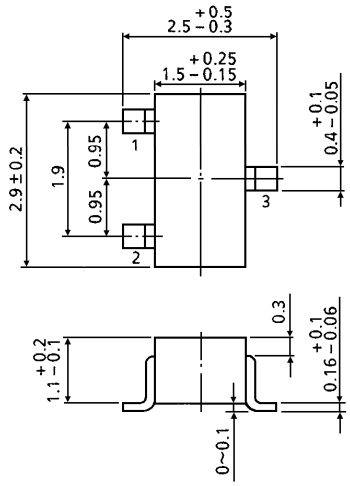
TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5089

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- NF = 1.1dB, $|S_{21e}|^2$ = 13dB (f = 1GHz)



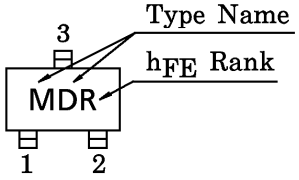
JEDEC	—
EIAJ	SC-59
TOSHIBA	2-3F1A

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	20	mA
Collector Current	I_C	40	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} = 8V, I_C = 20mA	7	10	—	GHz
Insertion Gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 8V, I_C = 20mA, f = 1GHz	10	13	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 8V, I_C = 20mA, f = 2GHz	—	7	—	
Noise Figure	NF (1)	V_{CE} = 8V, I_C = 5mA, f = 1GHz	—	1.1	2.5	dB
	NF (2)	V_{CE} = 8V, I_C = 5mA, f = 2GHz	—	1.7	—	

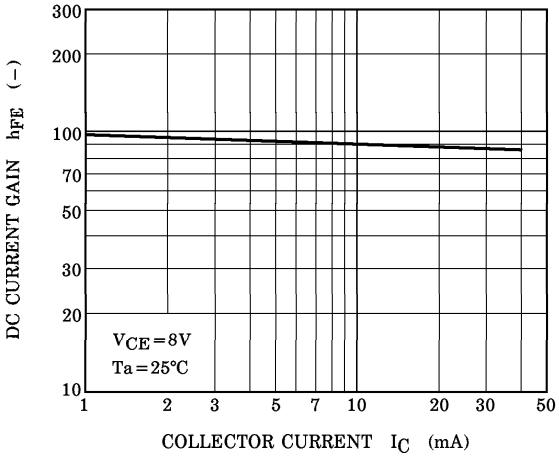
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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} (Note 1)	V_{CE} = 8V, I_C = 20mA	50	—	160	—
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 1MHz	—	0.7	—	pF
Reverse Transfer Capacitance	C_{re}	(Note 2)	—	0.5	0.95	pF

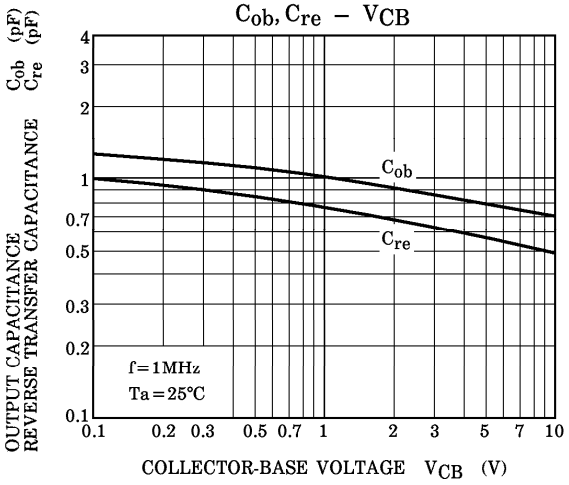
(Note 1) h_{FE} Classification R : 50~100, O : 80~160

(Note 2) C_{re} is measured by 3 terminal method with capacitance bridge.

