

NPN SILICON RF TRANSISTOR FOR LOW NOISE · HIGH-GAIN AMPLIFICATION 3-PIN ULTRA SUPER MINIMOLD

FEATURES

- Ideal for low noise · high-gain amplification and oscillation at 3 GHz or over
NF = 1.1 dB TYP., $G_a = 11$ dB @ $f = 2$ GHz, $V_{CE} = 2$ V, $I_c = 5$ mA
- Maximum available power gain: MAG. = 12.5 dB TYP. @ $f = 2$ GHz, $V_{CE} = 2$ V, $I_c = 20$ mA
- High f_T : $f_T = 21$ GHz TYP. @ $f = 2$ GHz, $V_{CE} = 2$ V, $I_c = 20$ mA
- $f_T = 25$ GHz "UHS0" (Ultra High Speed Process) technology adopted
- 3-pin ultra super minimold ($t = 0.75$ mm)

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5667	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 3 (collector) face the perforation side of the tape
2SC5667-T1	3 kpcs/reel	

Remark To order evaluation samples, consult your NEC sales representative (Unit sample quantity is 50 pcs).

ABSOLUTE MAXIMUM RATINGS ($T_A = +25$ °C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	15	V
Collector to Emitter Voltage	V_{CEO}	3.3	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_c	35	mA
Total Power Dissipation	P_{tot}^{Note}	115	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	-65 to +150	°C

Note Mounted on $1.08 \text{ cm}^2 \times 1.0 \text{ mm}$ (t) glass epoxy substrate

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ELECTRICAL CHARACTERISTICS (T_A = +25 °C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I _{CBO}	V _{CB} = 5 V, I _E = 0 mA	–	–	100	nA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1 V, I _C = 0 mA	–	–	100	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 2 V, I _C = 5 mA	50	70	100	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 2 V, I _C = 20 mA, f = 2 GHz	18	21	–	GHz
Insertion Power Gain (1)	S _{21e} ²	V _{CE} = 1 V, I _C = 10 mA, f = 2 GHz	9.0	11.0	–	dB
Insertion Power Gain (2)	S _{21e} ²	V _{CE} = 2 V, I _C = 20 mA, f = 2 GHz	9.5	11.5	–	dB
Noise Figure	NF	V _{CE} = 2 V, I _C = 5 mA, f = 2 GHz, Z _S = Z _{opt}	–	1.1	1.5	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 2 V, I _E = 0 mA, f = 1 MHz	–	0.24	0.30	pF
Maximum Available Power Gain	MAG. ^{Note 3}	V _{CE} = 2 V, I _C = 20 mA, f = 2 GHz	–	12.5	–	dB
Maximum Stable Power Gain	MSG. ^{Note 4}	V _{CE} = 2 V, I _C = 20 mA, f = 2 GHz	–	13.5	–	dB

Note 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2 %

2. Collector to base capacitance measured using capacitance meter (self-balancing bridge method) when the emitter is connected to the guard pin

$$3. \text{ MAG.} = \left| \frac{S_{21}}{S_{12}} \right| (k - \sqrt{k^2 - 1})$$

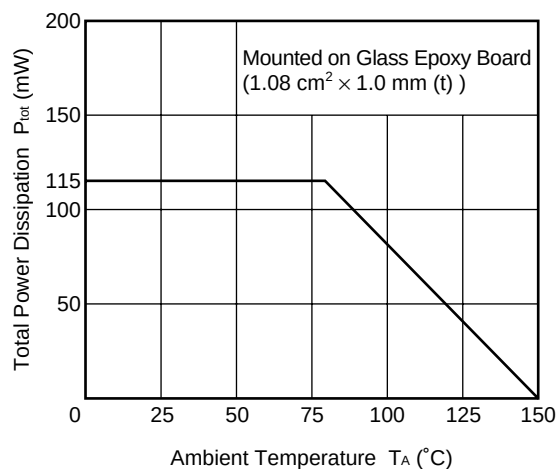
$$4. \text{ MSG.} = \left| \frac{S_{21}}{S_{12}} \right|$$

h_{FE} CLASSIFICATION

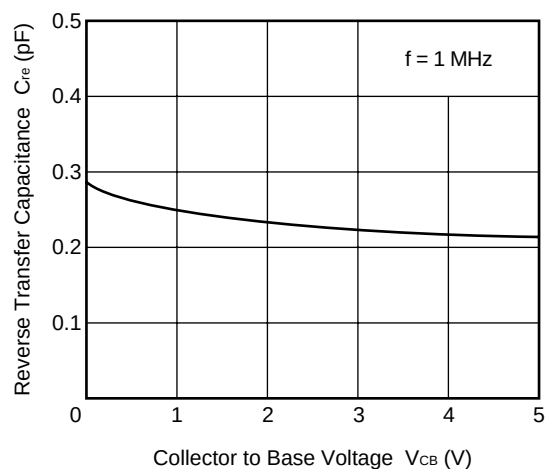
Rank	FB
Marking	UB
h _{FE} Value	50 to 100

TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25\text{ }^{\circ}\text{C}$)

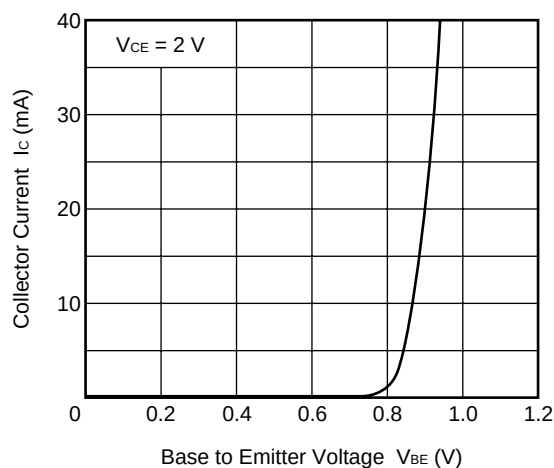
**TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE**



