

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC4321

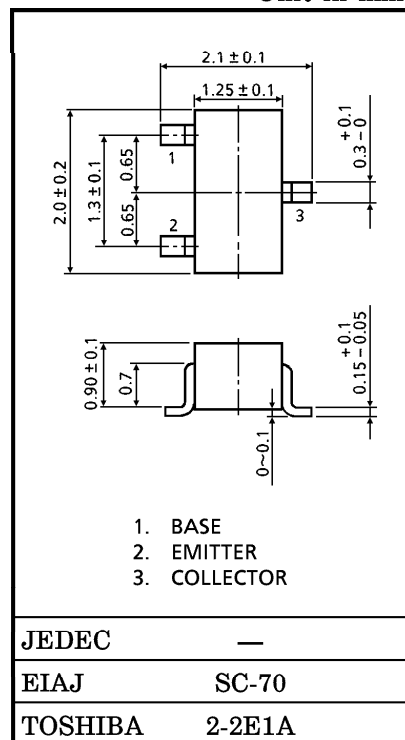
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

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

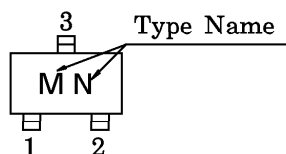
MAXIMUM RATINGS ($T_a = 25^\circ C$)

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	100	mW
Junction Temperature	T_j	125	$^\circ C$
Storage Temperature Range	T_{stg}	-55~125	$^\circ C$



