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TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

2SC5084

VHF~UHF Band Low Noise Amplifier Applications

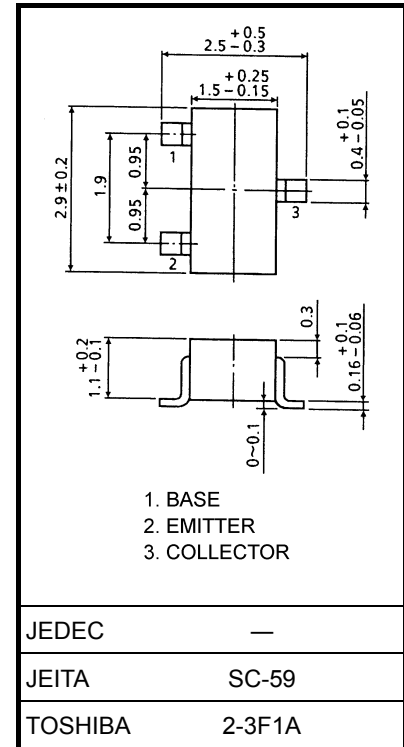
- Low noise figure, high gain.
- $NF = 1.1\text{dB}$, $|S_{21e}|^2 = 11\text{dB}$ ($f = 1\text{GHz}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

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	150	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 125	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm



Weight: 0.012 g (typ.)

Microwave Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	$V_{CE} = 10\text{V}$, $I_C = 20\text{mA}$	5	7	—	GHz
Insertion gain	$ S_{21e} ^2$ (1)	$V_{CE} = 10\text{V}$, $I_C = 20\text{mA}$, $f = 500\text{MHz}$	—	16.5	—	dB
	$ S_{21e} ^2$ (2)	$V_{CE} = 10\text{V}$, $I_C = 20\text{mA}$, $f = 1\text{GHz}$	7.5	11	—	
Noise figure	NF (1)	$V_{CE} = 10\text{V}$, $I_C = 5\text{mA}$, $f = 500\text{MHz}$	—	1	—	dB
	NF (2)	$V_{CE} = 10\text{V}$, $I_C = 5\text{mA}$, $f = 1\text{GHz}$	—	1.1	2	

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

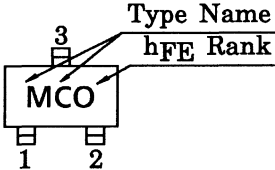
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 10\text{V}$, $I_E = 0$	—	—	1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 1\text{V}$, $I_C = 0$	—	—	1	μA
DC current gain	h_{FE} (Note 1)	$V_{CE} = 10\text{V}$, $I_C = 20\text{mA}$	80	—	240	
Output capacitance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

