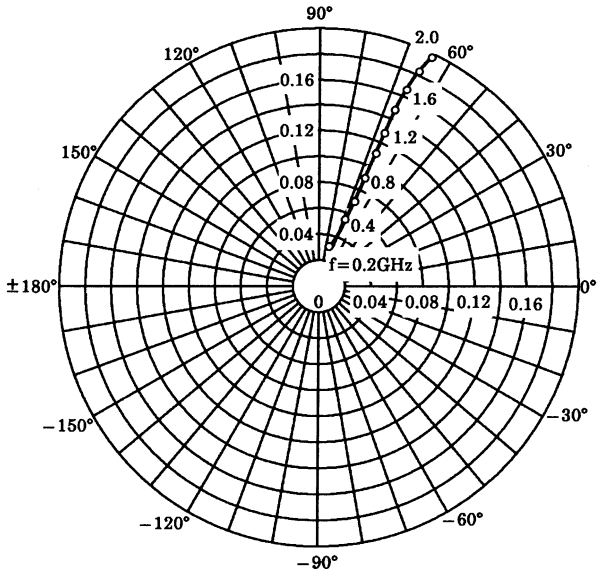
I_C = 7mA
Ta = 25°C
(UNIT : Ω)



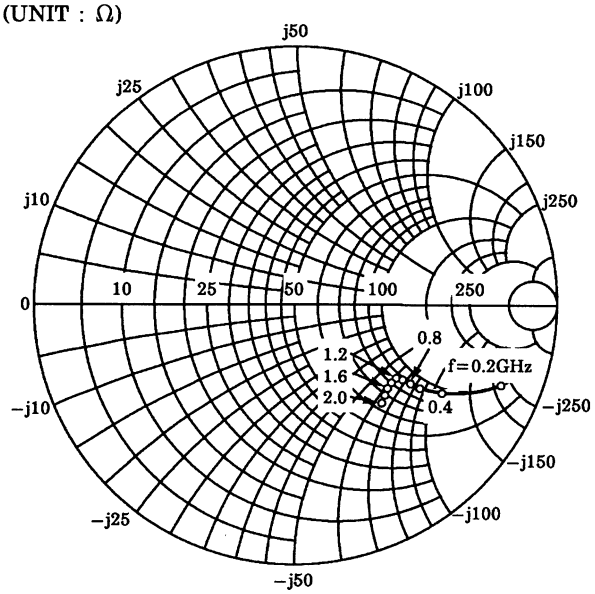
S_{21e}
V_{CE} = 6V
I_C = 7mA
Ta = 25°C



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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