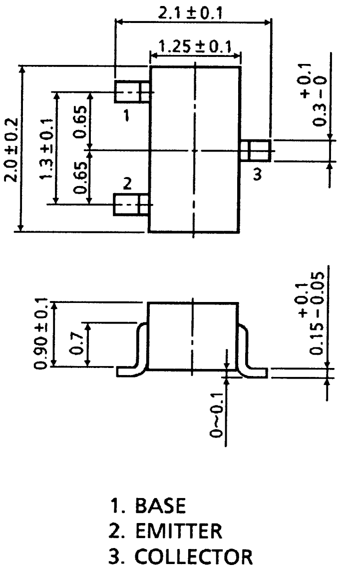
TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC5085

VHF~UHF Band Low Noise Amplifier Applications

- Low noise figure, high gain.
- NF = 1.1dB, $|S_{21e}|^2$ = 11dB (f = 1 GHz)

Unit: mm



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}	12	V
Emitter-base voltage	V_{EBO}	3	V
Base current	I_B	40	mA
Collector current	I_C	80	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} = 10 V, I_C = 20 mA	5	7	—	GHz
Insertion gain	$|S_{21e}|^2$ (1)	V_{CE} = 10 V, I_C = 20 mA, f = 500 MHz	—	16.5	—	dB
	$|S_{21e}|^2$ (2)	V_{CE} = 10 V, I_C = 20 mA, f = 1 GHz	7.5	11	—	
Noise figure	NF (1)	V_{CE} = 10 V, I_C = 5 mA, f = 500 MHz	—	1	—	dB
	NF (2)	V_{CE} = 10 V, I_C = 5 mA, f = 1 GHz	—	1.1	2	

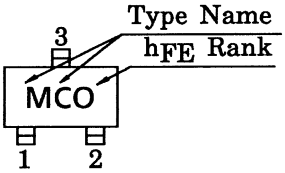
Electrical Characteristics (Ta = 25°C)

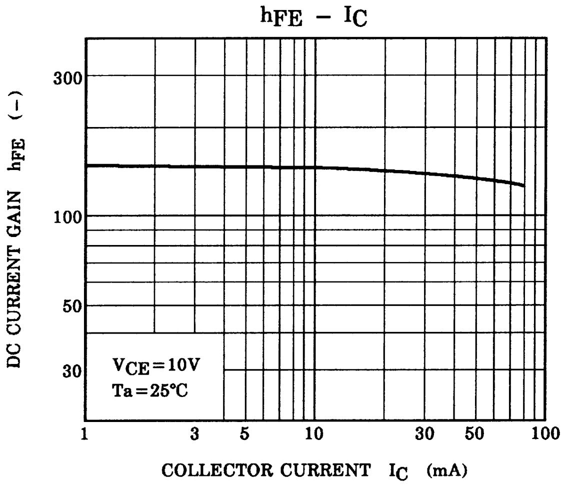
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 10 V, I_E = 0	—	—	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE} (Note 1)	V_{CE} = 10 V, I_C = 20 mA	80	—	240	
Output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz (Note 2)	—	1.0	—	pF
Reverse transfer capacitance	C_{re}		—	0.65	1.15	pF

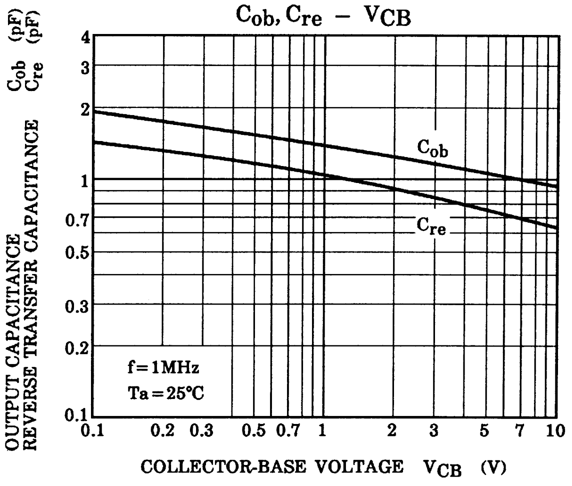
Note 1: h_{FE} classification O: 80~160, Y: 120~240

