

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5091

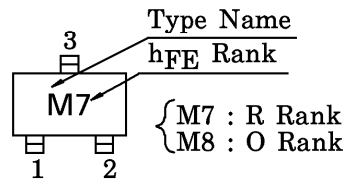
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

- Low Noise Figure, High Gain.
- $NF = 1.1\text{dB}$, $|S_{21e}|^2 = 7\text{dB}$ ($f = 1\text{GHz}$)

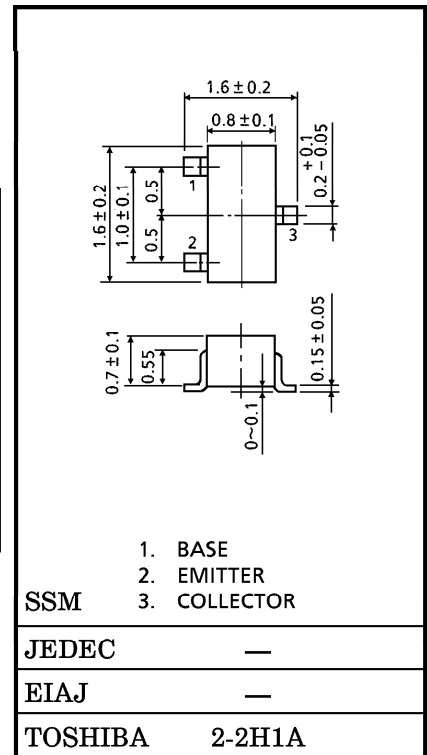
MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CB0}	20	V
Collector-Emitter Voltage	V_{CE0}	10	V
Emitter-Base Voltage	V_{EB0}	1.5	V
Base Current	I_B	20	mA
Collector Current	I_C	40	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature	T_j	125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55~125	$^\circ\text{C}$

