

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC4320

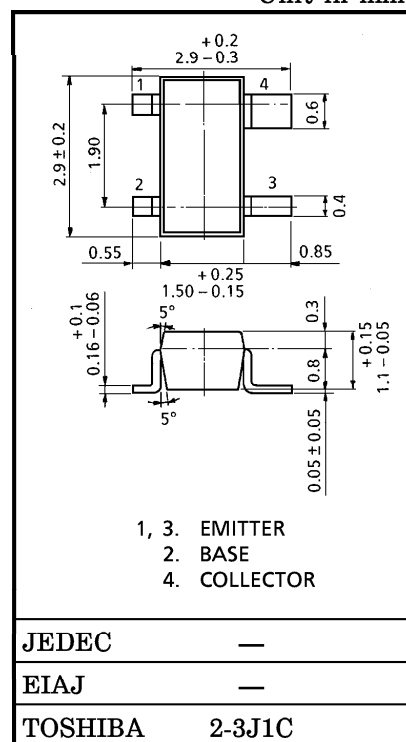
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

- Low Noise Figure, High Gain
- $NF = 1.1dB, |S_{21e}|^2 = 15dB (f = 1GHz)$

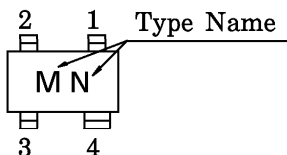
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V _{CB0}	20	V
Collector-Emitter Voltage	V _{CEO}	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	150	mW
Junction Temperature	T _j	125	°C
Storage Temperature Range	T _{stg}	-55~125	°C



Weight : 0.012g

Marking



MICROWAVE CHARACTERISTICS (Ta = 25°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	12	15	—	dB
	S _{21e} ² (2)	V _{CE} = 8V, I _C = 20mA, f = 2GHz	—	9	—	
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	—	

