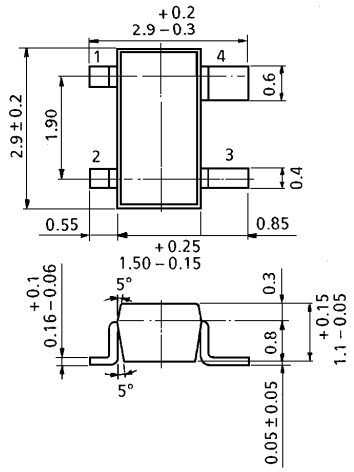
TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC4324

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- NF = 1.8dB, $|S_{21e}|^2$ = 9.5dB (f = 2GHz)



1, 3. EMITTER
2. BASE
4. COLLECTOR

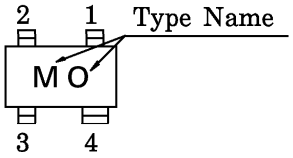
JEDEC	—
EIAJ	—
TOSHIBA	2-3J1C

Weight : 0.012g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	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

Marking



MICROWAVE CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	V_{CE} = 6V, I_C = 7mA	7	10	—	GHz
Insertion Gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 6V, I_C = 7mA, f = 1GHz	—	15	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 6V, I_C = 7mA, f = 2GHz	6.5	9.5	—	
Noise Figure	NF (1)	V_{CE} = 6V, I_C = 3mA, f = 1GHz	—	1.4	—	dB
	NF (2)	V_{CE} = 6V, I_C = 3mA, f = 2GHz	—	1.8	3.0	

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 10V, I_E = 0	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1V, I_C = 0	—	—	1	μA
DC Current Gain	h_{FE}	V_{CE} = 6V, I_C = 7mA	50	—	250	—
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 1MHz	—	0.55	—	pF
Reverse Transfer Capacitance	C_{re}	(Note)	—	0.35	0.8	pF

(Note) C_{re} is measured by 3 terminal method with Capacitance Bridge.

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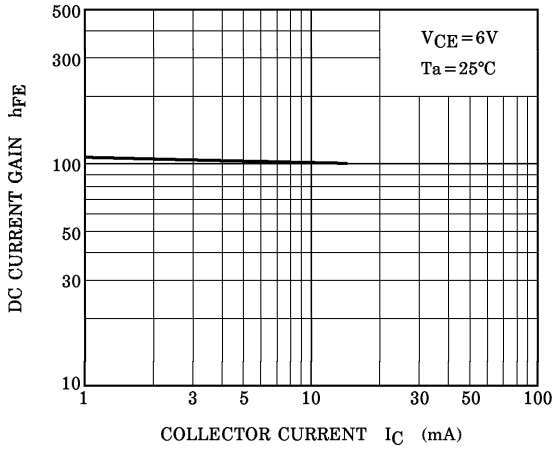
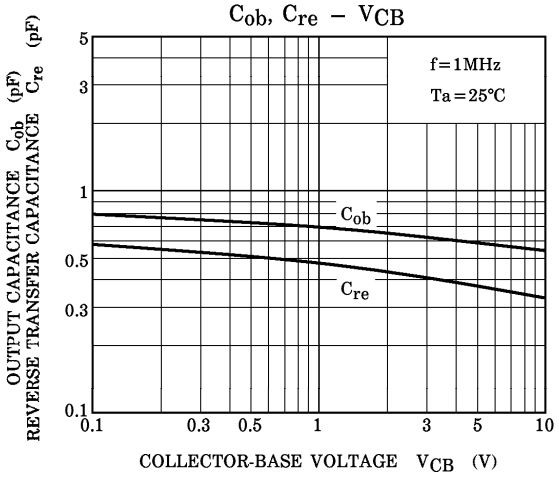
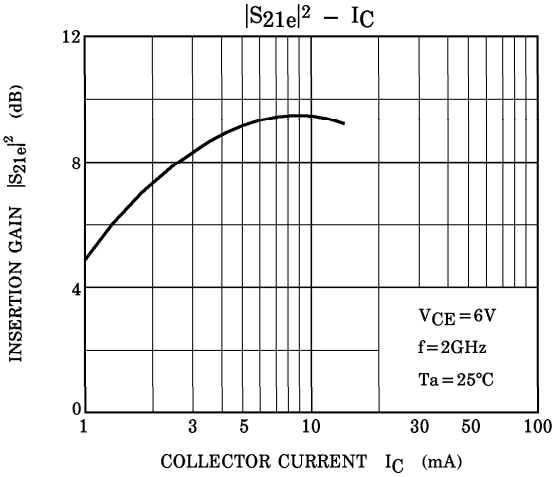
h_{FE} – I_C



