

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5089

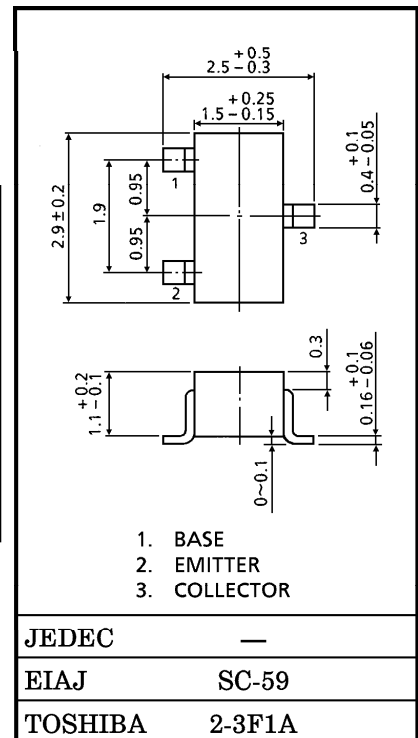
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain.
- $NF = 1.1dB$, $|S_{21e}|^2 = 13dB$ ($f = 1GHz$)

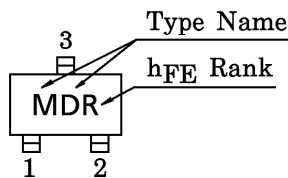
MAXIMUM RATINGS ($T_a = 25^\circ C$)

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



Weight : 0.012g

MARKING



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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	$V_{CE} = 8V, I_C = 20mA$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE} = 8V, I_C = 20mA, f = 1GHz$	10	13	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 8V, I_C = 20mA, f = 2GHz$	—	7	—	
Noise Figure	NF (1)	$V_{CE} = 8V, I_C = 5mA, f = 1GHz$	—	1.1	2.5	dB
	NF (2)	$V_{CE} = 8V, I_C = 5mA, f = 2GHz$	—	1.7	—	

