

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

# 2SC5092

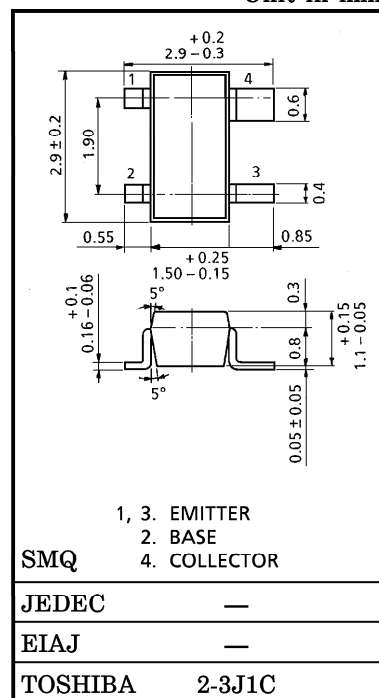
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

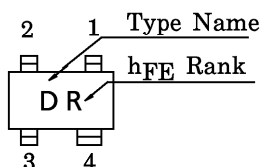
- Low Noise Figure, High Gain.
- $NF = 1.8\text{dB}$ ,  $|S_{21e}|^2 = 9.5\text{dB}$  ( $f = 2\text{GHz}$ )

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	$I_B$	20	mA
Collector Current	$I_C$	40	mA
Collector Power Dissipation	$P_C$	150	mW
Junction Temperature	$T_j$	125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ\text{C}$



MARKING



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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T$	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2$ (1)	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$ , $f = 1\text{GHz}$	12	15	—	dB
	$ S_{21e} ^2$ (2)	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$ , $f = 2\text{GHz}$	6.5	9.5	—	
Noise Figure	NF (1)	$V_{CE} = 8\text{V}$ , $I_C = 5\text{mA}$ , $f = 1\text{GHz}$	—	1.4	2.5	dB
	NF (2)	$V_{CE} = 8\text{V}$ , $I_C = 5\text{mA}$ , $f = 2\text{GHz}$	—	1.8	3	

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

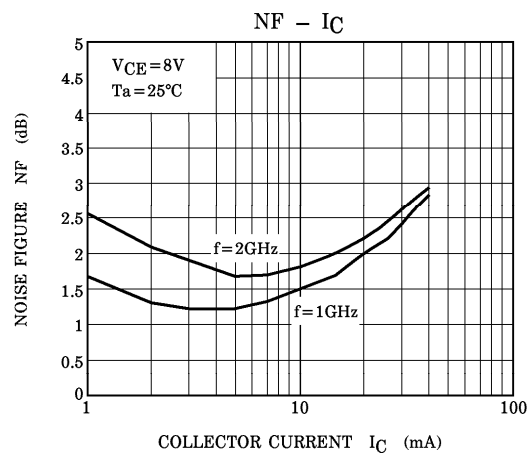
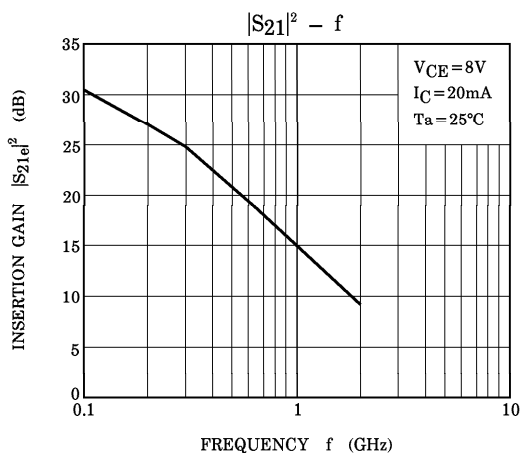
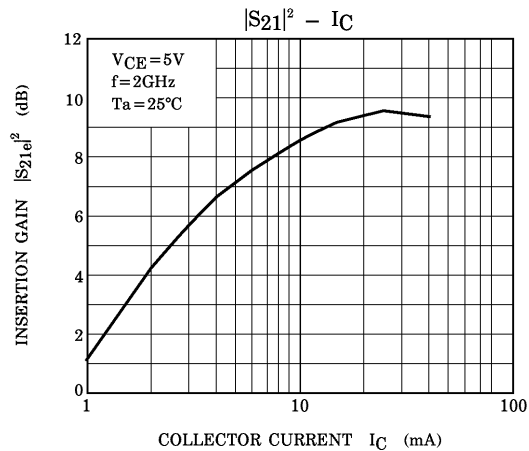
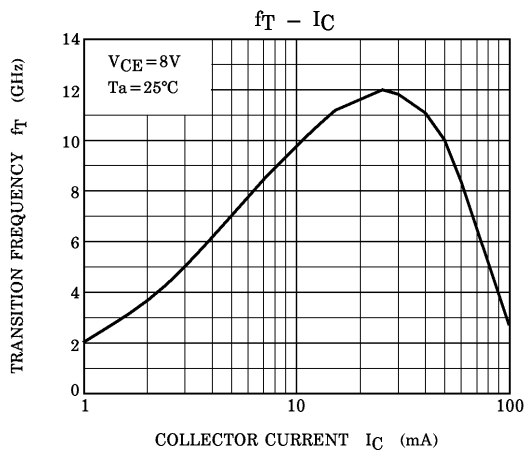
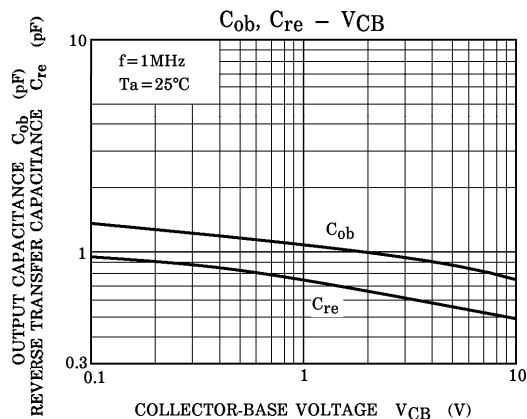
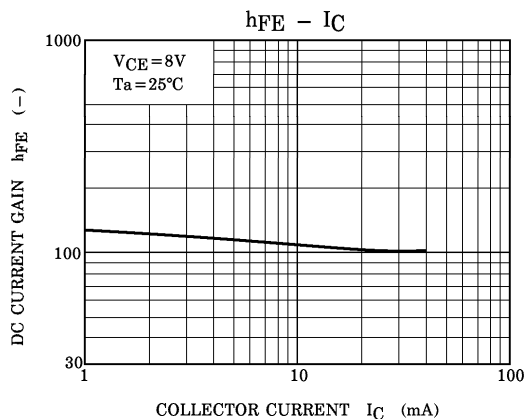
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 10\text{V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{EB} = 1\text{V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC Current Gain	$h_{FE}$ (Note 1)	$V_{CE} = 8\text{V}$ , $I_C = 20\text{mA}$	50	—	160	—
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$ (Note 2)	—	0.7	1.1	pF
Reverse Transfer Capacitance	$C_{re}$		—	0.45	0.95	pF

