

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC5097

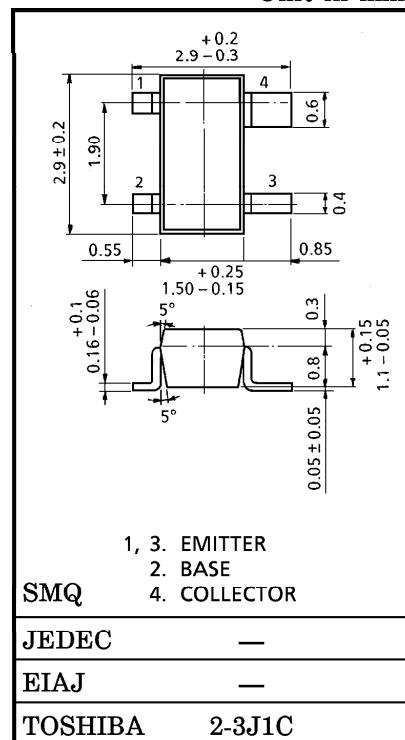
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

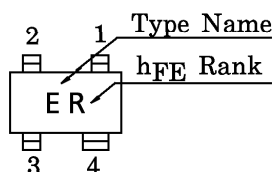
- Low Noise Figure, High Gain.
- $NF=1.8dB$ ,  $|S_{21e}|^2=10dB$  ( $f=2GHz$ )

MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

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	$I_B$	7	mA
Collector Current	$I_C$	15	mA
Collector Power Dissipation	$P_C$	150	mW
Junction Temperature	$T_j$	125	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ C$



MARKING



MICROWAVE CHARACTERISTICS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T$	$V_{CE}=6V, I_C=7mA$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE}=6V, I_C=7mA, f=1GHz$	12.5	15.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE}=6V, I_C=7mA, f=2GHz$	7	10	—	
Noise Figure	NF (1)	$V_{CE}=6V, I_C=3mA, f=1GHz$	—	1.3	2.5	dB
	NF (2)	$V_{CE}=6V, I_C=3mA, f=2GHz$	—	1.8	3.0	

ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ C$ )