Weight : 0.006g

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	—	

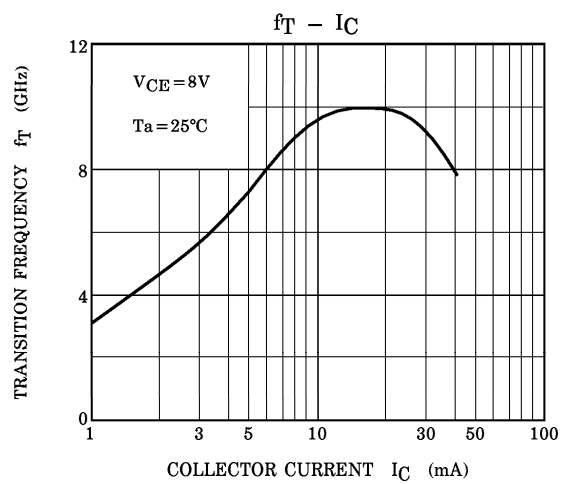
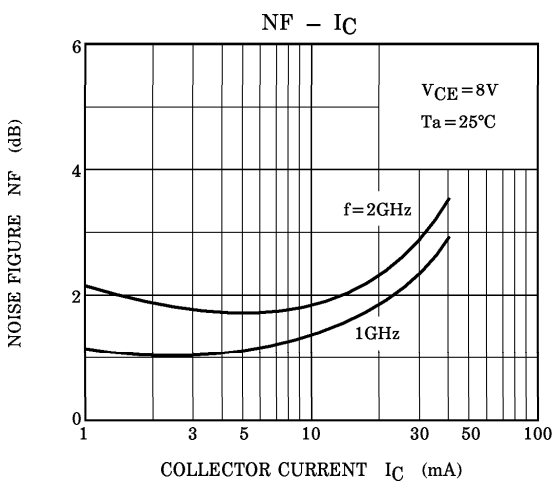
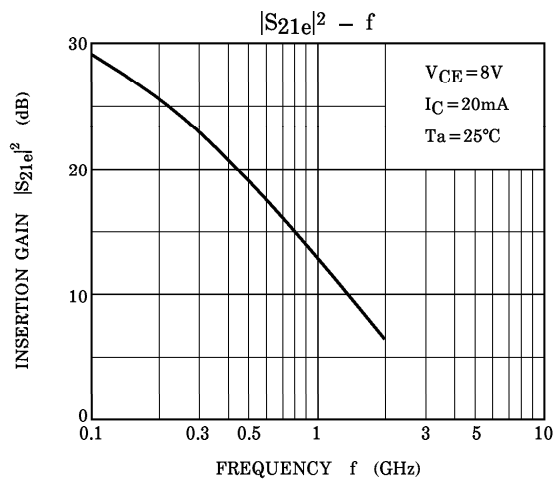
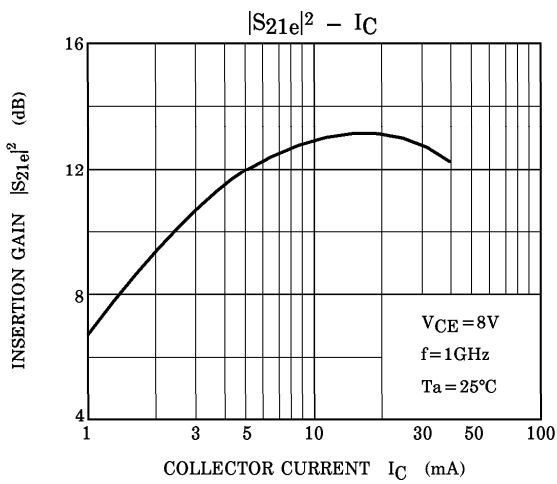
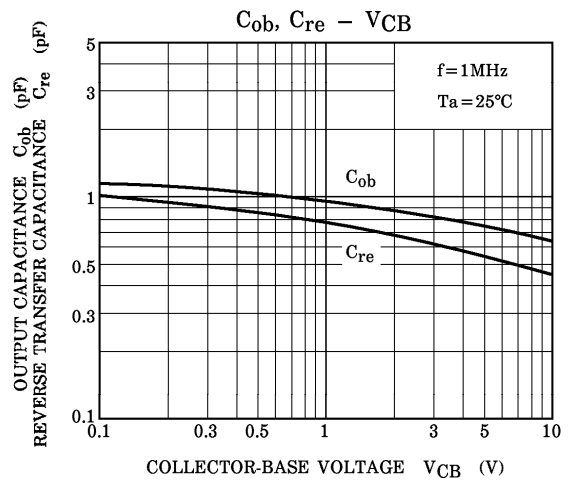
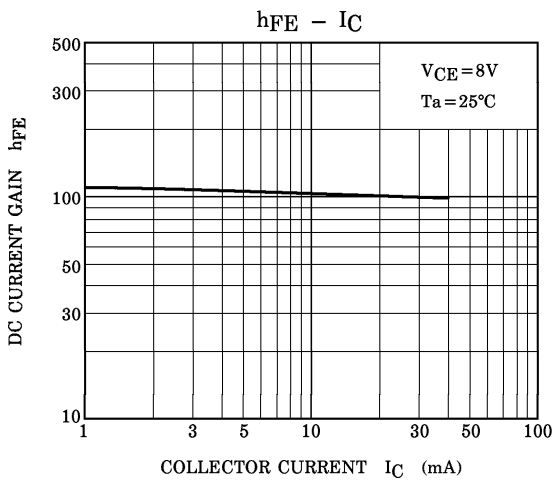
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ C$)

