

DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR μ PA871TC

NPN SILICON RF TRANSISTOR (WITH 2 ELEMENTS) IN A FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Built-in low phase distortion transistor suited for OSC applications
 $f_T = 5.0 \text{ GHz TYP.}$, $|S_{21e}|^2 = 4.0 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 5 \text{ mA, } f = 2 \text{ GHz}$
- Built-in 2 transistors ($2 \times 2\text{SC}5600$)
- Flat-lead 6-pin thin-type ultra super minimold package

BUILT-IN TRANSISTORS

	Q1, Q2
3-pin thin-type ultra super minimold part No.	2SC5600

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μ PA871TC	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 6 (Q1 Base), Pin 5 (Q2 Base), Pin 4 (Q2 Emitter) face the perforation side of the tape
μ PA871TC-T1	3 kpcs/reel	

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 50 pcs.

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 Compound Semiconductor Devices representative for availability and additional information.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V _{CBO}	9	V
Collector to Emitter Voltage	V _{CEO}	5.5	V
Emitter to Base Voltage	V _{EBO}	1.5	V
Collector Current	I _C	100	mA
Total Power Dissipation	P _{tot} ^{Note}	200 in 1 element	mW
		230 in 2 elements	
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	−65 to +150	°C

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I _{CBO}	V _{CB} = 5 V, I _E = 0 mA	–	–	600	nA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1 V, I _C = 0 mA	–	–	600	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 1 V, I _C = 5 mA	100	–	160	–
Gain Bandwidth Product (1)	f _T	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz	3.5	5.0	–	GHz
Gain Bandwidth Product (2)	f _T	V _{CE} = 1 V, I _C = 15 mA, f = 2 GHz	5.5	6.5	–	GHz
Insertion Power Gain (1)	S _{21e} ²	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz	3.5	4.0	–	dB
Insertion Power Gain (2)	S _{21e} ²	V _{CE} = 1 V, I _C = 15 mA, f = 2 GHz	4.5	5.5	–	dB
Noise Figure	NF	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz, Z _S = Z _{opt}	–	1.5	2.5	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 0.5 V, I _E = 0 mA, f = 1 MHz	–	0.8	1.0	pF

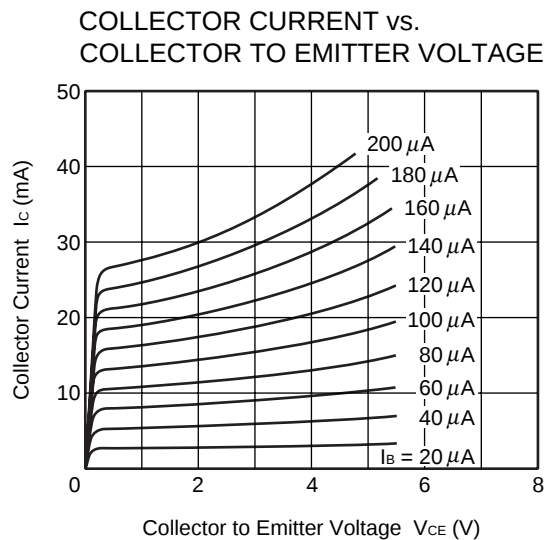
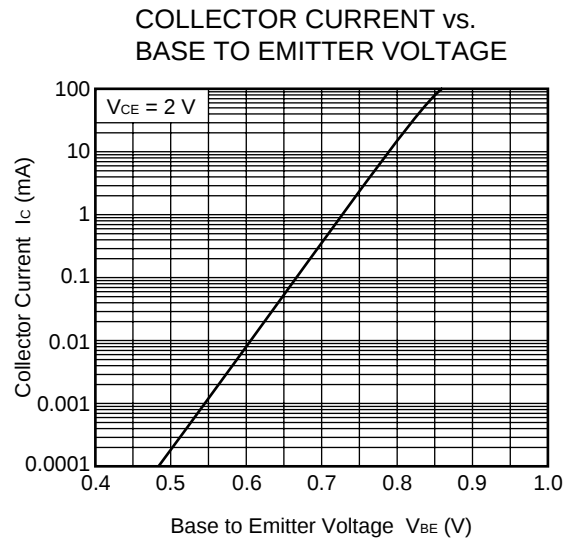
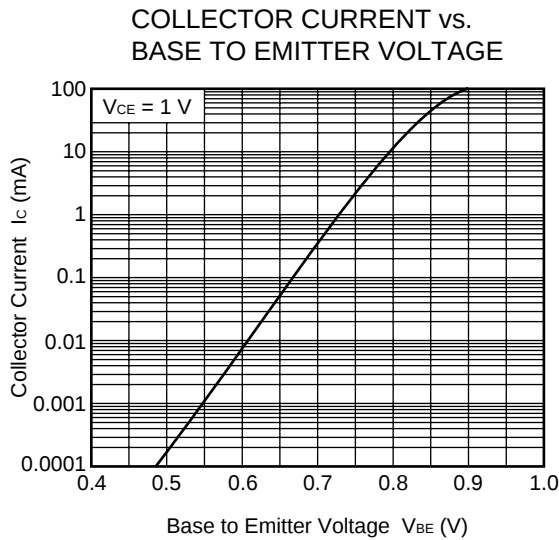
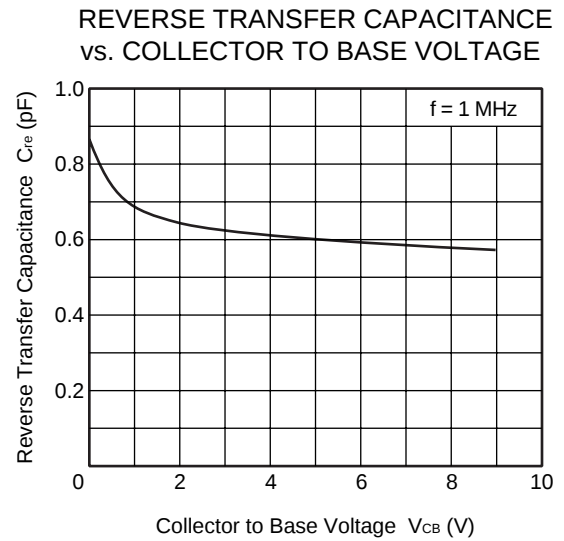
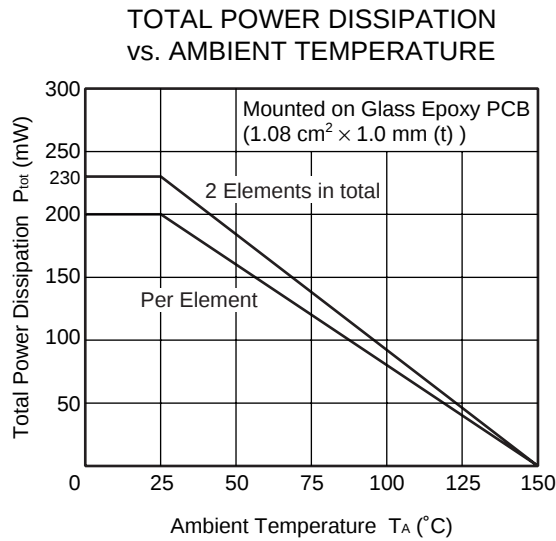
Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

