

TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC5319

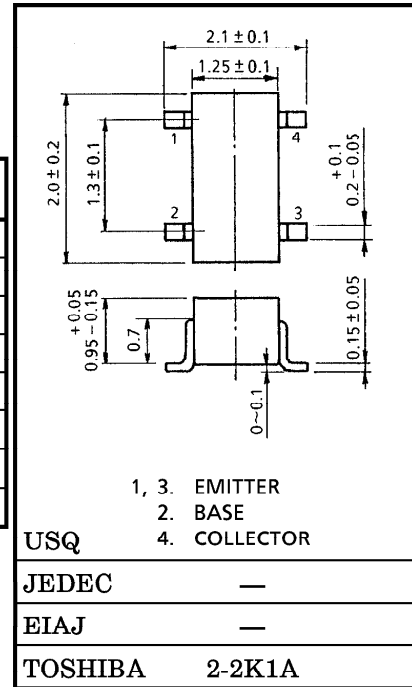
VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

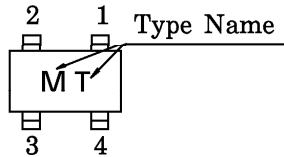
- Low Noise Figure : NF = 1.3dB (f=2GHz)
- High Gain : Ga = 11.5dB (f=2GHz)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V _{CB0}	8	V
Collector-Emitter Voltage	V _{CEO}	5	V
Emitter-Base Voltage	V _{EB0}	1.5	V
Collector Current	I _C	20	mA
Base Current	I _B	10	mA
Collector Power Dissipation	P _C	100	mW
Junction Temperature	T _j	125	°C
Storage Temperature Range	T _{stg}	-55~125	°C



Marking



MICROWAVE CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f _T	V _{CE} = 3V, I _C = 15mA	13	16	—	GHz
Insertion Gain	S _{21e} ² (1)	V _{CE} = 3V, I _C = 15mA, f = 1GHz	14.5	17	—	dB
	S _{21e} ² (2)	V _{CE} = 3V, I _C = 15mA, f = 2GHz	8.5	11.5	—	
Noise Figure	NF (1)	V _{CE} = 3V, I _C = 5mA, f = 1GHz	—	0.9	1.8	dB
	NF (2)	V _{CE} = 3V, I _C = 5mA, f = 2GHz	—	1.3	2.2	