MARKING



Unit in mm



Weight : 2.4mg

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

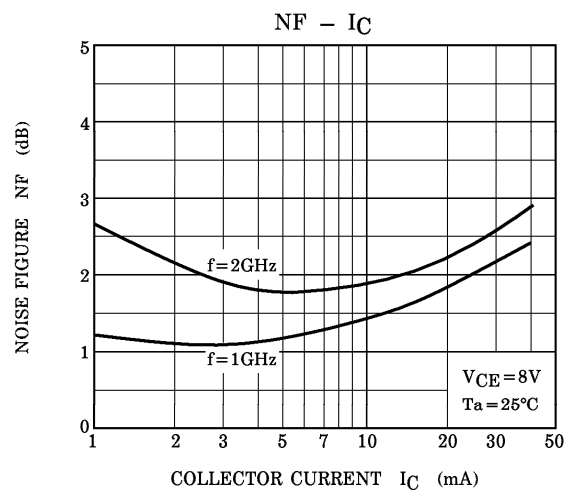
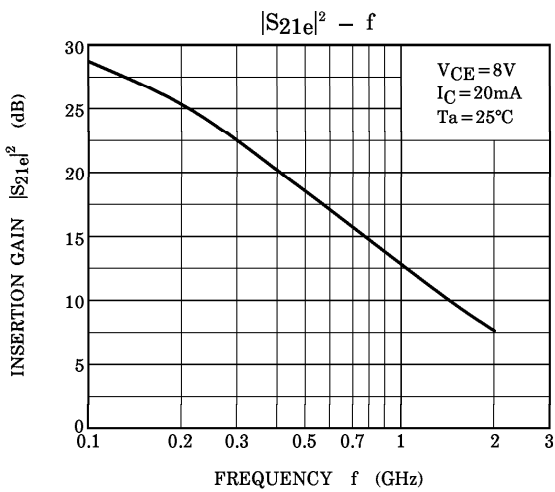
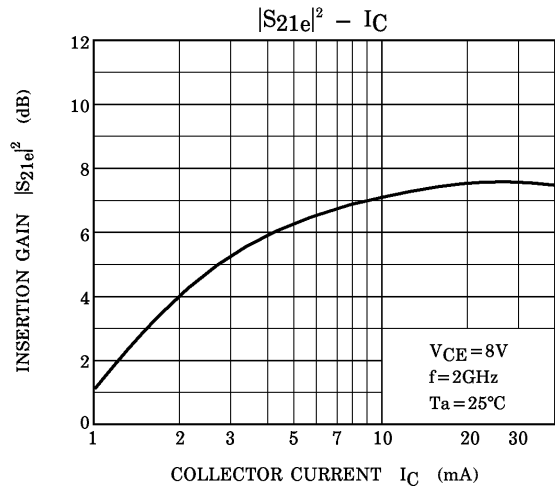
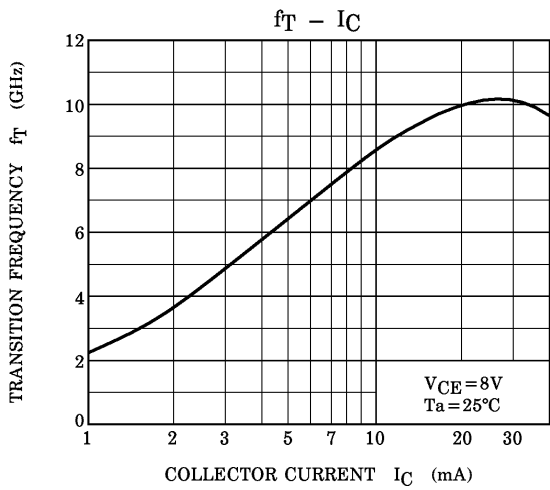
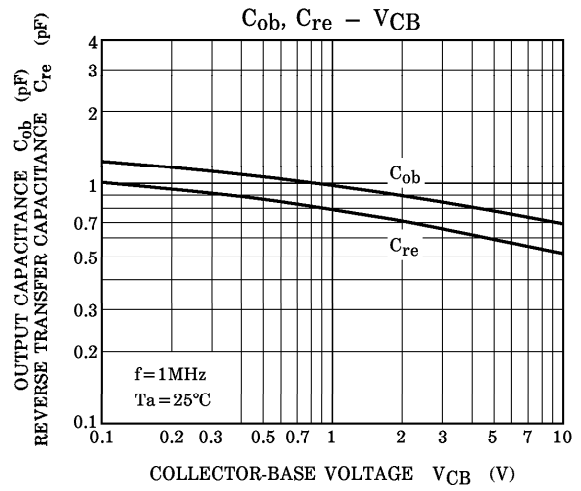
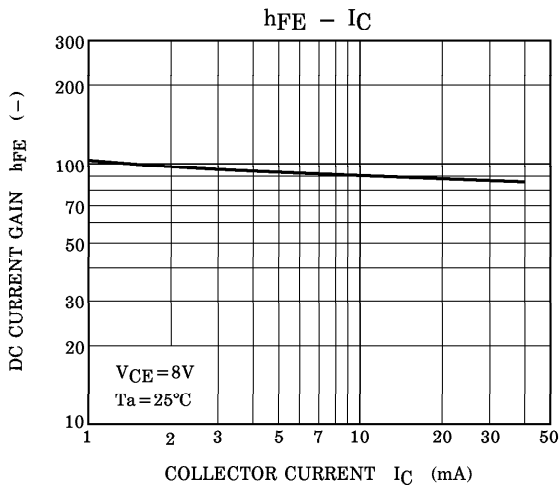
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$	7	10	—	GHz
Insertion Gain	$ S_{21e} ^2 (1)$	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$, $f = 1\text{GHz}$	10	13	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$,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