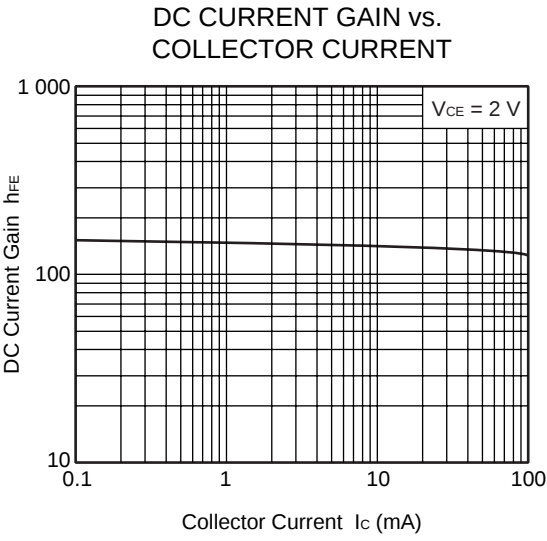
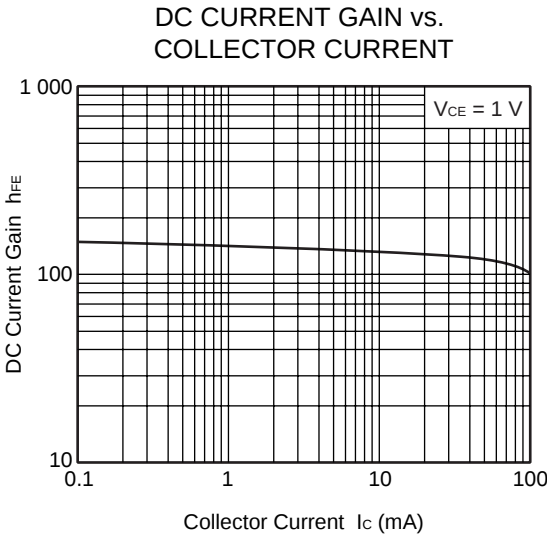
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

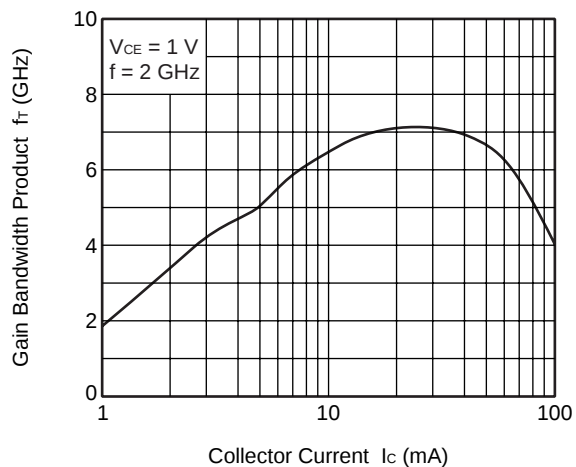
Rank	FB
Marking	3E
h _{FE} Value	100 to 160

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

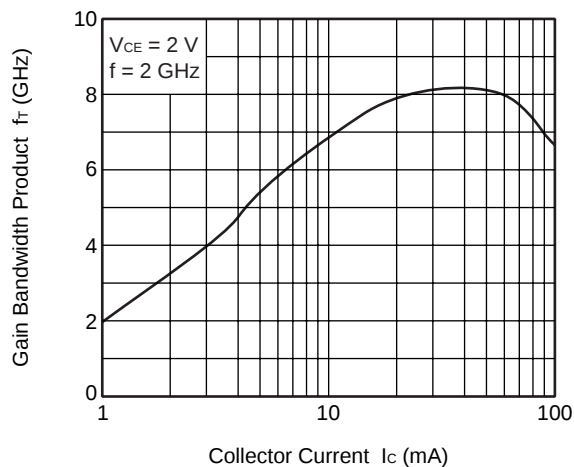




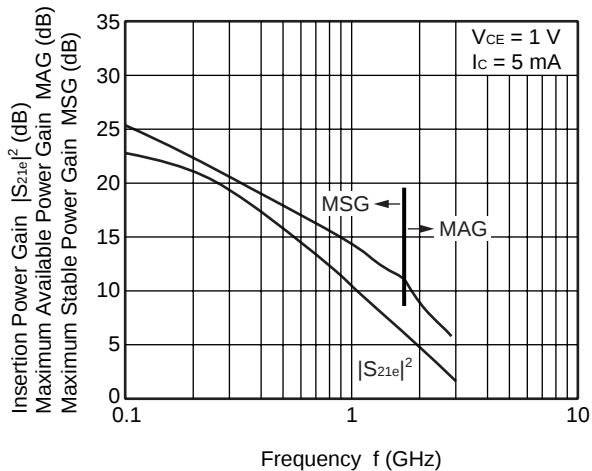
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



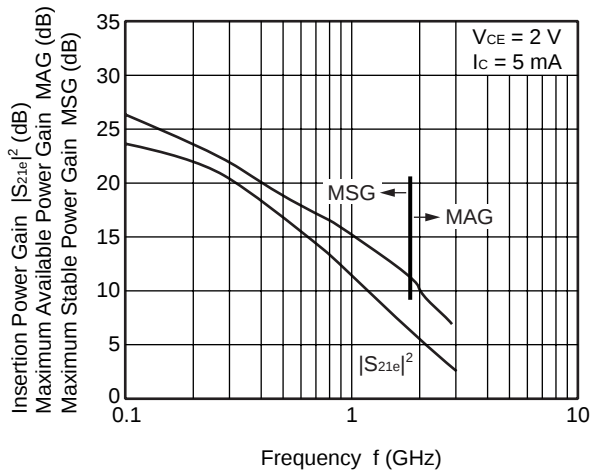
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



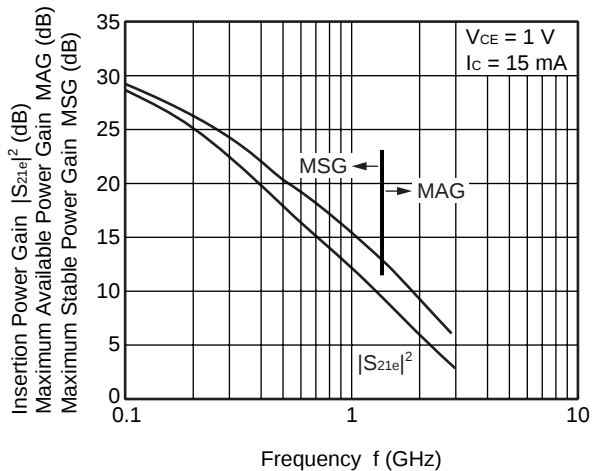
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



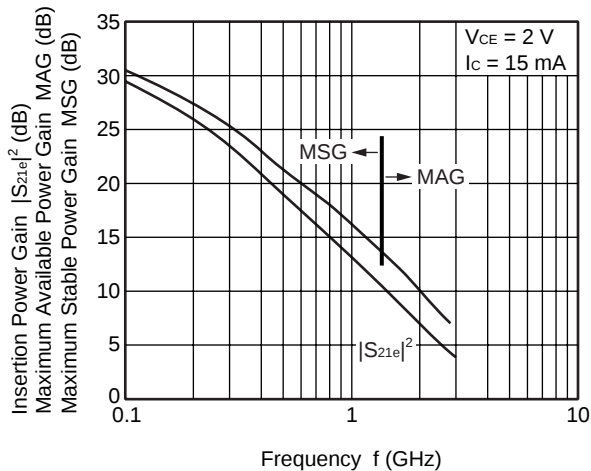
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



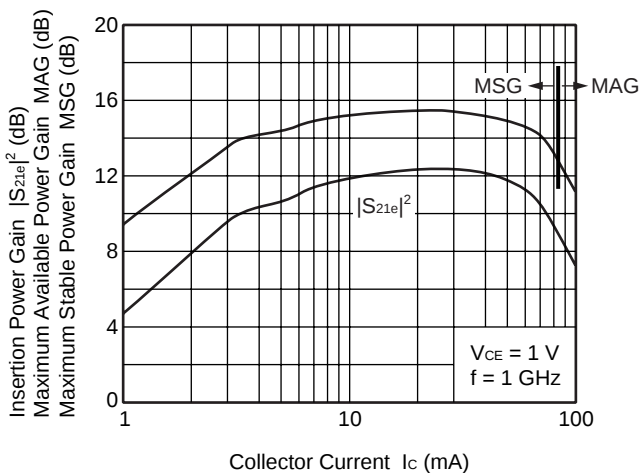
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