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

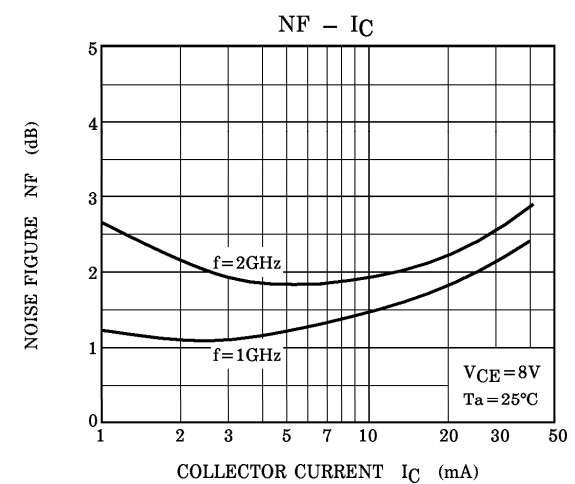
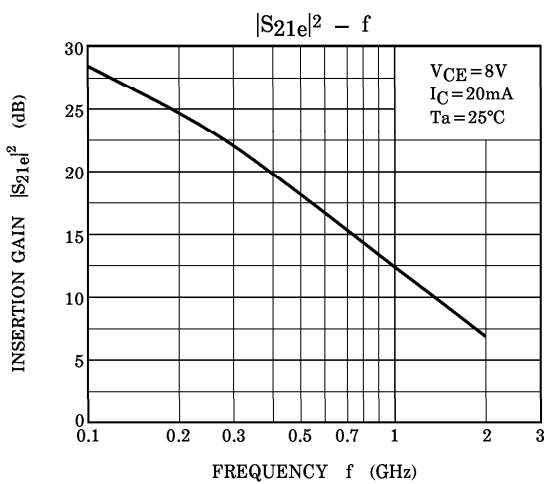
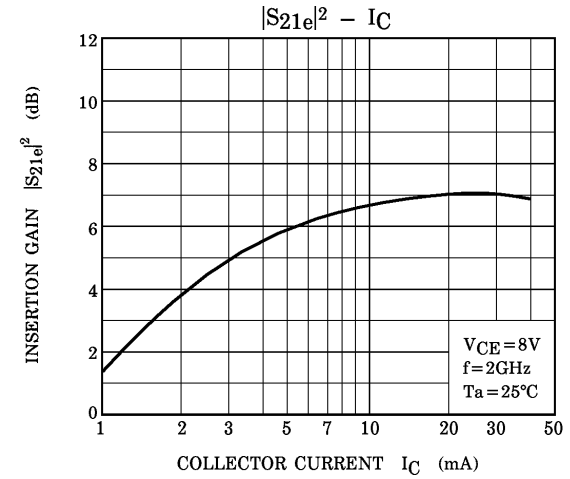
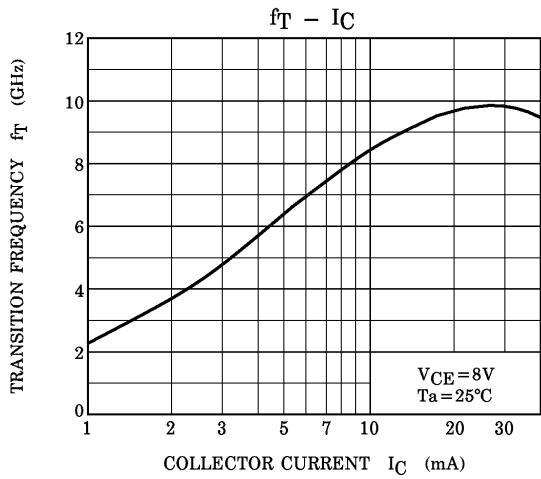
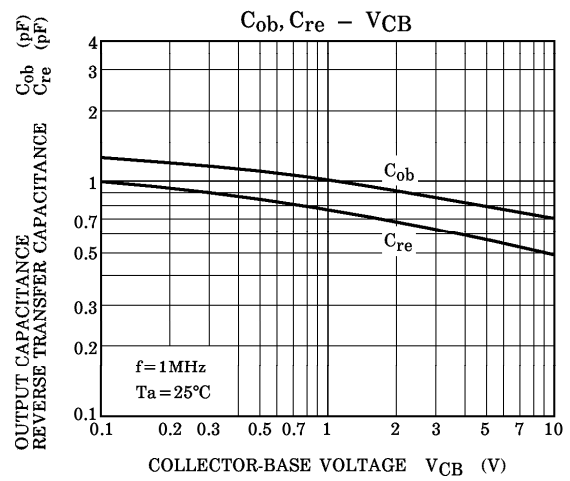
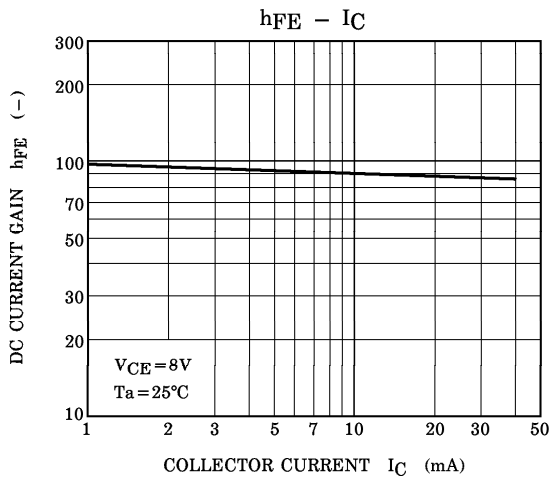
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB} = 10V, I_E = 0$	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1V, I_C = 0$	—	—	1	μA
DC Current Gain	h_{FE} (Note 1)	$V_{CE} = 8V, I_C = 20mA$	50	—	160	—
Output Capacitance	C_{ob}	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	0.7	—	pF
Reverse Transfer Capacitance	C_{re}		(Note 2)	—	0.5	0.95

