

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

## 2SC5094

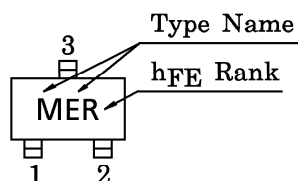
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

- 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	$T_{stg}$	$-55\sim 125$	$^\circ\text{C}$

MARKING

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

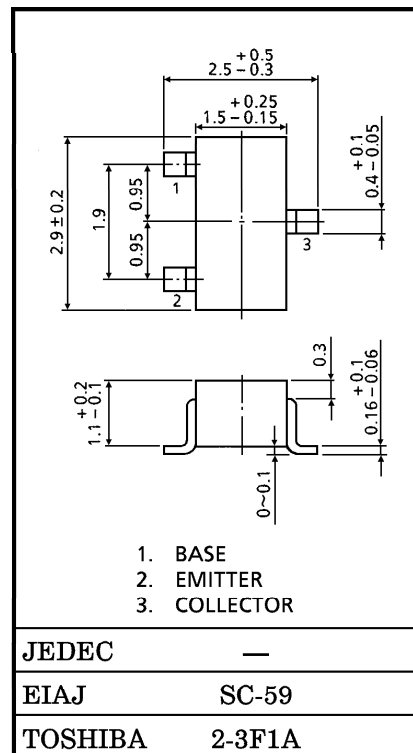
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T$	$V_{CE}=6\text{V}$ , $I_C=7\text{mA}$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE}=6\text{V}$ , $I_C=7\text{mA}$ , $f=1\text{GHz}$	—	13	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE}=6\text{V}$ , $I_C=7\text{mA}$ , $f=2\text{GHz}$	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 ( $T_a = 25^\circ\text{C}$ )