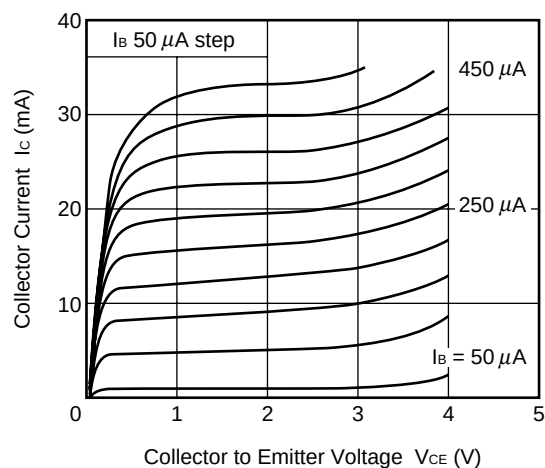
**REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE**



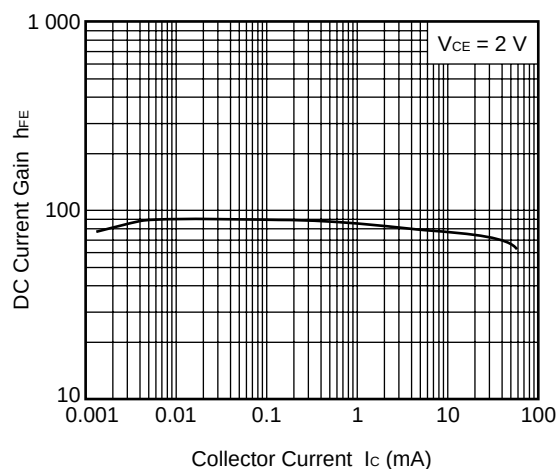
**COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE**



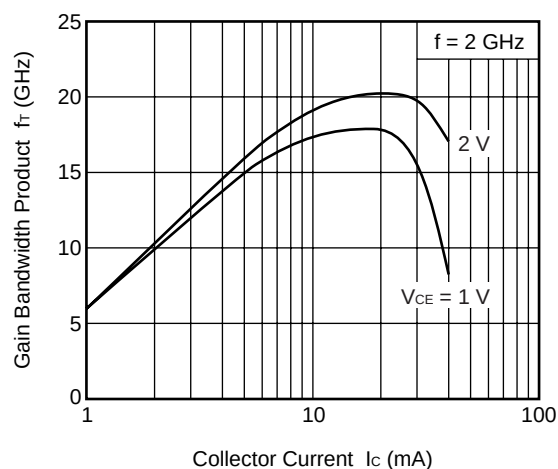
**COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE**



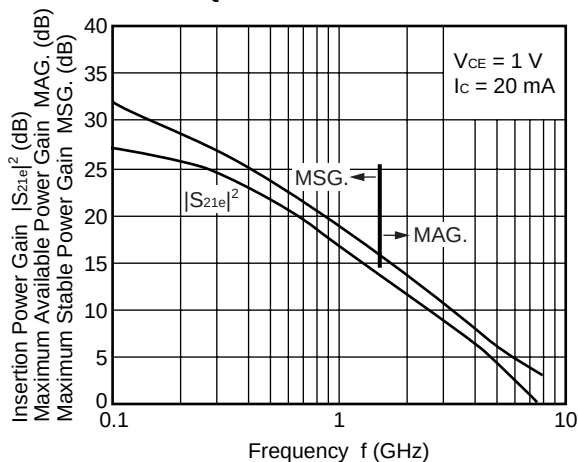
**DC CURRENT GAIN vs.
COLLECTOR CURRENT**



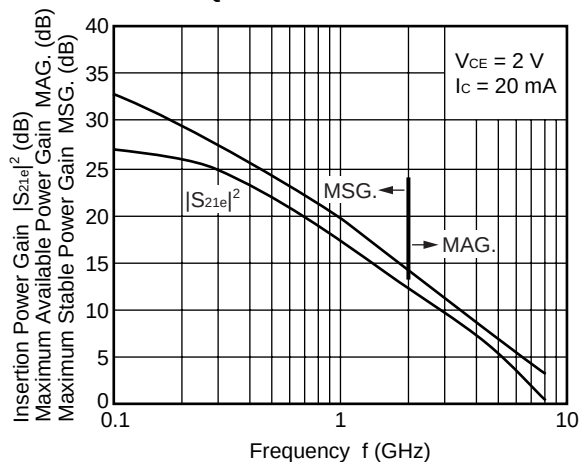
**GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT**



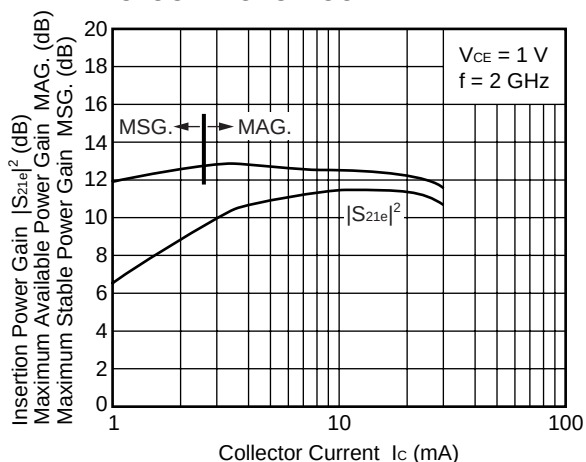
INSERTION POWER GAIN,
MAXIMUM AVAILABLE POWER GAIN,
MAXIMUM STABLE POWER GAIN
vs. FREQUENCY



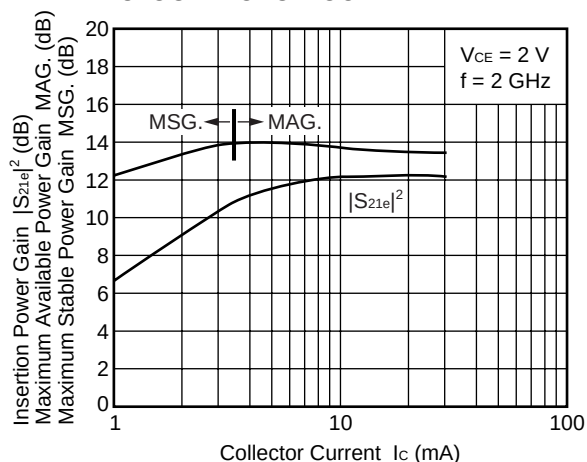
INSERTION POWER GAIN,
MAXIMUM AVAILABLE POWER GAIN,
MAXIMUM STABLE POWER GAIN
vs. FREQUENCY