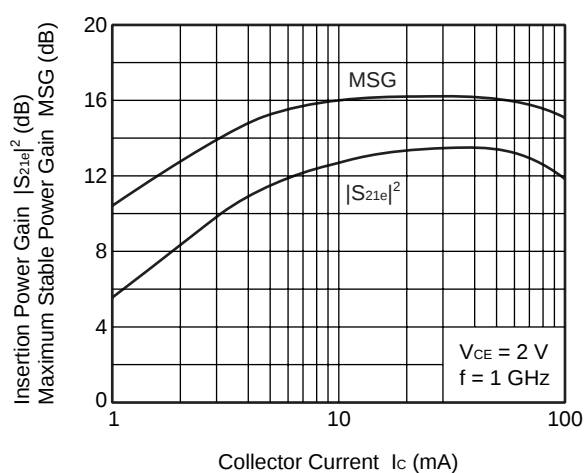
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



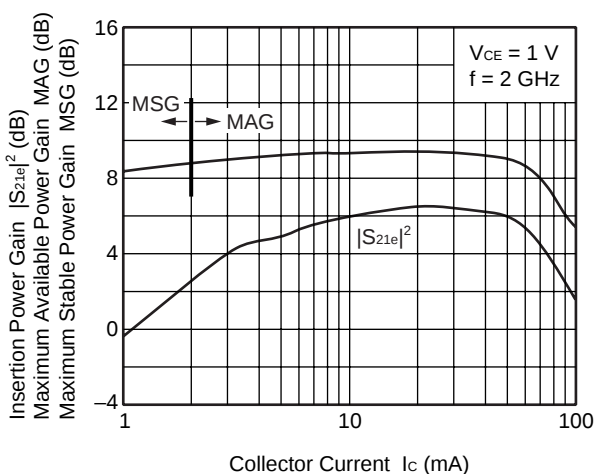
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



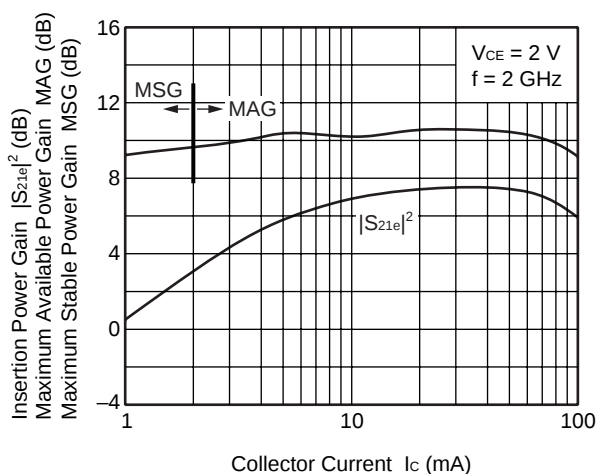
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



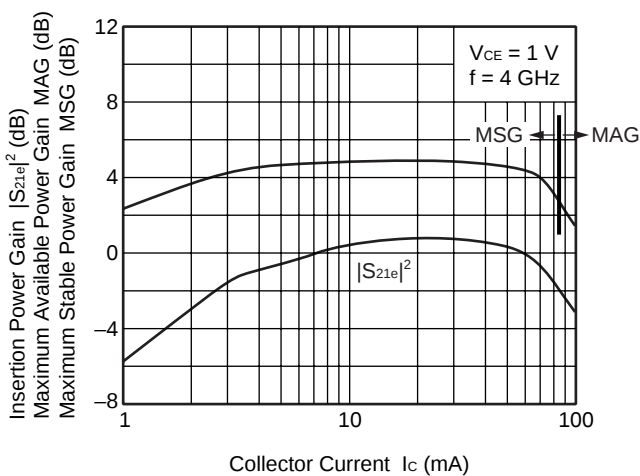
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



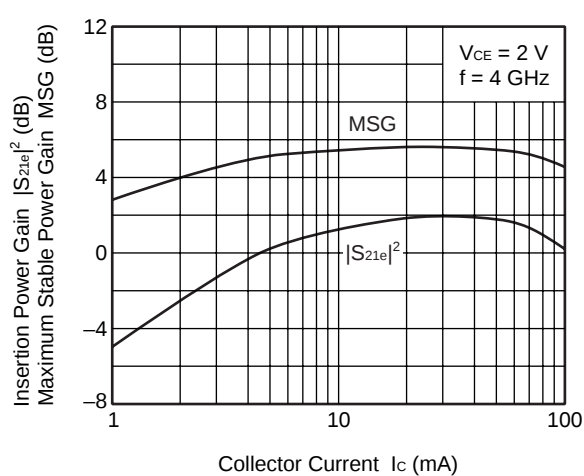
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



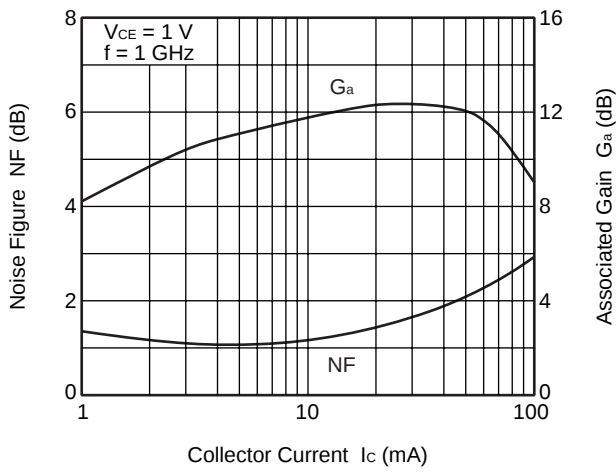
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



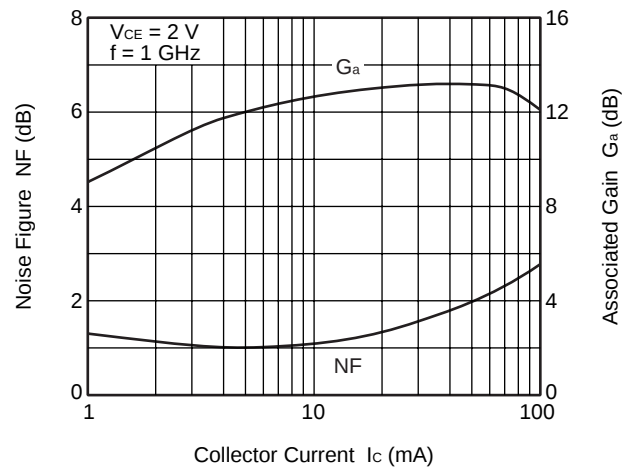
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



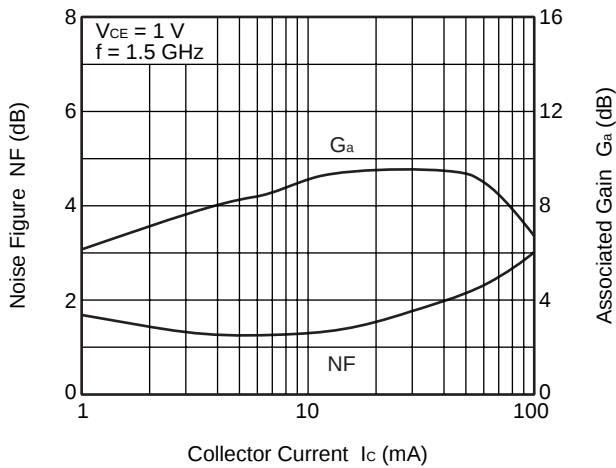
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



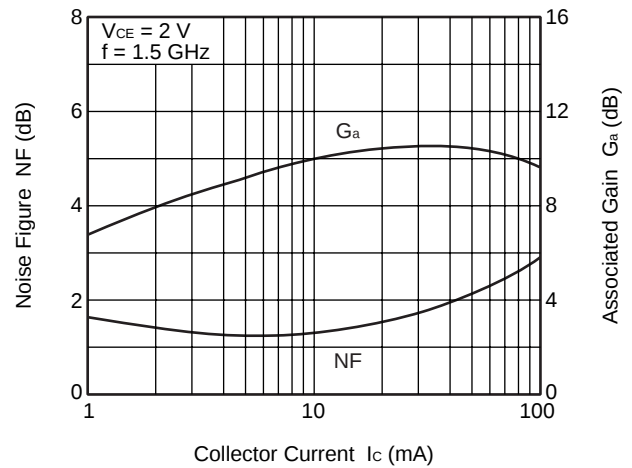
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



