NEC

NPN SILICON RF TRANSISTOR
2SC5600

NPN SILICON RF TRANSISTOR
FLAT-LEAD 3-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Low voltage operation, low phase distortion
- Ideal for OSC applications
- Flat-lead 3-pin thin-type ultra super minimold (t = 0.59 mm)

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5600	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC5600-T1	3 kpcs/reel	• Pin 3 (collector) face the perforation side of the tape

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}	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	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−65 to +150	°C

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

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

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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	–	–	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	80	–	160	–
RF Characteristics						
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)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.5	4.0	–	dB
Insertion Power Gain (2)	$\lvert S_{21e} \rvert^2$	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

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

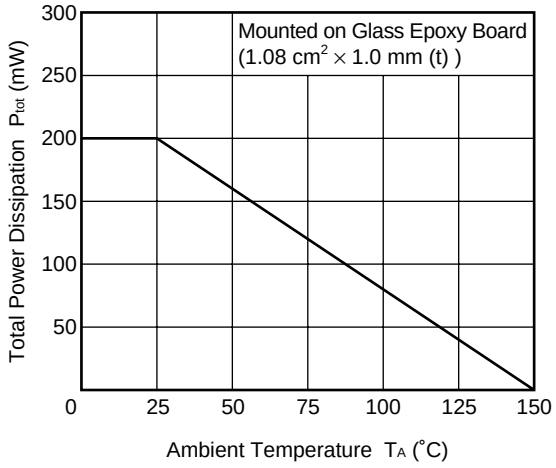
2. Collector to base capacitance measured using capacitance meter (self-balancing bridge method) when the emitter is connected to the guard pin

h_{FE} CLASSIFICATION

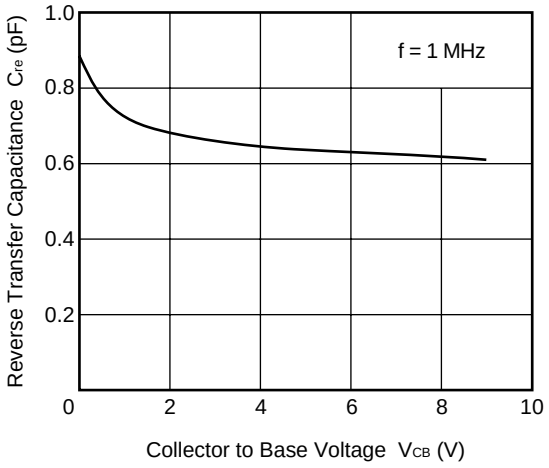
Rank	FB
Marking	TV
h_{FE} Value	80 to 160

TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25 °C)

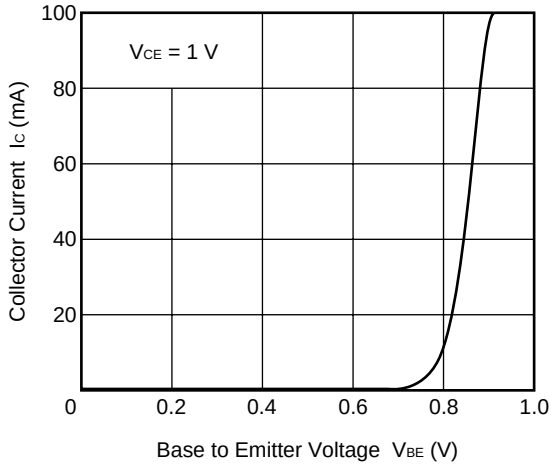
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



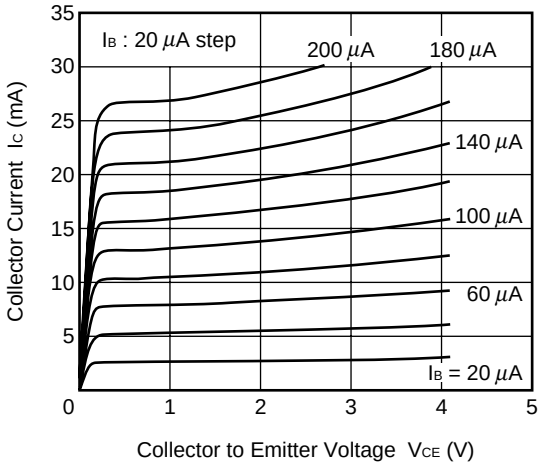
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