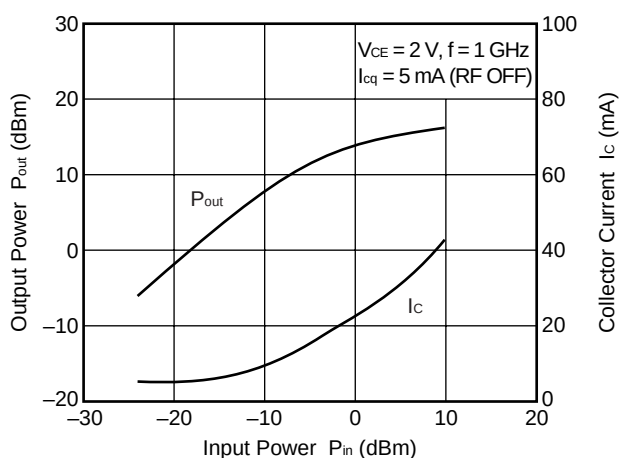
INSERTION POWER GAIN,
MAXIMUM AVAILABLE POWER GAIN,
MAXIMUM STABLE POWER GAIN
vs. COLLECTOR CURRENT



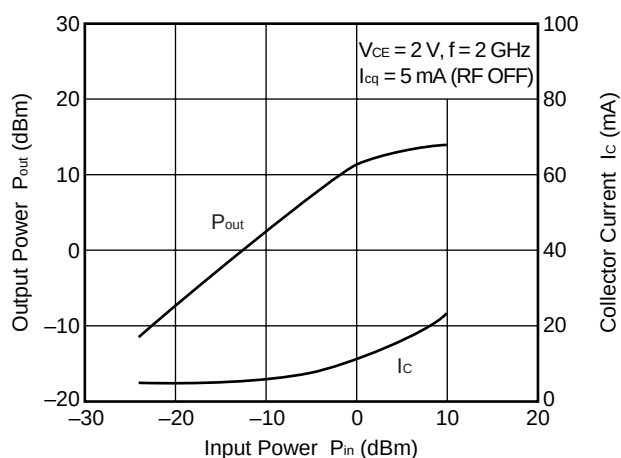
INSERTION POWER GAIN,
MAXIMUM AVAILABLE POWER GAIN,
MAXIMUM STABLE POWER GAIN
vs. COLLECTOR CURRENT



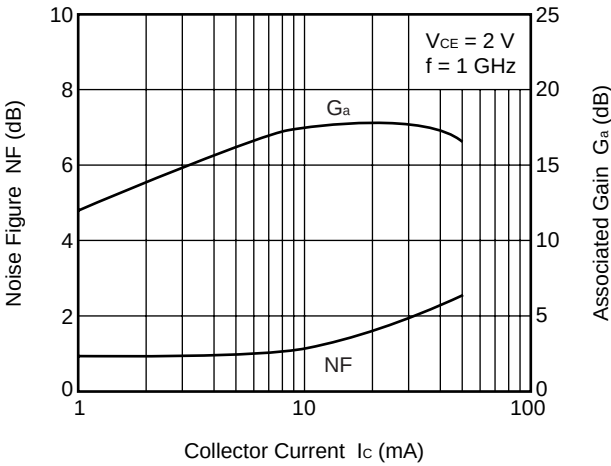
OUTPUT POWER, COLLECTOR
CURRENT vs. INPUT POWER



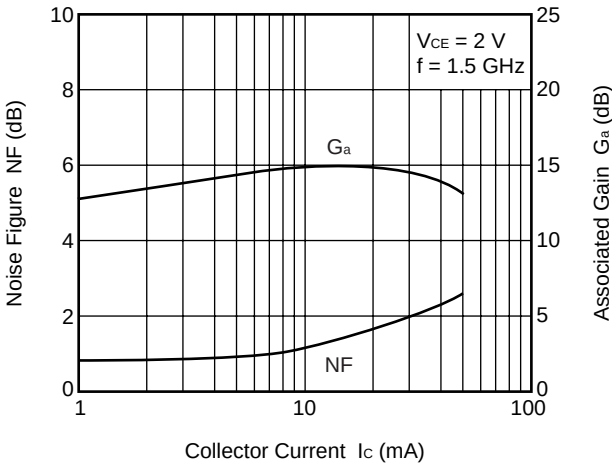
OUTPUT POWER, COLLECTOR
CURRENT vs. INPUT POWER



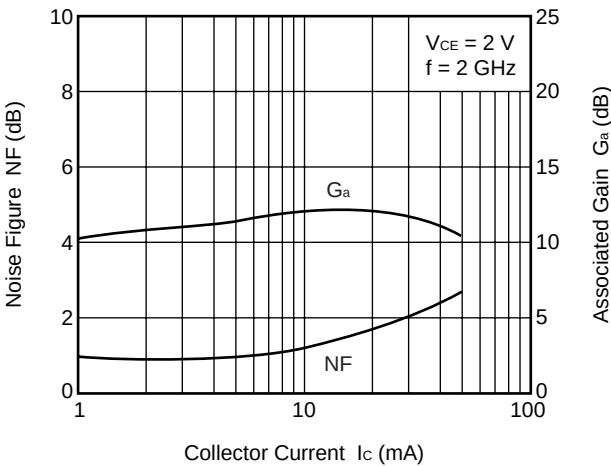
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



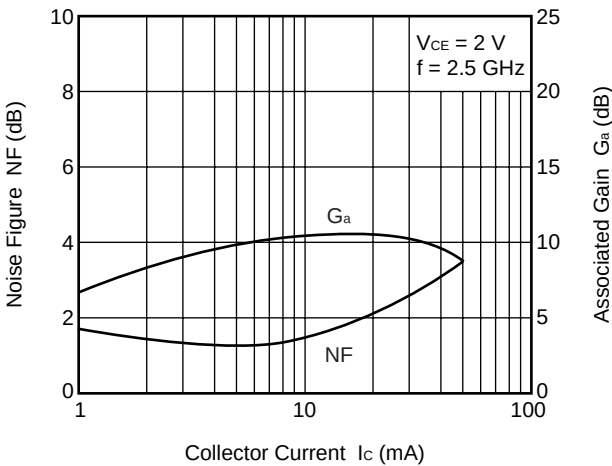
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