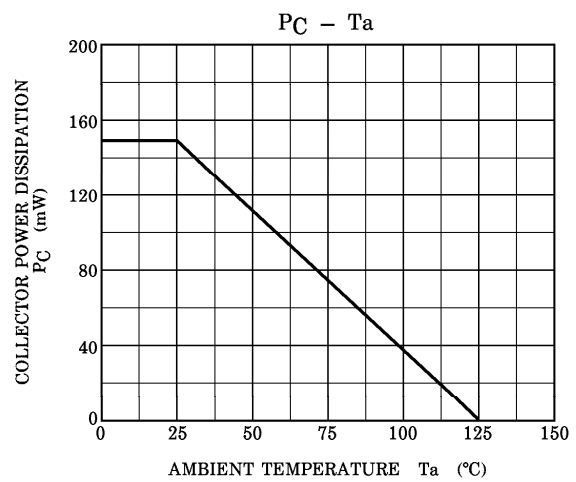
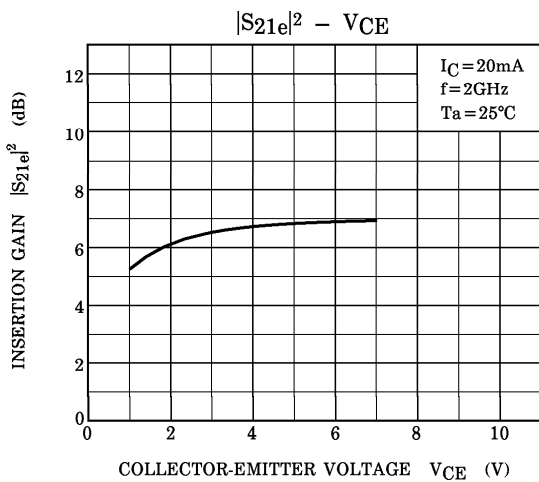
(Note 1) h_{FE} Classification R : 50~100, O : 80~160

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

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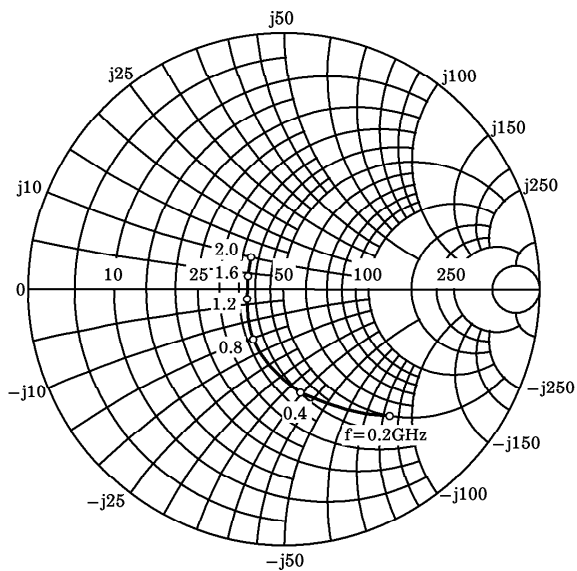
S-Parameter $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.653	-48.5	10.080	136.2	0.046	63.5	0.766	-27.9
400	0.420	-82.1	7.242	112.7	0.069	57.6	0.561	-35.0
600	0.284	-105.7	5.393	98.9	0.086	57.9	0.466	-35.4
800	0.214	-126.0	4.245	89.7	0.103	59.4	0.420	-34.9
1000	0.169	-146.7	3.508	82.2	0.121	60.6	0.394	-34.7
1200	0.155	-166.4	3.012	75.9	0.140	61.9	0.382	-35.1
1400	0.152	174.1	2.645	70.2	0.162	62.1	0.374	-36.1
1600	0.154	156.7	2.350	65.0	0.182	61.3	0.363	-38.5
1800	0.161	145.9	2.136	60.2	0.202	60.5	0.355	-41.0
2000	0.181	134.5	1.972	55.8	0.224	60.6	0.345	-44.0

