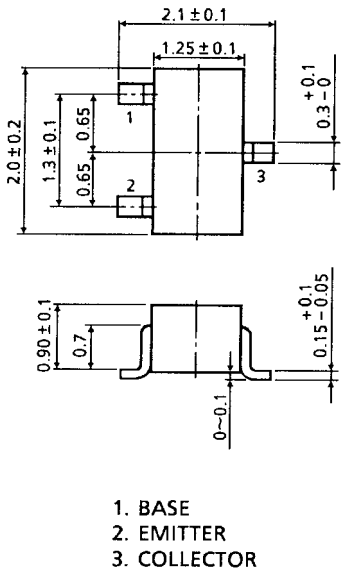
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC4325

VHF~UHF Band Low Noise Amplifier Applications

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

Unit: mm



1. BASE
2. EMITTER
3. COLLECTOR

JEDEC	—
JEITA	SC-70
TOSHIBA	2-2E1A

Weight: 0.006 g (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)

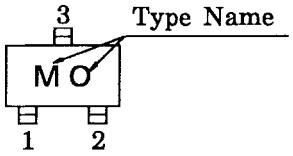
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE} = 6 V, I_C = 7 mA	7	10	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 6 V, I_C = 7 mA, f = 1 GHz	—	13	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 6 V, I_C = 7 mA, f = 2 GHz	4.5	7.5	—	
Noise figure	NF (1)	V_{CE} = 6 V, I_C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

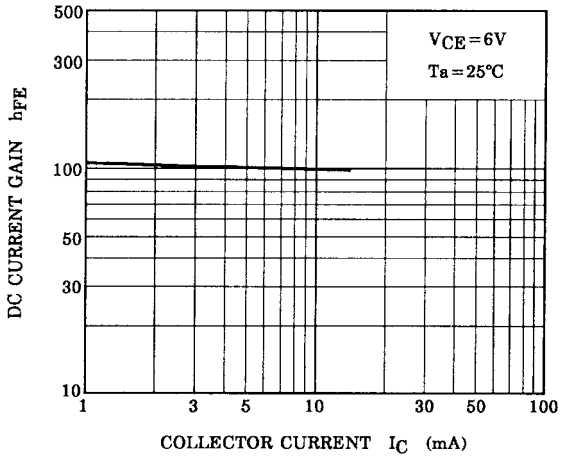
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 6 V, I_C = 7 mA	50	—	250	
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz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