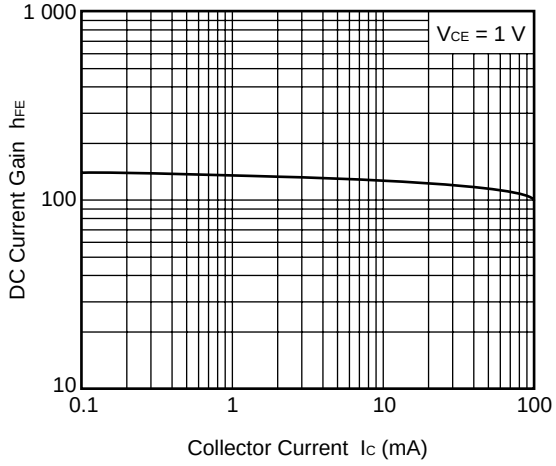
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



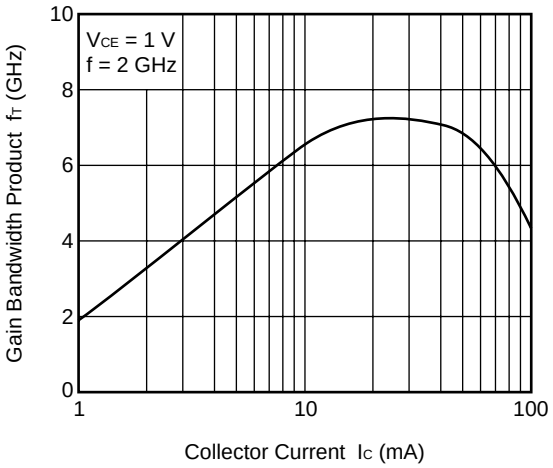
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



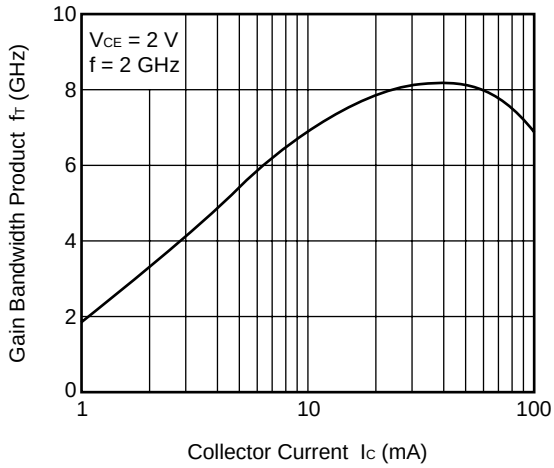
DC CURRENT GAIN vs. COLLECTOR CURRENT



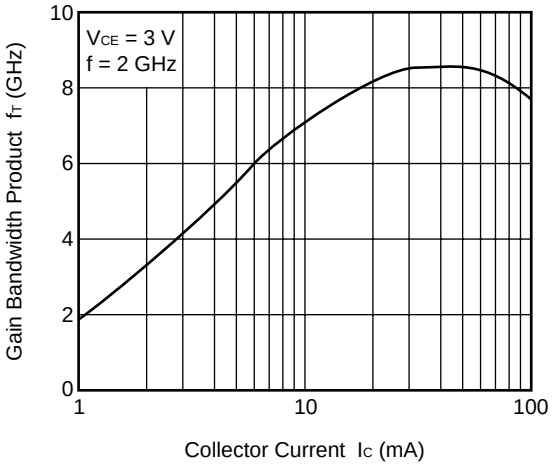
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



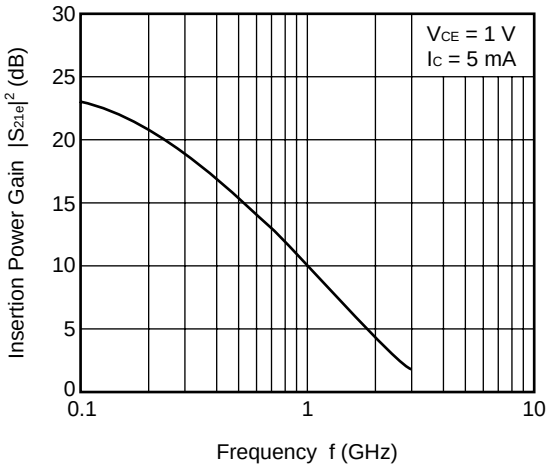
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