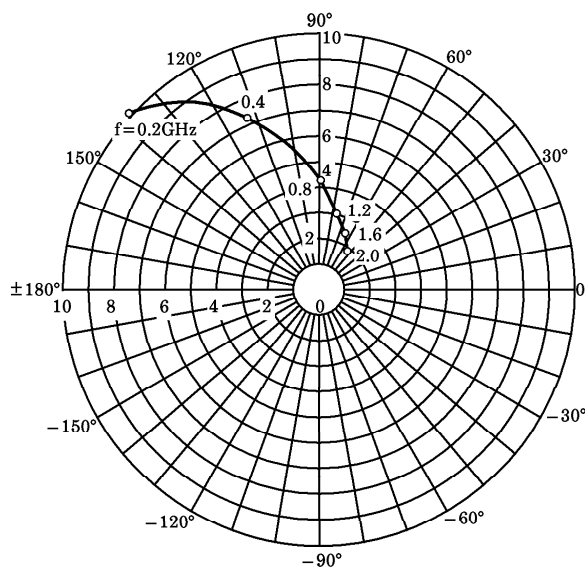
$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.275	-80.2	17.464	114.7	0.033	68.9	0.506	-36.6
400	0.147	-116.5	9.693	97.8	0.057	72.0	0.353	-32.4
600	0.097	-150.0	6.680	88.8	0.082	72.7	0.313	-27.9
800	0.083	179.5	5.088	82.3	0.106	72.1	0.300	-25.9
1000	0.084	151.3	4.141	76.7	0.131	71.2	0.295	-25.2
1200	0.095	135.6	3.497	72.2	0.156	69.8	0.295	-25.7
1400	0.108	124.2	3.058	67.7	0.182	67.7	0.297	-27.3
1600	0.121	113.8	2.699	63.2	0.206	65.2	0.289	-30.1
1800	0.128	108.4	2.432	59.2	0.228	63.0	0.283	-33.2
2000	0.146	104.2	2.241	55.5	0.253	61.6	0.274	-36.5

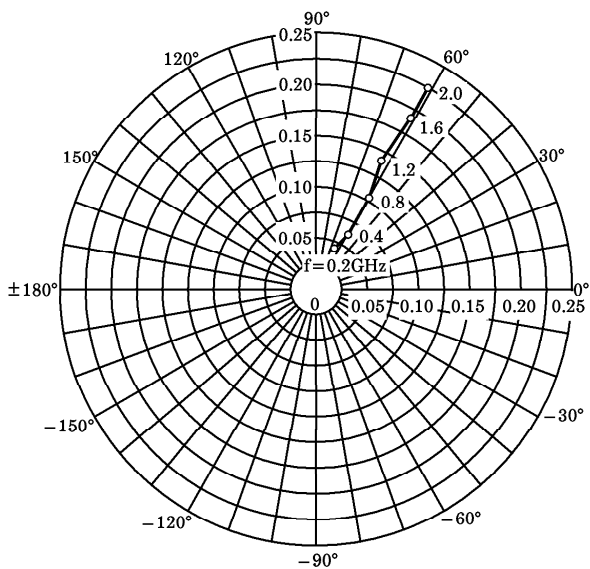
S_{11e}
 V_{CE}=8V
 I_C=5mA
 T_a=25°C
 (UNIT : Ω)