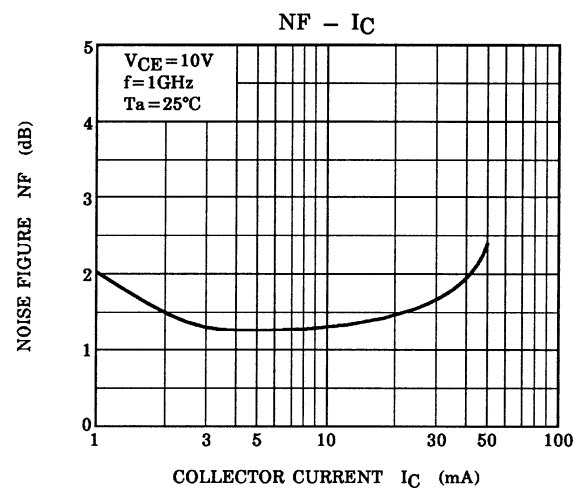
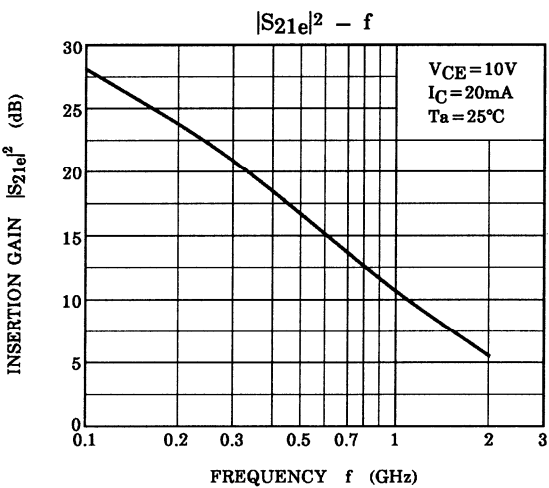
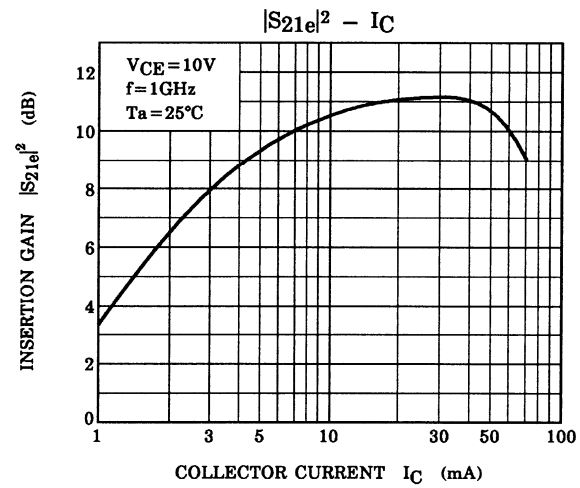
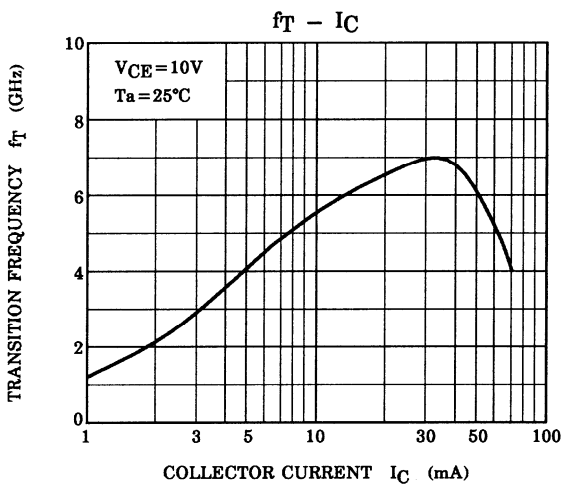
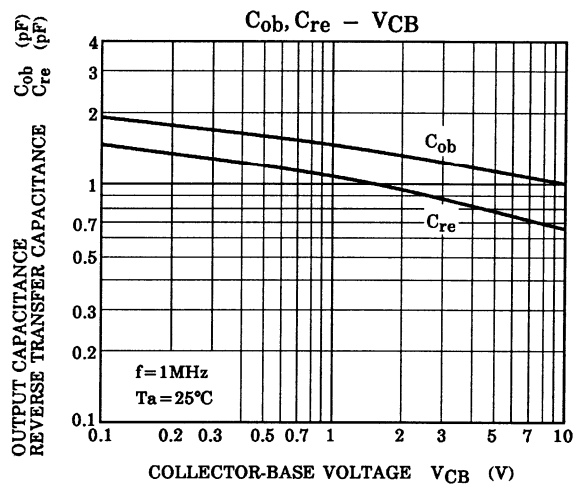
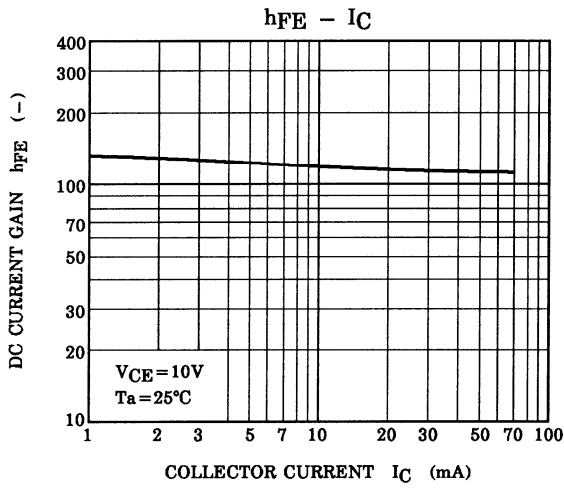
Note 1: h_{FE} classification O: 80 to 160, Y: 120 to 240

