

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC4322

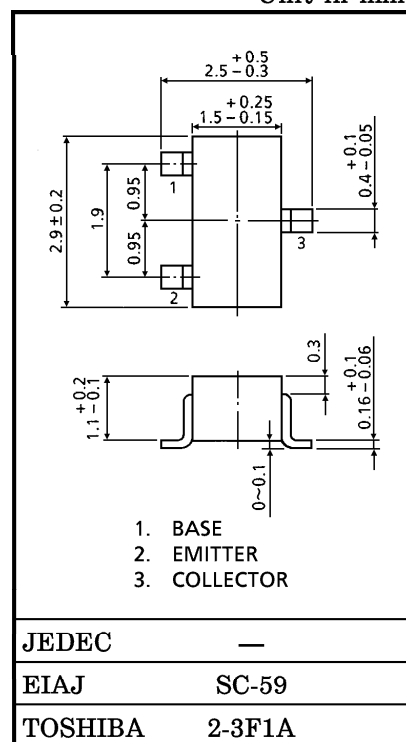
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- $NF = 1.8\text{dB}$ ,  $|S_{21e}|^2 = 7.5\text{dB}$  ( $f = 2\text{GHz}$ )

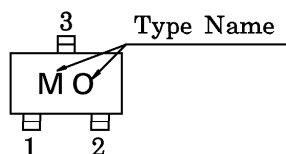
MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

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	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ\text{C}$



Weight : 0.012g

Marking



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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$ , $f = 1\text{GHz}$	—	13	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$ , $f = 2\text{GHz}$	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
	NF (2)	$V_{CE} = 6\text{V}$ , $I_C = 3\text{mA}$ , $f = 2\text{GHz}$	—	1.8	3.0	