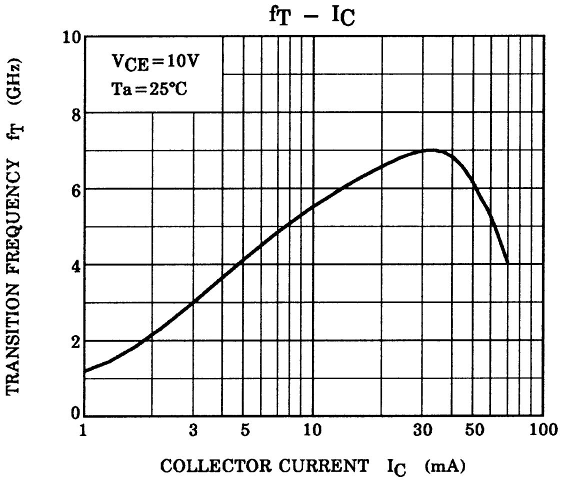
Note 2: C_{re} is measured by 3 terminal method with capacitance bridge.

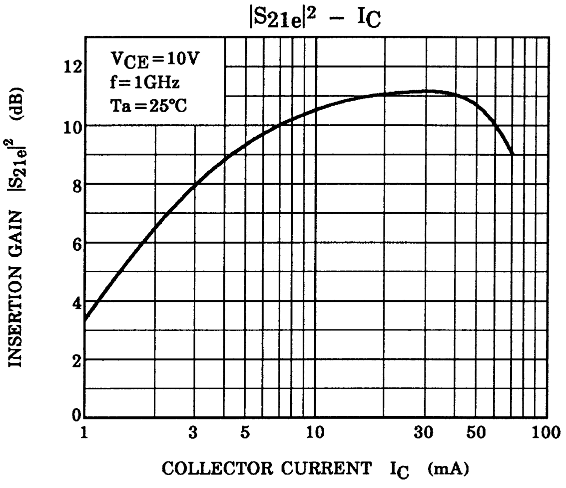
Marking

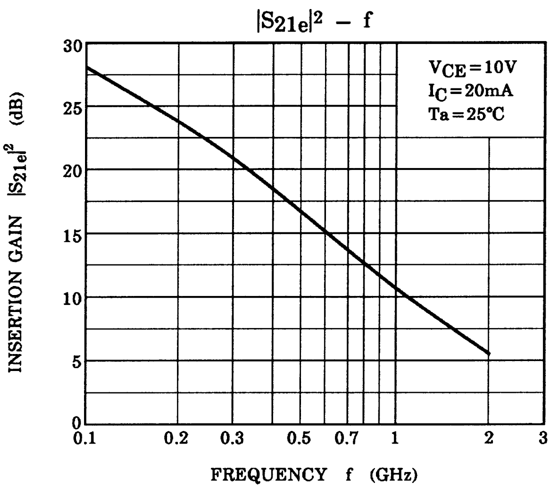


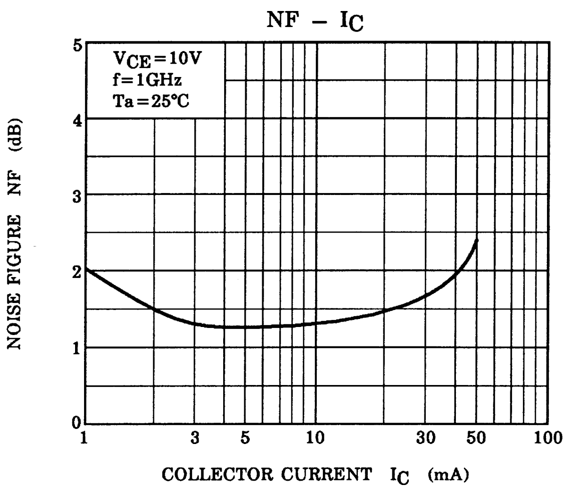

h_{FE} – I_C

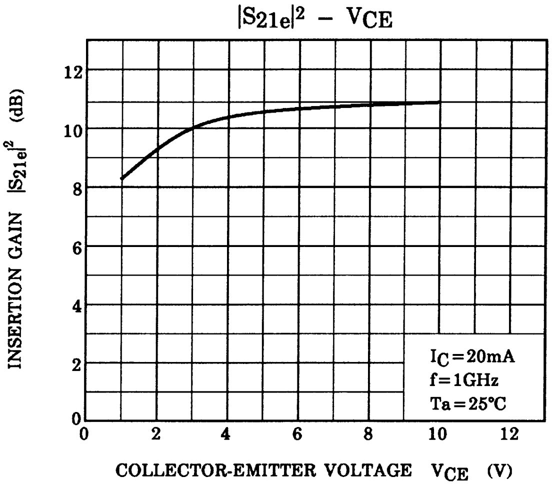

C_{ob}, C_{re} – V_{CB}

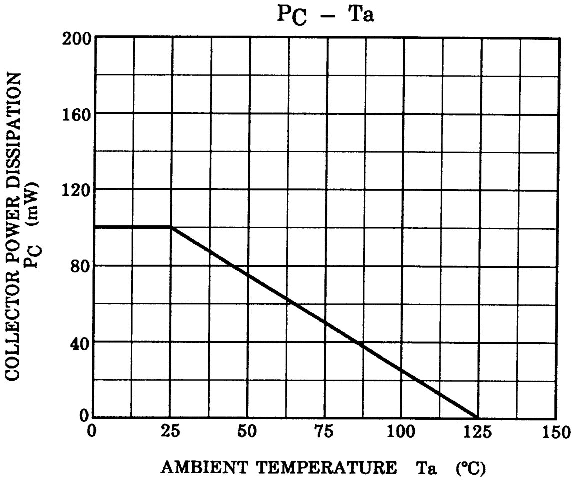

f_T – I_C


$|S_{21e}|^2$ – I_C


$|S_{21e}|^2$ – f


NF – I_C





S-Parameter $Z_O = 50\ \Omega$, Ta = 25°C

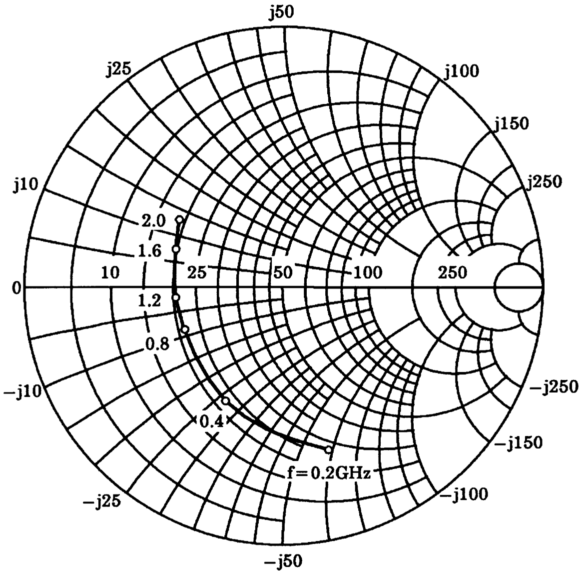
V_{CE} = 10 V, I_C = 5 mA

Frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.672	−73.0	9.460	128.6	0.052	53.6	0.707	−31.3
400	0.498	−115.9	6.268	105.9	0.068	46.8	0.513	−36.2
600	0.443	−141.7	4.554	93.3	0.078	49.0	0.437	−36.6
800	0.426	−158.7	3.556	84.5	0.088	53.2	0.401	−36.8
1000	0.422	−171.9	2.948	77.5	0.099	57.9	0.383	−38.3