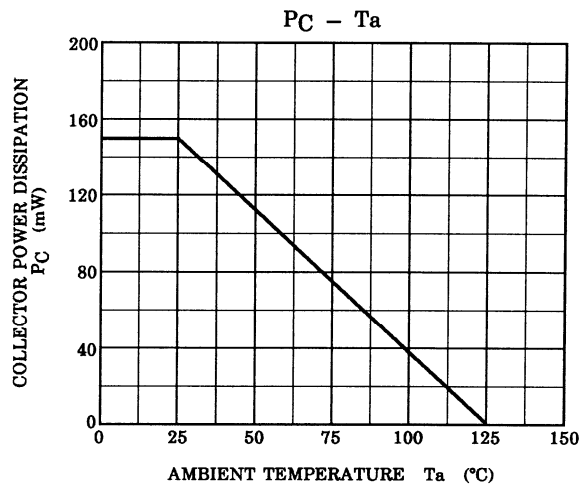
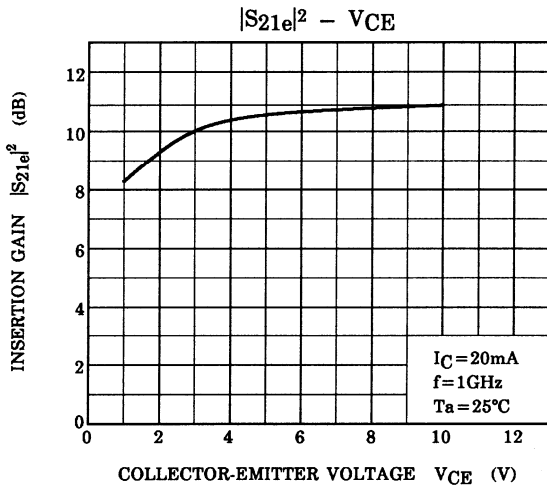
Note 2: C_{re} is measured by 3 terminal method with capacitance bridge.

Start of commercial production
1993-10

Marking







S-Parameter $Z_O = 50 \Omega, T_a = 25^\circ\text{C}$

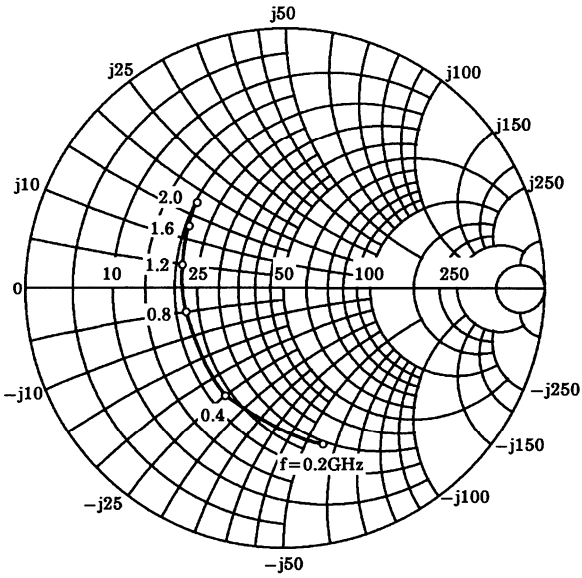
$V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$

Frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.628	-77.1	9.254	126.5	0.051	53.3	0.695	-31.0
400	0.471	-122.1	6.027	103.3	0.067	48.4	0.509	-34.9
600	0.417	-149.1	4.341	90.3	0.077	51.9	0.441	-35.2
800	0.404	-167.3	3.381	81.2	0.090	56.9	0.412	-36.0
1000	0.402	178.1	2.798	73.3	0.104	62.0	0.398	-37.7
1200	0.412	166.6	2.393	66.7	0.122	66.4	0.390	-40.3
1400	0.427	156.6	2.108	60.4	0.145	69.1	0.385	-44.3
1600	0.440	147.3	1.881	54.8	0.170	69.8	0.376	-48.8
1800	0.455	140.0	1.713	49.4	0.194	70.2	0.373	-54.3
2000	0.482	132.6	1.586	44.6	0.223	71.3	0.367	-60.0

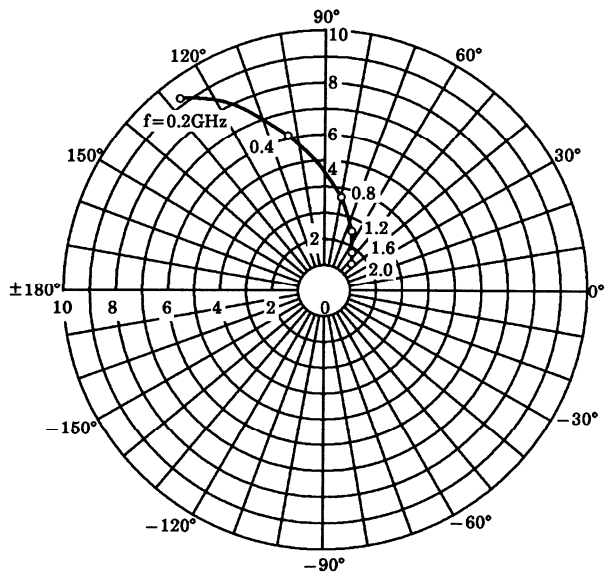
$V_{CE} = 10 \text{ V}, I_C = 20 \text{ mA}$

Frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.340	-122.7	15.443	107.4	0.034	62.7	0.415	-40.5
400	0.299	-158.7	8.266	92.4	0.056	69.3	0.293	-34.2
600	0.293	-178.0	5.664	84.0	0.080	71.7	0.265	-30.4
800	0.294	169.0	4.334	77.3	0.104	72.1	0.255	-29.9
1000	0.299	157.9	3.528	71.2	0.129	72.0	0.252	-30.6
1200	0.310	149.5	3.002	66.0	0.155	71.4	0.254	-32.5
1400	0.321	142.0	2.629	61.0	0.183	69.7	0.255	-36.1
1600	0.332	134.9	2.336	56.3	0.209	67.6	0.248	-40.6
1800	0.341	129.5	2.121	51.7	0.234	65.6	0.242	-45.9
2000	0.366	124.3	1.958	47.3	0.260	64.6	0.236	-51.7

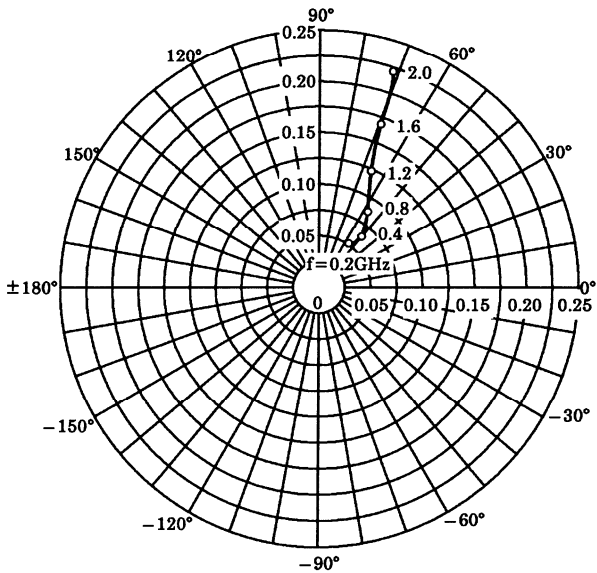
S11e
 VCE = 10V
 IC = 5mA
 Ta = 25°C
 (UNIT : Ω)