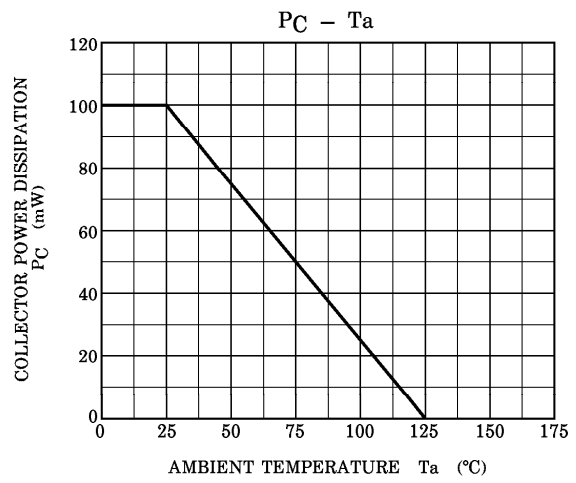
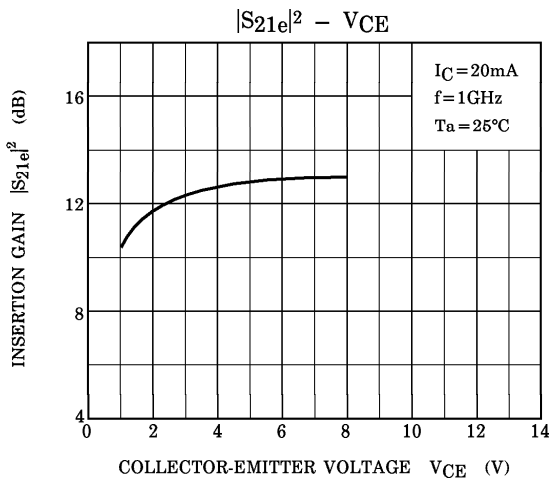
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB} = 10V, I_E = 0$	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1V, I_C = 0$	—	—	1	μA
DC Current Gain	h_{FE}	$V_{CE} = 8V, I_C = 20mA$	50	—	250	—
Output Capacitance	C_{ob}	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	0.65	—	pF
Reverse Transfer Capacitance	C_{re}	(Note)	—	0.45	0.9	pF

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

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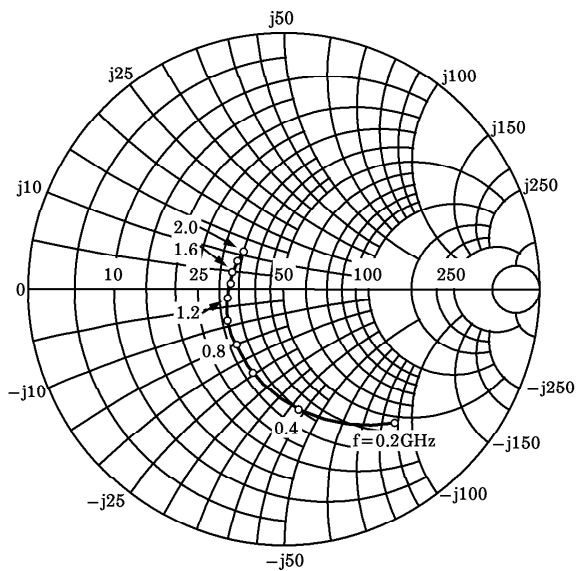
S-PARAMETER $Z_O = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.680	-49.6	11.448	140.0	0.048	67.0	0.820	-28.4
400	0.478	-83.2	8.076	116.6	0.073	59.6	0.613	-41.1
600	0.353	-108.3	5.992	102.7	0.092	59.1	0.495	-46.2
800	0.281	-129.2	4.711	93.0	0.109	60.1	0.428	-48.9
1000	0.240	-149.0	3.875	85.8	0.127	61.1	0.389	-51.0
1200	0.216	-169.1	3.294	79.6	0.146	62.1	0.364	-53.3
1400	0.202	175.1	2.876	73.8	0.166	62.6	0.350	-55.6
1600	0.194	158.9	2.572	69.0	0.186	62.6	0.339	-58.4
1800	0.193	142.9	2.349	64.5	0.207	62.4	0.332	-61.7
2000	0.202	130.9	2.128	61.1	0.227	62.3	0.325	-65.7