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

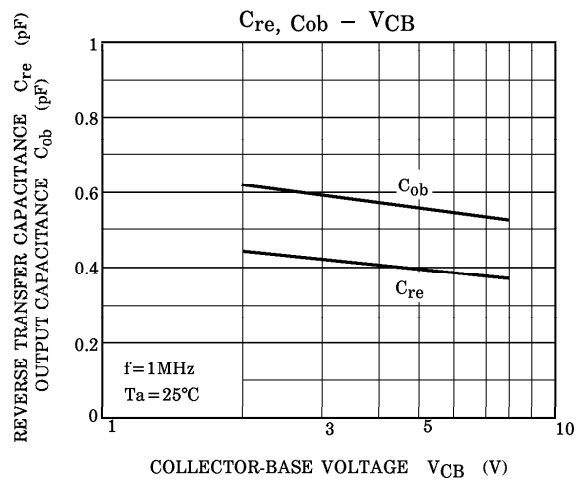
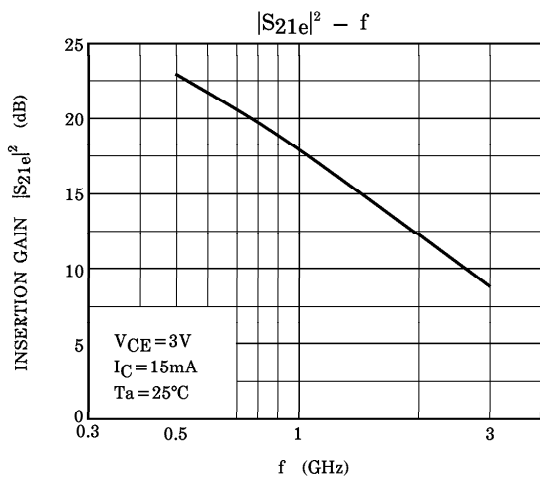
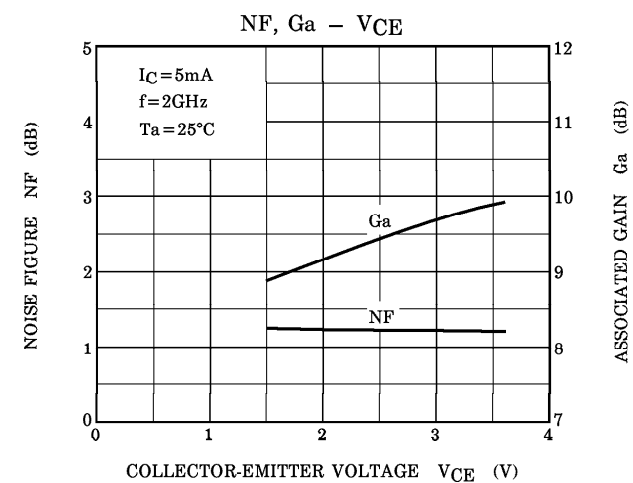
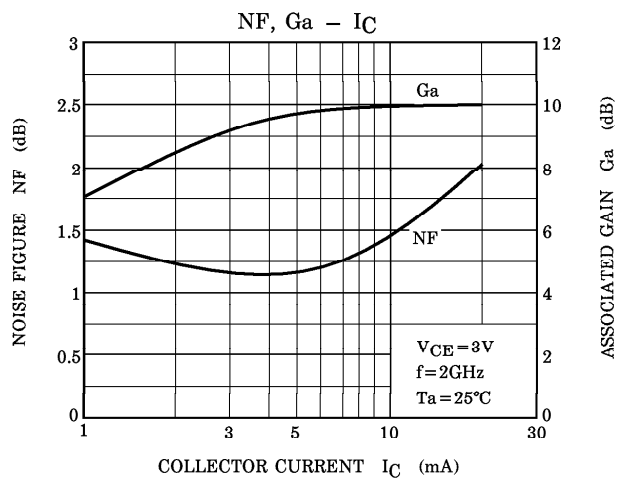
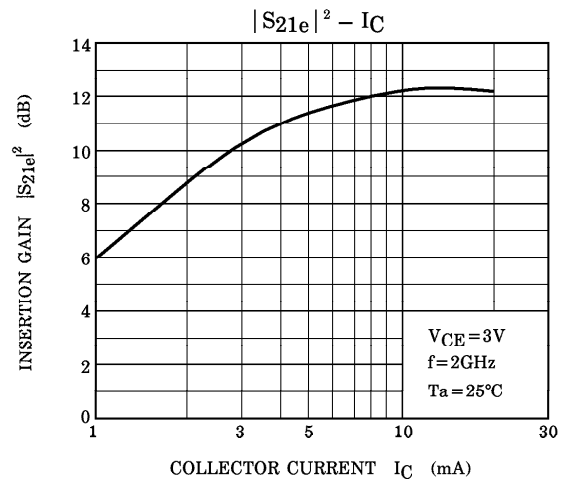
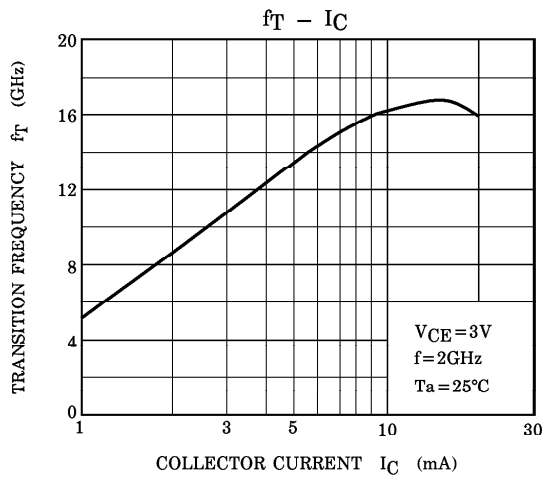
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I _{CB0}	V _{CB} = 10V, I _E = 0	—	—	1	μA
Emitter Cut-off Current	I _{EB0}	V _{EB} = 1V, I _C = 0	—	—	1	μA
DC Current Gain	h _{FE}	V _{CE} = 3V, I _C = 15mA	50	—	250	V
Output Capacitance	C _{ob}	V _{CB} = 2.5V, I _E = 0, f = 1MHz	—	0.6	—	pF
Reverse Transfer Capacitance	C _{re}	(Note)	—	0.4	—	pF

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

CAUTION : This device electrostatic sensitivity. Please handle with caution.