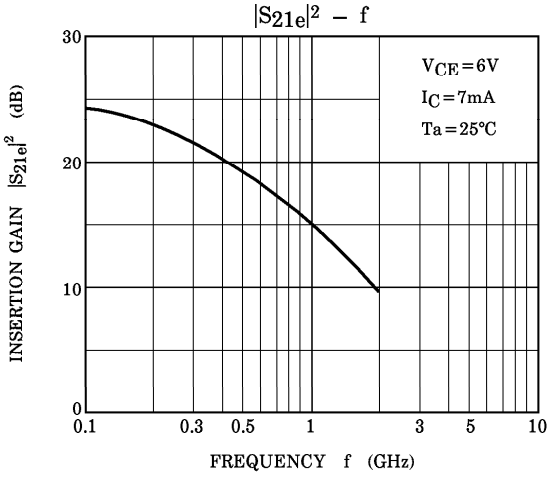
C_{ob}, C_{re} – V_{CB}



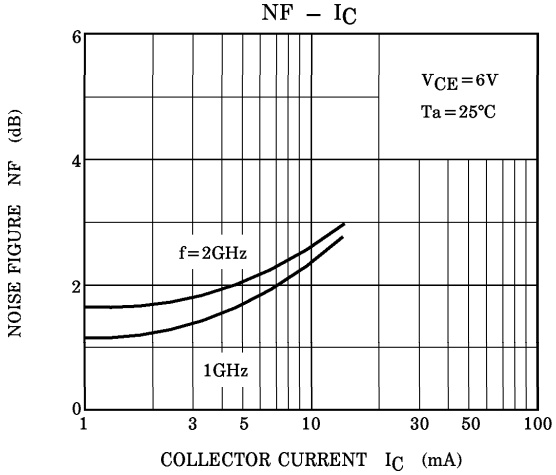
$|S_{21e}|^2$ – I_C



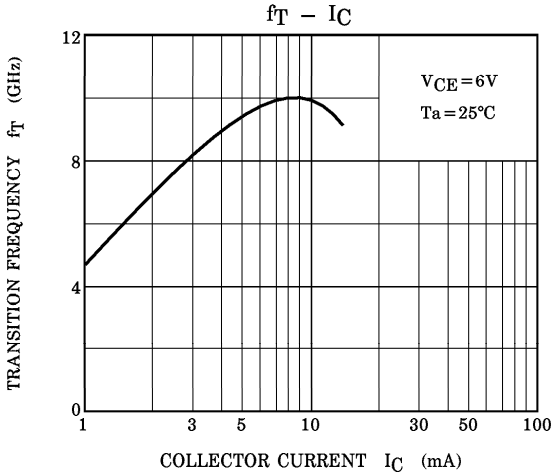
$|S_{21e}|^2$ – f

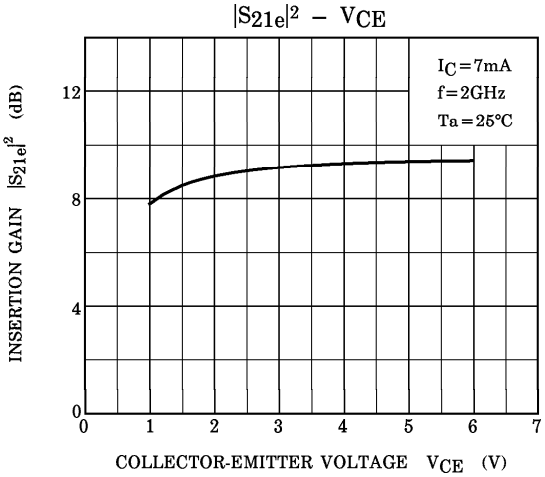


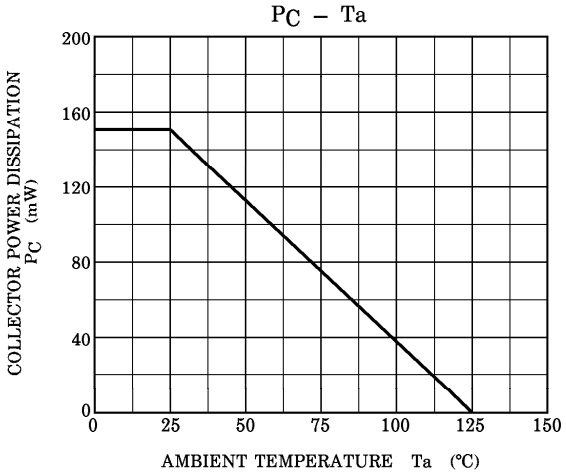
NF – I_C



f_T – I_C







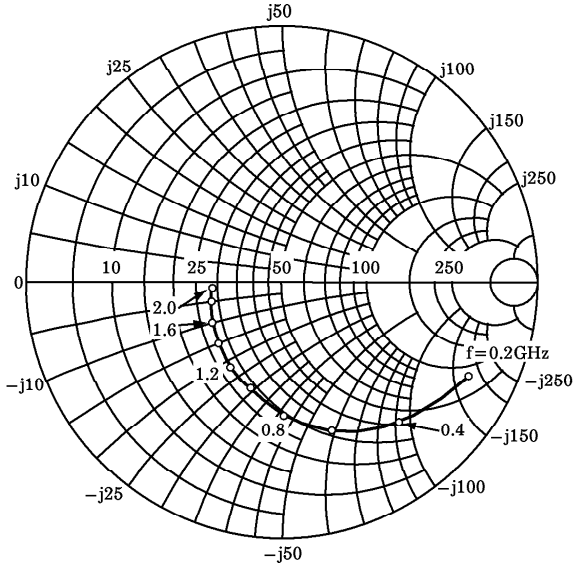
S-PARAMETER $Z_O = 50\Omega$, Ta = 25°C
V_{CE} = 6V, I_C = 3mA

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.831	−26.6	7.776	156.8	0.042	74.0	0.939	−19.5
400	0.719	−50.1	6.775	139.2	0.074	61.6	0.833	−35.5
600	0.618	−70.8	5.857	125.4	0.097	52.5	0.724	−48.1
800	0.515	−88.5	5.063	113.9	0.111	46.5	0.627	−58.0
1000	0.434	−104.0	4.381	105.3	0.122	42.3	0.553	−65.6
1200	0.374	−119.2	3.886	97.2	0.130	39.6	0.495	−71.6
1400	0.332	−134.7	3.425	89.8	0.137	37.8	0.453	−76.1
1600	0.293	−147.5	3.135	84.4	0.145	36.5	0.423	−81.0
1800	0.267	−163.2	2.926	78.2	0.150	35.8	0.397	−85.1
2000	0.248	−175.3	2.709	73.7	0.157	35.7	0.382	−89.4