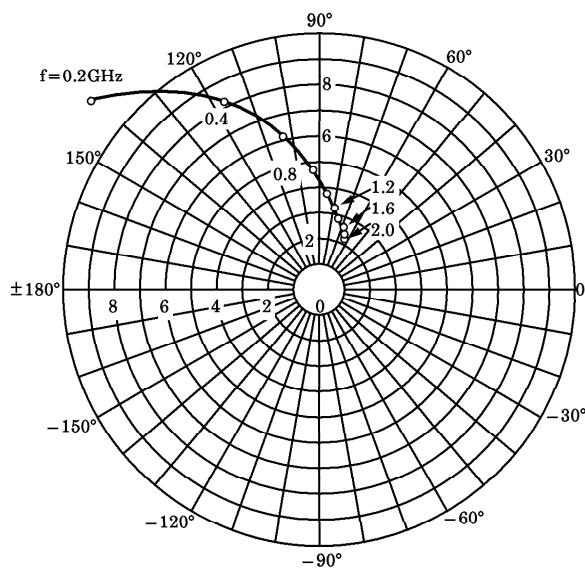
$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.332	-83.7	18.406	118.0	0.034	68.8	0.565	-38.2
400	0.212	-123.3	10.378	100.0	0.057	71.1	0.393	-39.9
600	0.173	-150.7	7.130	90.7	0.080	73.0	0.336	-39.3
800	0.157	-175.3	5.442	84.3	0.104	73.0	0.309	-39.6
1000	0.161	167.5	4.394	79.1	0.128	72.4	0.295	-41.0
1200	0.162	149.7	3.728	74.3	0.152	71.7	0.285	-43.2
1400	0.169	138.2	3.240	69.5	0.175	70.5	0.280	-46.0
1600	0.177	125.9	2.877	65.7	0.200	68.9	0.278	-48.9
1800	0.178	113.5	2.595	61.8	0.223	67.4	0.279	-53.0
2000	0.190	104.3	2.352	58.6	0.246	65.8	0.275	-57.8

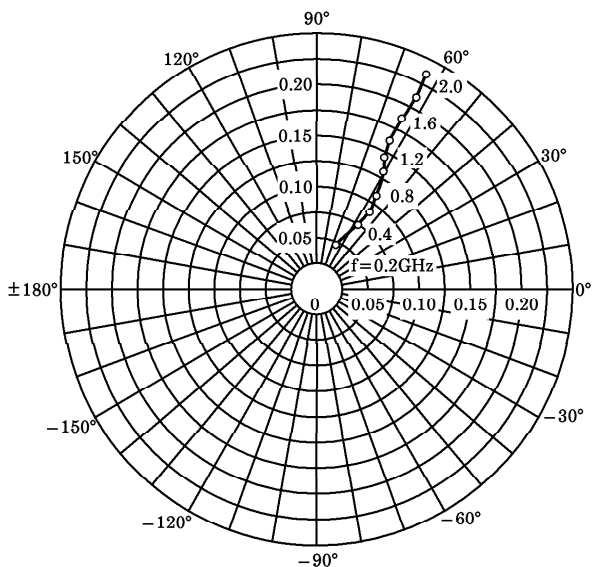
S_{11e}
 V_{CE}=8V
 I_C=5mA
 T_a=25°C
 (UNIT : Ω)