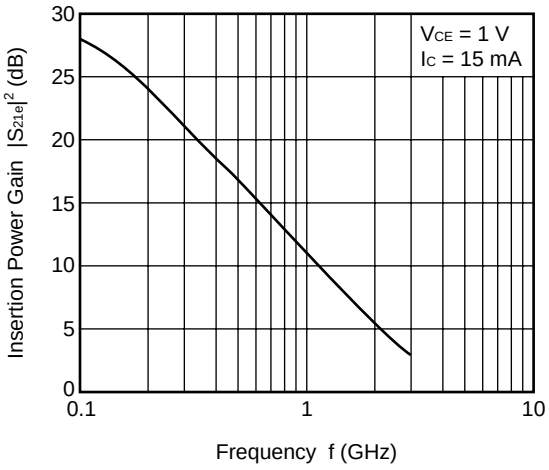
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



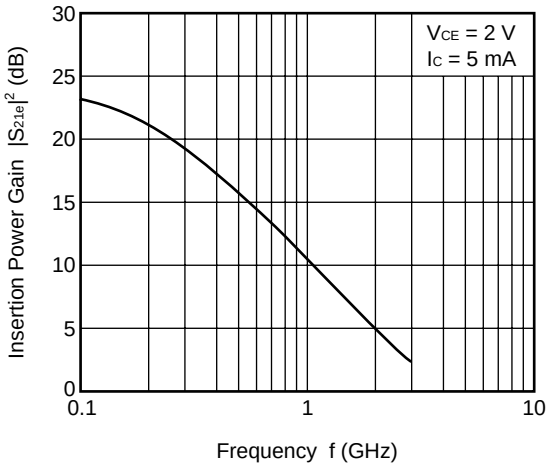
INSERTION POWER GAIN vs. FREQUENCY



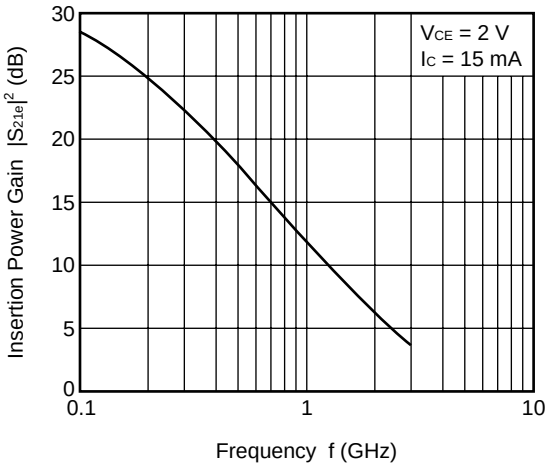
INSERTION POWER GAIN vs. FREQUENCY



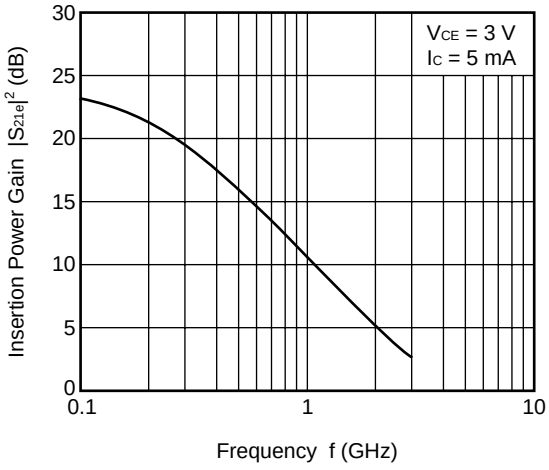
INSERTION POWER GAIN vs. FREQUENCY



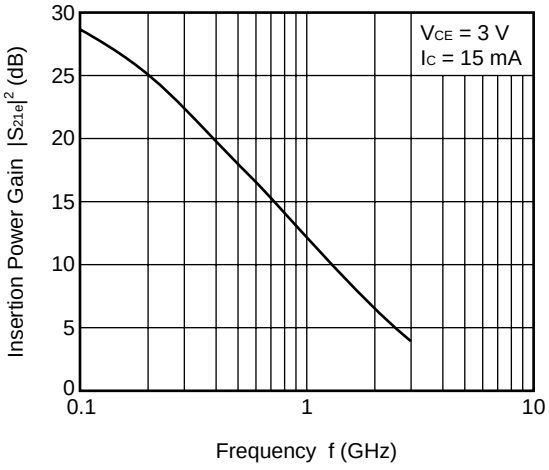
INSERTION POWER GAIN vs. FREQUENCY