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 $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 3\text{V}$, $I_C = 1\text{mA}$

f (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
800	0.838	-52.3	3.011	134.2	0.146	56.2	0.880	-38.1
900	0.813	-57.7	2.956	130.8	0.161	53.4	0.854	-40.8
1000	0.793	-62.3	2.839	125.4	0.174	49.5	0.842	-44.8
1100	0.780	-67.0	2.758	122.9	0.183	46.4	0.811	-47.9
1200	0.736	-72.6	2.584	116.6	0.194	42.6	0.798	-51.6
1300	0.733	-77.0	2.597	115.6	0.198	39.5	0.778	-54.5
1400	0.709	-82.4	2.500	109.2	0.202	38.0	0.760	-57.6
1500	0.688	-87.2	2.414	105.8	0.206	36.1	0.739	-60.7
1600	0.686	-89.8	2.331	102.2	0.213	35.7	0.728	-63.5
1700	0.668	-93.8	2.229	100.1	0.228	34.4	0.713	-66.2
1800	0.643	-97.7	2.201	95.4	0.236	30.4	0.707	-69.3
1900	0.619	-102.6	2.094	90.4	0.236	27.4	0.698	-71.5
2000	0.589	-107.3	2.003	90.5	0.239	24.9	0.686	-74.7
2100	0.593	-107.8	1.941	84.9	0.236	23.0	0.678	-76.7
2200	0.560	-112.4	1.864	86.0	0.240	22.5	0.666	-79.6
2300	0.564	-116.6	1.942	79.1	0.247	19.6	0.668	-81.8
2400	0.590	-119.3	1.753	81.6	0.239	16.5	0.656	-84.0

$V_{CE} = 3\text{V}$, $I_C = 3\text{mA}$

f (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
800	0.634	-83.6	6.442	118.6	0.113	48.4	0.682	-56.4
900	0.606	-91.1	6.105	114.7	0.121	45.7	0.644	-59.7
1000	0.587	-96.3	5.681	110.0	0.126	42.8	0.613	-64.2
1100	0.562	-101.2	5.375	107.1	0.131	40.8	0.582	-66.9
1200	0.528	-108.0	4.899	102.1	0.133	38.6	0.555	-70.9
1300	0.524	-113.7	4.756	100.3	0.135	37.7	0.532	-74.0
1400	0.504	-118.2	4.473	96.2	0.137	37.6	0.507	-77.1
1500	0.470	-124.2	4.223	93.0	0.140	37.0	0.489	-79.7
1600	0.480	-127.2	4.049	90.2	0.144	37.3	0.477	-82.4
1700	0.459	-128.9	3.813	88.8	0.150	35.8	0.459	-85.3
1800	0.445	-134.4	3.662	84.7	0.153	33.9	0.457	-87.7
1900	0.428	-140.0	3.441	81.0	0.153	33.3	0.442	-89.9
2000	0.424	-143.1	3.329	81.0	0.152	32.5	0.436	-92.4
2100	0.404	-145.6	3.149	77.3	0.153	33.0	0.432	-94.1
2200	0.385	-149.3	3.041	77.5	0.157	33.0	0.420	-97.2
2300	0.407	-156.7	2.999	71.6	0.159	31.6	0.421	-98.4
2400	0.437	-155.7	2.808	74.0	0.157	31.8	0.413	-100.6

$V_{CE} = 3V, I_C = 5mA$

f (MHz)	S11		S21		S12		S22	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
800	0.539	-101.6	7.906	110.6	0.093	47.0	0.557	-66.6
900	0.512	-109.5	7.361	106.9	0.098	45.0	0.516	-70.0
1000	0.498	-114.8	6.733	102.6	0.102	43.5	0.486	-74.0
1100	0.472	-122.2	6.308	100.0	0.105	42.9	0.455	-76.7
1200	0.461	-126.3	5.709	95.8	0.108	41.9	0.431	-80.0
1300	0.450	-131.8	5.487	94.0	0.109	41.9	0.411	-82.8
1400	0.439	-136.7	5.146	90.4	0.112	42.6	0.392	-86.0
1500	0.413	-143.8	4.796	87.9	0.116	42.8	0.377	-88.3
1600	0.435	-146.5	4.593	85.4	0.121	43.3	0.368	-90.9
1700	0.411	-146.6	4.305	83.9	0.126	42.5	0.355	-93.4
1800	0.402	-153.7	4.099	80.0	0.128	41.5	0.354	-95.7
1900	0.386	-159.0	3.870	77.6	0.129	41.5	0.343	-97.9
2000	0.386	-161.9	3.729	77.2	0.131	41.4	0.340	-99.9
2100	0.369	-164.5	3.519	74.1	0.133	42.4	0.337	-101.7
2200	0.368	-168.2	3.407	74.2	0.138	42.6	0.332	-104.1
2300	0.378	-172.1	3.339	69.1	0.140	41.8	0.334	-105.2
2400	0.398	-170.2	3.153	71.0	0.140	42.4	0.328	-107.2