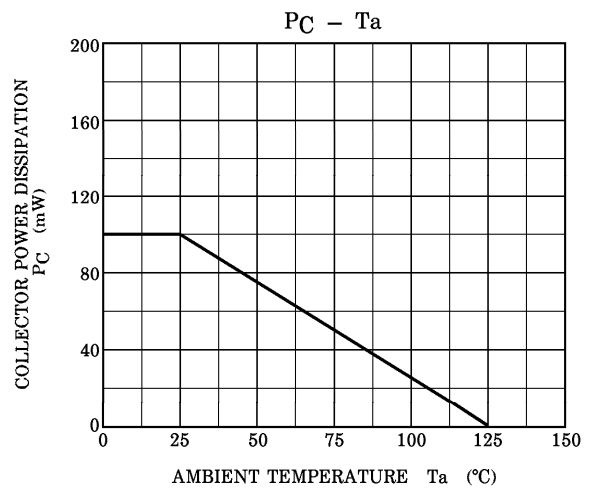
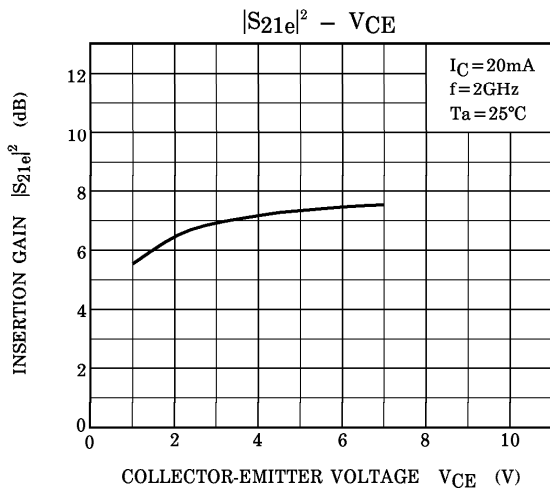
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

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





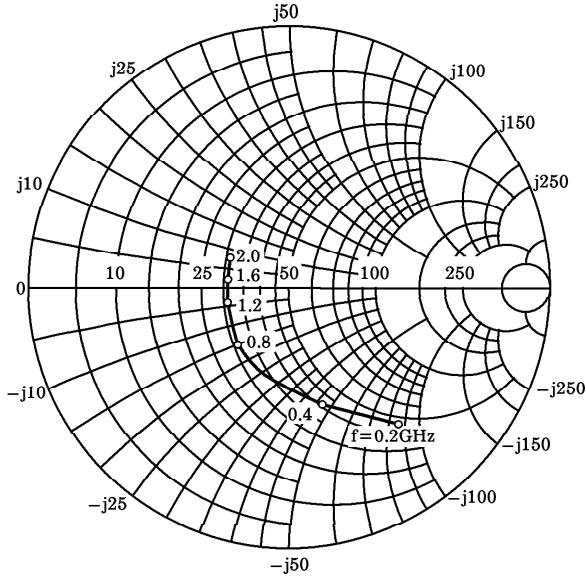
S-Parameter $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.683	-50.1	10.186	138.3	0.049	62.0	0.773	-30.0
400	0.462	-86.9	7.472	114.6	0.071	54.3	0.556	-39.6
600	0.343	-113.1	5.618	100.9	0.086	53.8	0.448	-41.7
800	0.282	-133.6	4.407	91.7	0.101	55.3	0.392	-41.6
1000	0.249	-151.0	3.663	84.7	0.115	57.2	0.360	-41.7
1200	0.236	-166.6	3.128	78.7	0.131	58.9	0.339	-41.7
1400	0.233	179.7	2.759	73.1	0.150	60.1	0.330	-42.8
1600	0.234	168.3	2.457	68.2	0.168	60.0	0.319	-45.0
1800	0.238	158.6	2.224	63.4	0.185	60.0	0.311	-47.9
2000	0.251	149.6	2.038	59.4	0.203	60.4	0.302	-50.2

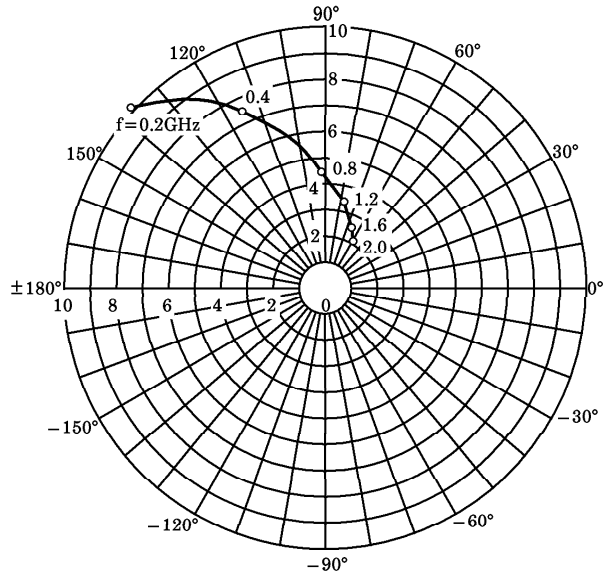
$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$