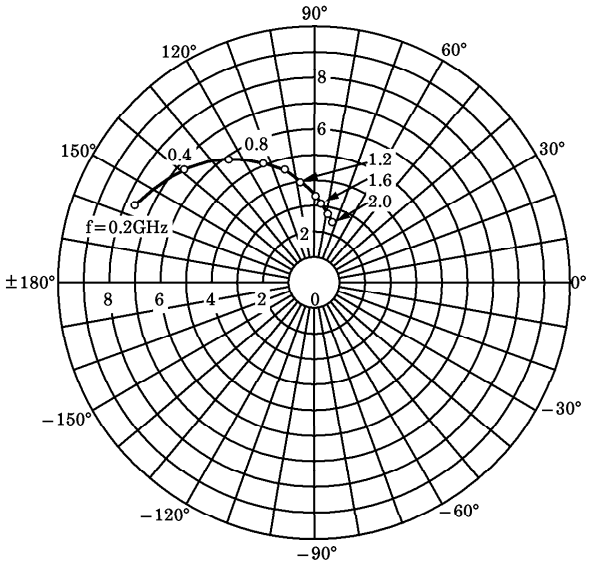
V_{CE} = 6V, I_C = 7mA

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.683	−43.5	13.639	148.7	0.037	68.4	0.876	−27.8
400	0.541	−78.5	10.619	126.8	0.060	55.8	0.688	−46.4
600	0.437	−105.5	8.350	112.6	0.072	49.8	0.547	−57.7
800	0.365	−128.4	6.752	102.1	0.082	47.6	0.447	−65.1
1000	0.319	−148.8	5.640	94.4	0.090	47.0	0.383	−70.0
1200	0.293	−166.3	4.877	87.5	0.098	47.1	0.338	−73.3
1400	0.280	174.4	4.248	81.3	0.107	46.9	0.308	−75.4
1600	0.269	162.3	3.813	76.4	0.116	47.4	0.292	−78.0
1800	0.272	148.6	3.489	70.8	0.124	47.5	0.283	−80.3
2000	0.264	137.2	3.182	66.5	0.134	47.6	0.278	−83.7

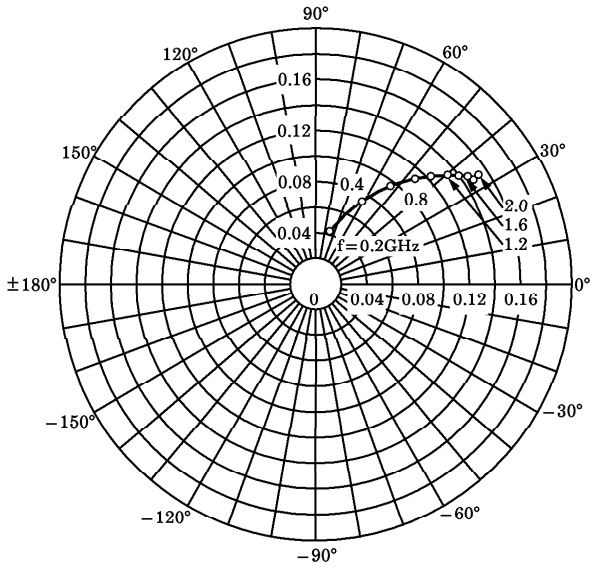
S_{11e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C
(UNIT : Ω)



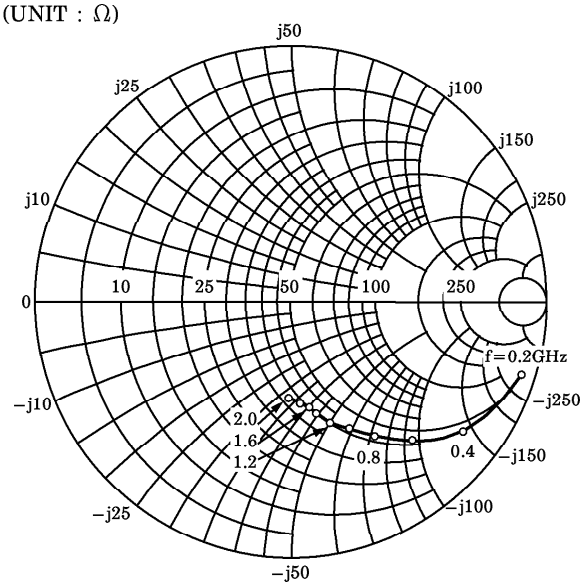
S_{21e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