$V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$, $Z_0 = 50\ \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.890	−9.7	8.544	170.0	0.016	84.9	0.985	−7.0
0.2	0.865	−17.0	8.322	160.8	0.031	78.8	0.963	−14.1
0.3	0.833	−26.3	7.936	152.4	0.045	73.4	0.928	−20.8
0.4	0.788	−33.7	7.602	143.8	0.058	68.2	0.886	−27.2
0.5	0.741	−41.4	7.133	135.9	0.068	64.3	0.839	−32.8
0.6	0.680	−47.9	6.645	128.8	0.077	60.7	0.787	−37.9
0.7	0.632	−54.0	6.243	122.8	0.085	58.1	0.740	−42.4
0.8	0.580	−59.3	5.819	117.2	0.091	56.0	0.695	−46.5
0.9	0.536	−64.5	5.470	111.7	0.097	54.3	0.654	−50.0
1.0	0.495	−69.2	5.174	106.7	0.101	53.3	0.616	−53.4
1.1	0.458	−74.2	4.878	102.5	0.106	52.4	0.582	−56.4
1.2	0.425	−78.8	4.619	97.8	0.110	51.8	0.553	−59.1
1.3	0.395	−83.2	4.384	93.9	0.114	51.5	0.525	−61.9
1.4	0.368	−88.3	4.161	90.2	0.118	51.3	0.499	−64.5
1.5	0.341	−92.7	3.950	86.3	0.122	51.3	0.478	−67.1
1.6	0.320	−97.4	3.777	82.7	0.127	51.3	0.457	−69.6
1.7	0.295	−101.8	3.600	79.5	0.131	51.7	0.439	−72.0
1.8	0.276	−107.3	3.448	76.1	0.135	52.0	0.423	−74.4
1.9	0.263	−112.8	3.303	73.0	0.140	52.1	0.408	−77.1
2.0	0.253	−119.0	3.182	69.9	0.146	52.6	0.395	−79.7
2.1	0.238	−124.7	3.087	67.0	0.151	53.2	0.381	−82.3
2.2	0.230	−130.5	2.968	64.3	0.156	53.5	0.372	−85.3
2.3	0.226	−135.7	2.870	61.3	0.162	53.8	0.362	−88.2
2.4	0.222	−142.6	2.789	58.5	0.168	54.0	0.352	−91.4
2.5	0.220	−147.1	2.697	56.0	0.175	54.3	0.342	−94.8
2.6	0.222	−153.0	2.623	53.2	0.181	54.4	0.336	−98.5
2.7	0.223	−157.6	2.550	51.0	0.188	54.5	0.330	−102.4
2.8	0.223	−162.9	2.479	48.4	0.195	54.5	0.325	−105.9
2.9	0.222	−167.8	2.413	46.1	0.203	54.1	0.320	−109.3
3.0	0.222	−174.9	2.346	43.7	0.212	53.9	0.312	−113.6
4.0	0.368	145.6	1.857	19.1	0.313	46.2	0.360	−163.4
5.0	0.555	120.0	1.397	−4.2	0.400	32.4	0.508	156.2
6.0	0.650	104.4	1.108	−17.0	0.450	18.5	0.634	130.5
7.0	0.727	90.2	0.867	−31.9	0.482	5.8	0.730	111.4
8.0	0.783	84.9	0.725	−32.4	0.499	−2.4	0.778	98.3

$V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_0 = 50\ \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.822	-12.2	12.268	167.4	0.016	83.6	0.970	-8.8
0.2	0.793	-21.9	11.711	156.4	0.030	76.8	0.933	-17.5
0.3	0.738	-31.8	10.871	146.2	0.043	71.4	0.878	-25.2
0.4	0.678	-39.8	10.101	136.6	0.054	67.3	0.816	-32.0
0.5	0.614	-48.4	9.228	128.3	0.062	64.0	0.753	-37.6
0.6	0.553	-54.5	8.389	121.1	0.070	61.5	0.692	-42.4
0.7	0.501	-60.3	7.694	115.3	0.077	59.8	0.637	-46.3
0.8	0.449	-65.5	7.051	110.0	0.083	58.9	0.592	-49.7
0.9	0.409	-70.1	6.534	104.8	0.089	58.1	0.552	-52.7
1.0	0.369	-75.3	6.062	100.4	0.094	57.9	0.516	-55.3
1.1	0.340	-79.2	5.677	96.3	0.100	57.6	0.486	-57.8
1.2	0.312	-83.2	5.310	92.4	0.105	57.5	0.460	-60.0
1.3	0.285	-88.5	4.979	88.7	0.110	57.4	0.435	-62.1
1.4	0.261	-92.3	4.694	85.3	0.116	57.4	0.413	-64.5
1.5	0.241	-97.8	4.421	82.2	0.122	57.4	0.396	-66.6
1.6	0.223	-101.6	4.224	79.1	0.128	57.5	0.379	-68.8
1.7	0.210	-107.6	4.011	76.1	0.134	57.6	0.364	-70.9
1.8	0.187	-113.6	3.825	73.3	0.140	57.6	0.350	-73.1
1.9	0.180	-119.9	3.653	70.4	0.147	57.2	0.337	-75.5
2.0	0.170	-127.5	3.513	67.5	0.154	57.3	0.326	-78.1
2.1	0.167	-134.5	3.392	65.1	0.160	57.4	0.315	-80.6
2.2	0.162	-140.7	3.255	62.8	0.167	57.1	0.306	-83.5
2.3	0.160	-146.2	3.142	59.9	0.174	57.0	0.298	-86.4
2.4	0.163	-154.2	3.041	57.4	0.182	56.7	0.289	-89.7
2.5	0.165	-158.4	2.938	55.2	0.189	56.2	0.280	-93.3
2.6	0.167	-163.3	2.853	52.7	0.197	55.8	0.275	-97.1
2.7	0.174	-169.0	2.774	50.6	0.204	55.4	0.269	-101.3
2.8	0.175	-173.8	2.687	48.2	0.212	54.8	0.265	-105.0
2.9	0.178	-179.0	2.616	46.0	0.220	54.1	0.259	-108.6
3.0	0.182	173.3	2.548	43.9	0.229	53.6	0.253	-113.3
4.0	0.339	139.7	2.015	21.3	0.321	43.7	0.301	-166.8
5.0	0.530	117.8	1.546	-0.8	0.398	30.5	0.451	154.0
6.0	0.623	103.9	1.261	-14.3	0.443	17.7	0.585	130.4
7.0	0.713	90.6	0.996	-30.5	0.476	5.6	0.693	112.1
8.0	0.772	85.2	0.828	-33.0	0.495	-2.3	0.752	99.3