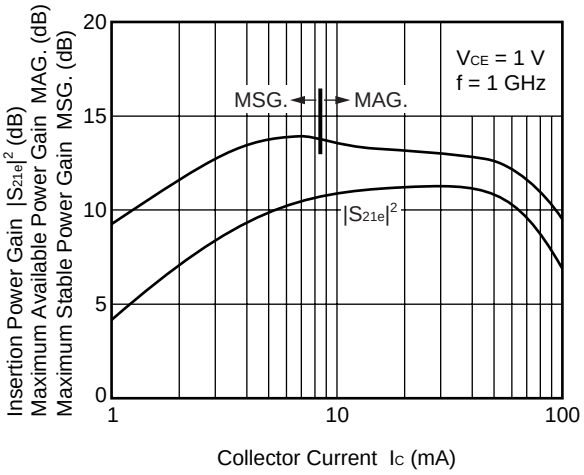
INSERTION POWER GAIN vs. FREQUENCY



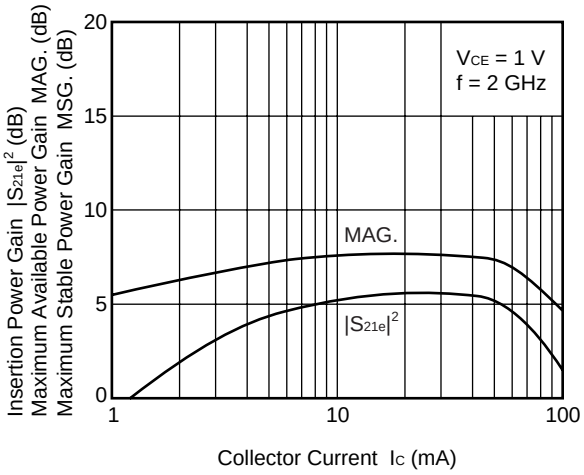
INSERTION POWER GAIN vs. FREQUENCY



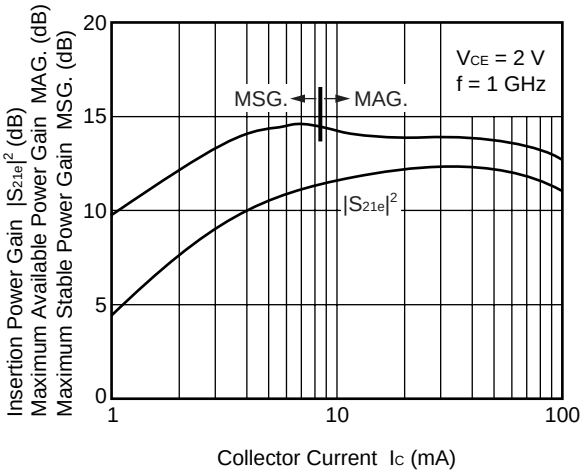
INSERTION POWER GAIN, MAG., MSG. vs. COLLECTOR CURRENT



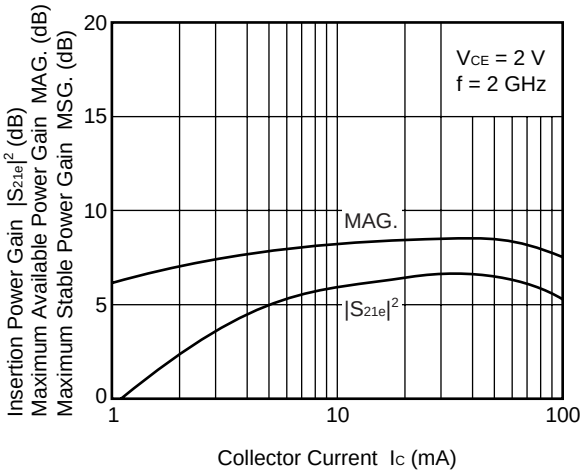
INSERTION POWER GAIN, MAG., MSG. vs. COLLECTOR CURRENT



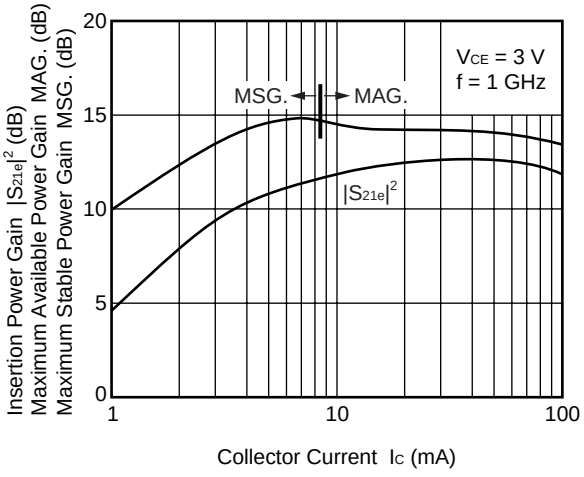
INSERTION POWER GAIN, MAG., MSG. vs. COLLECTOR CURRENT