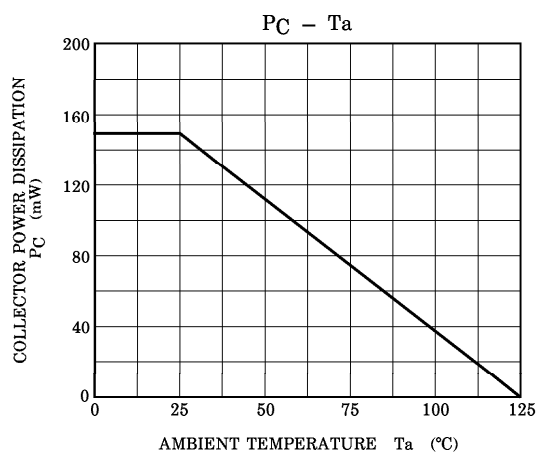
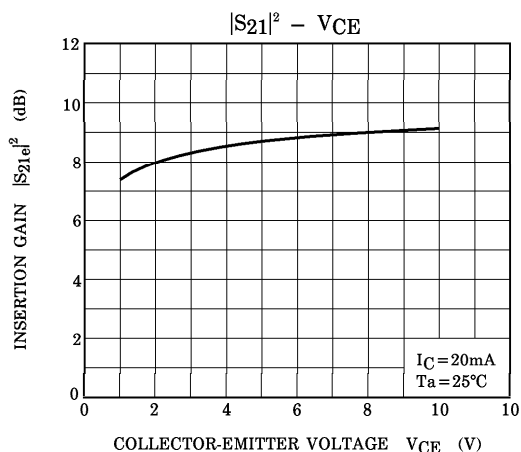
(Note 1)  $h_{FE}$  Classification R : 50~100, O : 80~160