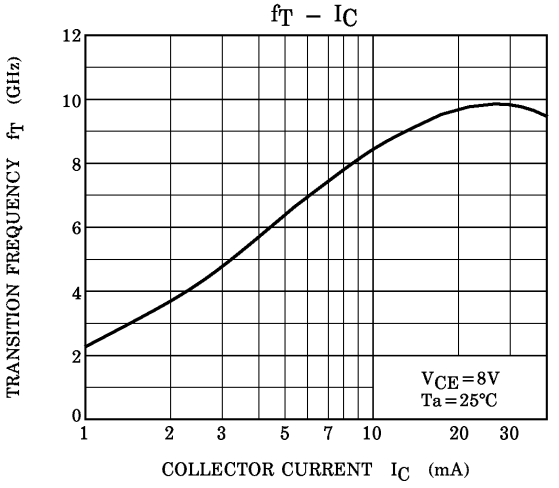
h_{FE} – I_C



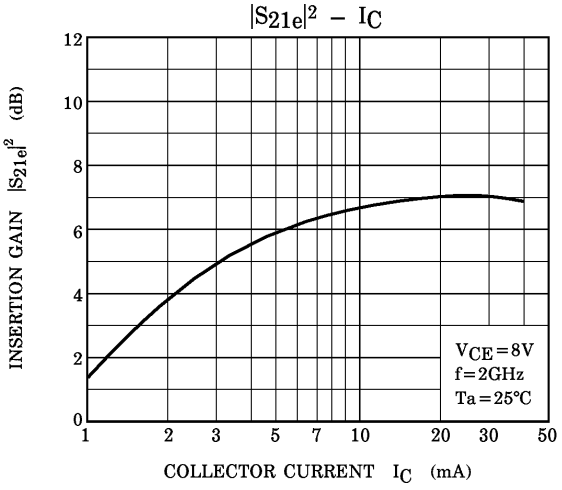
C_{ob}, C_{re} – V_{CB}



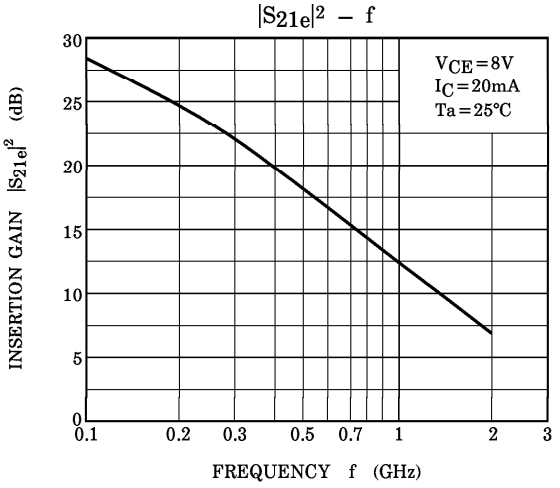
f_T – I_C



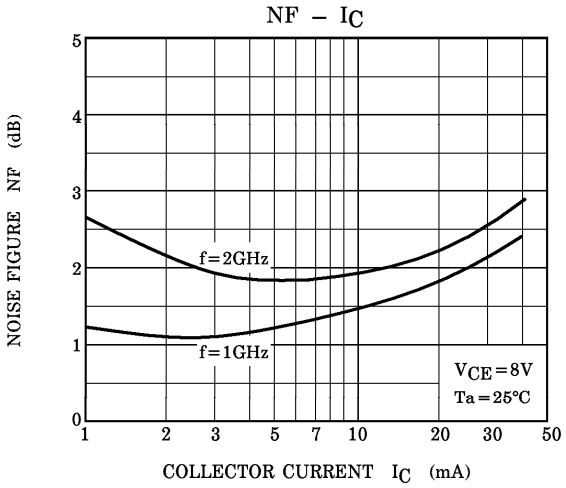
$|S_{21e}|^2$ – I_C

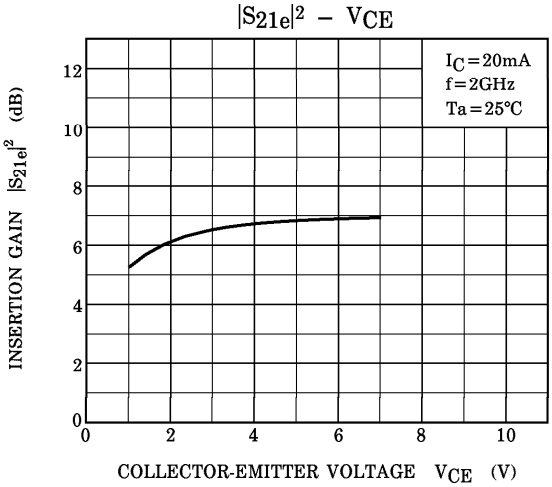


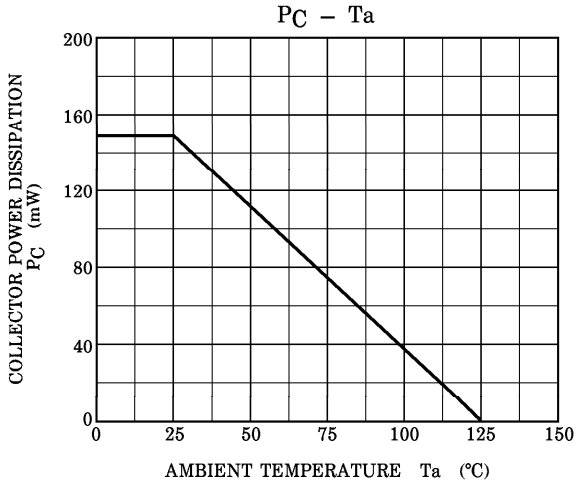
$|S_{21e}|^2$ – f



NF – I_C







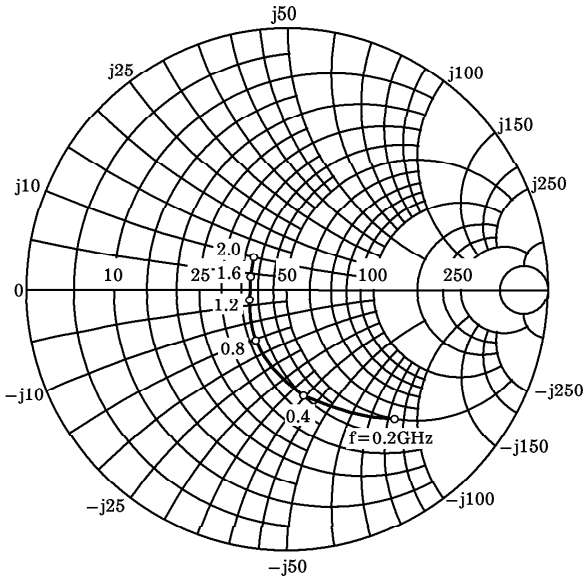
S-Parameter $Z_O = 50\Omega$, Ta = 25°C
V_{CE} = 8V, I_C = 5mA

frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.653	−48.5	10.080	136.2	0.046	63.5	0.766	−27.9
400	0.420	−82.1	7.242	112.7	0.069	57.6	0.561	−35.0
600	0.284	−105.7	5.393	98.9	0.086	57.9	0.466	−35.4
800	0.214	−126.0	4.245	89.7	0.103	59.4	0.420	−34.9
1000	0.169	−146.7	3.508	82.2	0.121	60.6	0.394	−34.7
1200	0.155	−166.4	3.012	75.9	0.140	61.9	0.382	−35.1
1400	0.152	174.1	2.645	70.2	0.162	62.1	0.374	−36.1
1600	0.154	156.7	2.350	65.0	0.182	61.3	0.363	−38.5
1800	0.161	145.9	2.136	60.2	0.202	60.5	0.355	−41.0
2000	0.181	134.5	1.972	55.8	0.224	60.6	0.345	−44.0