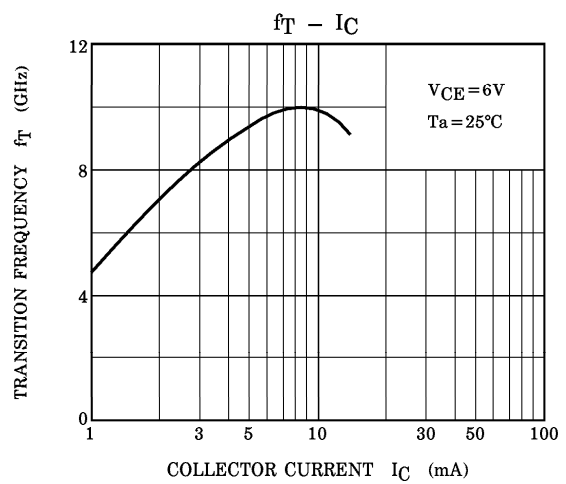
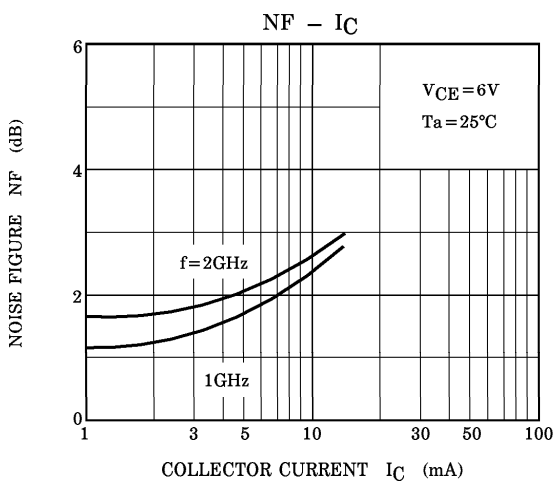
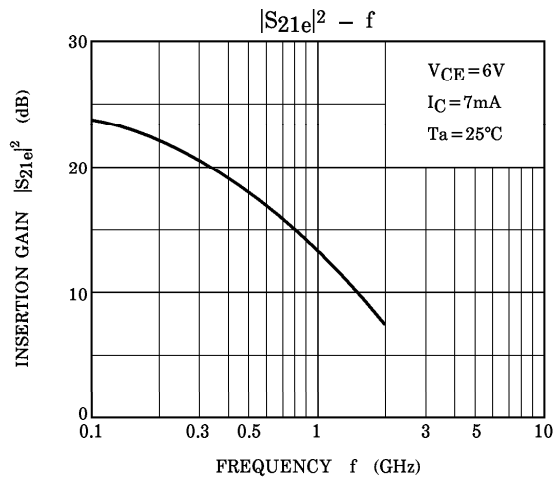
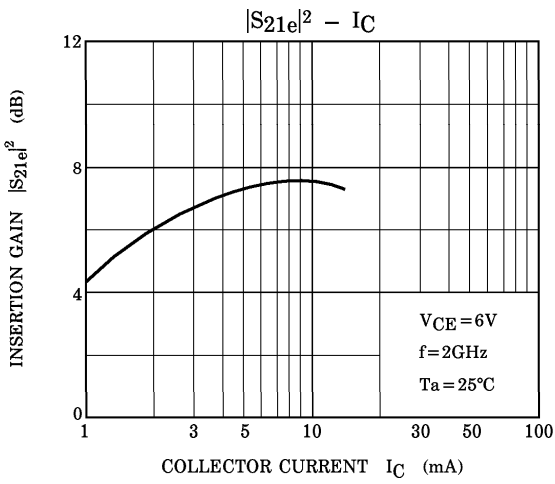
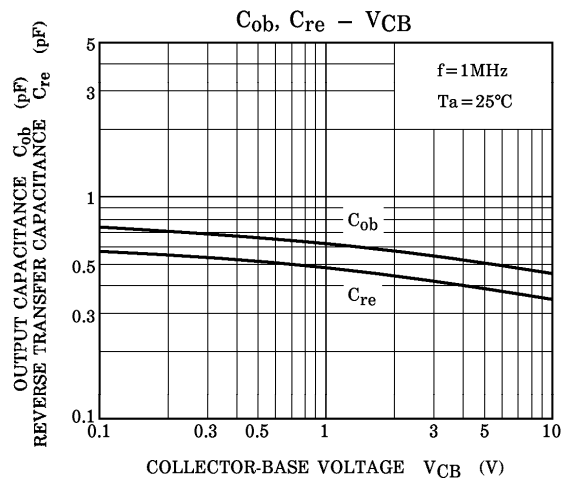
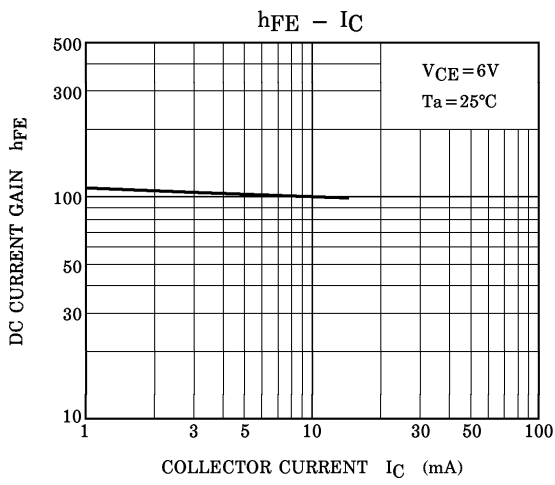
ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