frequency (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
200	0.319	-91.9	18.338	116.7	0.033	65.3	0.494	-43.5
400	0.213	-134.2	10.303	99.2	0.054	68.9	0.312	-42.4
600	0.185	-160.0	7.111	90.3	0.076	70.8	0.258	-37.6
800	0.176	-178.2	5.415	84.3	0.098	71.2	0.236	-34.3
1000	0.174	167.8	4.400	79.2	0.120	71.1	0.228	-32.0
1200	0.178	156.8	3.712	74.8	0.143	70.3	0.226	-31.5
1400	0.186	147.5	3.236	70.3	0.168	68.7	0.226	-32.8
1600	0.194	139.7	2.874	66.3	0.190	66.6	0.223	-35.9
1800	0.199	133.7	2.583	62.6	0.211	64.9	0.216	-39.0
2000	0.215	127.8	2.369	58.8	0.232	63.5	0.211	-41.9

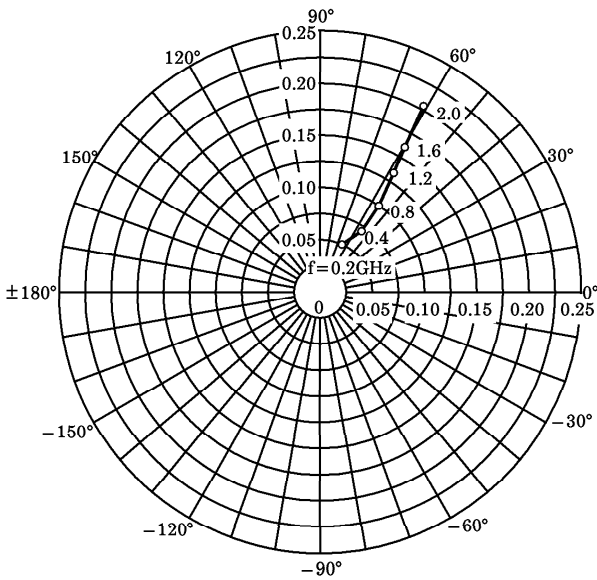
S_{11e}
 V_{CE} = 8V
 I_C = 5mA
 T_a = 25°C
 (UNIT : Ω)



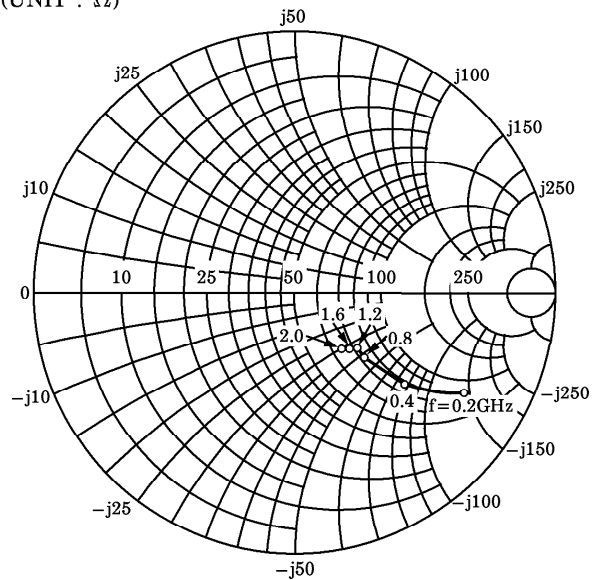
S_{21e}
 V_{CE} = 8V
 I_C = 5mA
 T_a = 25°C



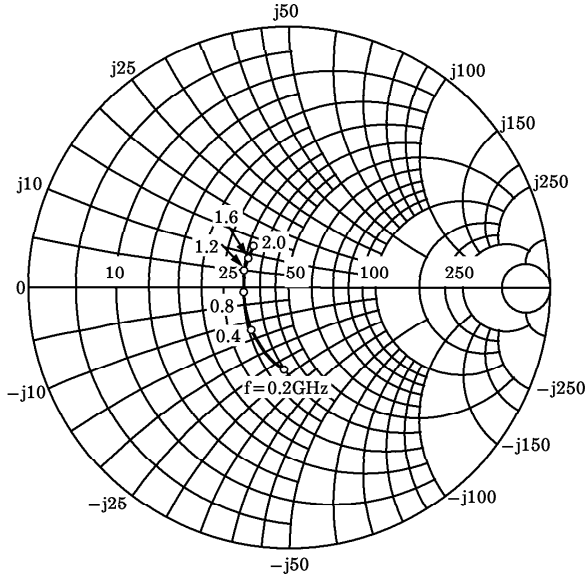
S_{12e}
 V_{CE} = 8V
 I_C = 5mA
 T_a = 25°C