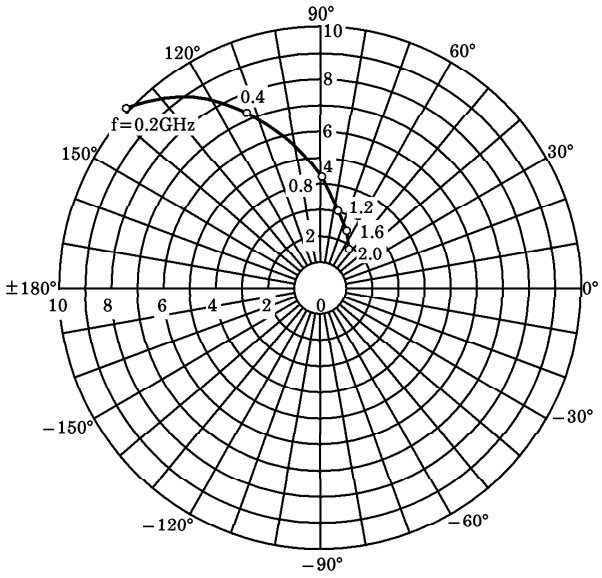
V_{CE} = 8V, I_C = 20mA

frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.275	−80.2	17.464	114.7	0.033	68.9	0.506	−36.6
400	0.147	−116.5	9.693	97.8	0.057	72.0	0.353	−32.4
600	0.097	−150.0	6.680	88.8	0.082	72.7	0.313	−27.9
800	0.083	179.5	5.088	82.3	0.106	72.1	0.300	−25.9
1000	0.084	151.3	4.141	76.7	0.131	71.2	0.295	−25.2
1200	0.095	135.6	3.497	72.2	0.156	69.8	0.295	−25.7
1400	0.108	124.2	3.058	67.7	0.182	67.7	0.297	−27.3
1600	0.121	113.8	2.699	63.2	0.206	65.2	0.289	−30.1
1800	0.128	108.4	2.432	59.2	0.228	63.0	0.283	−33.2
2000	0.146	104.2	2.241	55.5	0.253	61.6	0.274	−36.5

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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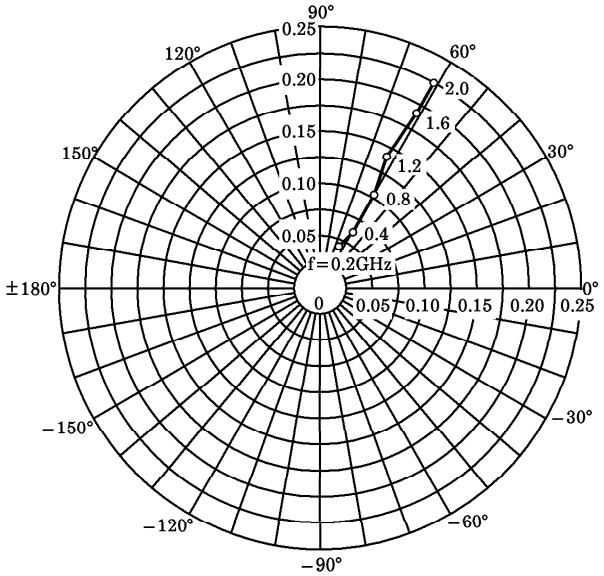
I_C = 5mA
Ta = 25°C



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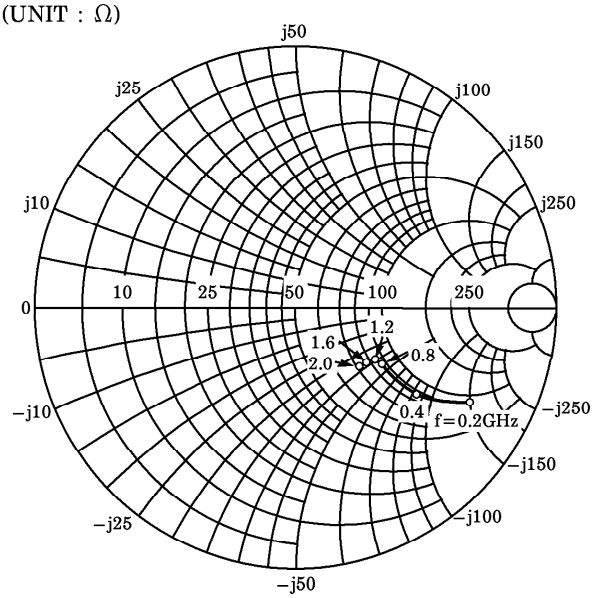