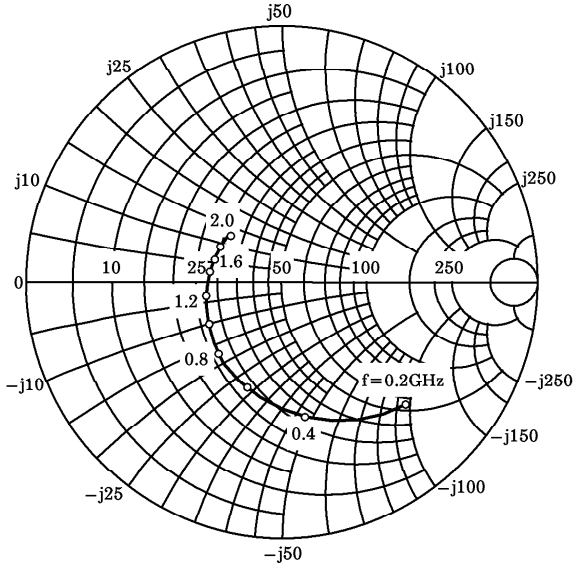
S_{12e}
V_{CE} = 6V
I_C = 3mA
Ta = 25°C



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
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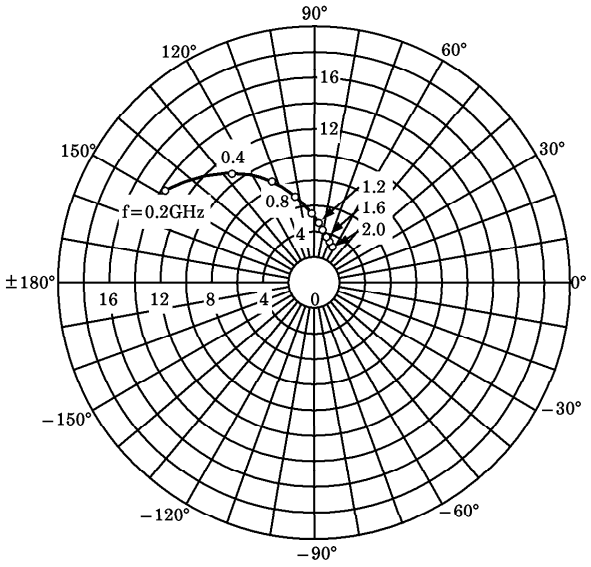

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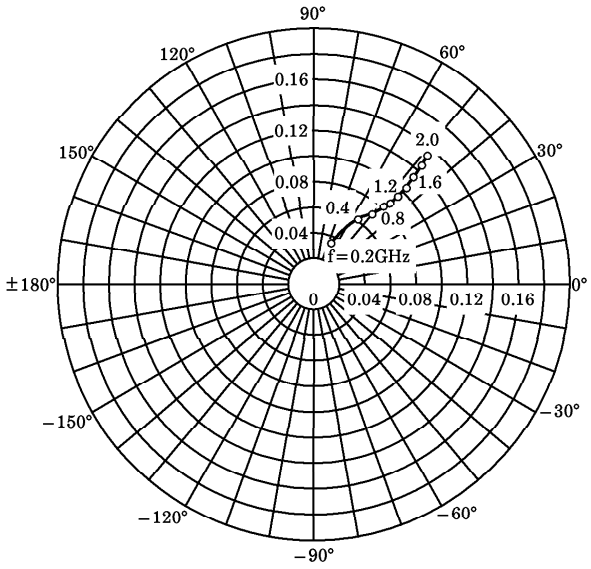

S_{22e}
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I_C = 7mA
Ta = 25°C
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