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

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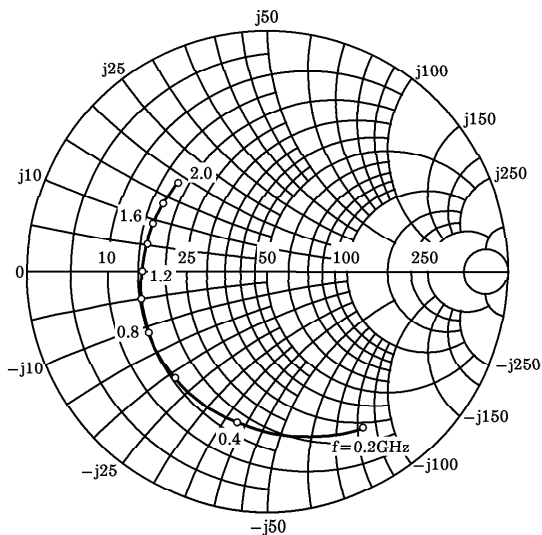
S-Parameter Z<sub>0</sub> = 50Ω, T<sub>a</sub> = 25°C  
 V<sub>CE</sub> = 8V, I<sub>C</sub> = 5mA

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.767	-58.9	12.888	143.5	0.049	62.8	0.856	-34.5
400	0.655	-102.2	9.480	119.3	0.073	48.7	0.663	-57.5
600	0.605	-130.0	7.087	104.6	0.086	43.1	0.535	-72.7
800	0.567	-150.4	5.577	93.9	0.093	40.7	0.456	-84.3
1000	0.547	-166.4	4.548	86.0	0.098	41.1	0.407	-93.8
1200	0.533	-179.7	3.798	79.3	0.103	42.5	0.373	-102.4
1400	0.528	169.1	3.268	76.9	0.109	44.1	0.346	-110.3
1600	0.519	158.4	2.856	69.3	0.116	46.6	0.328	-117.4
1800	0.520	148.3	2.551	65.1	0.124	48.9	0.314	-123.0
2000	0.524	138.7	2.290	61.1	0.133	51.1	0.303	-128.3

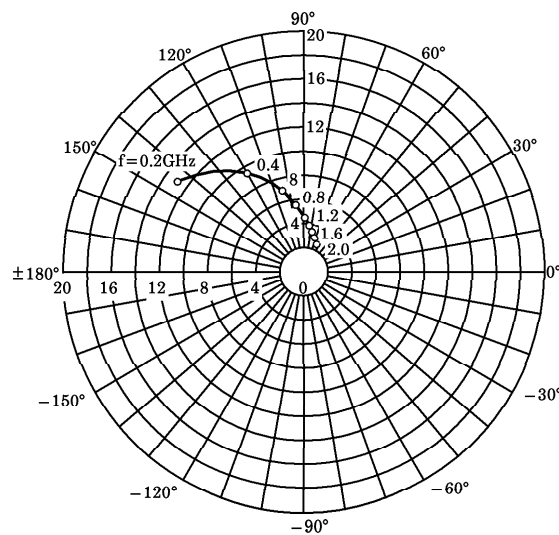
V<sub>CE</sub> = 8V, I<sub>C</sub> = 20mA

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.540	-106.8	23.009	123.0	0.033	56.9	0.605	-57.8
400	0.521	-147.5	13.445	102.7	0.045	54.9	0.392	-81.2
600	0.521	-167.1	9.277	92.8	0.057	57.9	0.309	-95.5
800	0.525	-178.9	7.029	85.7	0.069	60.0	0.271	-107.3
1000	0.526	-168.8	5.651	80.0	0.082	62.5	0.250	-117.9
1200	0.529	-158.7	4.688	75.6	0.094	63.4	0.236	-127.6
1400	0.531	-148.5	4.011	71.6	0.106	64.5	0.225	-136.2
1600	0.536	-140.4	3.531	68.1	0.119	65.1	0.214	-143.8
1800	0.539	-131.7	3.159	64.7	0.133	65.5	0.201	-149.8
2000	0.540	-122.8	2.842	61.8	0.147	65.7	0.190	-154.8

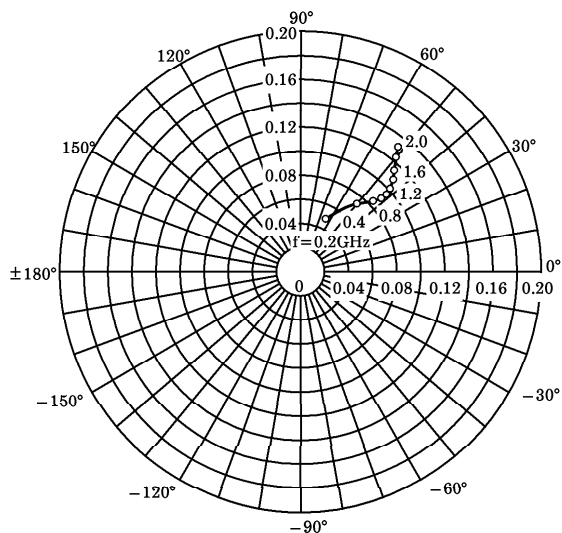
S<sub>11e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (Unit : Ω)