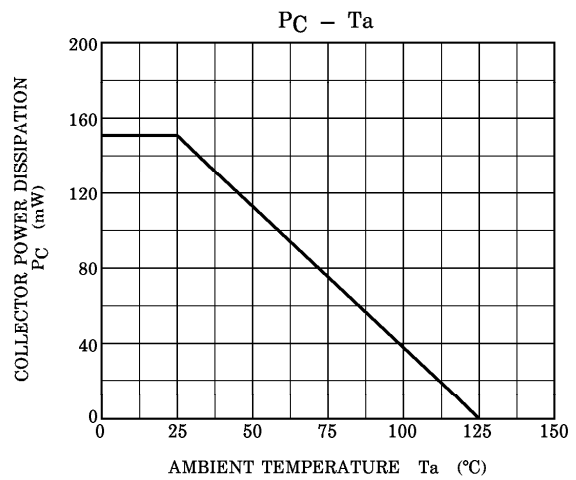
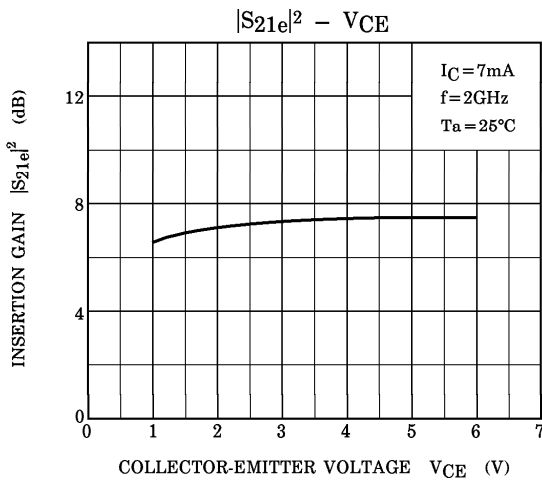
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 10\text{V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = 1\text{V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 6\text{V}$ , $I_C = 7\text{mA}$	50	—	250	—
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$	—	0.45	—	pF
Reverse Transfer Capacitance	$C_{re}$	(Note)	—	0.35	0.8	pF

(Note)  $C_{re}$  is measured by 3 terminal method with Capacitance Bridge.

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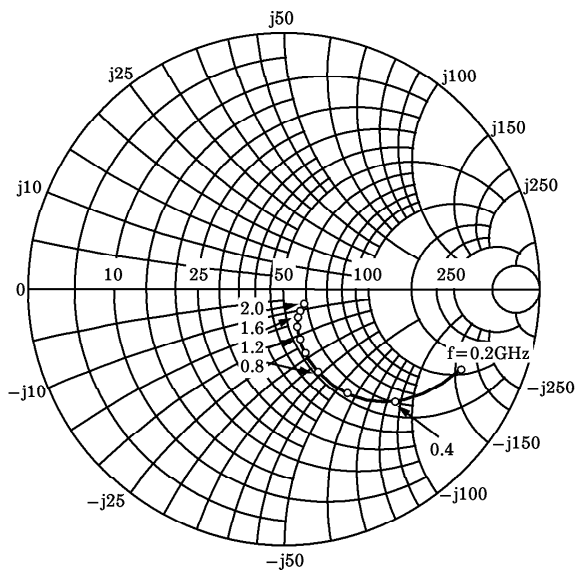
S-PARAMETER Z<sub>O</sub> = 50Ω, Ta = 25°C  
V<sub>CE</sub> = 6V, I<sub>C</sub> = 3mA

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.764	-25.0	7.758	153.8	0.037	76.2	0.934	-16.4
400	0.613	-44.9	6.493	132.9	0.065	67.0	0.808	-27.7
600	0.473	-57.9	5.331	117.9	0.085	62.8	0.702	-34.3
800	0.356	-66.9	4.433	106.2	0.102	61.2	0.623	-38.0
1000	0.261	-70.4	3.738	97.7	0.117	60.4	0.575	-40.6
1200	0.198	-71.7	3.266	90.1	0.132	60.2	0.544	-42.4
1400	0.147	-66.3	2.853	83.0	0.147	60.1	0.529	-44.1
1600	0.129	-54.9	2.555	78.2	0.163	60.3	0.519	-46.4
1800	0.114	-41.8	2.348	72.8	0.179	60.0	0.514	-49.0
2000	0.124	-34.5	2.108	69.2	0.192	60.1	0.513	-52.4