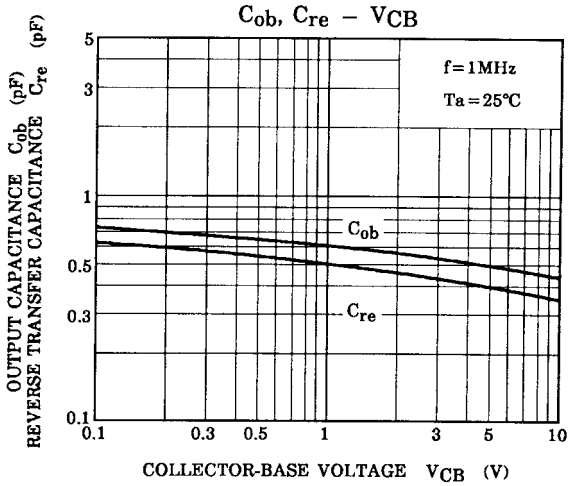
Marking



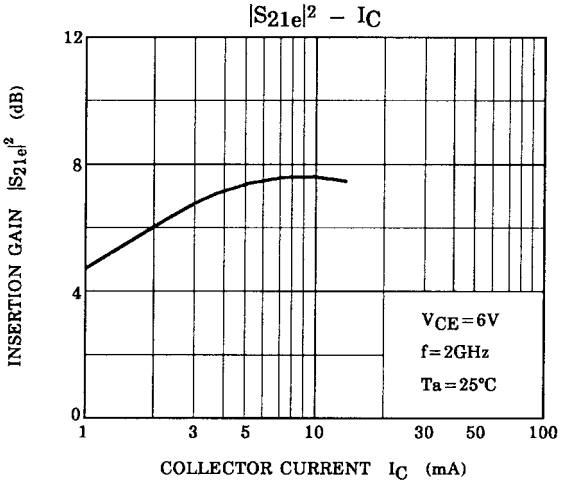
h_{FE} – I_C



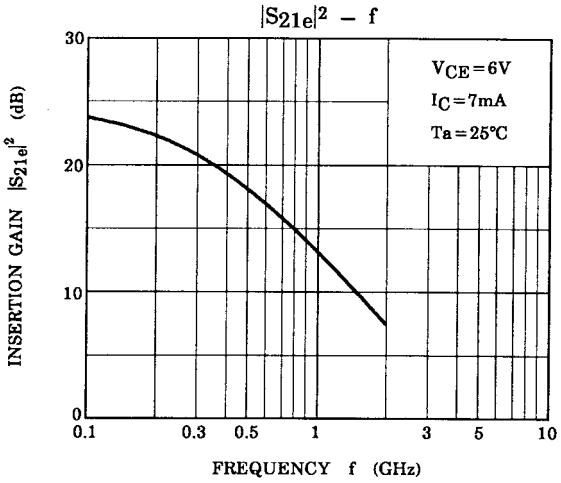
C_{ob}, C_{re} – V_{CB}



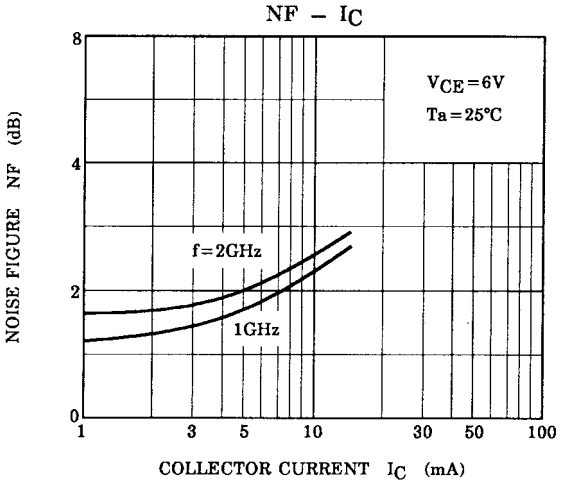
$|S_{21e}|^2$ – I_C



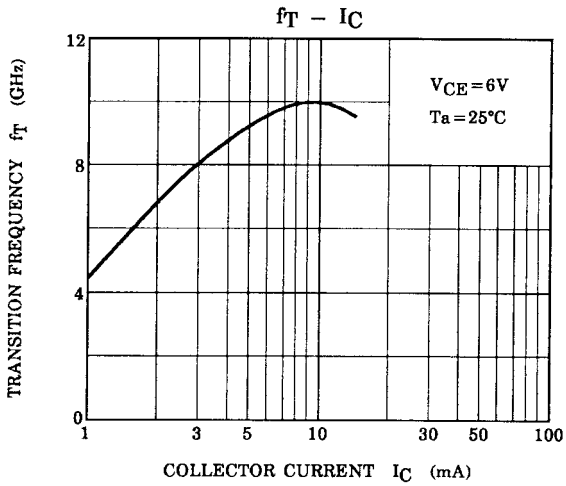
$|S_{21e}|^2$ – f

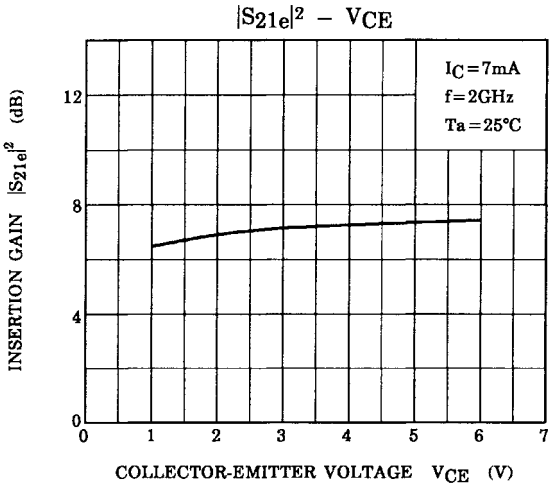


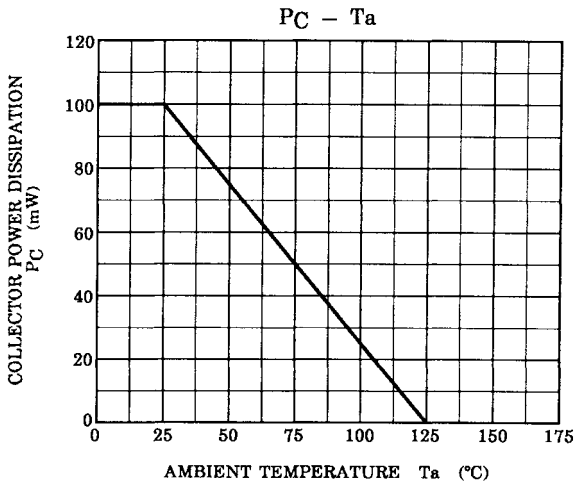
NF – I_C



f_T – I_C







S-Parameter Z_O = 50 Ω, Ta = 25°C

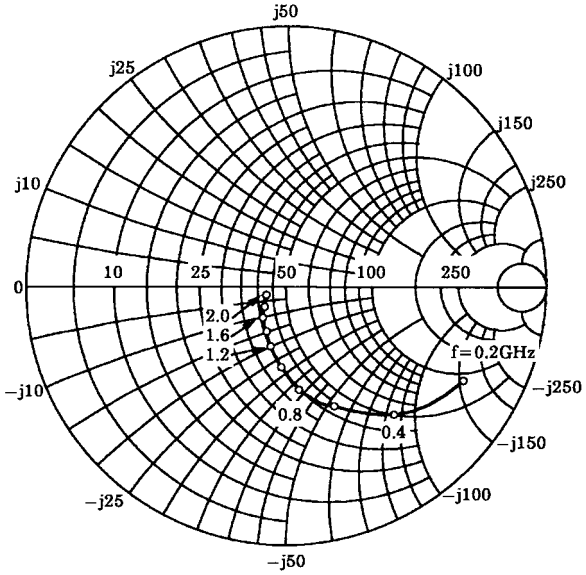
V_{CE} = 6 V, I_C = 3 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.778	–27.1	7.781	154.1	0.043	75.7	0.932	–18.5
400	0.641	–49.4	6.538	133.4	0.075	66.5	0.800	–31.9
600	0.500	–67.1	5.409	118.1	0.097	61.9	0.683	–40.4
800	0.394	–80.5	4.508	106.6	0.115	59.9	0.595	–45.8
1000	0.311	–93.1	3.809	97.9	0.132	59.4	0.536	–49.6
1200	0.238	–103.0	3.314	90.6	0.149	59.3	0.492	–52.7
1400	0.194	–114.5	2.909	84.0	0.165	59.3	0.465	–55.3
1600	0.146	–122.2	2.619	78.7	0.183	59.4	0.444	–57.9
1800	0.102	–135.3	2.409	73.5	0.199	59.4	0.428	–60.8
2000	0.074	–150.4	2.188	70.0	0.216	59.6	0.415	–64.2