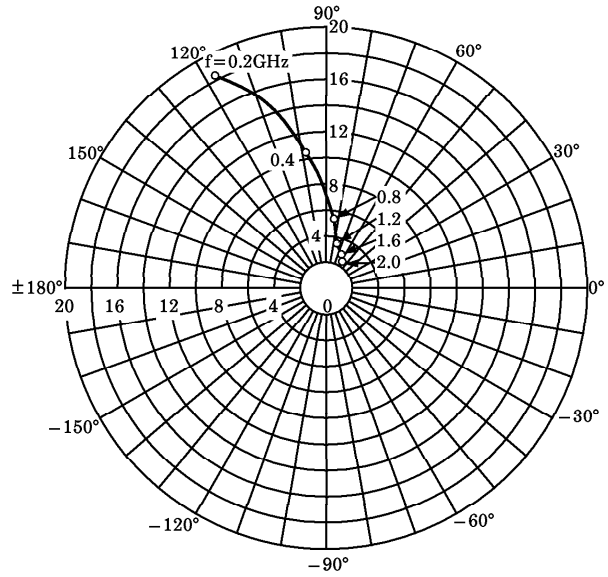
S_{22e}
 V_{CE} = 8V
 I_C = 5mA
 T_a = 25°C
 (UNIT : Ω)



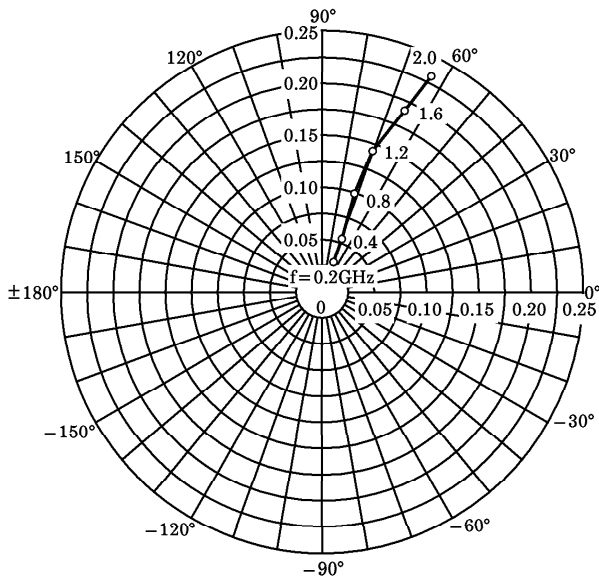
S_{11e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C
 (UNIT : Ω)



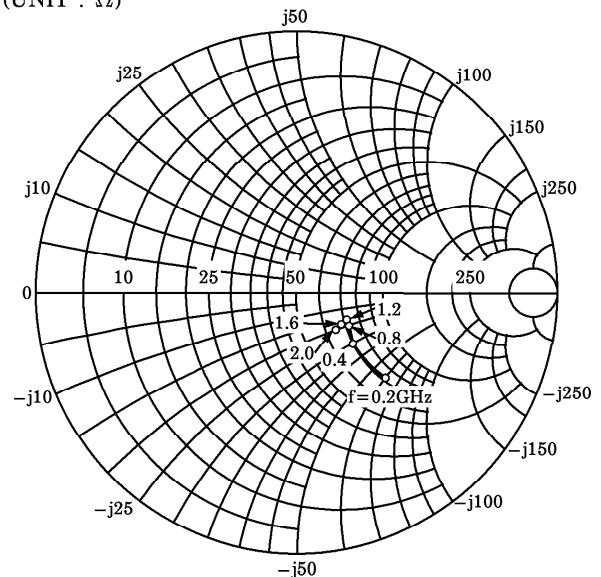
S_{21e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C



S_{12e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C



S_{22e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C
 (UNIT : Ω)



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