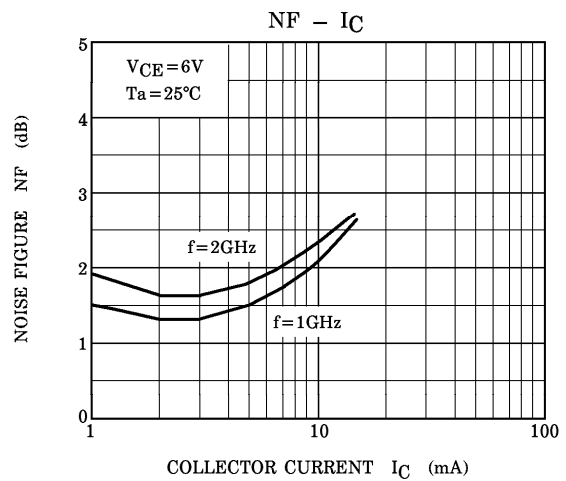
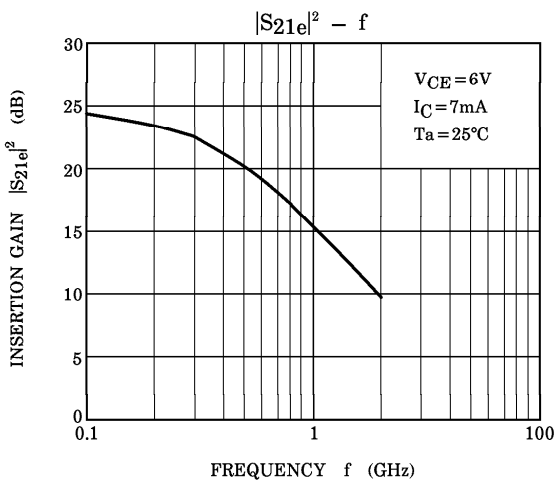
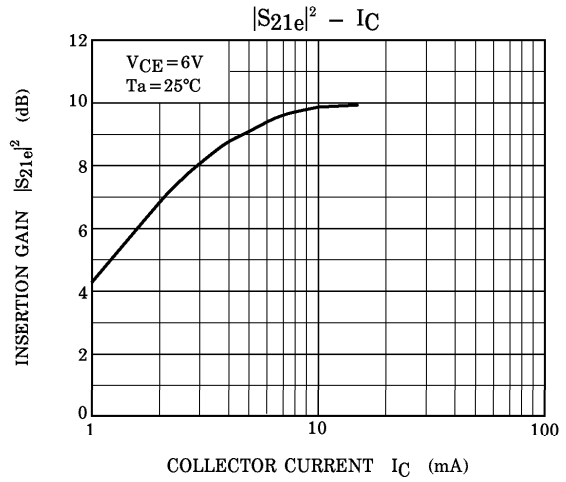
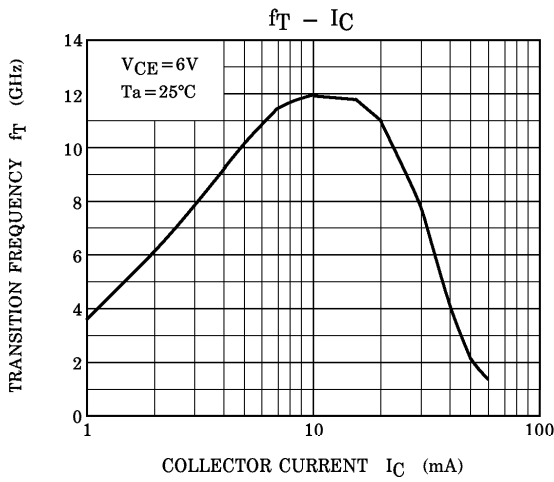
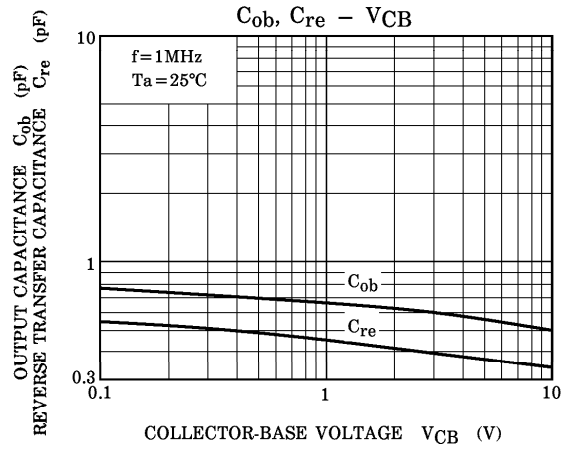
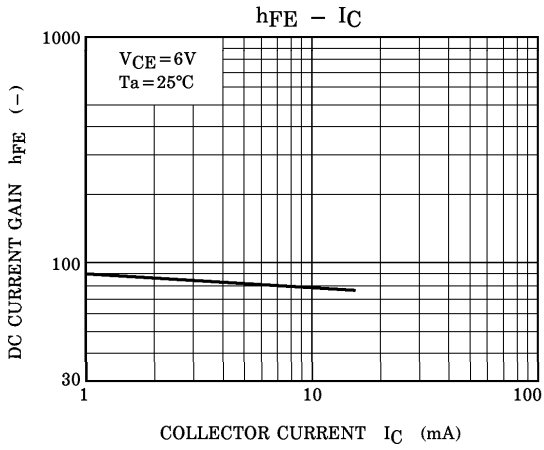
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB}=10V, I_E=0$	—	—	1	$\mu A$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=1V, I_C=0$	—	—	1	$\mu A$
DC Current Gain	$h_{FE}$ (Note 1)	$V_{CE}=6V, I_C=7mA$	50	—	160	—
Output Capacitance	$C_{ob}$	$V_{CB}=10V, I_E=0, f=1MHz$	—	0.5	0.9	pF
Reverse Transfer Capacitance	$C_{re}$		(Note 2)	—	0.35	0.85

