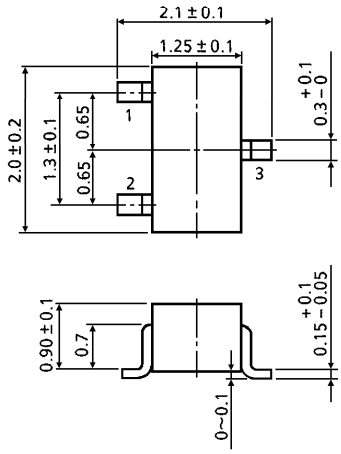
TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5090

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

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



1. BASE
2. EMITTER
3. COLLECTOR

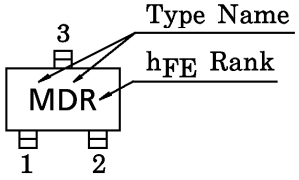
JEDEC	—
EIAJ	SC-70
TOSHIBA	2-2E1A

Weight : 0.006g

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	100	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	—	

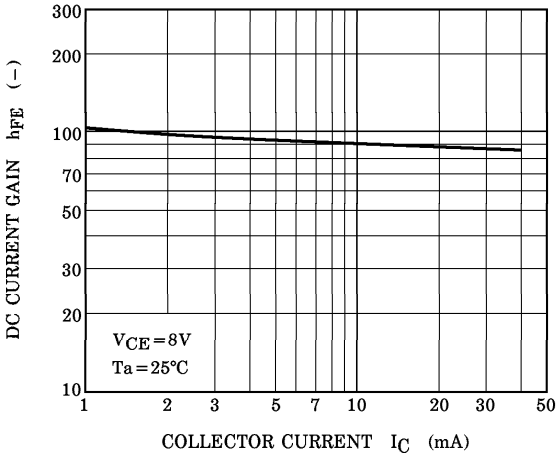
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

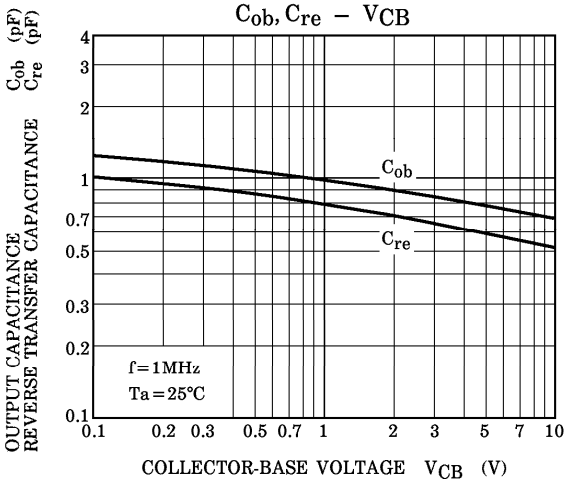
(Note 1) h_{FE} Classification R : 50~100, O : 80~160