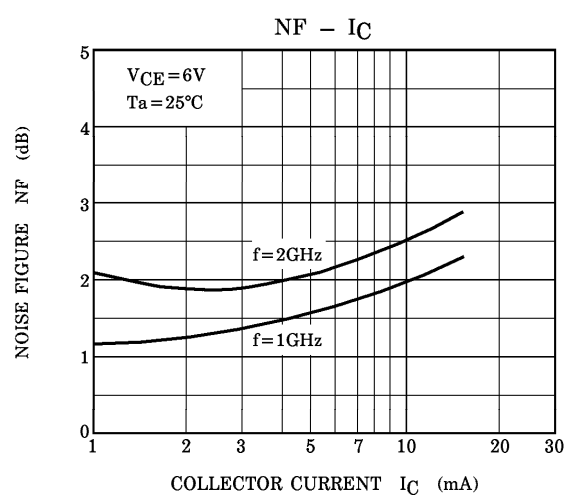
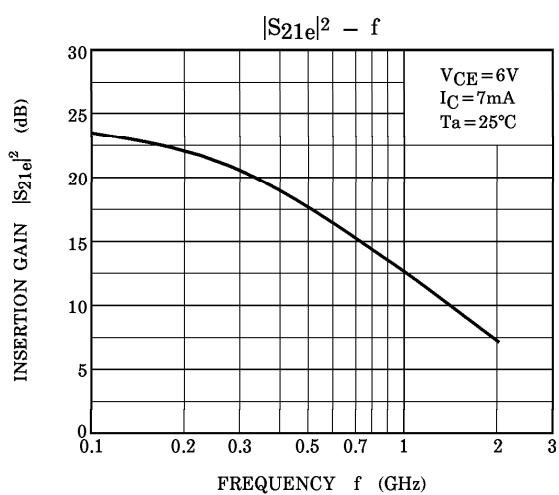
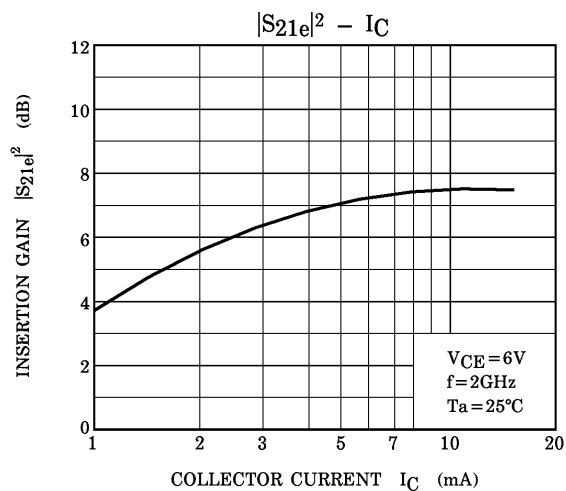
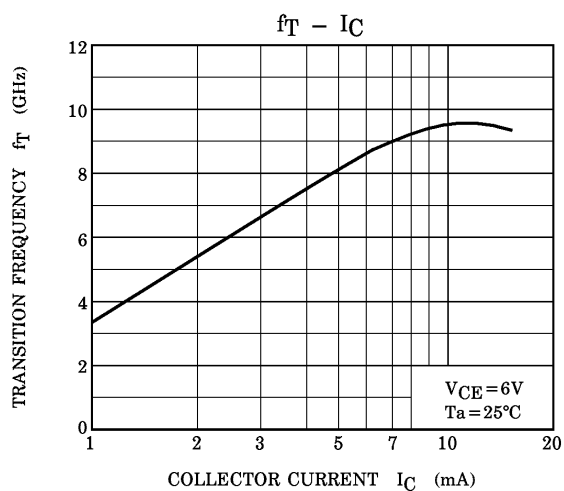
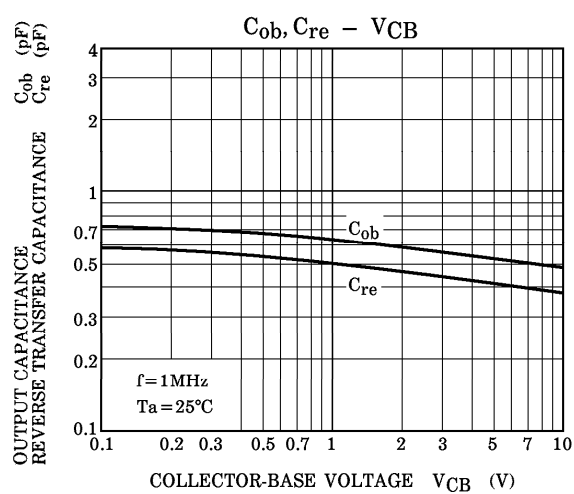
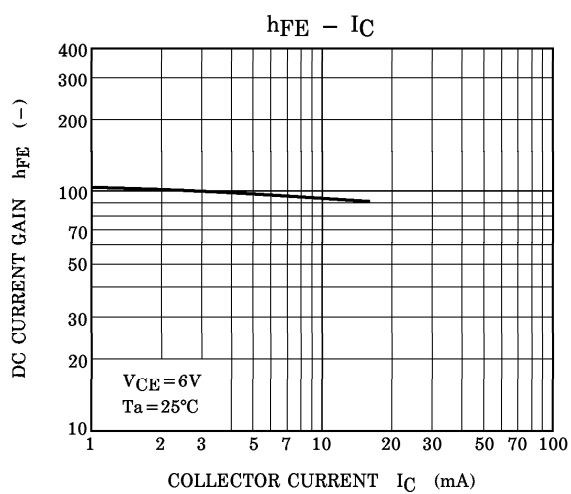
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB}=10\text{V}$ , $I_E=0$	—	—	1	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=1\text{V}$ , $I_C=0$	—	—	1	$\mu\text{A}$
DC Current Gain	$h_{FE}$ (Note 1)	$V_{CE}=6\text{V}$ , $I_C=7\text{mA}$	50	—	160	—
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}$ , $I_E=0$ , $f=1\text{MHz}$ (Note 2)	—	0.5	—	pF
Reverse Transfer Capacitance	$C_{re}$		—	0.4	0.85	pF