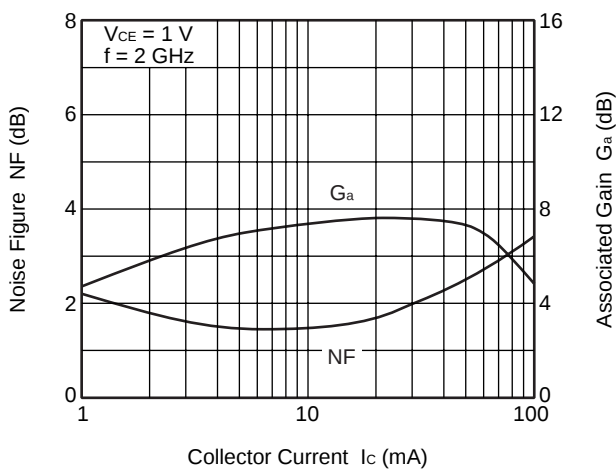
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



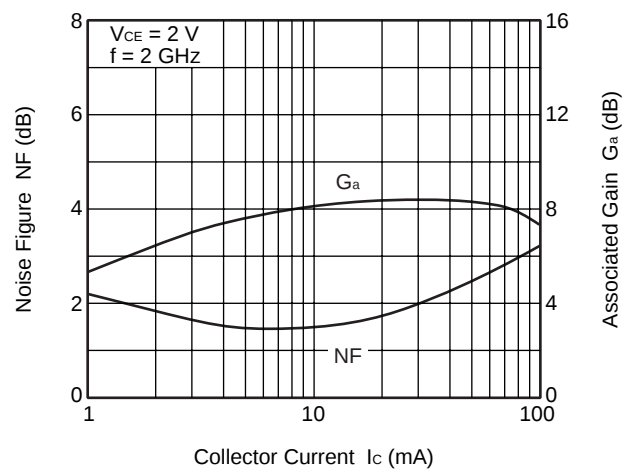
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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 V, I_C = 1 mA, Z_o = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.991	-19.4	3.621	166.8	0.048	87.1	0.999	-8.5
0.2	0.984	-39.3	3.495	152.7	0.088	63.3	0.962	-15.4
0.3	0.946	-58.5	3.218	139.1	0.122	56.7	0.924	-22.5
0.4	0.896	-76.2	2.924	126.8	0.152	46.4	0.872	-28.3
0.5	0.851	-91.2	2.618	116.8	0.175	38.8	0.818	-33.2
0.6	0.816	-103.4	2.358	108.8	0.183	33.1	0.766	-37.2
0.7	0.790	-114.1	2.147	101.5	0.193	27.5	0.724	-40.7
0.8	0.787	-123.4	1.993	95.4	0.195	22.7	0.682	-43.6
0.9	0.774	-132.4	1.841	88.8	0.197	19.1	0.652	-46.3
1.0	0.771	-140.6	1.724	82.5	0.196	15.9	0.626	-48.9
1.1	0.760	-147.8	1.599	77.3	0.192	13.5	0.606	-51.4
1.2	0.751	-154.4	1.493	72.3	0.189	10.8	0.589	-53.9
1.3	0.744	-160.5	1.387	67.4	0.184	9.6	0.573	-56.6
1.4	0.738	-165.7	1.311	63.5	0.179	8.3	0.557	-59.7
1.5	0.737	-170.7	1.236	59.5	0.171	7.0	0.549	-62.8
1.6	0.737	-175.7	1.171	55.6	0.166	7.1	0.538	-65.6
1.7	0.741	-179.8	1.123	52.3	0.159	6.3	0.531	-69.4
1.8	0.750	-175.0	1.074	48.4	0.151	7.1	0.526	-72.6
1.9	0.750	-170.2	1.021	44.5	0.144	8.9	0.522	-76.2
2.0	0.752	-166.5	0.970	41.1	0.140	10.8	0.520	-80.3
2.1	0.752	-162.8	0.920	38.0	0.135	13.5	0.513	-84.5
2.2	0.756	-159.4	0.887	35.2	0.129	17.9	0.515	-88.9
2.3	0.757	-156.5	0.849	32.6	0.127	21.9	0.511	-93.0
2.4	0.767	-153.8	0.815	30.2	0.126	25.9	0.509	-98.0
2.5	0.772	-151.1	0.790	28.1	0.130	31.0	0.505	-102.7
2.6	0.771	-148.2	0.755	26.0	0.132	35.1	0.507	-107.2
2.7	0.782	-145.1	0.728	23.8	0.137	39.7	0.507	-111.8
2.8	0.782	-143.2	0.701	22.1	0.146	42.4	0.511	-116.4
2.9	0.781	-140.7	0.673	20.0	0.157	46.5	0.511	-120.8
3.0	0.785	-137.9	0.652	17.9	0.170	48.1	0.519	-125.6
4.0	0.824	-119.0	0.517	9.4	0.299	46.5	0.598	-173.1
5.0	0.820	-104.5	0.470	6.6	0.415	29.6	0.679	-153.2

V_{CE} = 1 V, I_C = 3 mA, Z_o = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.905	-33.5	10.568	158.4	0.046	75.5	0.939	-19.2
0.2	0.856	-64.3	9.334	138.9	0.072	54.9	0.817	-32.8
0.3	0.777	-88.9	7.733	123.8	0.095	45.6	0.697	-43.2
0.4	0.715	-108.7	6.456	112.2	0.108	39.4	0.592	-50.5
0.5	0.674	-123.2	5.436	103.7	0.118	35.9	0.512	-55.3
0.6	0.654	-134.4	4.702	97.4	0.119	33.8	0.447	-58.9
0.7	0.641	-143.6	4.126	91.9	0.124	32.5	0.400	-61.7
0.8	0.642	-150.9	3.714	87.1	0.128	31.5	0.363	-64.3
0.9	0.636	-158.3	3.350	82.2	0.130	31.9	0.331	-66.2
1.0	0.636	-164.4	3.059	77.6	0.133	31.7	0.309	-69.0
1.1	0.631	-169.8	2.808	73.8	0.135	32.6	0.292	-70.7
1.2	0.626	-174.9	2.601	70.1	0.136	32.8	0.277	-73.5
1.3	0.627	-179.2	2.395	66.3	0.142	33.7	0.264	-76.5
1.4	0.625	-177.0	2.234	63.3	0.146	34.9	0.251	-79.8
1.5	0.628	-173.1	2.100	60.2	0.146	35.8	0.242	-83.4
1.6	0.633	-169.2	1.983	57.0	0.151	36.1	0.233	-87.3
1.7	0.638	-165.9	1.883	54.5	0.154	36.4	0.227	-91.5
1.8	0.647	-162.2	1.790	51.2	0.156	37.9	0.221	-95.2
1.9	0.651	-158.5	1.696	48.4	0.163	39.2	0.216	-99.6
2.0	0.657	-155.7	1.611	45.2	0.169	39.7	0.212	-104.5
2.1	0.659	-152.9	1.531	42.6	0.173	39.9	0.210	-110.1
2.2	0.663	-150.6	1.464	40.1	0.179	40.9	0.212	-115.0
2.3	0.669	-148.4	1.399	37.7	0.186	41.8	0.209	-119.4
2.4	0.678	-146.3	1.353	35.6	0.192	42.4	0.213	-125.6
2.5	0.682	-144.1	1.307	33.2	0.200	42.5	0.215	-130.9
2.6	0.684	-142.1	1.250	31.1	0.204	42.8	0.220	-135.4
2.7	0.695	-139.7	1.209	28.7	0.212	43.4	0.223	-140.7
2.8	0.695	-138.2	1.161	26.7	0.219	42.9	0.232	-144.9
2.9	0.696	-136.1	1.126	24.4	0.229	43.4	0.237	-149.6
3.0	0.704	-133.7	1.097	22.1	0.238	43.2	0.250	-153.8
4.0	0.762	-118.6	0.845	6.2	0.317	37.7	0.383	-168.8
5.0	0.787	-105.6	0.673	-3.7	0.404	25.2	0.507	-145.0