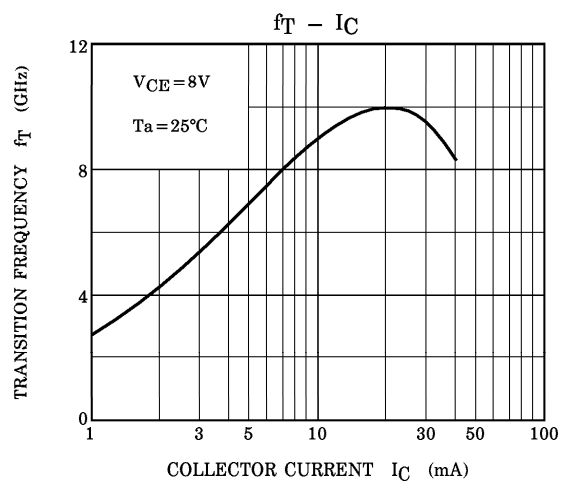
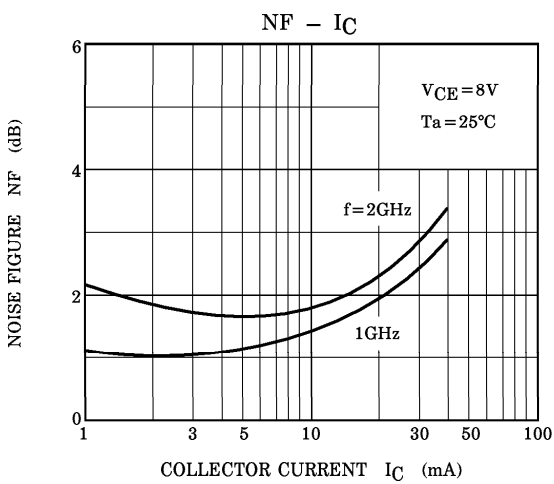
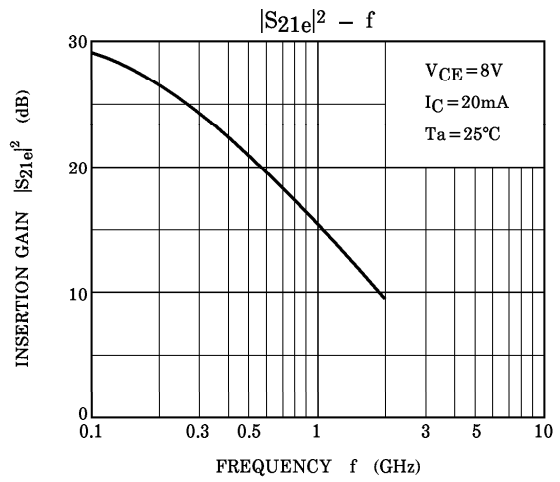
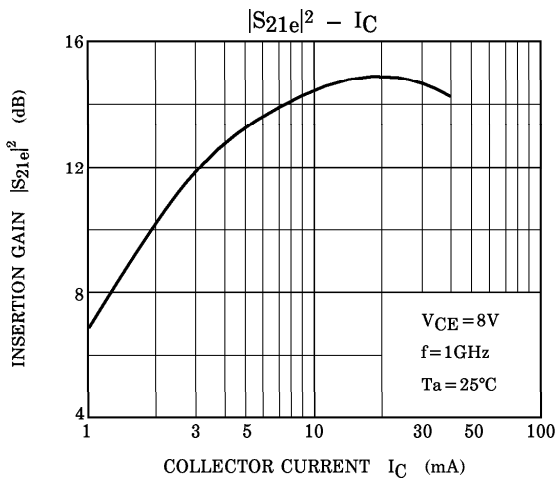
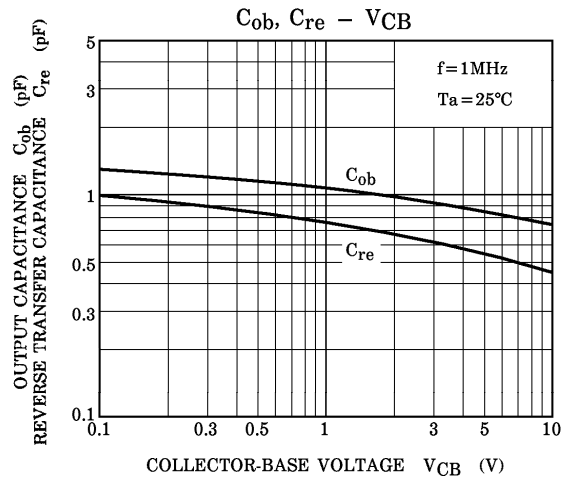
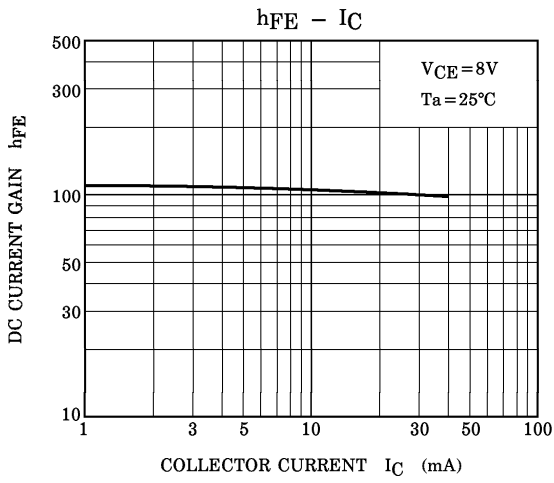
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