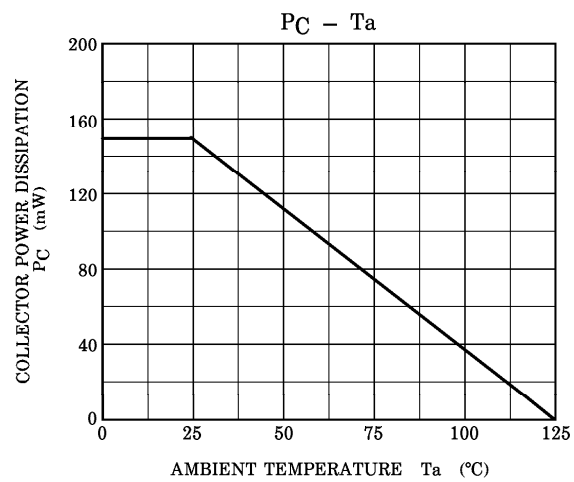
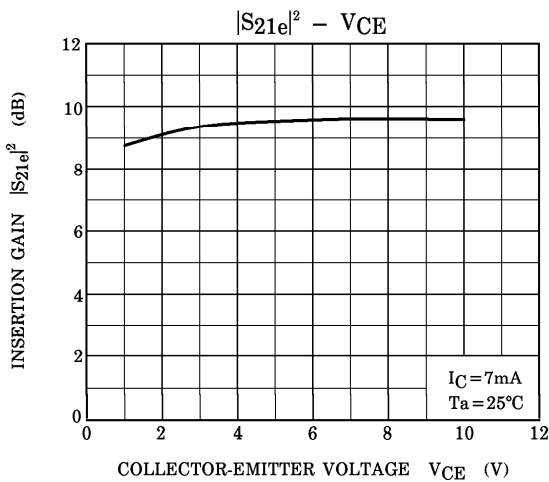
(Note 1)  $h_{FE}$  Classification R : 50~100, O : 80~160

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

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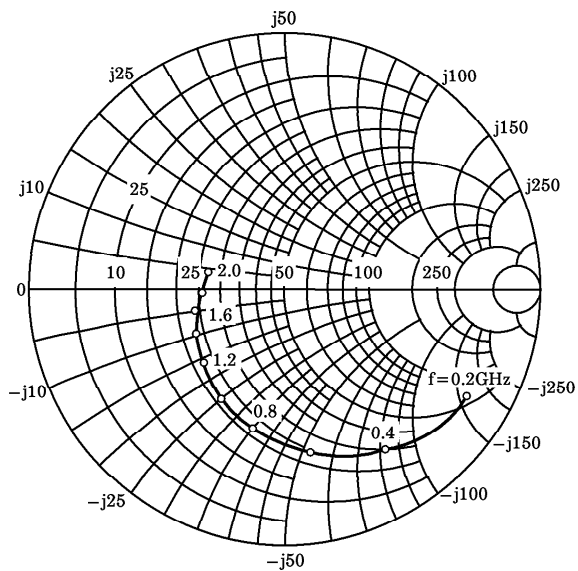
S-Parameter  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 6\text{V}$ ,  $I_C = 3\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.831	-29.9	8.685	158.4	0.040	75.6	0.961	-20.4
400	0.744	-57.7	7.706	139.0	0.071	63.6	0.871	-38.7
600	0.653	-81.5	6.564	123.7	0.093	54.8	0.772	-54.2
800	0.565	-102.8	5.604	111.1	0.108	48.4	0.681	-67.0
1000	0.501	-121.2	4.788	101.3	0.117	45.1	0.608	-77.4
1200	0.441	-137.8	4.120	92.9	0.124	42.7	0.547	-86.4
1400	0.396	-153.1	3.583	85.9	0.129	42.0	0.496	-94.0
1600	0.363	-166.2	3.156	80.3	0.135	42.0	0.459	-100.7
1800	0.330	-179.2	2.820	75.4	0.141	42.7	0.430	-106.1
2000	0.314	-167.4	2.533	70.7	0.147	43.5	0.407	-110.8