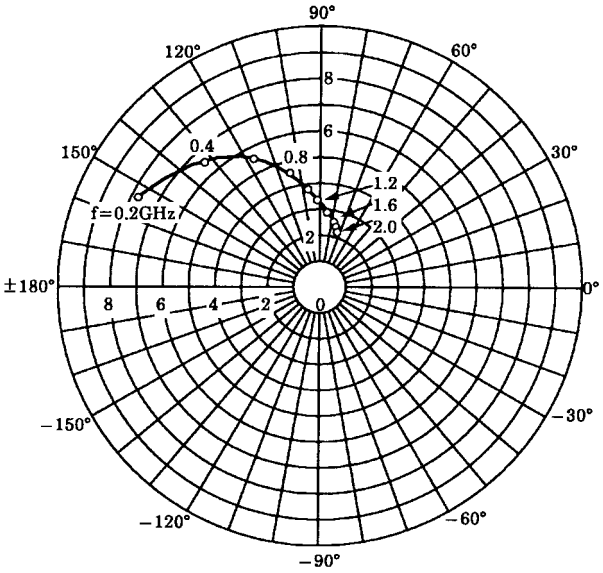
V_{CE} = 6 V, I_C = 7 mA

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.581	–39.7	12.614	141.9	0.037	73.0	0.842	–24.8
400	0.397	–64.8	9.040	119.2	0.061	67.7	0.652	–36.1
600	0.278	–82.1	6.744	105.5	0.081	67.3	0.541	–40.4
800	0.194	–94.9	5.328	96.2	0.101	67.7	0.477	–42.6
1000	0.137	–109.4	4.364	89.2	0.121	67.8	0.440	–44.3
1200	0.096	–123.2	3.733	83.2	0.141	67.8	0.417	–46.4
1400	0.062	–140.8	3.254	77.9	0.162	67.1	0.403	–48.5
1600	0.041	–169.5	2.899	73.4	0.183	66.6	0.394	–50.9
1800	0.030	137.0	2.634	68.9	0.203	65.6	0.389	–54.0
2000	0.038	99.1	2.377	66.1	0.222	65.1	0.382	–57.6

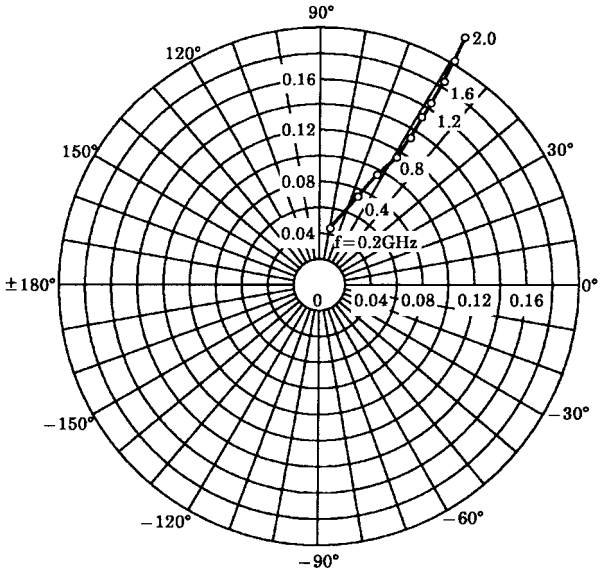
S_{11e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C
(UNIT : Ω)



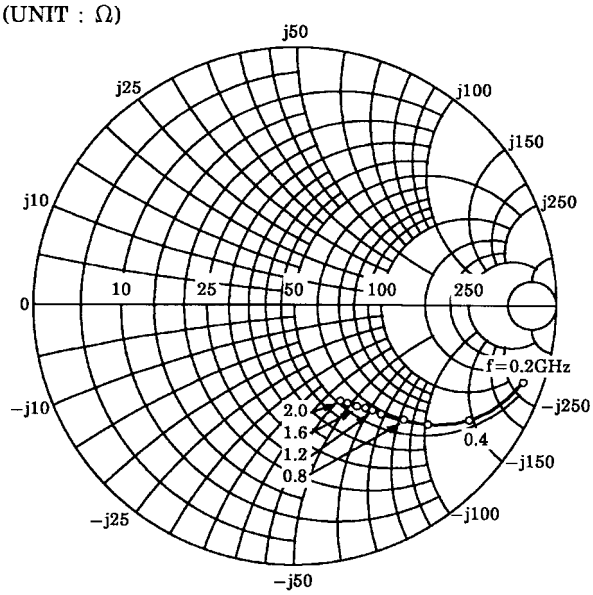
S_{21e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