1200	0.428	177.5	2.526	71.1	0.113	62.7	0.373	−40.6
1400	0.437	168.3	2.240	65.5	0.133	65.8	0.367	−43.9
1600	0.449	159.9	1.997	60.1	0.152	67.6	0.362	−48.2
1800	0.464	153.1	1.821	55.0	0.171	68.7	0.358	−52.8
2000	0.485	146.7	1.686	50.9	0.195	70.6	0.350	−57.6

V_{CE} = 10 V, I_C = 20 mA

Frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.392	−116.4	16.247	109.3	0.034	59.7	0.420	−43.7
400	0.329	−152.1	8.775	94.5	0.054	66.0	0.280	−38.4
600	0.321	−170.6	6.018	86.3	0.075	69.5	0.244	−33.7
800	0.321	177.5	4.598	80.2	0.097	70.7	0.231	−31.7
1000	0.324	167.9	3.767	74.8	0.119	71.2	0.225	−31.3
1200	0.332	160.3	3.191	70.0	0.142	71.3	0.225	−32.7
1400	0.341	153.5	2.812	65.2	0.168	70.0	0.225	−36.2
1600	0.352	146.6	2.502	60.7	0.190	68.4	0.222	−40.3
1800	0.362	142.2	2.264	56.5	0.212	66.8	0.217	−44.9
2000	0.379	137.7	2.092	52.8	0.236	66.3	0.212	−49.4