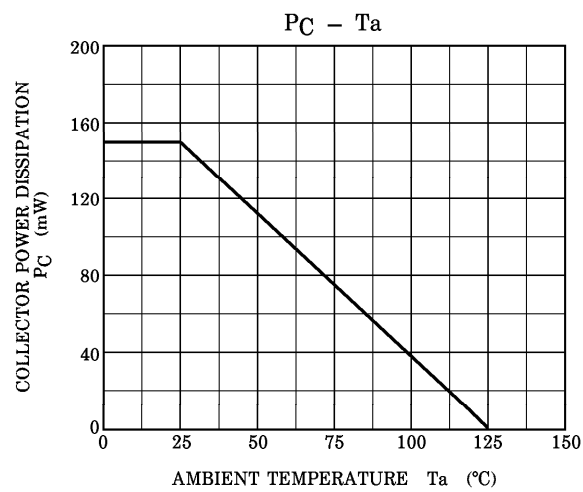
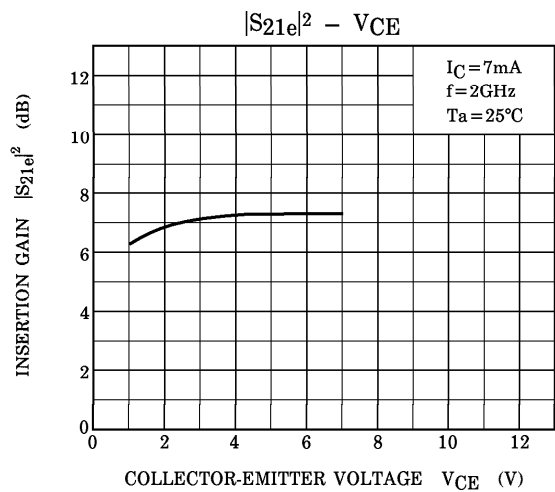
(Note 1)  $h_{FE}$  Classification R : 50~100, O : 80~160(Note 2)  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

Unit in mm



Weight : 0.012g





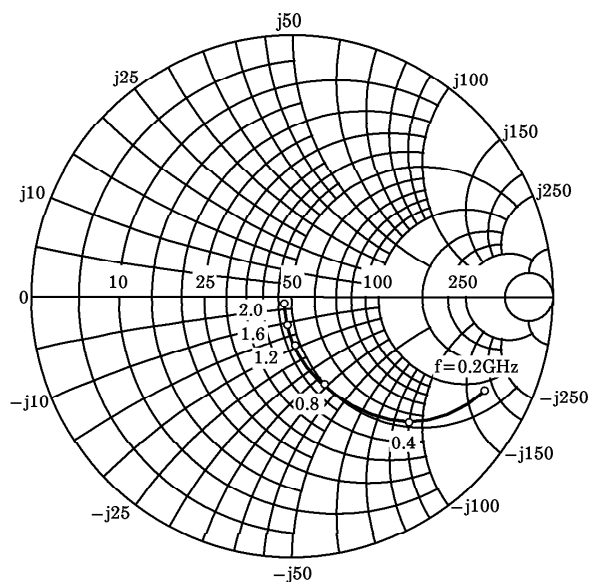
S-Parameter  $Z_0 = 50\Omega$ ,  $T_a = 25^\circ\text{C}$   
 $V_{CE} = 6\text{V}$ ,  $I_C = 3\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.817	-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

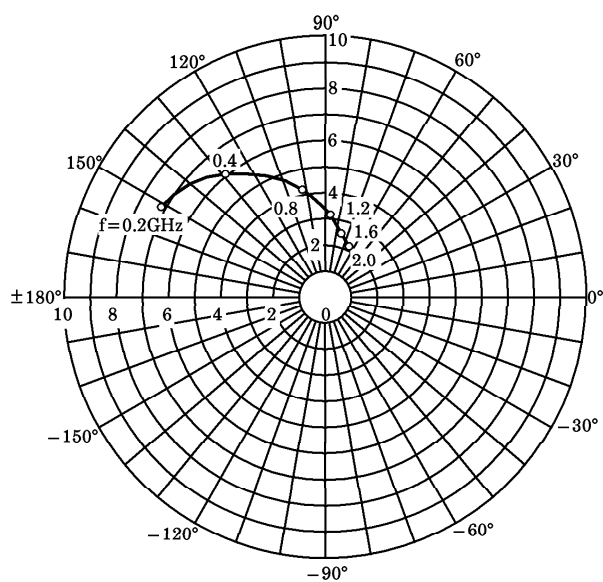
$V_{CE} = 6\text{V}$ ,  $I_C = 7\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	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