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

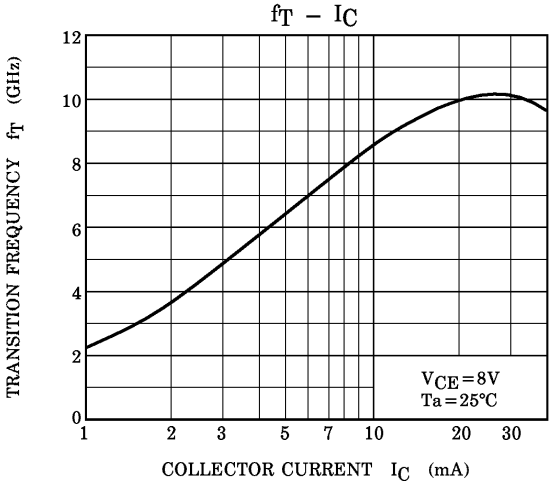
h_{FE} – I_C



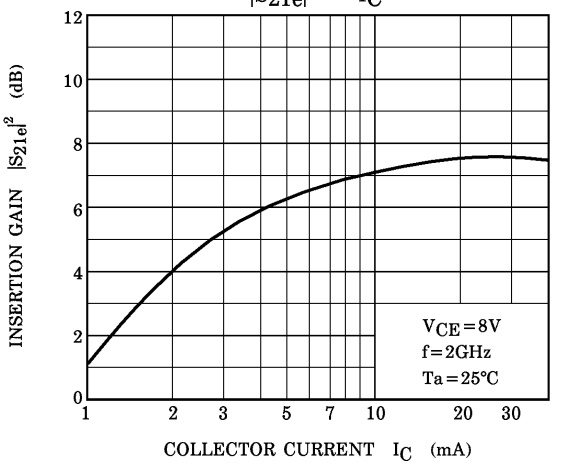
C_{ob}, C_{re} – V_{CB}



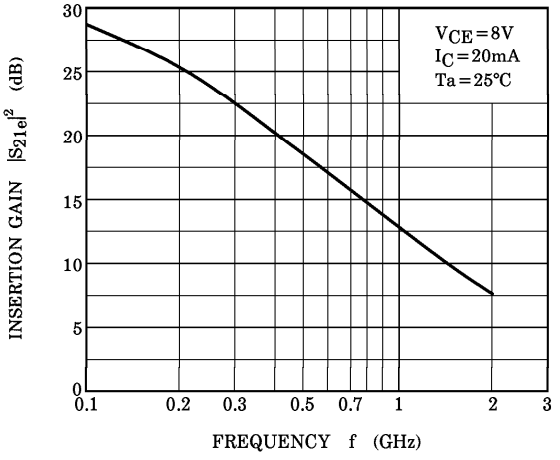
f_T – I_C



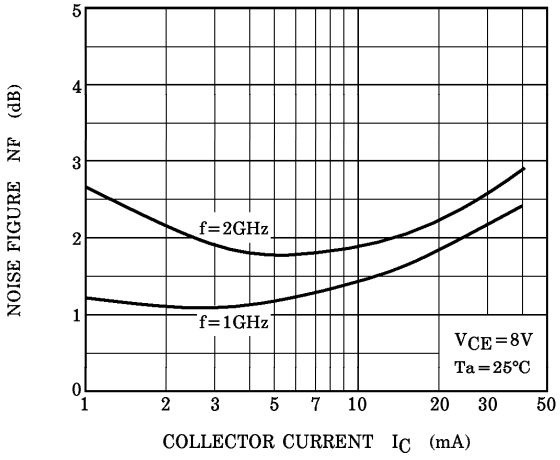
$|S_{21e}|^2$ – I_C

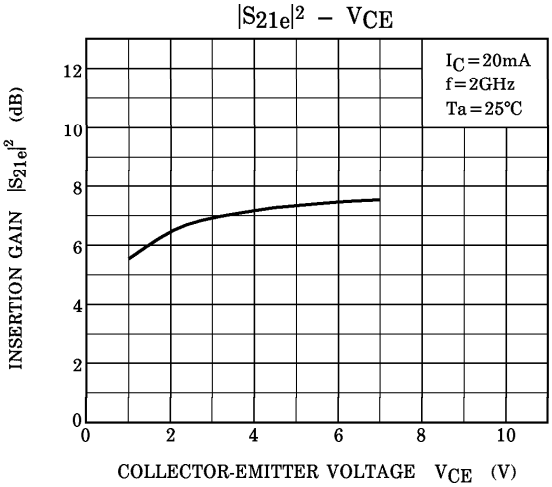


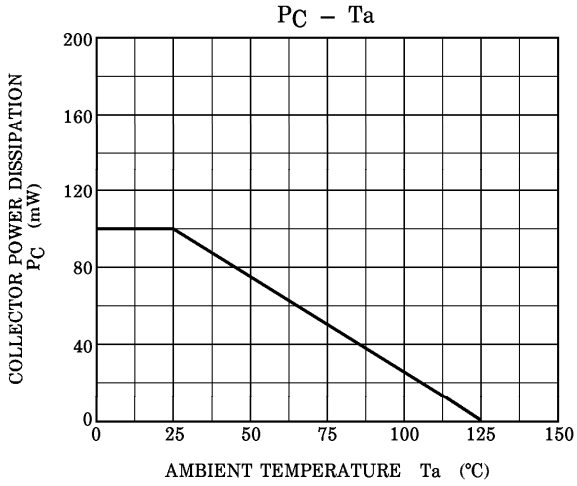
$|S_{21e}|^2$ – f



NF – I_C







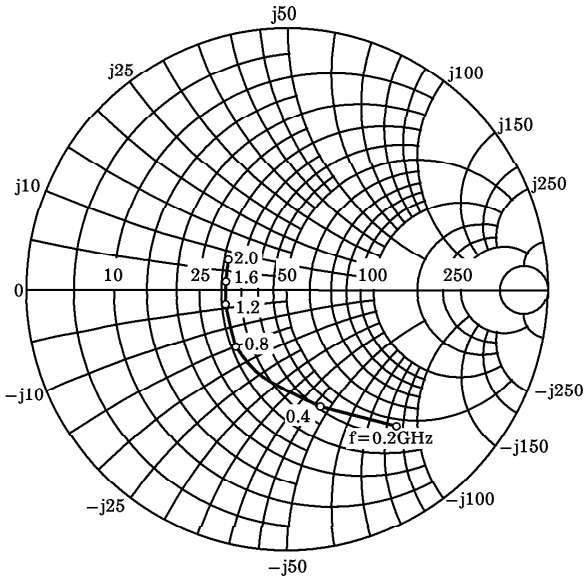
S-Parameter $Z_O = 50\Omega$, Ta = 25°C
V_{CE} = 8V, I_C = 5mA

frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.683	−50.1	10.186	138.3	0.049	62.0	0.773	−30.0
400	0.462	−86.9	7.472	114.6	0.071	54.3	0.556	−39.6
600	0.343	−113.1	5.618	100.9	0.086	53.8	0.448	−41.7
800	0.282	−133.6	4.407	91.7	0.101	55.3	0.392	−41.6
1000	0.249	−151.0	3.663	84.7	0.115	57.2	0.360	−41.7
1200	0.236	−166.6	3.128	78.7	0.131	58.9	0.339	−41.7
1400	0.233	179.7	2.759	73.1	0.150	60.1	0.330	−42.8
1600	0.234	168.3	2.457	68.2	0.168	60.0	0.319	−45.0
1800	0.238	158.6	2.224	63.4	0.185	60.0	0.311	−47.9
2000	0.251	149.6	2.038	59.4	0.203	60.4	0.302	−50.2