$V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$, $Z_O = 50\ \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.713	-15.2	17.973	163.5	0.015	79.6	0.941	-11.7
0.2	0.665	-27.6	16.464	149.4	0.028	75.9	0.874	-22.5
0.3	0.590	-39.3	14.609	137.6	0.039	70.4	0.790	-31.0
0.4	0.516	-48.3	12.962	127.4	0.048	67.6	0.707	-37.7
0.5	0.450	-56.4	11.391	119.2	0.056	65.8	0.634	-42.5
0.6	0.396	-62.4	10.059	112.5	0.063	64.6	0.570	-46.3
0.7	0.344	-67.3	9.028	107.0	0.070	63.9	0.518	-49.3
0.8	0.305	-72.4	8.118	102.4	0.076	64.0	0.477	-51.6
0.9	0.274	-75.5	7.409	98.0	0.083	63.8	0.443	-53.7
1.0	0.240	-80.3	6.827	93.8	0.090	63.7	0.415	-55.6
1.1	0.217	-85.0	6.284	90.5	0.097	63.7	0.390	-57.4
1.2	0.196	-89.3	5.825	87.0	0.103	63.6	0.370	-59.3
1.3	0.178	-94.2	5.460	84.1	0.111	63.4	0.352	-61.0
1.4	0.161	-99.1	5.126	81.1	0.118	63.2	0.334	-62.9
1.5	0.142	-103.8	4.814	78.4	0.125	62.9	0.320	-64.9
1.6	0.133	-111.6	4.564	75.5	0.132	62.5	0.307	-66.7
1.7	0.126	-117.2	4.309	72.9	0.140	62.2	0.294	-68.7
1.8	0.116	-125.8	4.113	70.3	0.147	61.8	0.283	-70.9
1.9	0.108	-133.8	3.910	67.7	0.155	61.1	0.273	-73.3
2.0	0.109	-146.4	3.753	65.2	0.164	60.7	0.264	-75.9
2.1	0.113	-153.9	3.622	63.0	0.171	60.2	0.255	-78.5
2.2	0.116	-159.5	3.470	61.0	0.179	59.6	0.247	-81.6
2.3	0.119	-165.8	3.340	58.5	0.187	58.9	0.240	-84.7
2.4	0.125	-174.4	3.235	56.2	0.195	58.2	0.233	-88.4
2.5	0.130	-178.7	3.121	54.1	0.203	57.4	0.224	-92.3
2.6	0.130	178.9	3.021	51.7	0.211	56.5	0.220	-96.6
2.7	0.143	173.4	2.937	49.9	0.219	55.8	0.214	-101.2
2.8	0.147	168.0	2.838	47.7	0.227	54.9	0.210	-105.4
2.9	0.155	163.6	2.765	45.7	0.236	53.9	0.206	-109.7
3.0	0.167	157.7	2.692	43.6	0.244	53.1	0.199	-114.8
4.0	0.326	133.2	2.119	22.8	0.331	41.4	0.258	-173.7
5.0	0.517	114.3	1.644	2.6	0.399	28.5	0.409	149.4
6.0	0.604	101.6	1.370	-11.2	0.439	16.5	0.542	128.4
7.0	0.693	90.0	1.111	-27.6	0.470	5.0	0.656	111.8
8.0	0.761	84.9	0.933	-31.4	0.490	-2.6	0.720	99.6

$V_{CE} = 1\text{ V}$, $I_C = 20\text{ mA}$, $Z_O = 50\ \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.590	-20.1	22.646	159.4	0.014	78.6	0.896	-14.5
0.2	0.520	-36.7	19.825	142.8	0.027	73.1	0.800	-26.9
0.3	0.449	-48.4	16.765	130.2	0.036	70.2	0.695	-35.6
0.4	0.368	-57.6	14.343	120.0	0.045	69.1	0.604	-41.6
0.5	0.315	-66.1	12.288	112.3	0.053	68.0	0.532	-45.5
0.6	0.266	-72.7	10.655	106.2	0.060	67.7	0.474	-48.2
0.7	0.227	-77.9	9.401	101.3	0.068	67.7	0.429	-50.3
0.8	0.200	-83.4	8.399	97.0	0.075	67.6	0.395	-52.1
0.9	0.176	-88.5	7.589	93.0	0.083	67.4	0.368	-53.6
1.0	0.151	-95.5	6.951	89.2	0.090	67.6	0.345	-55.1
1.1	0.137	-100.2	6.387	86.3	0.098	67.3	0.326	-56.7
1.2	0.125	-106.8	5.910	83.0	0.105	66.9	0.309	-58.3
1.3	0.111	-114.9	5.511	80.3	0.113	66.5	0.295	-60.0
1.4	0.103	-122.8	5.153	77.7	0.121	66.1	0.281	-61.9
1.5	0.096	-132.1	4.837	75.1	0.130	65.4	0.269	-63.9
1.6	0.091	-140.1	4.572	72.5	0.138	64.8	0.259	-65.9
1.7	0.090	-149.9	4.325	69.9	0.146	64.3	0.249	-68.0
1.8	0.093	-159.3	4.111	67.7	0.154	63.5	0.238	-70.3
1.9	0.100	-170.5	3.914	65.3	0.163	62.5	0.230	-73.1
2.0	0.103	-178.2	3.752	62.8	0.172	62.0	0.223	-76.0
2.1	0.116	175.8	3.605	60.8	0.180	61.3	0.215	-78.9
2.2	0.124	170.2	3.452	58.8	0.188	60.4	0.208	-82.4
2.3	0.128	168.6	3.317	56.3	0.197	59.5	0.202	-85.9
2.4	0.142	163.0	3.207	54.1	0.205	58.6	0.195	-90.0
2.5	0.149	160.5	3.097	52.2	0.213	57.6	0.188	-94.7
2.6	0.154	158.1	3.000	49.9	0.222	56.5	0.184	-99.6
2.7	0.167	153.3	2.907	48.0	0.230	55.7	0.180	-105.1
2.8	0.173	150.1	2.811	46.0	0.239	54.6	0.176	-109.9
2.9	0.181	148.7	2.739	44.0	0.247	53.4	0.174	-115.1
3.0	0.195	143.4	2.663	42.2	0.256	52.4	0.169	-121.0
4.0	0.358	126.6	2.084	22.2	0.341	39.7	0.246	178.0
5.0	0.535	109.9	1.617	2.5	0.403	26.8	0.402	144.3
6.0	0.619	98.8	1.361	-10.5	0.439	15.0	0.531	125.1
7.0	0.701	87.9	1.109	-26.4	0.468	3.9	0.642	109.8
8.0	0.766	83.5	0.947	-30.7	0.487	-3.4	0.705	98.5