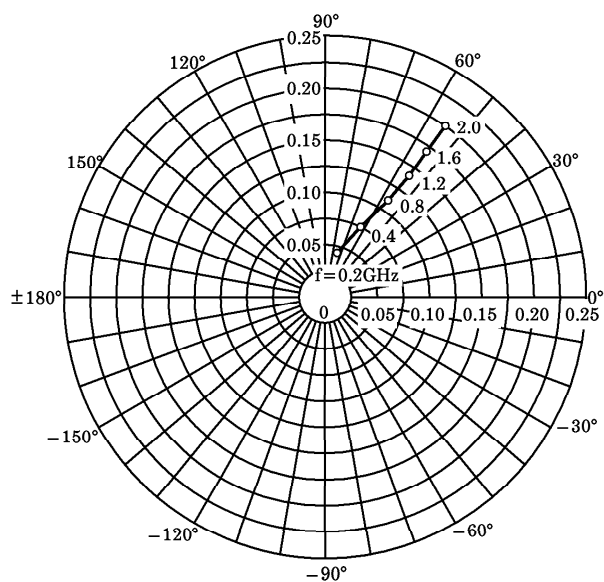
$S_{11e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



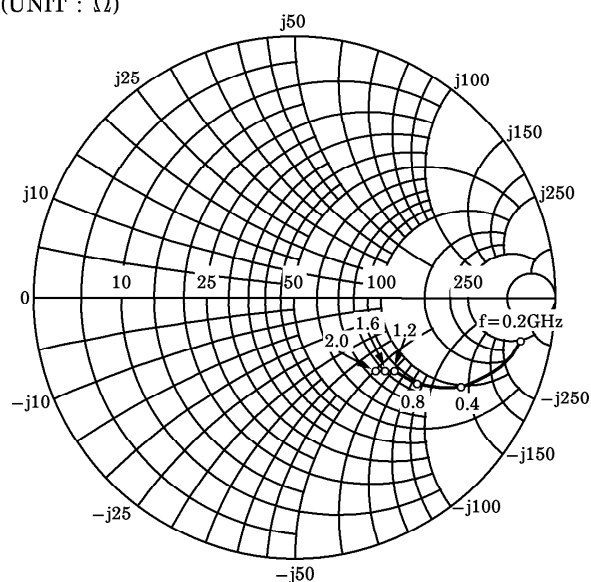
$S_{21e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$



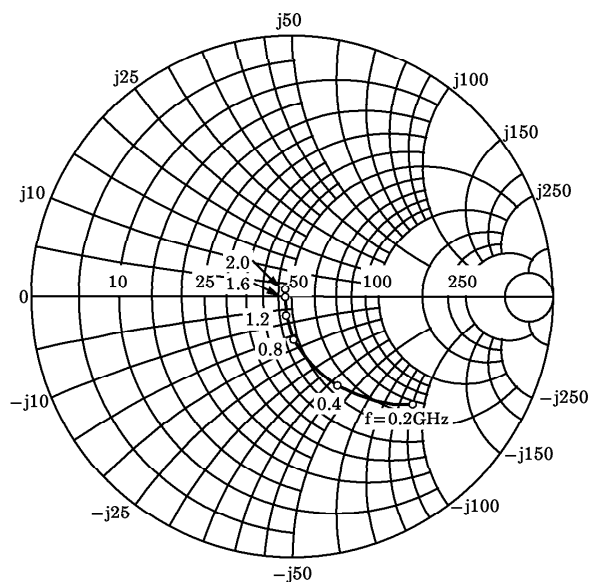
$S_{12e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$