S_{11e}
$V_{CE} = 10V$
$I_C = 5mA$
$Ta = 25°C$
(UNIT : Ω)



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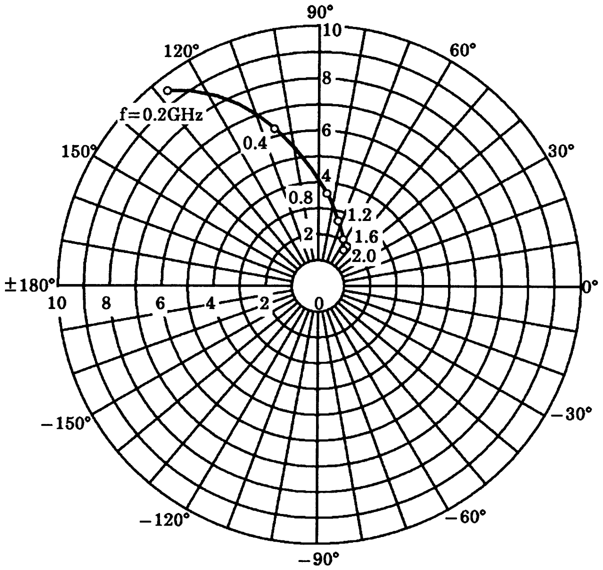
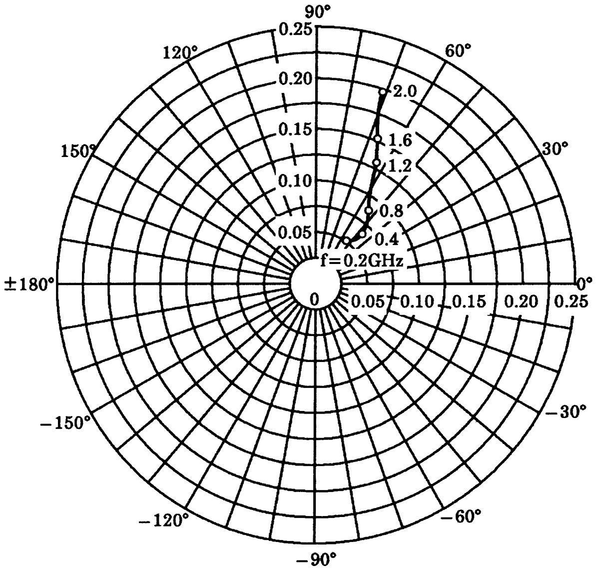
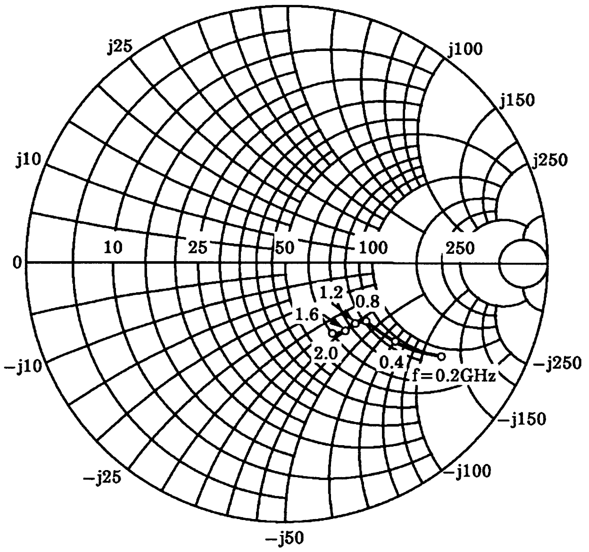