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.857	-40.6	14.145	154.1	0.043	71.9	0.902	-24.7
0.2	0.790	-76.0	11.832	132.6	0.065	51.7	0.735	-41.3
0.3	0.706	-102.1	9.354	117.7	0.082	44.1	0.597	-52.2
0.4	0.656	-121.4	7.570	107.1	0.091	39.6	0.488	-59.9
0.5	0.624	-134.9	6.276	99.4	0.099	38.4	0.411	-64.4
0.6	0.612	-144.9	5.368	93.7	0.103	38.2	0.352	-68.6
0.7	0.605	-153.2	4.679	88.8	0.111	37.9	0.308	-71.1
0.8	0.607	-159.8	4.194	84.5	0.113	37.9	0.277	-74.4
0.9	0.604	-166.3	3.768	80.0	0.119	39.0	0.250	-76.9
1.0	0.608	-171.8	3.427	75.9	0.123	39.4	0.229	-80.0
1.1	0.602	-176.4	3.125	72.3	0.128	40.5	0.213	-81.9
1.2	0.603	179.2	2.887	68.9	0.133	40.8	0.202	-85.8
1.3	0.599	175.1	2.656	65.5	0.139	41.9	0.190	-89.9
1.4	0.603	171.6	2.477	62.7	0.145	42.1	0.179	-93.9
1.5	0.607	168.5	2.321	59.8	0.150	42.4	0.172	-99.2
1.6	0.614	164.6	2.192	57.0	0.157	42.9	0.164	-104.1
1.7	0.619	161.4	2.080	54.4	0.163	42.5	0.160	-109.2
1.8	0.628	158.0	1.973	51.4	0.167	43.5	0.156	-114.1
1.9	0.629	154.6	1.870	48.5	0.174	44.3	0.155	-120.5
2.0	0.637	152.1	1.777	45.7	0.181	43.6	0.154	-125.6
2.1	0.641	149.4	1.682	43.3	0.188	43.8	0.155	-132.6
2.2	0.646	147.7	1.609	40.8	0.193	43.7	0.161	-137.6
2.3	0.650	145.1	1.535	38.5	0.200	43.7	0.160	-142.9
2.4	0.657	143.2	1.480	36.3	0.207	43.7	0.167	-148.9
2.5	0.666	141.1	1.427	34.2	0.215	43.3	0.170	-154.2
2.6	0.662	138.8	1.363	32.2	0.220	43.6	0.178	-158.1
2.7	0.669	137.2	1.317	30.3	0.226	44.0	0.183	-162.8
2.8	0.672	136.3	1.279	28.5	0.236	43.3	0.194	-165.2
2.9	0.675	134.2	1.242	26.1	0.247	43.4	0.204	-169.8
3.0	0.685	132.1	1.213	23.8	0.255	42.5	0.217	-173.0
4.0	0.749	117.2	0.930	6.9	0.322	35.2	0.351	156.9
5.0	0.779	105.0	0.744	-3.7	0.400	23.3	0.468	138.0

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.793	-52.5	18.676	148.3	0.036	75.5	0.849	-32.7
0.2	0.705	-91.2	14.443	125.2	0.055	47.4	0.631	-51.5
0.3	0.632	-116.9	10.828	111.4	0.068	44.5	0.490	-63.1
0.4	0.601	-134.5	8.561	101.8	0.078	42.2	0.386	-71.2
0.5	0.581	-146.5	6.991	95.3	0.085	43.9	0.319	-76.8
0.6	0.576	-155.0	5.919	90.4	0.090	44.9	0.268	-81.6
0.7	0.573	-162.1	5.127	86.0	0.098	44.8	0.232	-85.3
0.8	0.576	-167.8	4.573	82.0	0.104	45.6	0.206	-89.8
0.9	0.578	-173.2	4.096	78.0	0.112	46.9	0.183	-94.2
1.0	0.584	-177.7	3.709	74.4	0.118	47.6	0.169	-98.9
1.1	0.579	178.1	3.394	71.0	0.126	48.5	0.156	-102.0
1.2	0.579	174.0	3.123	68.0	0.132	48.8	0.147	-107.7
1.3	0.581	170.8	2.868	64.9	0.142	49.4	0.143	-113.0
1.4	0.581	167.7	2.675	62.4	0.150	49.2	0.135	-118.4
1.5	0.588	164.9	2.510	59.8	0.154	48.8	0.134	-125.1
1.6	0.593	161.4	2.353	57.0	0.165	49.0	0.131	-131.4
1.7	0.600	158.6	2.240	54.6	0.171	48.2	0.135	-137.9
1.8	0.609	155.5	2.125	51.7	0.177	48.7	0.134	-143.8
1.9	0.613	152.5	2.012	49.1	0.186	48.3	0.136	-149.7
2.0	0.621	150.3	1.915	46.4	0.193	47.6	0.139	-154.8
2.1	0.624	147.8	1.810	44.2	0.200	46.8	0.147	-161.6
2.2	0.631	146.1	1.729	41.9	0.208	47.1	0.155	-165.1
2.3	0.635	143.8	1.648	39.6	0.216	46.5	0.157	-169.7
2.4	0.642	142.4	1.591	37.6	0.224	45.8	0.170	-174.5
2.5	0.650	140.5	1.540	35.6	0.233	45.4	0.175	-178.7
2.6	0.651	138.4	1.476	33.5	0.237	44.8	0.185	178.9
2.7	0.664	136.6	1.422	31.2	0.244	44.2	0.193	174.3
2.8	0.662	135.3	1.368	29.3	0.252	43.8	0.202	172.7
2.9	0.663	133.1	1.327	27.2	0.263	43.4	0.212	169.6
3.0	0.671	131.1	1.297	25.1	0.270	42.4	0.222	167.6
4.0	0.733	117.7	1.008	8.8	0.335	34.3	0.353	146.8
5.0	0.768	105.6	0.811	-2.8	0.404	22.0	0.456	132.1

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

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.732	-63.5	22.710	143.1	0.039	53.8	0.785	-39.4
0.2	0.643	-104.7	16.341	119.4	0.049	45.4	0.550	-60.5
0.3	0.586	-128.8	11.832	106.8	0.057	45.6	0.413	-72.6
0.4	0.571	-144.3	9.170	98.5	0.067	45.5	0.319	-81.7
0.5	0.557	-155.0	7.454	92.6	0.076	48.1	0.261	-88.2
0.6	0.558	-162.1	6.290	88.1	0.083	50.2	0.219	-94.3
0.7	0.557	-168.5	5.434	84.0	0.093	50.7	0.189	-99.9
0.8	0.564	-173.4	4.821	80.5	0.100	52.0	0.168	-106.1
0.9	0.565	-178.1	4.311	76.8	0.109	52.4	0.151	-111.7
1.0	0.570	177.9	3.906	73.2	0.118	52.9	0.142	-118.2
1.1	0.566	174.0	3.558	70.2	0.126	53.6	0.132	-122.8
1.2	0.568	170.6	3.282	67.4	0.135	53.2	0.129	-130.1
1.3	0.568	167.6	3.008	64.4	0.144	53.4	0.127	-136.0
1.4	0.570	164.7	2.811	62.0	0.154	53.2	0.125	-142.4
1.5	0.579	162.0	2.626	59.5	0.160	53.1	0.128	-148.7
1.6	0.584	158.9	2.467	56.9	0.170	52.0	0.132	-154.8
1.7	0.592	156.1	2.335	54.6	0.177	51.2	0.138	-160.0
1.8	0.600	153.5	2.219	51.7	0.184	51.1	0.141	-165.6
1.9	0.604	150.5	2.103	49.4	0.194	50.9	0.146	-171.0
2.0	0.611	148.4	1.992	46.7	0.202	49.7	0.154	-174.7
2.1	0.616	146.2	1.892	44.6	0.209	48.4	0.163	-179.9
2.2	0.623	144.4	1.804	42.3	0.218	48.5	0.171	-177.5
2.3	0.629	142.5	1.728	40.1	0.227	48.0	0.175	-173.2
2.4	0.636	141.0	1.662	38.2	0.234	46.9	0.188	-170.0
2.5	0.644	139.2	1.607	36.1	0.243	45.9	0.195	-166.8
2.6	0.646	137.4	1.537	34.2	0.247	45.5	0.205	-165.1
2.7	0.654	135.4	1.483	32.1	0.256	44.8	0.214	-161.6
2.8	0.655	134.1	1.427	30.2	0.263	43.5	0.222	-160.0
2.9	0.654	132.4	1.381	28.1	0.272	43.3	0.232	-157.4
3.0	0.664	130.2	1.355	26.0	0.280	42.3	0.243	-155.8
4.0	0.726	117.2	1.050	10.0	0.343	33.4	0.362	-139.8
5.0	0.757	105.5	0.850	-1.8	0.406	20.9	0.453	-127.1