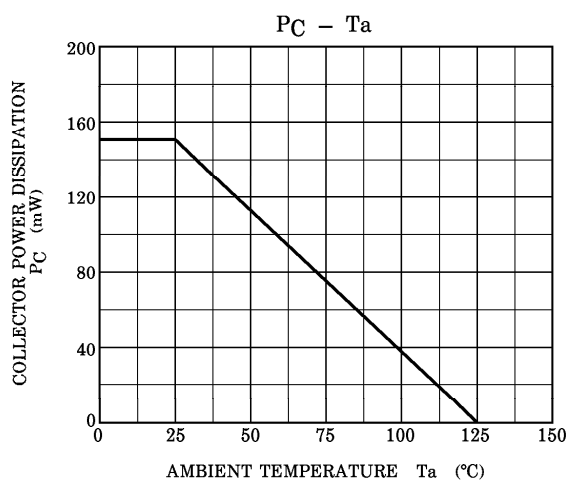
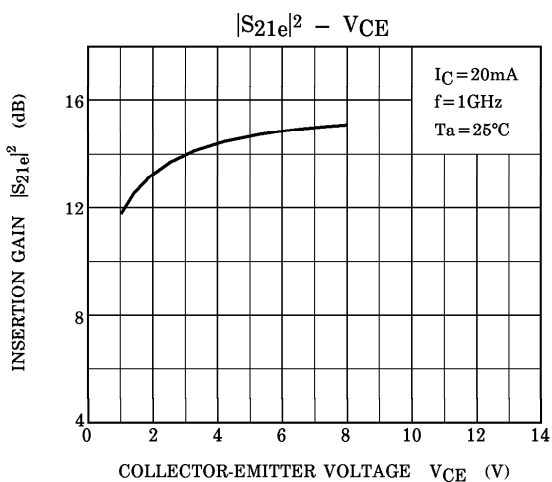
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I _{CB0}	V _{CB} = 10V, I _E = 0	—	—	1	μA
Emitter Cut-off Current	I _{EB0}	V _{EB} = 1V, I _C = 0	—	—	1	μA
DC Current Gain	h _{FE}	V _{CE} = 8V, I _C = 20mA	50	—	250	—
Output Capacitance	C _{ob}	V _{CB} = 10V, I _E = 0, f = 1MHz	—	0.75	—	pF
Reverse Transfer Capacitance	C _{re}	(Note)	—	0.45	0.9	pF

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

961001EAA2

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.





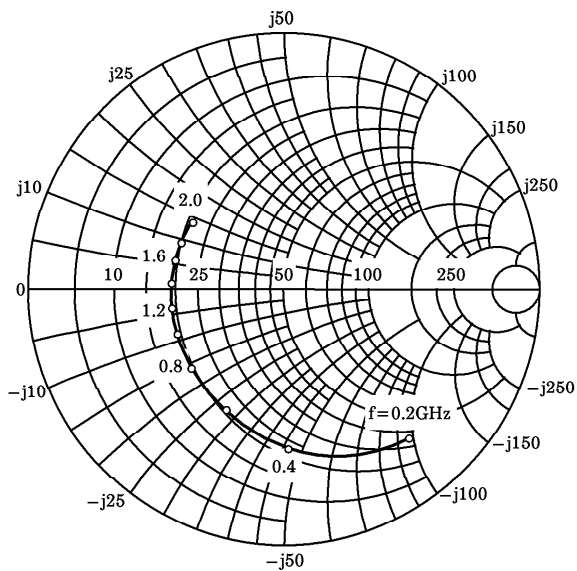
S-PARAMETER $Z_O = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.764	-49.6	11.754	147.1	0.047	64.2	0.869	-29.4
400	0.624	-87.9	8.966	124.6	0.072	48.9	0.669	-48.3
600	0.532	-115.7	6.947	110.5	0.084	42.1	0.526	-59.5
800	0.485	-137.5	5.581	100.4	0.091	39.3	0.429	-66.6
1000	0.446	-155.0	4.636	92.9	0.097	38.6	0.370	-71.3
1200	0.441	-169.2	4.003	86.3	0.102	38.8	0.330	-75.3
1400	0.432	177.1	3.487	80.1	0.107	39.6	0.305	-77.6
1600	0.426	166.1	3.144	75.1	0.114	40.1	0.288	-80.7
1800	0.431	154.4	2.900	70.0	0.119	41.9	0.276	-83.9
2000	0.425	145.2	2.652	65.5	0.127	43.1	0.272	-87.3