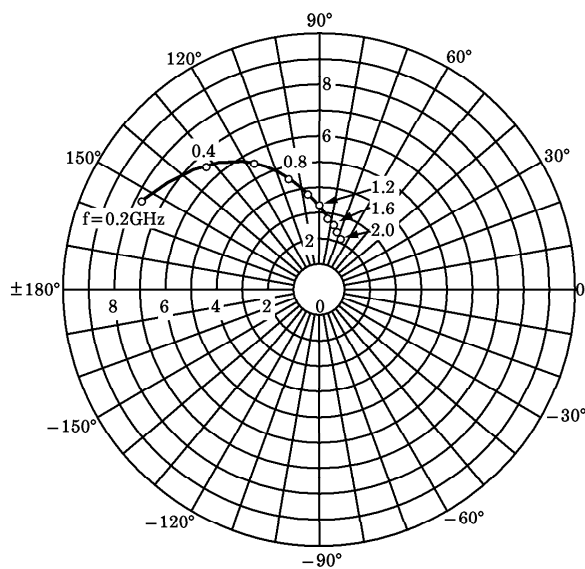
V<sub>CE</sub> = 6V, I<sub>C</sub> = 7mA

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.560	-35.3	12.525	142.0	0.032	74.2	0.853	-21.5
400	0.367	-54.1	8.958	118.8	0.055	69.5	0.678	-30.1
600	0.248	-63.4	6.693	105.3	0.073	68.4	0.581	-32.7
800	0.158	-62.4	5.270	95.5	0.091	68.6	0.530	-33.6
1000	0.101	-47.8	4.319	88.5	0.110	68.4	0.506	-34.7
1200	0.088	-27.3	3.687	82.1	0.128	67.9	0.493	-36.0
1400	0.099	-4.3	3.188	76.2	0.146	67.0	0.491	-37.8
1600	0.131	-0.7	2.813	71.9	0.165	66.2	0.492	-40.5
1800	0.152	0.4	2.563	67.4	0.183	65.2	0.498	-43.7
2000	0.167	-1.7	2.276	64.5	0.198	64.5	0.500	-47.5

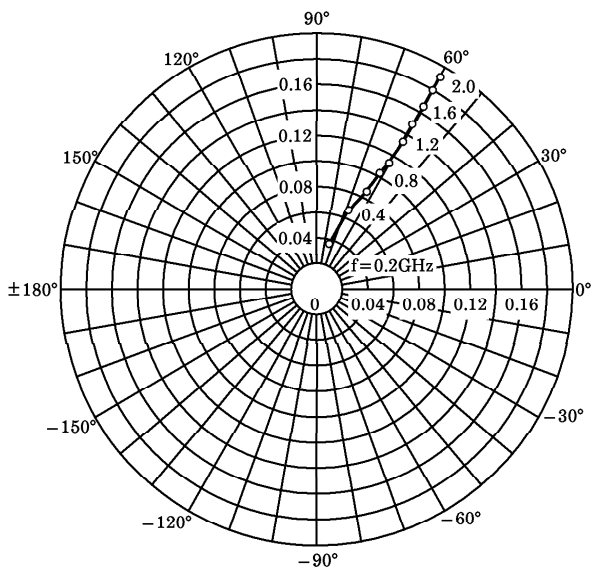
**S<sub>11e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



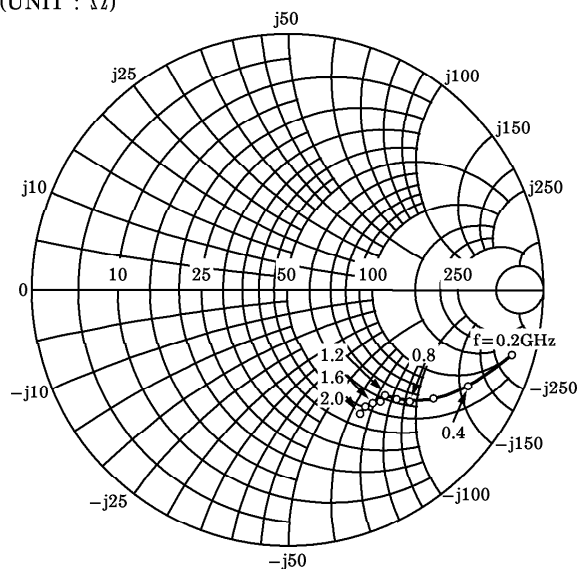
**S<sub>21e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C