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

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.581	-93.3	30.515	130.3	0.025	59.7	0.642	-56.5
0.2	0.551	-131.2	18.907	109.2	0.036	45.6	0.399	-80.4
0.3	0.535	-150.6	13.075	99.3	0.043	56.4	0.293	-95.0
0.4	0.535	-161.8	9.967	92.8	0.057	56.0	0.229	-107.7
0.5	0.535	-169.3	8.020	88.1	0.069	58.7	0.192	-117.4
0.6	0.537	-174.2	6.742	84.4	0.078	62.2	0.171	-127.6
0.7	0.540	-178.7	5.797	81.0	0.088	61.4	0.155	-135.9
0.8	0.549	177.6	5.132	77.8	0.099	61.0	0.148	-143.1
0.9	0.551	174.1	4.565	74.8	0.109	61.5	0.145	-151.1
1.0	0.558	170.8	4.128	71.5	0.119	61.1	0.145	-156.9
1.1	0.555	167.8	3.762	68.7	0.130	61.2	0.143	-161.8
1.2	0.557	165.0	3.470	66.2	0.139	60.0	0.148	-167.5
1.3	0.559	162.3	3.178	63.4	0.151	59.8	0.152	-171.6
1.4	0.563	160.1	2.966	61.4	0.162	58.2	0.157	-176.9
1.5	0.568	157.5	2.769	58.8	0.170	57.5	0.164	-179.8
1.6	0.576	154.9	2.607	56.5	0.182	56.7	0.172	-176.0
1.7	0.583	152.4	2.461	54.3	0.188	54.7	0.180	-172.5
1.8	0.591	150.1	2.329	51.5	0.197	54.5	0.187	-168.9
1.9	0.598	147.3	2.213	49.3	0.209	53.3	0.195	-166.1
2.0	0.604	145.4	2.097	46.8	0.216	52.1	0.203	-163.3
2.1	0.609	143.4	1.983	44.9	0.223	50.9	0.215	-160.1
2.2	0.617	142.1	1.894	42.8	0.232	50.2	0.225	-158.9
2.3	0.620	140.3	1.806	40.7	0.241	49.1	0.231	-155.3
2.4	0.629	138.9	1.745	38.7	0.249	47.7	0.242	-153.1
2.5	0.638	137.2	1.683	36.9	0.259	47.1	0.249	-150.8
2.6	0.638	135.5	1.610	35.0	0.265	46.1	0.258	-149.4
2.7	0.649	133.8	1.552	32.8	0.271	45.0	0.267	-146.8
2.8	0.649	132.5	1.493	31.0	0.278	43.8	0.274	-145.6
2.9	0.648	130.5	1.450	29.1	0.289	43.4	0.284	-143.9
3.0	0.660	128.8	1.417	27.1	0.295	42.0	0.293	-142.7
4.0	0.720	116.3	1.102	11.5	0.354	31.9	0.400	-130.1
5.0	0.753	105.2	0.896	-0.1	0.411	19.3	0.470	-119.4

$V_{CE} = 2\text{ V}$, $I_C = 1\text{ mA}$, $Z_O = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.984	-19.1	3.923	167.5	0.040	78.7	0.998	-7.6
0.2	0.989	-38.3	3.801	153.9	0.074	65.8	0.969	-13.9
0.3	0.942	-56.7	3.506	140.8	0.103	58.0	0.934	-20.3
0.4	0.898	-74.0	3.202	128.8	0.132	48.9	0.884	-25.7
0.5	0.853	-88.8	2.883	119.0	0.152	40.7	0.835	-30.3
0.6	0.816	-101.2	2.597	111.1	0.159	35.2	0.785	-33.9
0.7	0.791	-111.8	2.363	104.4	0.168	30.0	0.746	-37.1
0.8	0.781	-121.2	2.199	98.2	0.170	25.5	0.706	-39.8
0.9	0.768	-130.3	2.033	91.9	0.173	22.0	0.675	-42.1
1.0	0.766	-138.7	1.903	85.9	0.172	19.0	0.649	-44.4
1.1	0.754	-145.9	1.762	80.6	0.168	16.9	0.629	-46.6
1.2	0.745	-152.8	1.650	75.8	0.165	14.7	0.611	-48.8
1.3	0.735	-158.9	1.534	71.1	0.162	13.5	0.595	-51.2
1.4	0.727	-164.2	1.446	67.2	0.157	12.5	0.581	-53.9
1.5	0.727	-169.4	1.367	63.3	0.151	11.7	0.571	-56.7
1.6	0.729	-174.5	1.294	59.5	0.147	11.8	0.559	-59.2
1.7	0.731	-179.0	1.240	56.2	0.142	11.3	0.553	-62.4
1.8	0.739	176.0	1.184	52.1	0.135	13.7	0.547	-65.1
1.9	0.737	171.3	1.126	48.6	0.131	15.4	0.541	-68.4
2.0	0.743	167.4	1.072	45.0	0.127	18.0	0.537	-72.2
2.1	0.742	163.5	1.019	42.1	0.123	20.1	0.529	-75.8
2.2	0.746	160.3	0.977	39.0	0.120	25.3	0.529	-80.0
2.3	0.745	157.1	0.937	36.7	0.121	29.3	0.527	-83.5
2.4	0.754	154.5	0.903	34.3	0.121	33.6	0.520	-88.2
2.5	0.758	151.6	0.873	32.0	0.125	38.1	0.516	-92.4
2.6	0.758	148.7	0.837	29.7	0.128	42.5	0.514	-96.8
2.7	0.768	145.7	0.806	27.7	0.134	46.2	0.513	-101.2
2.8	0.769	143.8	0.777	25.6	0.143	48.5	0.515	-105.4
2.9	0.765	141.3	0.747	23.6	0.156	51.5	0.513	-109.5
3.0	0.774	138.4	0.725	21.3	0.168	52.9	0.518	-114.4
4.0	0.813	119.4	0.569	10.4	0.297	50.4	0.576	-162.6
5.0	0.816	105.0	0.498	6.5	0.419	33.1	0.654	161.3