$V_{CE} = 2\text{ V}$, $I_C = 3\text{ mA}$, $Z_0 = 50\ \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.886	-6.4	8.436	170.4	0.014	87.5	0.990	-6.2
0.2	0.883	-15.8	8.211	162.2	0.028	79.9	0.971	-12.6
0.3	0.845	-23.2	7.874	153.9	0.041	74.7	0.941	-18.7
0.4	0.813	-30.4	7.565	145.7	0.052	69.8	0.904	-24.5
0.5	0.764	-37.7	7.158	138.1	0.062	66.4	0.862	-29.7
0.6	0.710	-43.6	6.717	131.1	0.071	62.8	0.815	-34.5
0.7	0.661	-48.9	6.316	125.2	0.078	60.4	0.770	-38.8
0.8	0.612	-54.2	5.947	119.8	0.084	58.4	0.728	-42.5
0.9	0.569	-58.6	5.608	114.3	0.089	56.8	0.690	-45.9
1.0	0.525	-63.2	5.317	109.5	0.094	55.8	0.653	-49.0
1.1	0.493	-67.4	5.051	105.0	0.098	55.1	0.620	-51.9
1.2	0.459	-71.7	4.783	100.7	0.102	54.4	0.591	-54.4
1.3	0.426	-75.7	4.548	96.7	0.106	54.1	0.564	-57.0
1.4	0.397	-80.0	4.320	93.0	0.110	53.9	0.539	-59.5
1.5	0.371	-83.3	4.121	89.1	0.114	54.0	0.517	-61.8
1.6	0.346	-87.6	3.942	85.6	0.118	54.3	0.497	-64.1
1.7	0.322	-91.8	3.768	82.1	0.123	54.6	0.479	-66.3
1.8	0.298	-96.1	3.613	78.8	0.127	55.0	0.462	-68.4
1.9	0.284	-100.7	3.464	75.7	0.132	55.2	0.448	-70.8
2.0	0.269	-105.5	3.346	72.7	0.137	55.7	0.434	-73.2
2.1	0.253	-111.4	3.249	69.8	0.142	56.5	0.421	-75.5
2.2	0.238	-116.0	3.125	67.1	0.147	57.0	0.411	-78.2
2.3	0.235	-120.6	3.025	64.2	0.153	57.5	0.401	-80.8
2.4	0.228	-126.8	2.945	61.3	0.160	57.7	0.391	-83.6
2.5	0.223	-131.9	2.848	59.0	0.166	57.9	0.381	-86.6
2.6	0.219	-136.6	2.779	56.2	0.173	58.3	0.373	-90.0
2.7	0.215	-142.1	2.705	53.8	0.180	58.4	0.366	-93.4
2.8	0.213	-146.7	2.617	51.3	0.187	58.4	0.361	-96.5
2.9	0.204	-152.4	2.551	49.1	0.195	58.1	0.353	-99.5
3.0	0.206	-159.8	2.479	46.6	0.204	58.0	0.345	-103.5
4.0	0.336	154.4	1.989	21.4	0.311	50.3	0.373	-152.1
5.0	0.537	125.2	1.515	-2.8	0.407	35.7	0.511	164.0
6.0	0.635	107.6	1.195	-16.8	0.462	20.7	0.641	135.3
7.0	0.726	92.4	0.924	-32.2	0.494	7.2	0.736	114.4
8.0	0.783	86.4	0.759	-33.1	0.509	-1.6	0.783	100.3