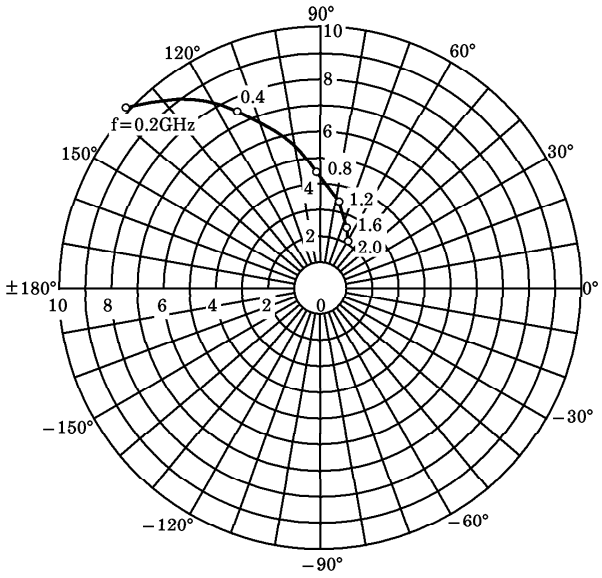
V_{CE} = 8V, I_C = 20mA

frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.319	−91.9	18.338	116.7	0.033	65.3	0.494	−43.5
400	0.213	−134.2	10.303	99.2	0.054	68.9	0.312	−42.4
600	0.185	−160.0	7.111	90.3	0.076	70.8	0.258	−37.6
800	0.176	−178.2	5.415	84.3	0.098	71.2	0.236	−34.3
1000	0.174	167.8	4.400	79.2	0.120	71.1	0.228	−32.0
1200	0.178	156.8	3.712	74.8	0.143	70.3	0.226	−31.5
1400	0.186	147.5	3.236	70.3	0.168	68.7	0.226	−32.8
1600	0.194	139.7	2.874	66.3	0.190	66.6	0.223	−35.9
1800	0.199	133.7	2.583	62.6	0.211	64.9	0.216	−39.0
2000	0.215	127.8	2.369	58.8	0.232	63.5	0.211	−41.9

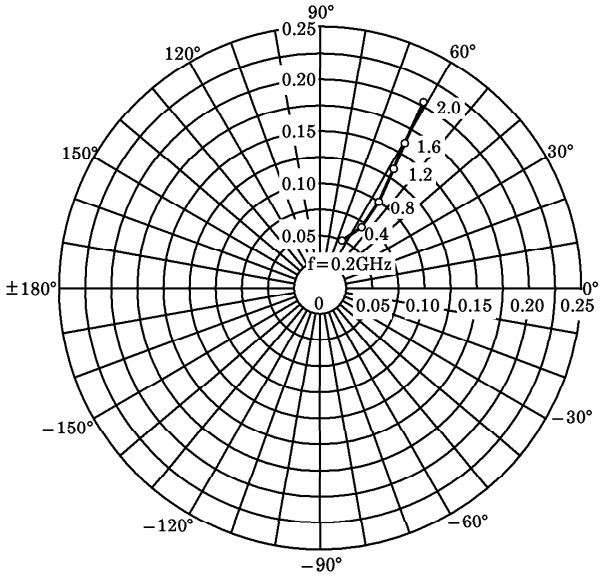
S_{11e}
V_{CE} = 8V
I_C = 5mA
Ta = 25°C
(UNIT : Ω)



S_{21e}
V_{CE} = 8V
I_C = 5mA
Ta = 25°C



S_{12e}
V_{CE} = 8V
I_C = 5mA
Ta = 25°C



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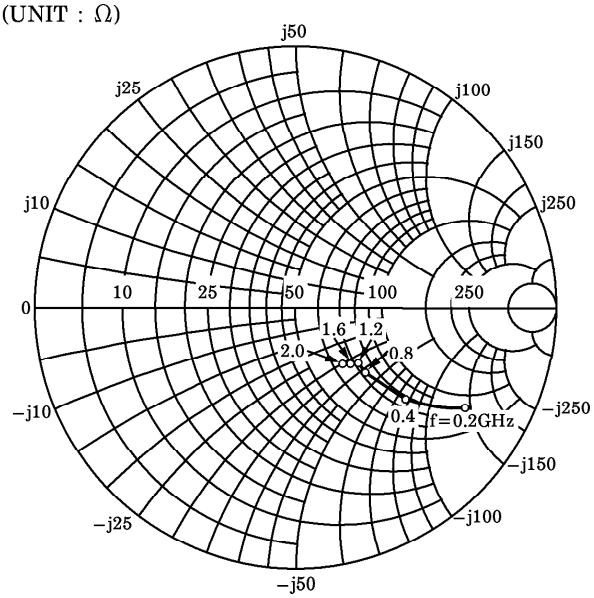

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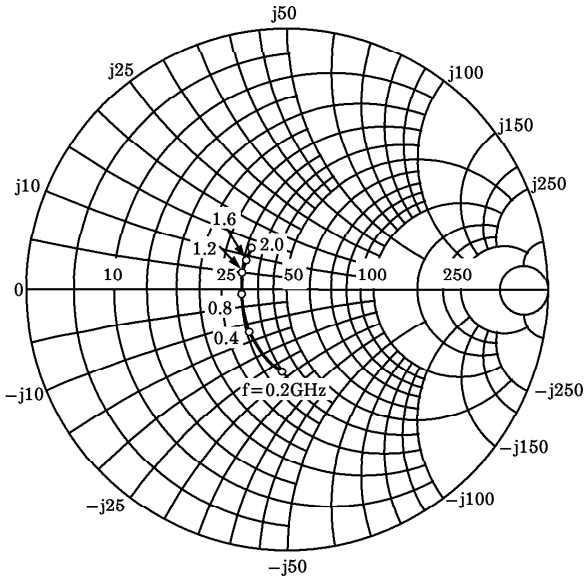