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

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.939	-28.4	9.630	161.3	0.036	84.0	0.964	-14.7
0.2	0.887	-55.9	8.779	143.3	0.066	56.2	0.866	-26.0
0.3	0.805	-79.1	7.497	128.6	0.086	49.6	0.767	-35.0
0.4	0.742	-98.6	6.405	116.9	0.100	42.7	0.673	-41.2
0.5	0.693	-113.8	5.459	108.0	0.111	38.7	0.595	-45.4
0.6	0.667	-125.5	4.762	101.3	0.114	35.8	0.532	-48.4
0.7	0.647	-135.2	4.207	95.5	0.120	33.2	0.484	-50.7
0.8	0.644	-143.4	3.803	90.6	0.120	32.3	0.445	-52.6
0.9	0.635	-151.3	3.446	85.7	0.124	31.8	0.415	-54.0
1.0	0.635	-158.0	3.157	80.8	0.126	31.6	0.390	-55.7
1.1	0.628	-163.9	2.903	76.6	0.126	32.3	0.373	-57.2
1.2	0.624	-169.4	2.694	72.9	0.128	32.3	0.355	-59.3
1.3	0.620	-174.1	2.470	69.4	0.130	33.5	0.341	-61.4
1.4	0.618	-178.2	2.313	66.2	0.133	34.3	0.327	-63.8
1.5	0.620	177.4	2.176	62.9	0.134	35.0	0.316	-66.6
1.6	0.624	173.3	2.053	59.8	0.138	36.7	0.304	-69.0
1.7	0.629	169.5	1.954	57.1	0.140	36.7	0.296	-72.4
1.8	0.637	165.7	1.854	53.7	0.142	38.7	0.289	-75.2
1.9	0.639	162.0	1.761	50.7	0.148	40.5	0.281	-78.0
2.0	0.645	159.0	1.676	47.4	0.153	41.1	0.276	-82.4
2.1	0.647	155.7	1.589	45.0	0.157	41.9	0.265	-86.6
2.2	0.655	153.4	1.526	42.4	0.162	43.4	0.266	-90.9
2.3	0.656	150.7	1.458	39.9	0.168	44.4	0.262	-94.1
2.4	0.665	148.8	1.406	37.6	0.174	44.6	0.258	-100.1
2.5	0.672	146.4	1.359	35.4	0.182	45.7	0.255	-104.3
2.6	0.673	144.2	1.300	33.3	0.186	46.3	0.255	-108.9
2.7	0.685	142.0	1.256	30.8	0.194	47.0	0.253	-114.2
2.8	0.687	140.1	1.210	28.8	0.202	47.0	0.259	-118.6
2.9	0.684	137.8	1.165	26.5	0.212	47.5	0.259	-123.2
3.0	0.695	135.6	1.139	24.1	0.221	47.7	0.268	-128.1
4.0	0.755	119.7	0.873	7.3	0.307	42.7	0.369	-174.8
5.0	0.786	106.5	0.695	-3.1	0.403	29.5	0.492	156.0

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

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.851	-39.0	15.112	155.3	0.035	66.6	0.912	-21.9
0.2	0.782	-71.7	12.744	134.3	0.057	53.4	0.758	-36.6
0.3	0.693	-97.3	10.222	119.5	0.070	49.0	0.624	-46.3
0.4	0.638	-116.7	8.302	108.8	0.082	42.9	0.516	-52.4
0.5	0.601	-130.4	6.897	101.1	0.089	41.6	0.441	-56.1
0.6	0.587	-141.0	5.911	95.5	0.092	40.7	0.383	-58.9
0.7	0.576	-149.5	5.156	90.5	0.099	40.9	0.342	-60.5
0.8	0.577	-156.5	4.615	86.4	0.102	41.6	0.306	-62.2
0.9	0.573	-163.0	4.155	82.1	0.109	42.4	0.282	-63.9
1.0	0.576	-168.7	3.779	77.8	0.113	42.6	0.260	-65.5
1.1	0.571	-173.5	3.453	74.4	0.117	44.4	0.246	-66.9
1.2	0.570	-178.0	3.187	71.1	0.122	44.3	0.231	-69.3
1.3	0.569	177.9	2.929	67.8	0.129	45.1	0.218	-71.6
1.4	0.569	174.3	2.740	64.9	0.135	46.0	0.206	-74.6
1.5	0.575	170.6	2.566	62.2	0.139	46.6	0.197	-78.2
1.6	0.580	167.0	2.418	59.5	0.147	47.0	0.188	-81.7
1.7	0.585	163.7	2.295	56.9	0.151	46.2	0.181	-86.1
1.8	0.597	160.5	2.181	53.8	0.158	47.7	0.172	-89.9
1.9	0.600	157.0	2.065	51.2	0.165	48.0	0.165	-93.8
2.0	0.605	154.4	1.961	48.3	0.174	47.4	0.164	-99.0
2.1	0.609	151.8	1.860	46.0	0.177	47.6	0.155	-105.4
2.2	0.615	149.7	1.777	43.6	0.185	48.1	0.158	-110.6
2.3	0.621	147.8	1.702	41.3	0.192	47.9	0.154	-115.2
2.4	0.630	145.8	1.639	39.2	0.199	47.6	0.157	-122.8
2.5	0.636	143.7	1.586	37.0	0.208	47.8	0.155	-128.5
2.6	0.639	141.4	1.520	34.9	0.213	47.2	0.159	-133.1
2.7	0.650	139.5	1.463	32.8	0.220	47.0	0.160	-139.4
2.8	0.651	138.0	1.412	30.7	0.227	46.6	0.166	-143.8
2.9	0.650	136.1	1.363	28.5	0.238	46.8	0.171	-149.3
3.0	0.660	133.6	1.335	26.2	0.246	45.9	0.182	-153.2
4.0	0.727	119.4	1.027	9.1	0.319	39.2	0.305	168.2
5.0	0.766	106.9	0.821	-3.0	0.398	26.9	0.425	146.9

$V_{CE} = 2 \text{ V}$, $I_C = 7 \text{ mA}$, $Z_o = 50 \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.802	-45.9	18.711	151.1	0.032	69.2	0.878	-27.4
0.2	0.723	-81.9	15.009	129.1	0.051	50.4	0.681	-43.1
0.3	0.629	-107.3	11.524	114.8	0.061	48.0	0.546	-52.9
0.4	0.588	-126.5	9.192	104.9	0.072	44.9	0.436	-59.0
0.5	0.562	-139.3	7.548	97.9	0.080	44.8	0.368	-62.6
0.6	0.551	-148.8	6.424	92.8	0.083	46.6	0.313	-65.1
0.7	0.547	-156.7	5.569	88.2	0.091	45.3	0.275	-66.9
0.8	0.550	-162.5	4.976	84.5	0.097	47.0	0.247	-69.1
0.9	0.550	-168.4	4.460	80.4	0.104	47.8	0.223	-70.6
1.0	0.554	-173.6	4.045	76.6	0.110	48.7	0.203	-72.9
1.1	0.549	-178.1	3.698	73.3	0.117	50.0	0.191	-74.4
1.2	0.549	177.8	3.404	70.2	0.122	50.2	0.177	-77.8
1.3	0.548	174.2	3.128	67.1	0.131	50.5	0.169	-80.9
1.4	0.549	170.9	2.924	64.6	0.138	50.1	0.156	-84.2
1.5	0.556	167.6	2.740	62.0	0.144	50.9	0.148	-89.3
1.6	0.562	164.1	2.574	59.3	0.153	51.0	0.141	-94.4
1.7	0.567	161.3	2.441	56.7	0.158	50.3	0.136	-99.2
1.8	0.577	158.1	2.314	53.9	0.164	51.0	0.129	-104.2
1.9	0.582	154.9	2.194	51.2	0.174	50.7	0.125	-109.7
2.0	0.591	152.4	2.087	48.5	0.181	50.0	0.125	-115.5
2.1	0.595	150.2	1.973	46.4	0.188	49.5	0.121	-124.0
2.2	0.602	148.0	1.887	44.1	0.195	49.7	0.127	-130.2
2.3	0.606	146.0	1.804	41.9	0.202	49.2	0.123	-135.3
2.4	0.613	144.4	1.738	39.9	0.211	48.7	0.130	-143.2
2.5	0.621	142.3	1.682	37.7	0.219	48.2	0.132	-148.7
2.6	0.624	140.6	1.608	35.7	0.223	48.0	0.137	-153.3
2.7	0.636	138.5	1.550	33.5	0.231	47.4	0.142	-160.2
2.8	0.635	137.1	1.495	31.7	0.239	46.4	0.149	-163.6
2.9	0.637	135.1	1.446	29.3	0.249	46.5	0.158	-168.3
3.0	0.646	133.0	1.415	27.2	0.256	45.6	0.168	-171.3
4.0	0.714	119.1	1.091	10.4	0.325	37.7	0.296	158.1
5.0	0.753	106.9	0.872	-2.2	0.399	25.6	0.407	140.8

