TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

# 2SC5094

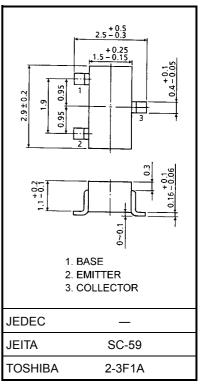
### VHF~UHF Band Low Noise Amplifier Applications

Unit: mm

- Low noise figure, high gain.
- NF = 1.8dB,  $|S_{21e}|^2 = 7.5dB$  (f = 2 GHz)

### **Maximum Ratings (Ta = 25°C)**

Characteristics	Symbol	Rating	Unit	
Collector-base voltage	$V_{CBO}$	20	V	
Collector-emitter voltage	V <sub>CEO</sub>	10	V	
Emitter-base voltage	V <sub>EBO</sub>	1.5	V	
Base current	Ι <sub>Β</sub>	7	mA	
Collector current	I <sub>C</sub>	15	mA	
Collector power dissipation	PC	150	mW	
Junction temperature	Tj	125	°C	
Storage temperature range	T <sub>stg</sub>	−55~125	°C	



### Weight: 0.012 g (typ.)

### Microwave Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit	
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 7 mA	7	10	_	GHz	
Insertion gain	S <sub>21e</sub>   <sup>2</sup> (1)	(1) $V_{CE} = 6 \text{ V}, I_{C} = 7 \text{ mA}, f = 1 \text{ GHz}$ —		13	_	- dB	
	S <sub>21e</sub>   <sup>2</sup> (2)	$V_{CE} = 6 \text{ V}, I_{C} = 7 \text{ mA}, f = 2 \text{ GHz}$	= 2 GHz 4.5 7.5 —				
Noise figure	NF (1)	$V_{CE} = 6 \text{ V}, I_{C} = 3 \text{ mA}, f = 1 \text{ GHz}$ —		1.4	_	dB	
Noise ligure	NF (2)	$V_{CE} = 6 \text{ V}, I_{C} = 3 \text{ mA}, f = 2 \text{ GHz}$	_	1.8	3.0	ub	

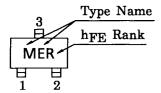
### **Electrical Characteristics (Ta = 25°C)**

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I <sub>CBO</sub>	$V_{CB} = 10 \text{ V}, I_{E} = 0$	_	_	1	μА
Emitter cut-off current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0	_	_	1	μΑ
DC current gain	h <sub>FE</sub> (Note 1)	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 7 mA	50	_	160	
Output capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz (Note 2)	_	0.5	_	pF
Reverse transfer capacitance	C <sub>re</sub>	VCB = 10  V, IE = 0, I = 1  MIHZ (Note 2)	_	0.4	0.85	pF

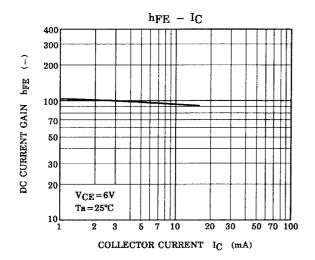
Note 1: hFE classification R: 50~100, O: 80~160

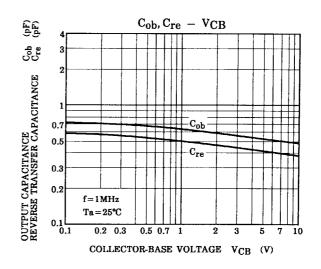
Note 2:  $C_{\text{re}}$  is measured by 3 terminal method with capacitance bridge.

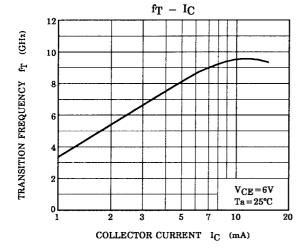
# Marking

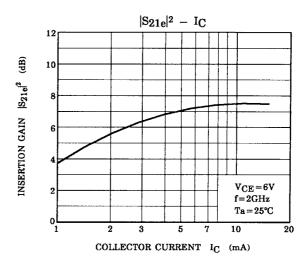


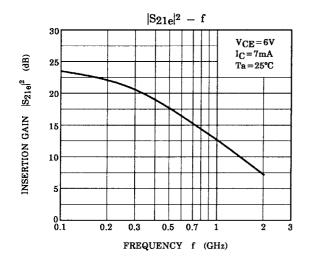
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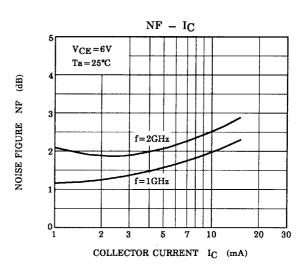




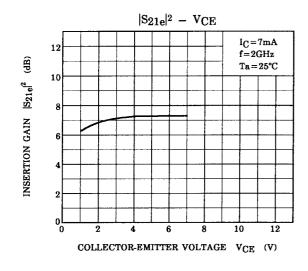


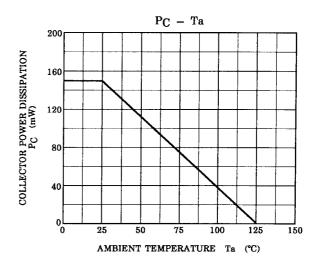






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## S-Parameter $Z_0 = 50 \Omega$ , Ta = 25°C