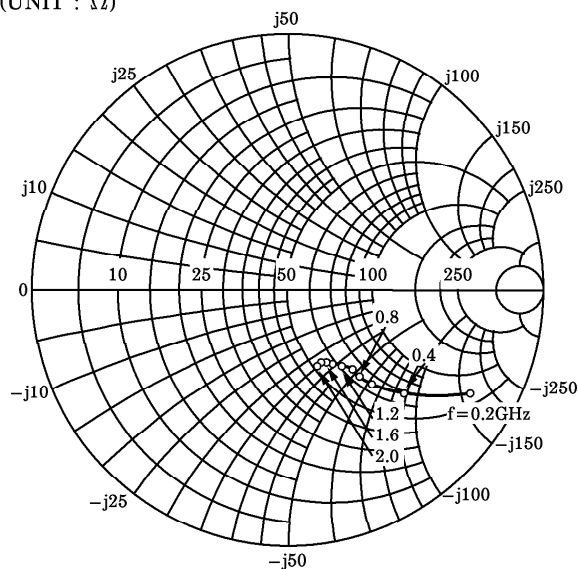
S_{21e}
 V_{CE}=8V
 I_C=5mA
 T_a=25°C



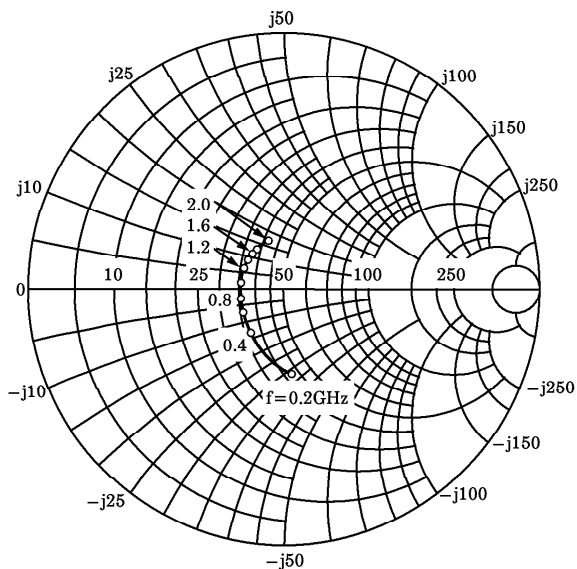
S_{12e}
 V_{CE}=8V
 I_C=5mA
 T_a=25°C



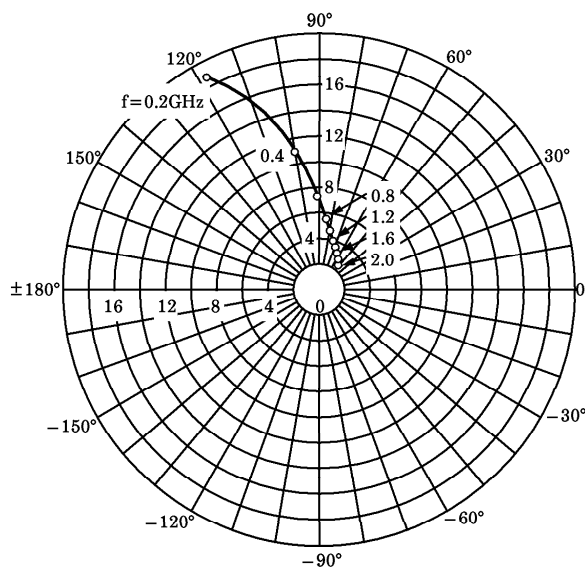
S_{22e}
 V_{CE}=8V
 I_C=5mA
 T_a=25°C
 (UNIT : Ω)



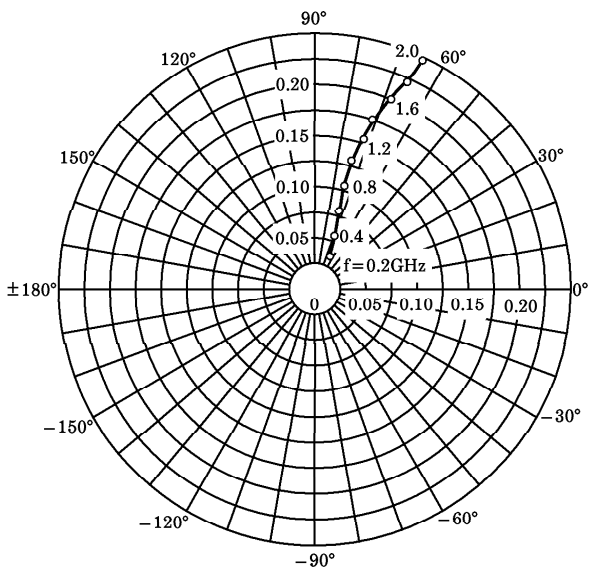
S_{11e}
 V_{CE}=8V
 I_C=20mA
 T_a=25°C
 (UNIT : Ω)



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)