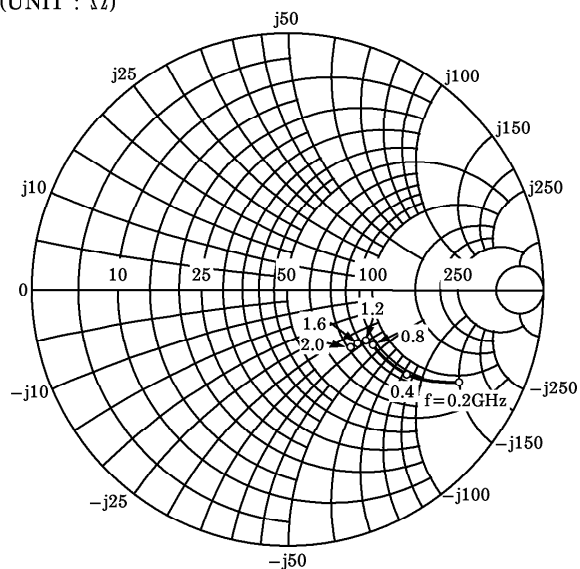
S_{21e}
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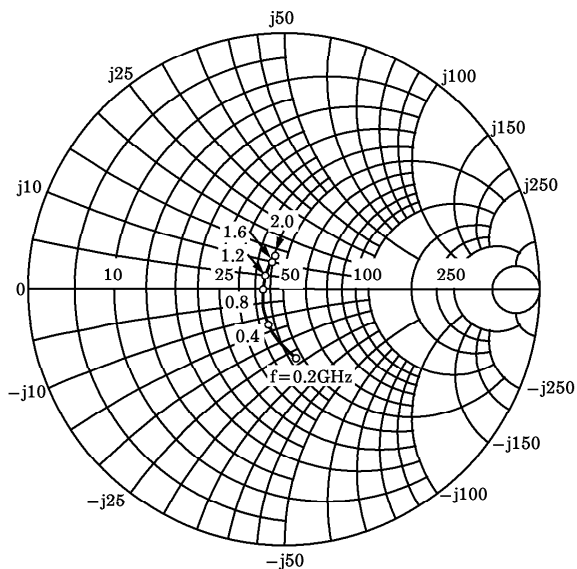
S_{12e}
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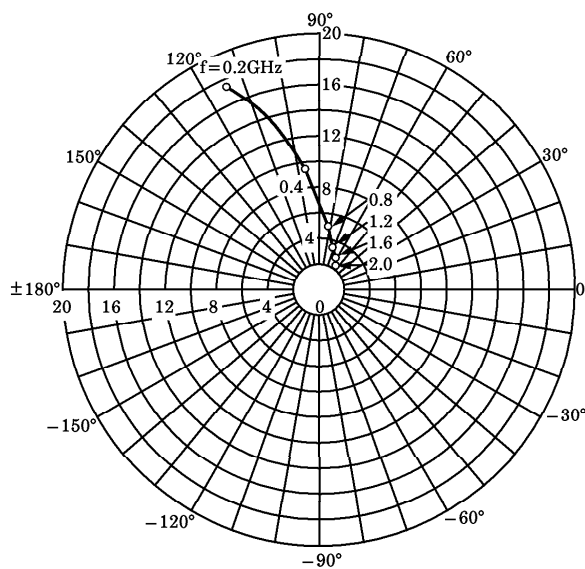
S_{22e}
 V_{CE}=8V
 I_C=5mA
 T_a=25°C
 (UNIT : Ω)



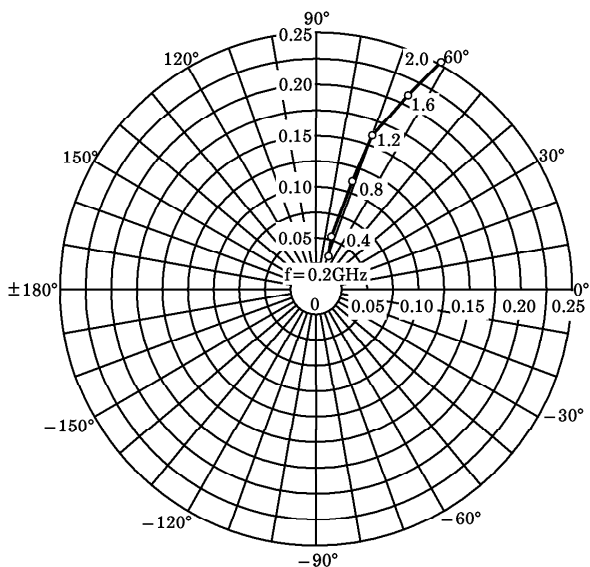
S_{11e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C
 (UNIT : Ω)



S_{21e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C



S_{12e}
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 T_a = 25°C



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