### $V_{CE} = 6 V$ , $I_C = 3 mA$

Frequency	S	11	S	21	S	12	S2	22
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.817	-25.8	7.113	150.2	0.044	71.4	0.898	-18.6
400	0.647	-46.3	6.028	129.5	0.073	61.8	0.746	-28.7
600	0.477	-61.4	5.061	113.9	0.092	57.2	0.636	-33.4
800	0.356	-71.3	4.197	102.8	0.108	55.7	0.565	-35.4
1000	0.265	-78.9	3.583	93.9	0.123	55.3	0.518	-36.8
1200	0.194	-85.6	3.135	86.7	0.137	55.7	0.486	-37.5
1400	0.136	-90.5	2.778	80.2	0.153	55.8	0.467	-38.8
1600	0.093	-97.7	2.490	74.4	0.169	55.3	0.449	-40.4
1800	0.058	-109.0	2.260	69.6	0.183	54.8	0.433	-42.6
2000	0.028	-134.7	2.089	65.2	0.199	55.2	0.418	-43.9

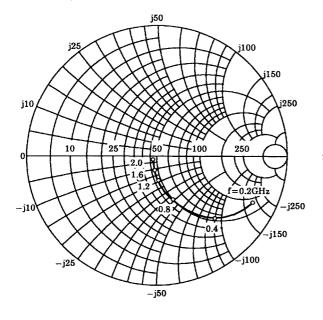
### $V_{CE} = 6 V$ , $I_C = 7 mA$

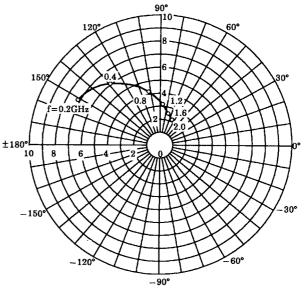
Frequency	S11		S21		S12		S22	
(MHz)	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.630	-39.7	12.332	138.1	0.037	68.5	0.783	-25.6
400	0.392	-64.1	8.847	114.7	0.059	64.3	0.586	-31.8
600	0.248	-78.3	6.514	101.4	0.077	64.1	0.495	-32.0
800	0.161	-87.5	5.094	92.6	0.096	64.7	0.449	-31.2
1000	0.105	-95.3	4.213	85.9	0.114	64.9	0.423	-30.5
1200	0.060	-106.3	3.589	80.3	0.133	65.0	0.412	-30.8
1400	0.028	-121.7	3.139	74.9	0.154	64.0	0.406	-32.1
1600	0.021	-158.4	2.786	70.1	0.173	62.5	0.398	-34.0
1800	0.035	171.6	2.498	66.0	0.190	61.2	0.387	-36.7
2000	0.054	144.0	2.300	62.3	0.210	60.7	0.377	-38.4

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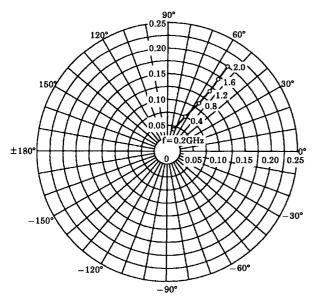
 $\begin{array}{l} S_{11e} \\ V_{CE} = 6V \\ I_{C} = 3mA \\ T_{a} = 25^{\circ}C \\ (UNIT:\Omega) \end{array}$ 



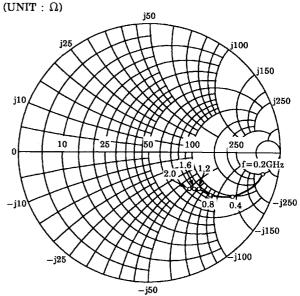




 $S_{12e}$   $V_{CE} = 6V$   $I_{C} = 3mA$  $T_{a} = 25^{\circ}C$ 

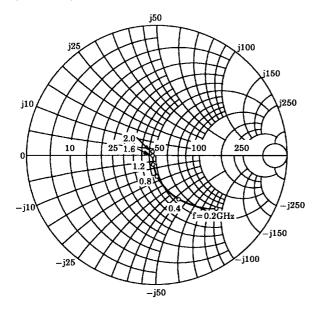


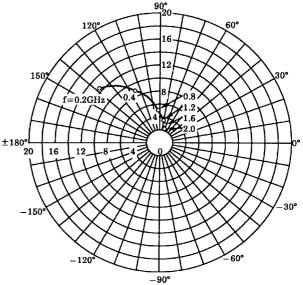
 $S_{22e}$   $V_{CE} = 6V$   $I_{C} = 3mA$   $T_{a} = 25^{\circ}C$ 



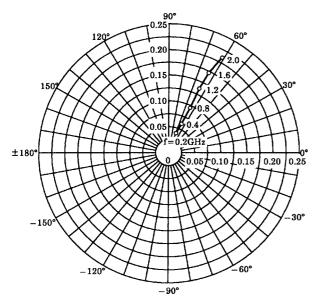
 $\begin{array}{l} S_{11e} \\ V_{CE} = 6V \\ I_{C} = 7mA \\ Ta = 25^{\circ}C \\ (UNIT:\Omega) \end{array}$ 

 $\begin{array}{c} S_{21e} \\ V_{CE} = 6V \\ I_{C} = 7mA \\ Ta = 25^{\circ}C \end{array}$ 





 $S_{12e}$   $V_{CE} = 6V$   $I_{C} = 7mA$   $T_{a} = 25^{\circ}C$ 



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