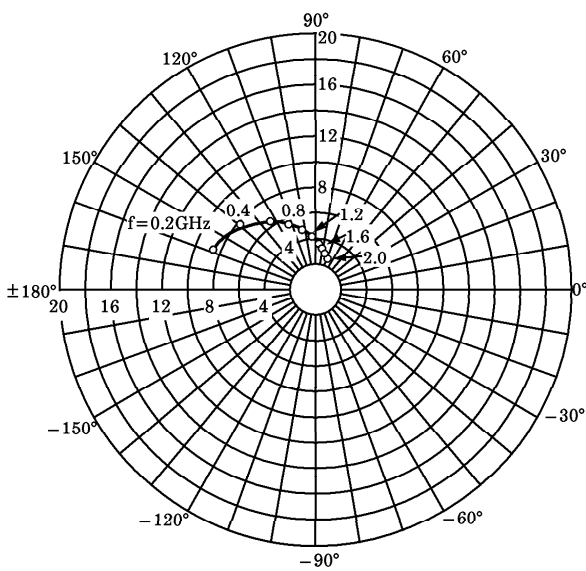
$V_{CE} = 6\text{V}$ ,  $I_C = 10\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.696	-46.2	15.000	148.1	0.036	70.3	0.893	-29.1
400	0.570	-83.4	11.651	125.1	0.058	59.4	0.726	-50.2
600	0.488	-111.0	8.996	110.5	0.072	54.8	0.596	-64.8
800	0.432	-133.1	7.207	100.0	0.083	52.8	0.508	-76.0
1000	0.403	-150.9	5.938	91.9	0.093	53.0	0.446	-85.0
1200	0.378	-167.1	4.989	85.3	0.101	53.1	0.401	-92.9
1400	0.364	177.9	4.292	79.9	0.110	54.0	0.363	-100.0
1600	0.348	164.4	3.761	75.3	0.120	54.7	0.336	-105.7
1800	0.339	151.5	3.353	71.1	0.130	55.7	0.314	-110.2
2000	0.334	138.6	3.015	67.2	0.140	56.2	0.296	-114.1

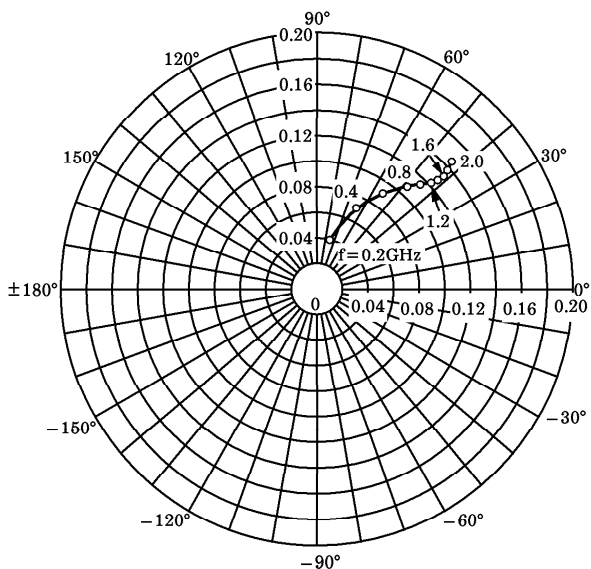
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C  
 (Unit : Ω)



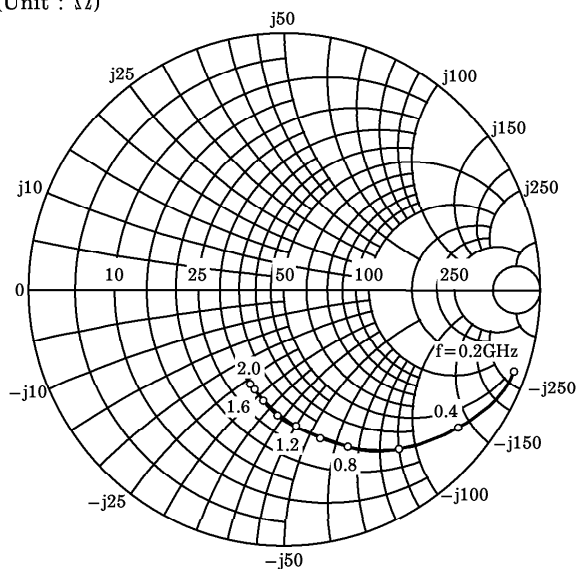
**S<sub>21e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C