$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$, $Z_0 = 50\ \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.845	-9.9	11.956	168.4	0.014	86.8	0.978	-7.7
0.2	0.821	-19.3	11.451	158.1	0.027	79.0	0.947	-15.3
0.3	0.769	-27.8	10.734	148.4	0.039	73.5	0.901	-22.3
0.4	0.712	-35.8	10.039	139.3	0.049	69.2	0.846	-28.4
0.5	0.654	-43.2	9.282	131.4	0.057	66.3	0.789	-33.6
0.6	0.596	-48.8	8.499	124.2	0.065	63.6	0.734	-38.0
0.7	0.539	-53.8	7.844	118.2	0.071	62.1	0.682	-41.8
0.8	0.492	-58.6	7.217	113.2	0.077	60.9	0.637	-45.0
0.9	0.450	-62.4	6.715	107.9	0.083	60.4	0.600	-47.6
1.0	0.409	-66.4	6.309	103.5	0.088	59.9	0.564	-50.1
1.1	0.378	-70.4	5.886	99.4	0.093	59.7	0.533	-52.4
1.2	0.347	-73.8	5.532	95.4	0.098	59.5	0.507	-54.5
1.3	0.322	-77.2	5.212	91.8	0.103	59.5	0.484	-56.6
1.4	0.295	-80.9	4.914	88.4	0.109	59.5	0.461	-58.6
1.5	0.272	-84.3	4.645	85.0	0.114	59.6	0.443	-60.5
1.6	0.254	-87.4	4.437	81.8	0.120	59.7	0.426	-62.3
1.7	0.233	-91.3	4.220	79.0	0.126	59.9	0.411	-64.2
1.8	0.212	-96.3	4.028	76.0	0.131	60.0	0.397	-66.2
1.9	0.200	-100.3	3.851	73.2	0.138	59.9	0.384	-68.2
2.0	0.183	-106.4	3.710	70.5	0.145	60.0	0.373	-70.4
2.1	0.177	-113.6	3.579	67.9	0.151	60.2	0.361	-72.5
2.2	0.168	-118.9	3.441	65.6	0.158	60.1	0.352	-75.2
2.3	0.163	-121.6	3.319	62.9	0.165	59.9	0.344	-77.6
2.4	0.160	-130.8	3.222	60.4	0.172	59.7	0.335	-80.3
2.5	0.156	-137.4	3.120	58.1	0.179	59.4	0.324	-83.4
2.6	0.157	-140.2	3.031	55.8	0.187	59.2	0.319	-86.8
2.7	0.158	-146.1	2.945	53.5	0.194	58.7	0.312	-90.3
2.8	0.154	-153.9	2.861	51.3	0.202	58.3	0.306	-93.3
2.9	0.151	-158.8	2.781	49.1	0.210	57.6	0.299	-96.5
3.0	0.156	-167.1	2.705	46.8	0.219	57.1	0.290	-100.5
4.0	0.297	149.1	2.171	24.0	0.316	47.7	0.312	-152.1
5.0	0.504	123.2	1.700	1.0	0.401	34.0	0.448	163.8
6.0	0.605	107.5	1.371	-13.7	0.453	20.3	0.587	136.6
7.0	0.704	93.5	1.082	-30.8	0.488	7.3	0.701	116.1
8.0	0.767	87.3	0.877	-33.9	0.506	-1.2	0.760	102.0

$V_{CE} = 2 \text{ V}$, $I_C = 10 \text{ mA}$, $Z_O = 50 \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.762	-11.8	17.382	164.7	0.013	83.6	0.957	-9.8
0.2	0.699	-23.5	16.175	151.8	0.025	77.0	0.901	-19.2
0.3	0.642	-33.8	14.561	140.7	0.036	72.8	0.829	-26.9
0.4	0.568	-41.1	13.085	130.8	0.045	70.0	0.755	-33.0
0.5	0.506	-48.7	11.657	122.8	0.052	67.7	0.686	-37.5
0.6	0.443	-54.0	10.377	115.9	0.059	66.4	0.626	-41.0
0.7	0.395	-57.7	9.349	110.3	0.065	65.9	0.575	-43.8
0.8	0.353	-61.5	8.473	105.6	0.071	65.6	0.534	-46.0
0.9	0.318	-64.4	7.777	101.0	0.078	65.3	0.500	-47.9
1.0	0.281	-67.8	7.175	97.0	0.084	65.4	0.472	-49.5
1.1	0.260	-70.2	6.642	93.5	0.090	65.4	0.446	-51.2
1.2	0.238	-72.8	6.188	90.0	0.096	65.2	0.425	-52.7
1.3	0.216	-76.0	5.782	87.1	0.103	65.2	0.406	-54.2
1.4	0.198	-79.4	5.435	84.0	0.110	65.0	0.389	-55.8
1.5	0.185	-82.1	5.108	81.0	0.117	64.8	0.375	-57.4
1.6	0.162	-86.0	4.833	78.4	0.124	64.6	0.362	-59.0
1.7	0.151	-89.0	4.602	76.0	0.131	64.4	0.349	-60.7
1.8	0.134	-94.9	4.366	73.3	0.138	64.1	0.337	-62.4
1.9	0.125	-99.8	4.178	70.7	0.145	63.5	0.328	-64.5
2.0	0.113	-107.9	4.019	68.2	0.153	63.2	0.318	-66.5
2.1	0.107	-115.6	3.867	66.0	0.160	62.9	0.308	-68.5
2.2	0.102	-124.5	3.703	63.9	0.168	62.3	0.301	-71.1
2.3	0.096	-127.9	3.580	61.5	0.176	61.7	0.293	-73.6
2.4	0.098	-140.3	3.460	59.2	0.184	61.1	0.285	-76.4
2.5	0.101	-146.5	3.354	57.1	0.191	60.5	0.275	-79.6
2.6	0.103	-150.5	3.249	54.8	0.199	59.7	0.270	-83.0
2.7	0.104	-157.8	3.153	53.1	0.207	59.0	0.263	-86.7
2.8	0.108	-163.4	3.057	51.0	0.215	58.1	0.257	-90.0
2.9	0.105	-170.7	2.971	48.9	0.223	57.2	0.250	-93.0
3.0	0.114	178.3	2.892	47.0	0.232	56.5	0.241	-97.4
4.0	0.274	142.9	2.318	26.0	0.323	45.6	0.259	-154.0
5.0	0.476	120.6	1.831	4.8	0.399	32.4	0.393	161.6
6.0	0.578	106.2	1.513	-10.0	0.446	19.4	0.535	136.1
7.0	0.682	93.7	1.225	-27.4	0.481	7.1	0.658	116.8
8.0	0.752	87.4	1.012	-32.6	0.501	-1.1	0.726	103.2