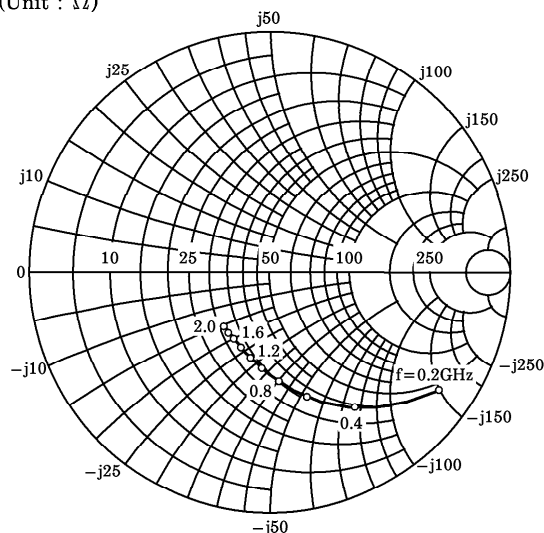
S<sub>21e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



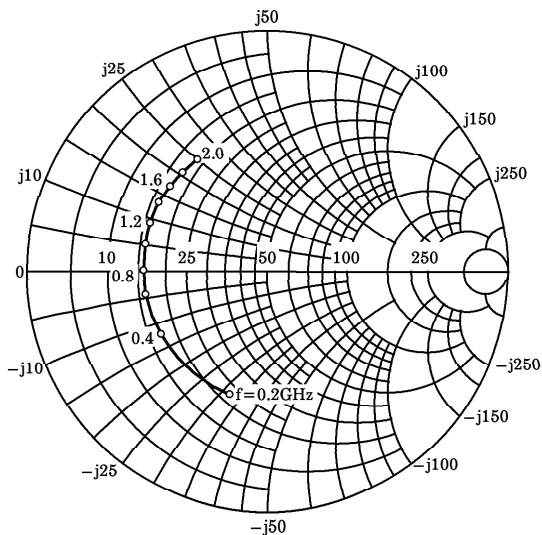
S<sub>12e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C



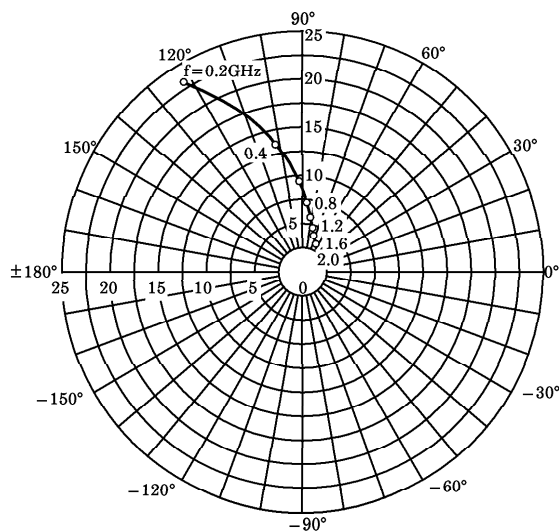
S<sub>22e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 5mA  
 T<sub>a</sub> = 25°C  
 (Unit : Ω)



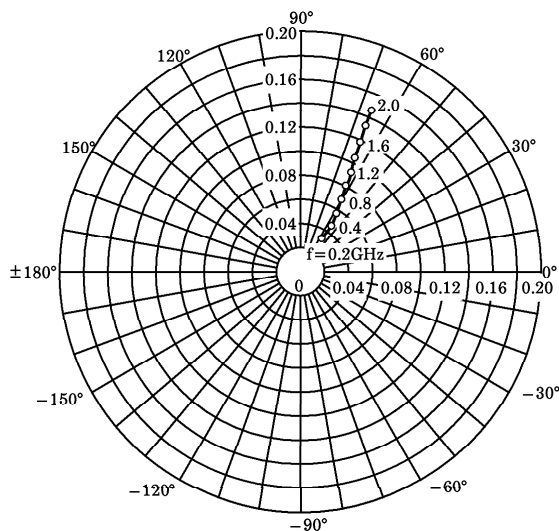
S<sub>11e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C  
 (Unit : Ω)



S<sub>21e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
 T<sub>a</sub> = 25°C



S<sub>12e</sub>  
 V<sub>CE</sub> = 8V  
 I<sub>C</sub> = 20mA  
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