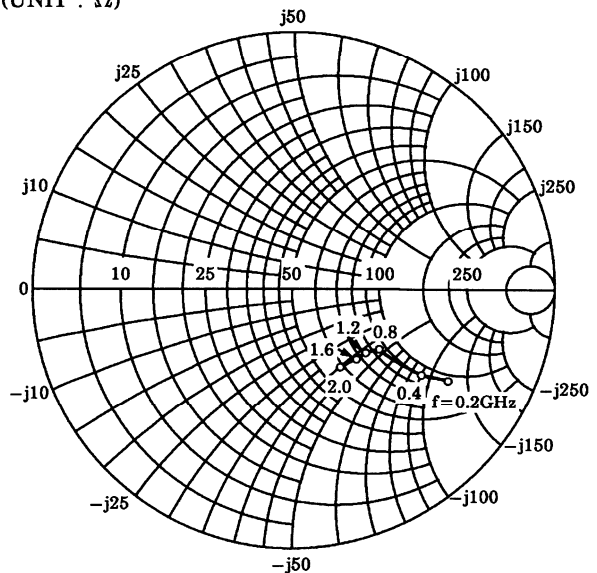
S21e
 VCE = 10V
 IC = 5mA
 Ta = 25°C



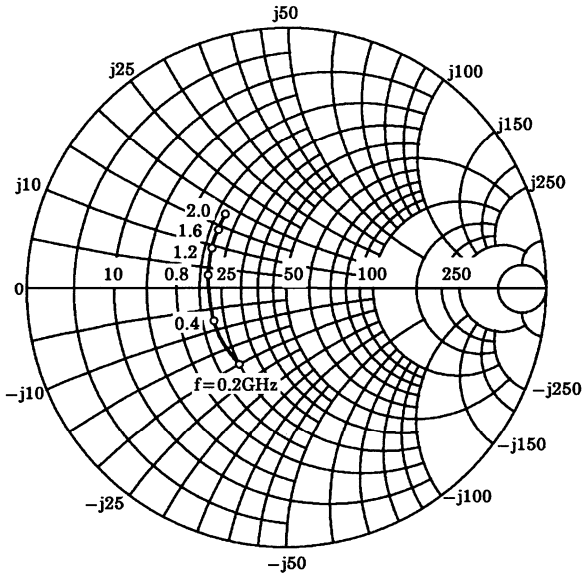
S12e
 VCE = 10V
 IC = 5mA
 Ta = 25°C



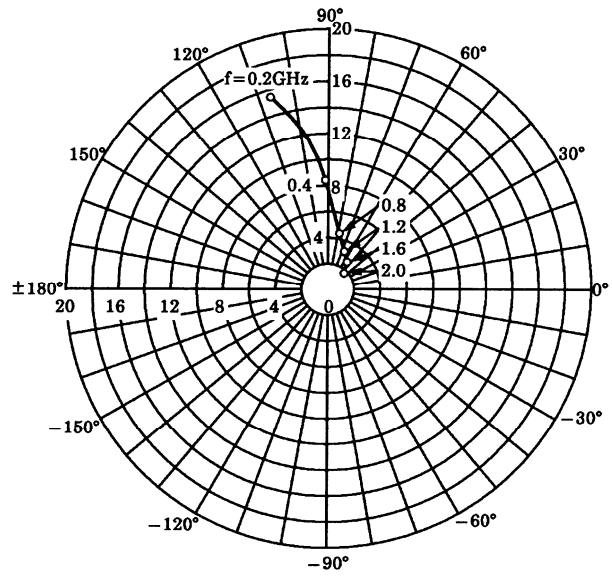
S22e
 VCE = 10V
 IC = 5mA
 Ta = 25°C
 (UNIT : Ω)



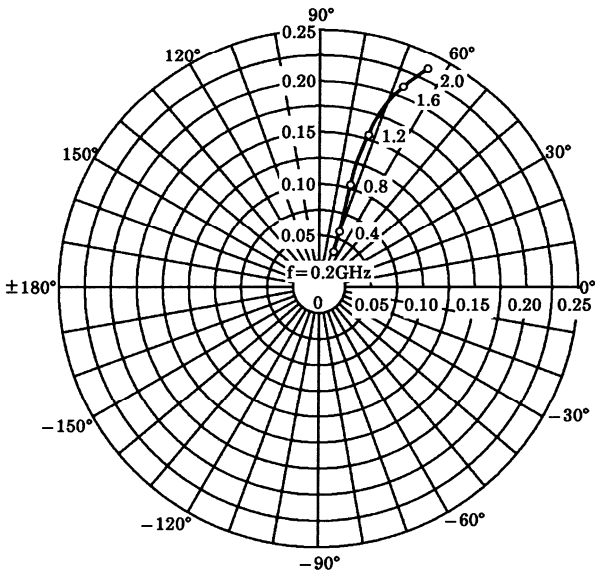
S11e
 VCE = 10V
 IC = 20mA
 Ta = 25°C
 (UNIT : Ω)



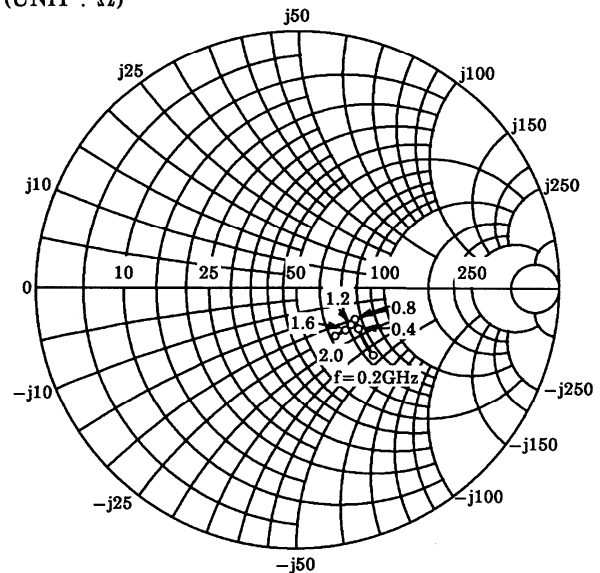
S21e
 VCE = 10V
 IC = 20mA
 Ta = 25°C



S12e
 VCE = 10V
 IC = 20mA
 Ta = 25°C



S22e
 VCE = 10V
 IC = 20mA
 Ta = 25°C
 (UNIT : Ω)



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