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

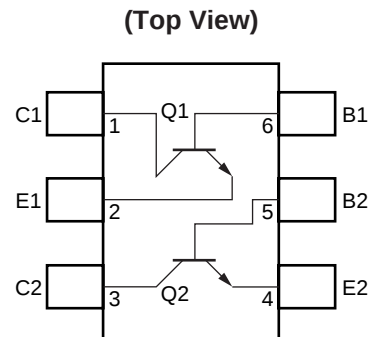
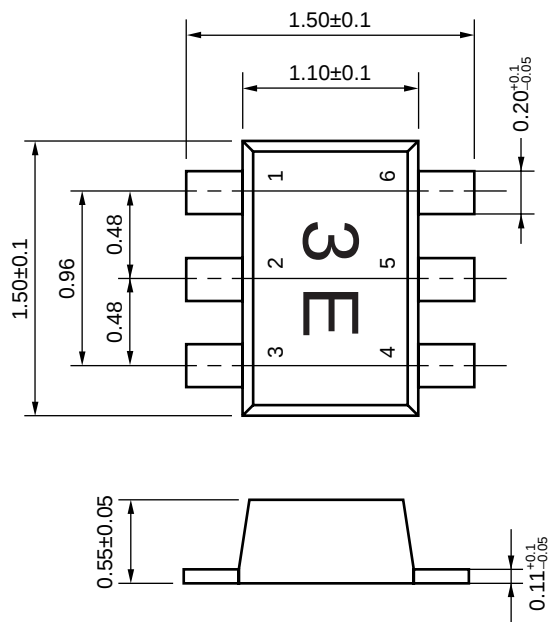
Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.750	-56.5	23.514	146.0	0.027	64.8	0.823	-33.9
0.2	0.644	-95.7	17.490	122.6	0.045	47.2	0.593	-51.3
0.3	0.572	-120.7	12.917	109.5	0.054	46.3	0.456	-60.9
0.4	0.541	-137.5	10.084	100.7	0.063	48.6	0.356	-67.2
0.5	0.526	-149.2	8.204	94.5	0.073	49.9	0.292	-70.9
0.6	0.523	-157.4	6.928	89.9	0.077	52.7	0.245	-74.0
0.7	0.521	-163.9	5.995	85.9	0.086	52.5	0.212	-76.3
0.8	0.523	-169.3	5.321	82.3	0.093	53.4	0.187	-79.3
0.9	0.527	-174.6	4.765	78.7	0.102	54.0	0.166	-81.7
1.0	0.531	-178.7	4.312	75.1	0.108	54.9	0.153	-85.3
1.1	0.526	177.4	3.932	72.2	0.117	55.8	0.139	-87.4
1.2	0.528	173.5	3.628	69.5	0.125	55.4	0.128	-92.4
1.3	0.529	170.1	3.328	66.6	0.135	55.2	0.122	-96.6
1.4	0.534	167.5	3.108	63.9	0.143	55.3	0.112	-101.6
1.5	0.537	164.5	2.906	61.5	0.149	55.0	0.110	-108.4
1.6	0.543	161.3	2.723	58.8	0.160	54.0	0.107	-115.8
1.7	0.551	158.6	2.583	56.8	0.165	53.3	0.104	-122.9
1.8	0.562	155.9	2.448	54.1	0.172	53.6	0.101	-129.8
1.9	0.567	152.4	2.323	51.5	0.181	53.0	0.100	-136.5
2.0	0.574	150.6	2.204	48.8	0.190	51.8	0.104	-143.6
2.1	0.578	148.1	2.090	46.8	0.197	51.6	0.109	-152.9
2.2	0.586	146.6	1.996	44.7	0.205	51.1	0.117	-156.8
2.3	0.591	144.5	1.905	42.4	0.214	50.1	0.117	-163.6
2.4	0.600	142.7	1.836	40.4	0.222	49.4	0.126	-169.5
2.5	0.607	141.2	1.774	38.5	0.230	48.7	0.132	-174.4
2.6	0.610	139.5	1.698	36.6	0.236	48.2	0.141	-177.7
2.7	0.622	137.2	1.636	34.4	0.242	47.6	0.147	177.2
2.8	0.624	136.0	1.578	32.5	0.250	46.6	0.156	175.1
2.9	0.624	134.2	1.527	30.4	0.261	46.2	0.167	171.3
3.0	0.636	132.0	1.493	28.4	0.267	45.3	0.176	169.7
4.0	0.702	119.0	1.156	11.7	0.333	36.2	0.301	147.8
5.0	0.744	106.9	0.927	-0.8	0.400	24.1	0.401	134.1

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

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.576	-82.7	32.751	133.7	0.019	74.7	0.684	-47.8
0.2	0.516	-122.3	20.941	111.9	0.033	49.5	0.430	-67.0
0.3	0.491	-143.9	14.639	101.4	0.039	56.1	0.309	-77.0
0.4	0.490	-156.1	11.171	94.7	0.051	59.8	0.235	-85.3
0.5	0.484	-164.6	9.005	89.8	0.065	60.6	0.188	-90.6
0.6	0.489	-170.0	7.567	86.3	0.072	63.7	0.157	-97.0
0.7	0.489	-175.5	6.505	82.5	0.082	62.6	0.134	-102.3
0.8	0.496	-179.0	5.770	79.5	0.090	62.8	0.119	-108.6
0.9	0.499	176.8	5.143	76.4	0.102	63.4	0.107	-115.2
1.0	0.506	173.6	4.652	73.3	0.112	62.7	0.101	-122.0
1.1	0.504	170.4	4.245	70.5	0.121	62.9	0.094	-127.8
1.2	0.507	167.5	3.891	67.9	0.130	61.6	0.092	-135.7
1.3	0.510	164.8	3.578	65.4	0.141	61.2	0.093	-142.2
1.4	0.514	162.2	3.339	63.2	0.151	60.2	0.091	-150.6
1.5	0.521	160.0	3.125	61.0	0.159	59.8	0.097	-157.2
1.6	0.527	157.0	2.931	58.4	0.171	58.4	0.102	-163.1
1.7	0.534	154.7	2.767	56.5	0.177	57.0	0.110	-168.7
1.8	0.545	152.2	2.633	53.7	0.184	56.7	0.115	-174.5
1.9	0.548	149.4	2.488	51.5	0.195	56.0	0.120	-179.7
2.0	0.560	147.7	2.358	49.3	0.205	54.3	0.129	176.7
2.1	0.565	145.5	2.233	47.1	0.210	53.3	0.139	171.2
2.2	0.571	143.9	2.132	45.1	0.221	52.6	0.149	169.6
2.3	0.575	142.3	2.034	42.9	0.229	51.4	0.156	165.1
2.4	0.586	140.8	1.960	41.0	0.237	50.5	0.167	162.2
2.5	0.594	139.3	1.892	39.1	0.246	49.5	0.174	158.6
2.6	0.595	137.6	1.809	37.3	0.252	48.6	0.183	156.7
2.7	0.610	135.7	1.743	35.2	0.258	47.4	0.192	153.6
2.8	0.609	134.4	1.678	33.5	0.265	46.5	0.198	152.8
2.9	0.610	132.5	1.627	31.3	0.276	46.0	0.210	150.2
3.0	0.620	130.6	1.588	29.4	0.283	44.7	0.218	149.4
4.0	0.689	118.1	1.231	13.3	0.343	34.7	0.334	135.3
5.0	0.733	106.8	0.996	0.9	0.403	22.3	0.412	124.5

PACKAGE DIMENSIONS

FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Collector (Q1)
2. Emitter (Q1)
3. Collector (Q2)
4. Emitter (Q2)
5. Base (Q2)
6. Base (Q1)

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M8E 00.4-0110

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► **Technical issue**

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