$V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_O = 50 \Omega$

Frequency GHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.660	-16.7	21.907	161.6	0.012	80.0	0.931	-11.7
0.2	0.585	-28.5	19.701	146.5	0.024	76.1	0.852	-22.2
0.3	0.505	-39.1	17.100	134.4	0.033	73.2	0.761	-30.0
0.4	0.444	-46.6	14.863	124.2	0.041	70.8	0.678	-35.3
0.5	0.381	-53.2	12.907	116.5	0.048	70.0	0.607	-38.9
0.6	0.328	-57.1	11.320	110.0	0.055	69.3	0.551	-41.6
0.7	0.287	-60.5	10.052	105.0	0.062	69.3	0.505	-43.4
0.8	0.255	-63.8	9.004	100.7	0.069	69.3	0.470	-44.9
0.9	0.228	-66.4	8.170	96.5	0.076	69.2	0.442	-46.2
1.0	0.202	-69.7	7.508	93.0	0.083	69.1	0.419	-47.4
1.1	0.181	-72.3	6.927	89.8	0.090	69.0	0.399	-48.7
1.2	0.161	-74.2	6.421	86.5	0.097	68.8	0.382	-50.0
1.3	0.148	-77.6	5.974	83.8	0.104	68.4	0.367	-51.3
1.4	0.135	-82.0	5.611	81.0	0.111	68.0	0.352	-52.8
1.5	0.117	-83.8	5.262	78.5	0.119	67.6	0.341	-54.4
1.6	0.106	-87.9	4.994	75.9	0.126	67.2	0.330	-55.9
1.7	0.098	-94.4	4.720	73.7	0.134	66.7	0.320	-57.4
1.8	0.085	-101.7	4.482	71.2	0.142	66.2	0.309	-59.2
1.9	0.074	-108.3	4.274	68.8	0.150	65.4	0.301	-61.2
2.0	0.070	-118.5	4.102	66.4	0.158	64.9	0.293	-63.4
2.1	0.071	-131.9	3.958	64.3	0.166	64.3	0.284	-65.5
2.2	0.066	-145.1	3.794	62.5	0.174	63.6	0.277	-68.1
2.3	0.071	-147.6	3.648	60.1	0.182	62.9	0.271	-70.7
2.4	0.079	-160.0	3.531	58.0	0.190	62.0	0.263	-73.6
2.5	0.079	-168.3	3.406	56.0	0.198	61.1	0.253	-76.9
2.6	0.087	-169.9	3.301	53.8	0.207	60.2	0.248	-80.5
2.7	0.094	-176.2	3.212	52.2	0.215	59.4	0.241	-84.3
2.8	0.098	176.4	3.110	50.1	0.223	58.4	0.235	-87.7
2.9	0.102	170.7	3.024	48.1	0.231	57.4	0.228	-91.3
3.0	0.111	161.5	2.945	46.0	0.240	56.5	0.219	-95.6
4.0	0.279	137.1	2.345	26.1	0.329	44.7	0.238	-155.9
5.0	0.484	117.4	1.854	5.5	0.402	31.3	0.375	159.4
6.0	0.577	104.4	1.555	-8.8	0.446	18.6	0.515	135.1
7.0	0.684	92.6	1.265	-26.0	0.480	6.6	0.641	116.5
8.0	0.757	86.6	1.058	-31.5	0.499	-1.5	0.709	103.3

NOISE PARAMETERS

$V_{CE} = 2\text{ V}$, $I_C = 3\text{ mA}$

Frequency (GHz)	NF _{min.} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG. (deg.)	
0.8	0.83	18.1	0.37	22.9	0.22
1.0	0.86	16.3	0.36	29.3	0.21
1.5	0.93	13.2	0.31	46.7	0.19
1.8	0.97	11.9	0.26	60.0	0.16
2.0	1.00	11.1	0.23	70.8	0.15
2.5	1.07	9.6	0.16	107.0	0.12

$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$

Frequency (GHz)	NF _{min.} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG. (deg.)	
0.8	0.88	18.5	0.24	19.6	0.19
1.0	0.91	16.7	0.23	26.6	0.18
1.5	0.96	13.5	0.18	41.2	0.17
1.8	1.00	12.2	0.14	54.6	0.15
2.0	1.02	11.4	0.11	68.2	0.14
2.5	1.08	9.8	0.06	128.5	0.12

$V_{CE} = 2\text{ V}$, $I_C = 7\text{ mA}$

Frequency (GHz)	NF _{min.} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG. (deg.)	
0.8	1.07	19.1	0.13	35.5	0.17
1.0	1.09	17.0	0.12	11.3	0.17
1.5	1.13	13.8	0.06	27.3	0.16
1.8	1.16	12.5	0.03	75.9	0.14
2.0	1.17	11.7	0.02	119.0	0.14
2.5	1.22	9.9	0.07	-115.5	0.14

$V_{CE} = 2 \text{ V}$, $I_C = 10 \text{ mA}$

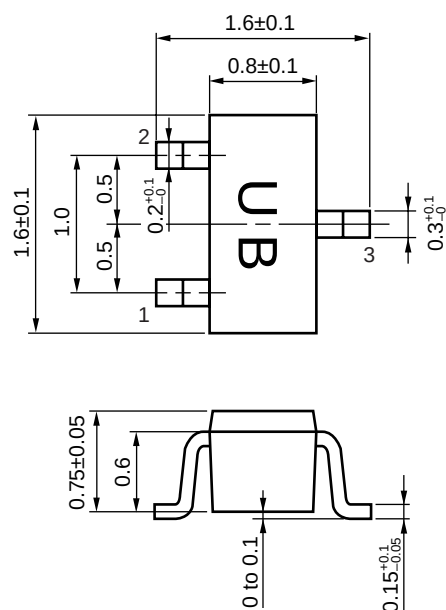
Frequency (GHz)	NF _{min.} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG. (deg.)	
0.8	1.25	19.1	0.04	−59.8	0.16
1.0	1.27	17.4	0.03	117.5	0.15
1.5	1.31	13.9	0.04	−75.8	0.16
1.8	1.34	12.5	0.07	−88.8	0.16
2.0	1.35	11.7	0.09	−112.4	0.15
2.5	1.40	10.1	0.16	−112.0	0.15

$V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$

Frequency (GHz)	NF _{min.} (dB)	G _a (dB)	Γ _{opt}		Rn/50
			MAG.	ANG. (deg.)	
0.8	1.69	19.2	0.15	−146.7	0.16
1.0	1.70	17.3	0.18	−138.6	0.16
1.5	1.74	14.0	0.22	−126.0	0.18
1.8	1.77	12.6	0.24	−121.9	0.19
2.0	1.78	11.8	0.24	−119.9	0.20
2.5	1.83	10.2	0.27	−115.1	0.22

PACKAGE DIMENSIONS

3 PIN ULTRA SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

[MEMO]

[MEMO]

[MEMO]

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