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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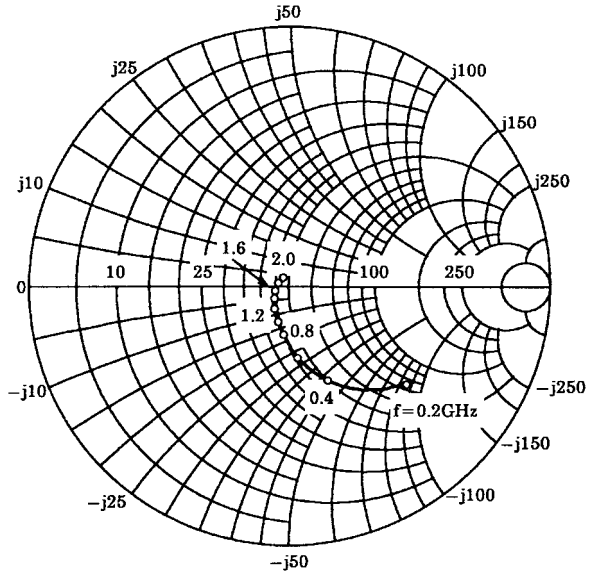
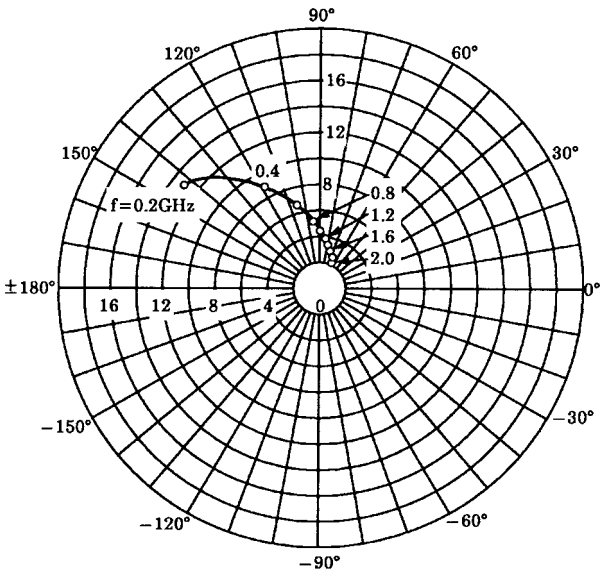
I_C = 7mA
Ta = 25°C
(UNIT : Ω)



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



S_{12e}
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I_C = 7mA
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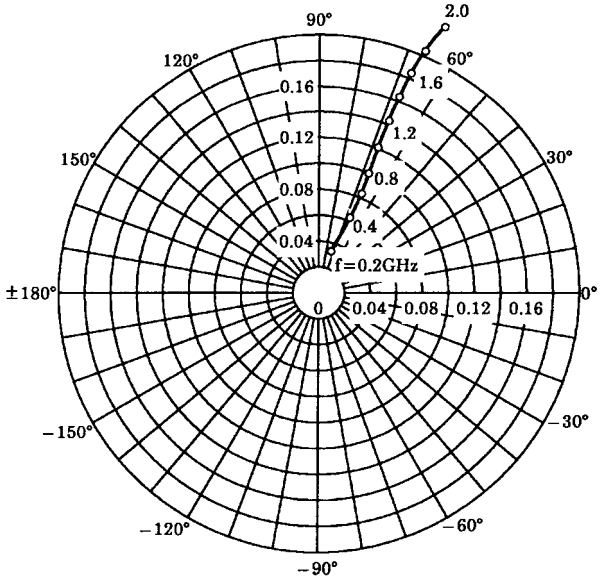

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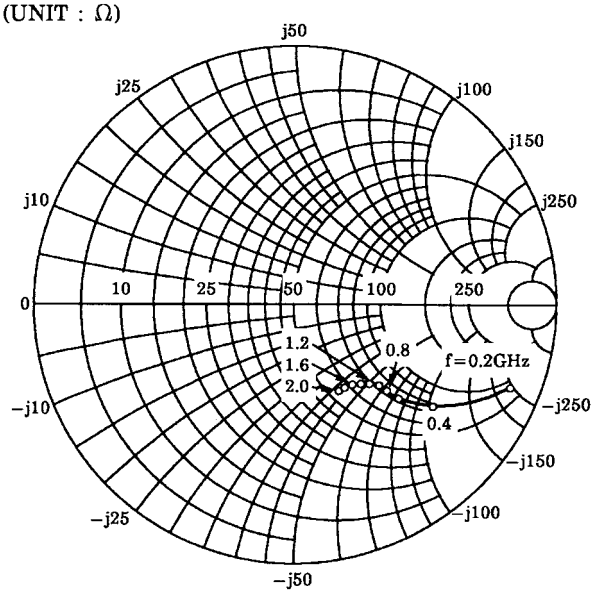

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