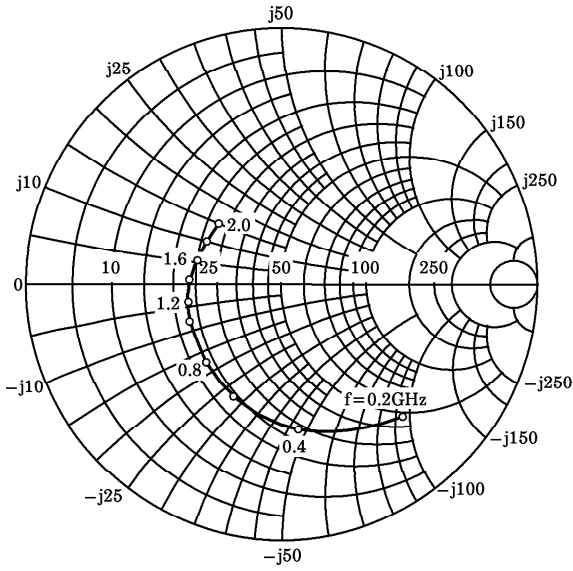
**S<sub>12e</sub>**  
 V<sub>CE</sub> = 6V  
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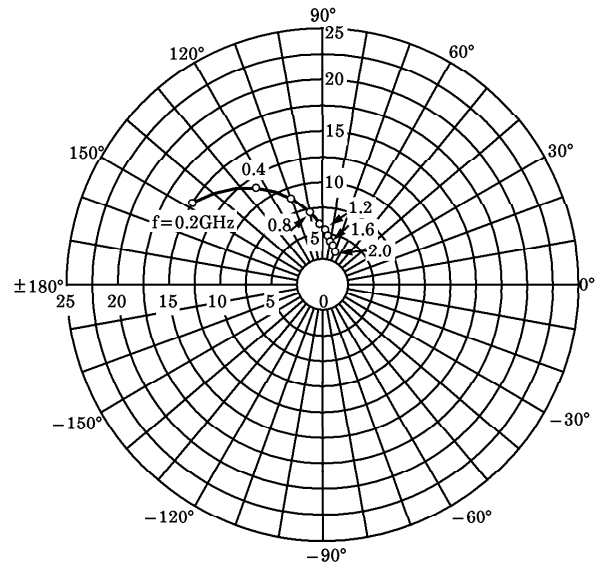
**S<sub>22e</sub>**  
 V<sub>CE</sub> = 6V  
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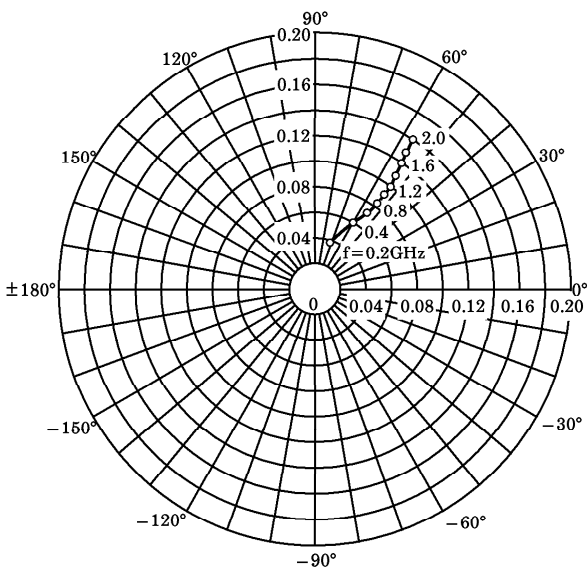
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 7mA  
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 (Unit : Ω)



**S<sub>21e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 7mA  
 T<sub>a</sub> = 25°C



**S<sub>12e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 7mA  
 T<sub>a</sub> = 25°C



**S<sub>22e</sub>**  
 V<sub>CE</sub> = 6V  
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