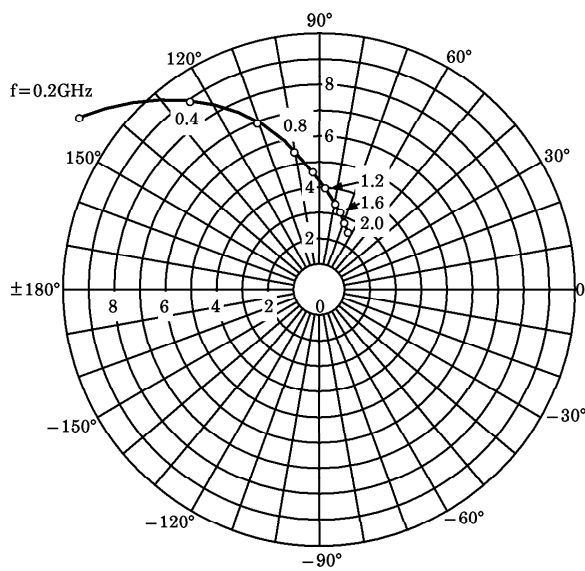
$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$

FREQUENCY MHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.540	-90.3	21.037	129.7	0.033	55.7	0.670	-46.8
400	0.479	-134.8	13.017	108.7	0.046	50.0	0.417	-64.5
600	0.461	-159.4	9.230	98.1	0.054	51.2	0.297	-71.9
800	0.454	-176.0	7.117	90.5	0.063	54.1	0.230	-75.4
1000	0.454	170.7	5.816	85.1	0.073	56.1	0.191	-76.7
1200	0.452	160.0	4.944	79.8	0.084	57.9	0.168	-77.0
1400	0.461	149.1	4.299	74.7	0.094	58.7	0.156	-75.7
1600	0.459	140.7	3.838	70.6	0.105	59.0	0.151	-75.8
1800	0.461	131.9	3.483	66.0	0.117	59.4	0.154	-76.6
2000	0.450	124.2	3.171	61.8	0.130	59.0	0.161	-79.3

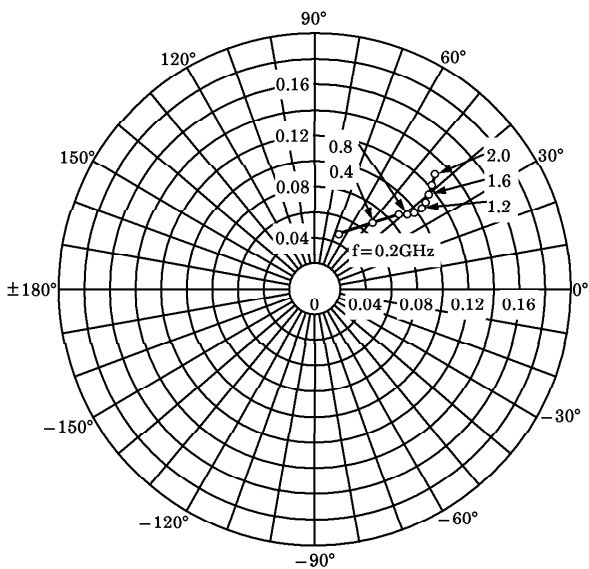
S_{11e}
 $V_{CE} = 8V$
 $I_C = 5mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



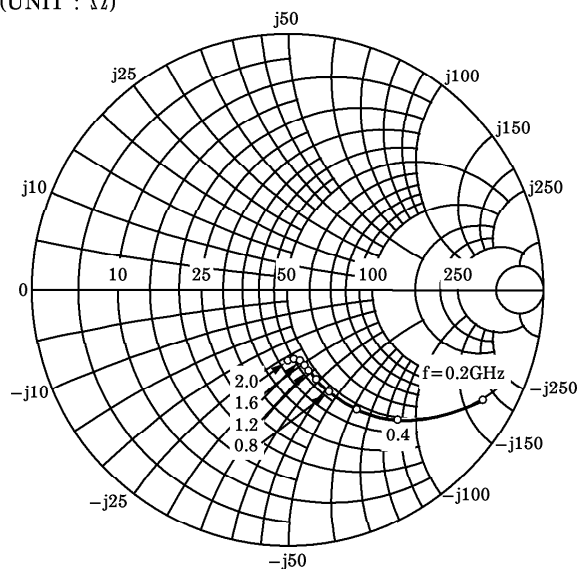
S_{21e}
 $V_{CE} = 8V$
 $I_C = 5mA$
 $T_a = 25^\circ C$