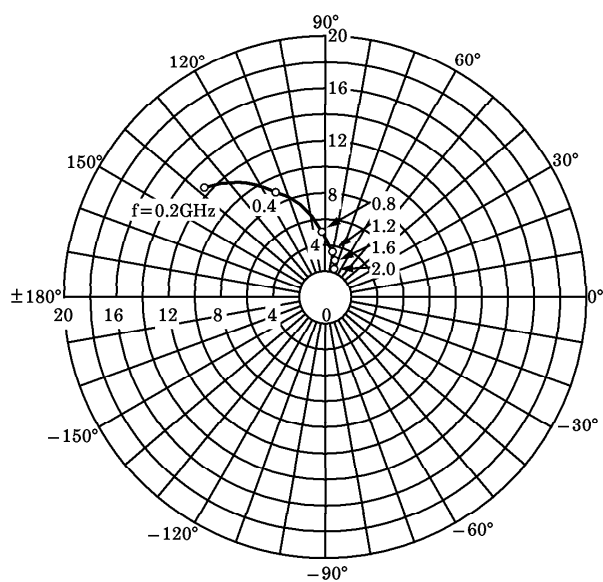
$S_{22e}$   
 $V_{CE} = 6V$   
 $I_C = 3mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



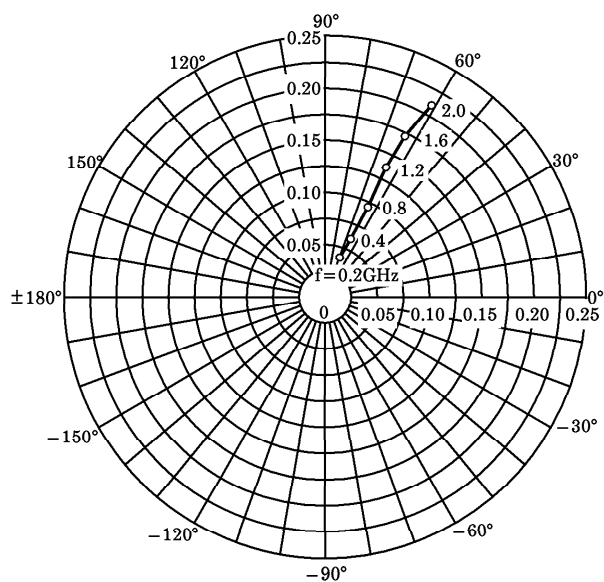
$S_{11e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



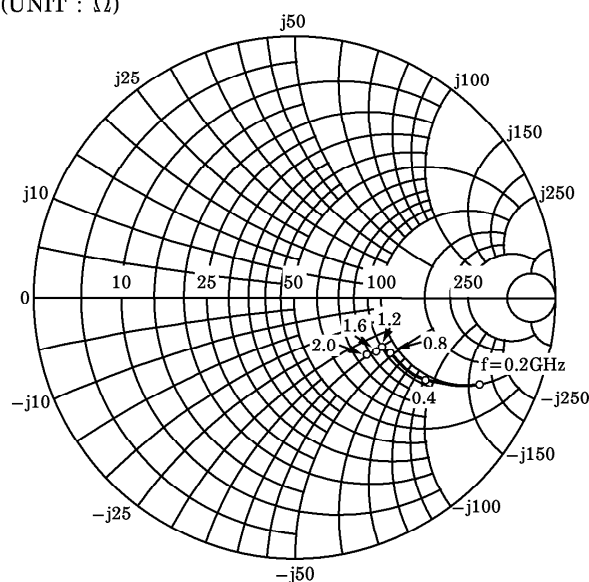
$S_{21e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$



$S_{12e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$



$S_{22e}$   
 $V_{CE} = 6V$   
 $I_C = 7mA$   
 $T_a = 25^\circ C$   
 (UNIT :  $\Omega$ )



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