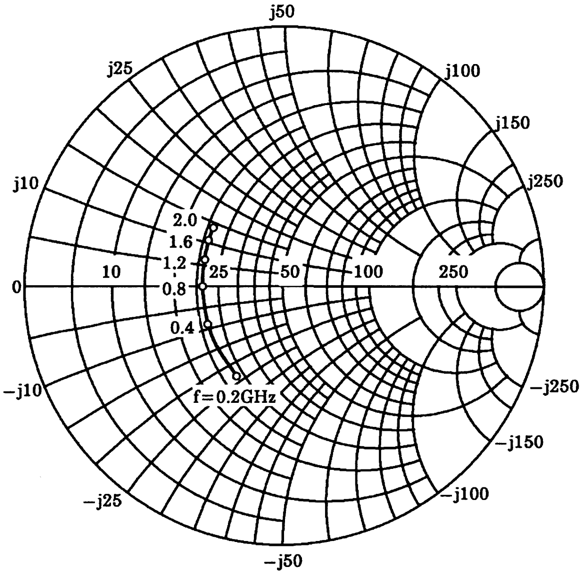
S_{12e}
$V_{CE} = 10V$
$I_C = 5mA$
$Ta = 25°C$



S_{22e}
$V_{CE} = 10V$
$I_C = 5mA$
$Ta = 25°C$
(UNIT : Ω)



S_{11e}
$V_{CE} = 10V$
$I_C = 20mA$
$Ta = 25°C$
(UNIT : Ω)



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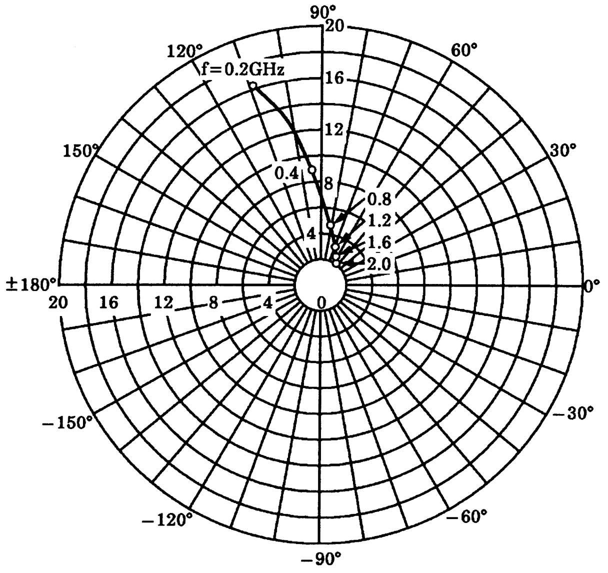

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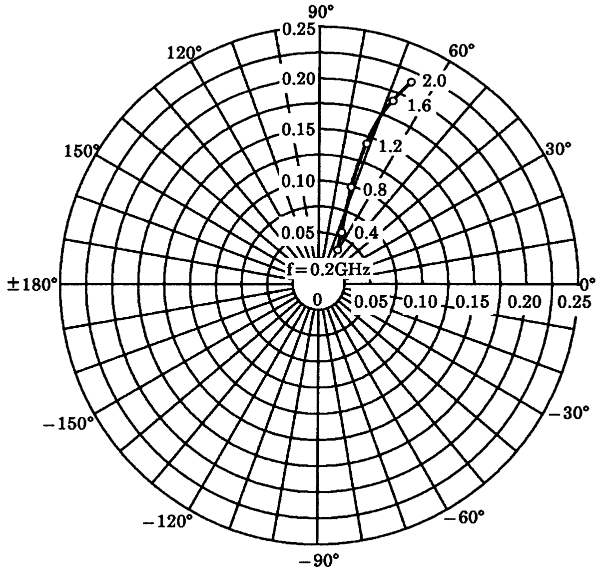

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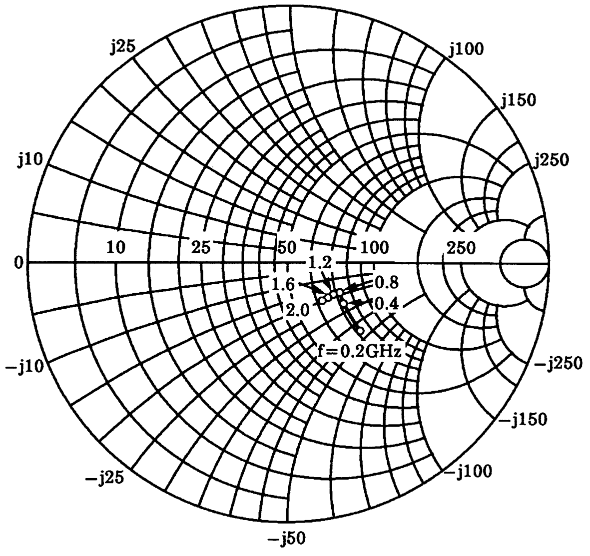

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