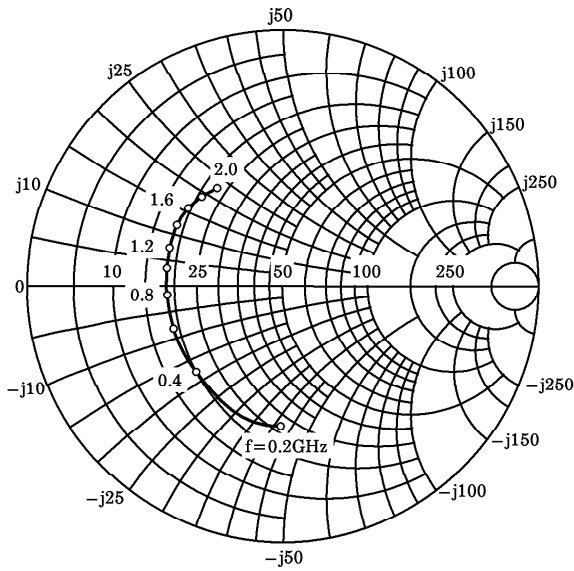
S_{12e}
 $V_{CE} = 8V$
 $I_C = 5mA$
 $T_a = 25^\circ C$



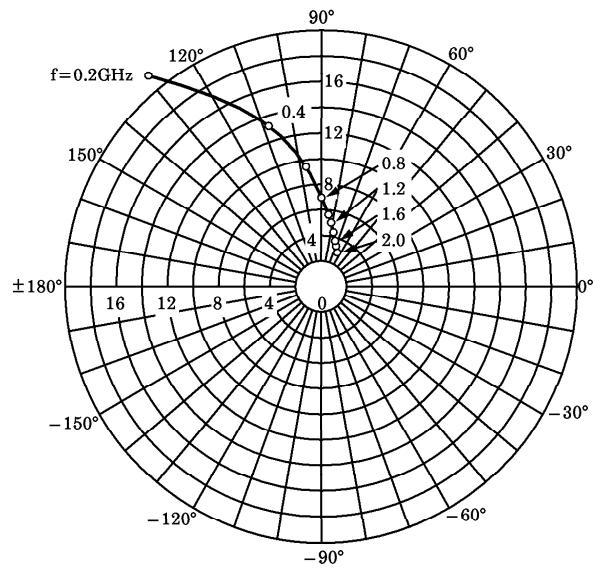
S_{22e}
 $V_{CE} = 8V$
 $I_C = 5mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



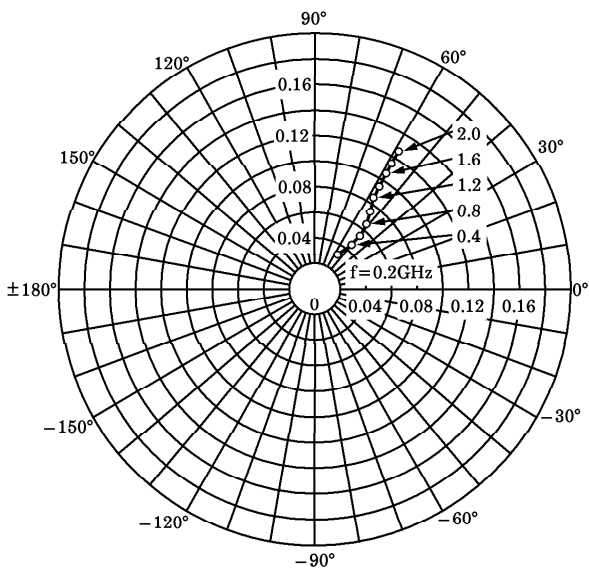
S_{11e}
 V_{CE} = 8V
 I_C = 20mA
 T_a = 25°C
 (UNIT : Ω)



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)