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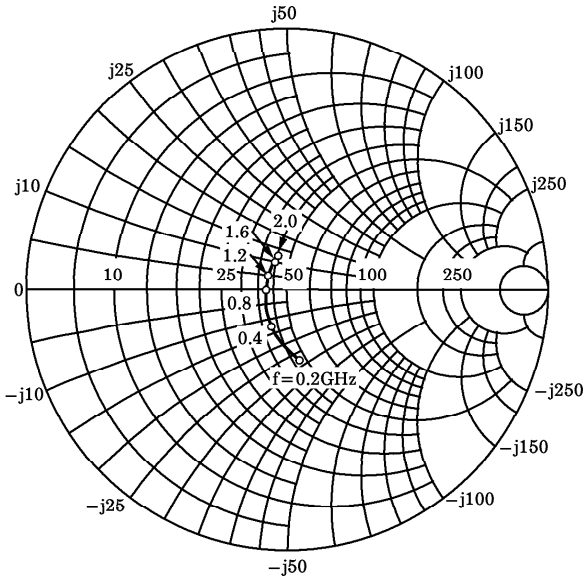

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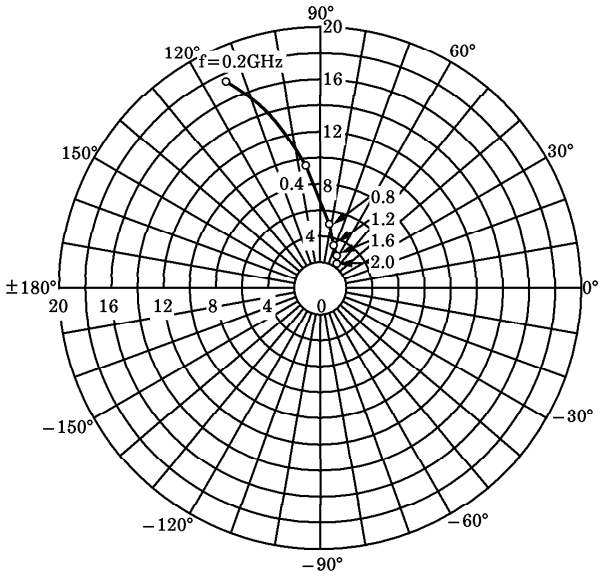

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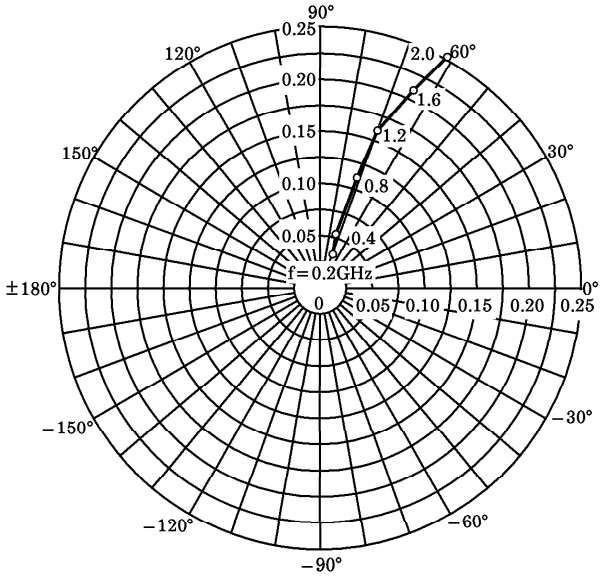

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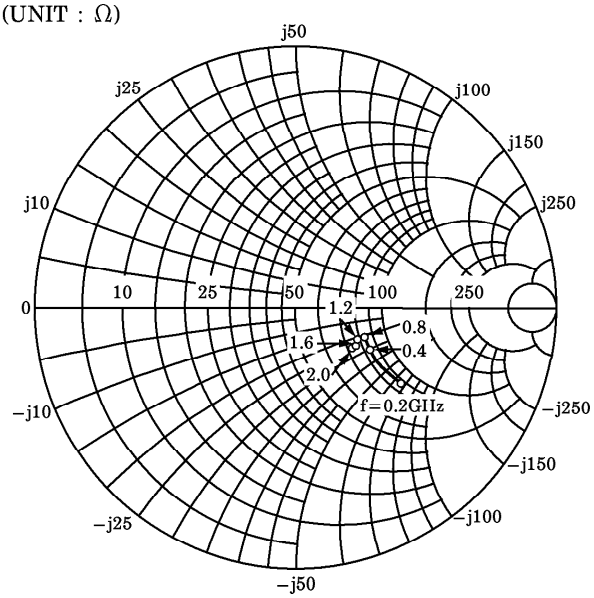

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