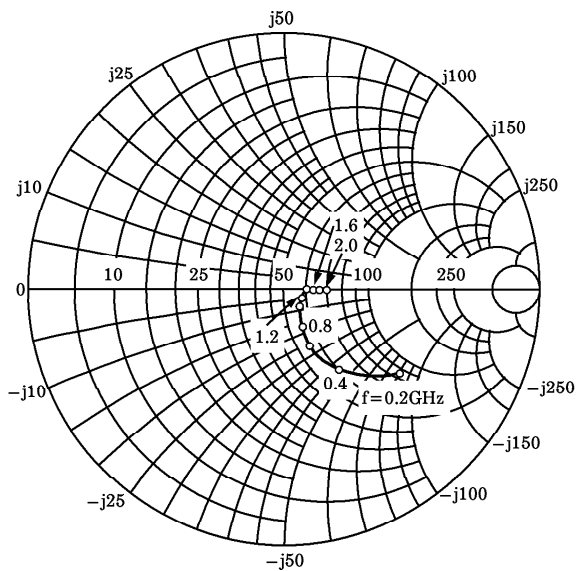
**S<sub>12e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C



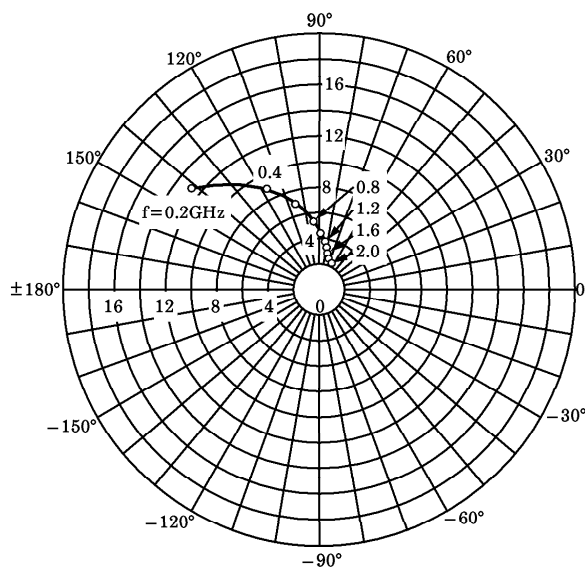
**S<sub>22e</sub>**  
 V<sub>CE</sub> = 6V  
 I<sub>C</sub> = 3mA  
 T<sub>a</sub> = 25°C  
 (UNIT : Ω)



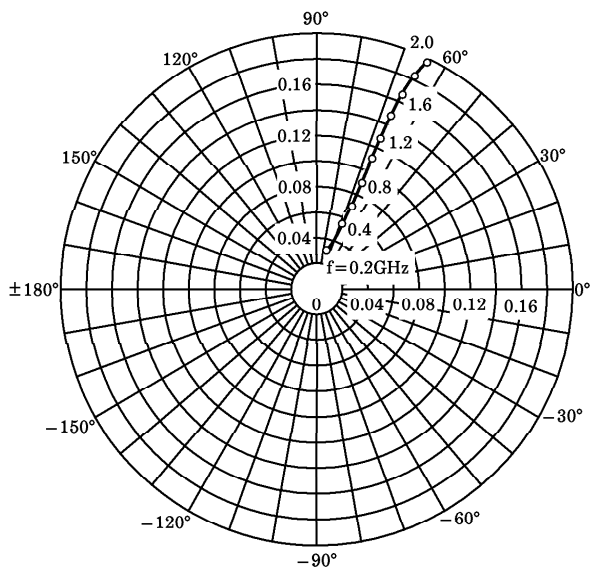
**S<sub>11e</sub>**  
 V<sub>CE</sub>=6V  
 I<sub>C</sub>=7mA  
 T<sub>a</sub>=25°C  
 (UNIT : Ω)



**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  
 I<sub>C</sub>=7mA  
 T<sub>a</sub>=25°C  
 (UNIT : Ω)