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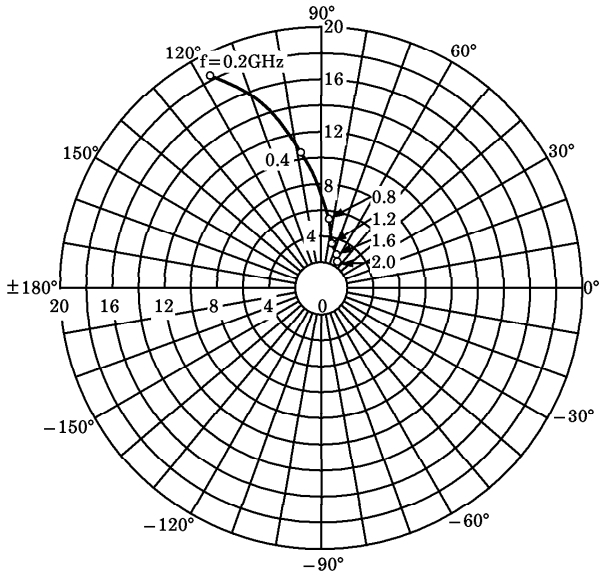

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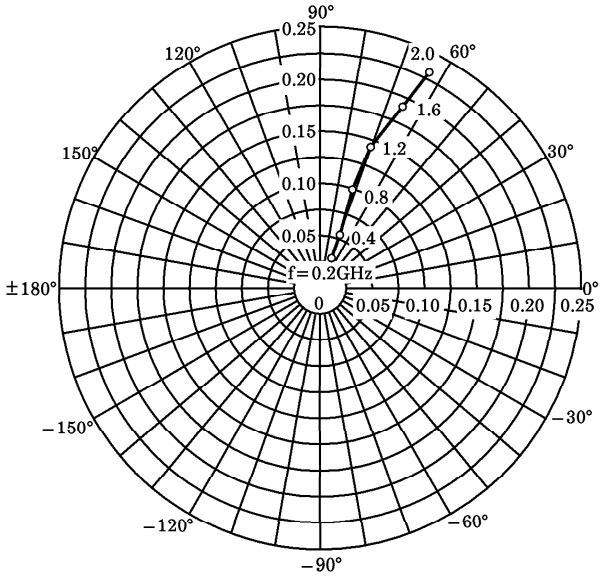

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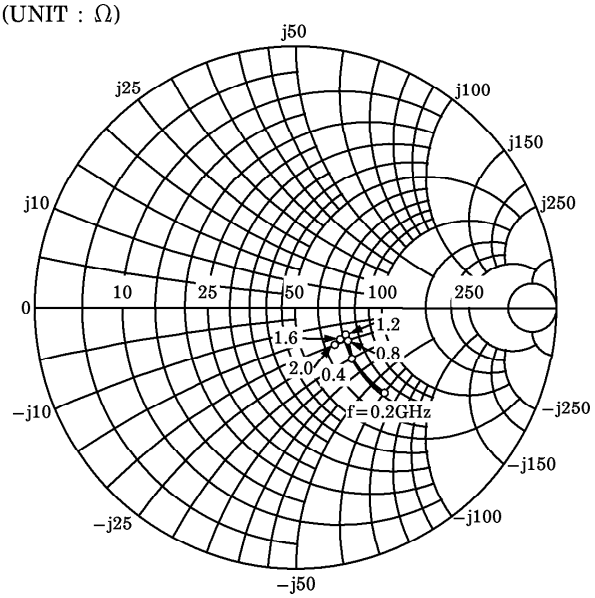

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