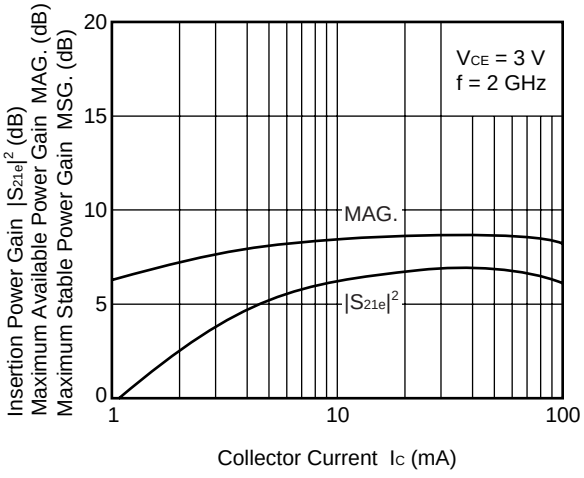
INSERTION POWER GAIN, MAG., MSG. vs. COLLECTOR CURRENT



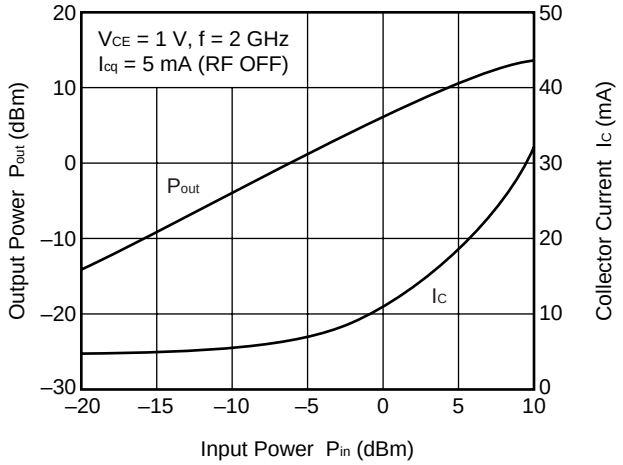
INSERTION POWER GAIN, MAG., MSG. vs. COLLECTOR CURRENT



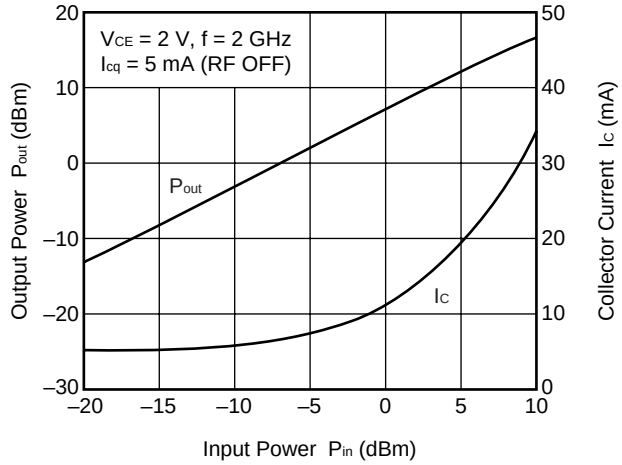
INSERTION POWER GAIN, MAG., MSG. vs. COLLECTOR CURRENT



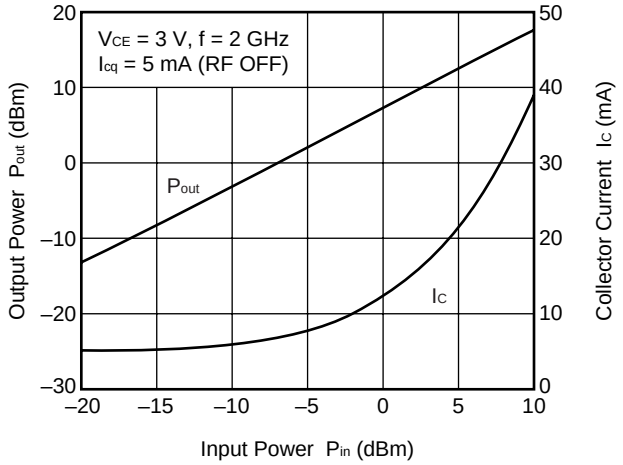
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



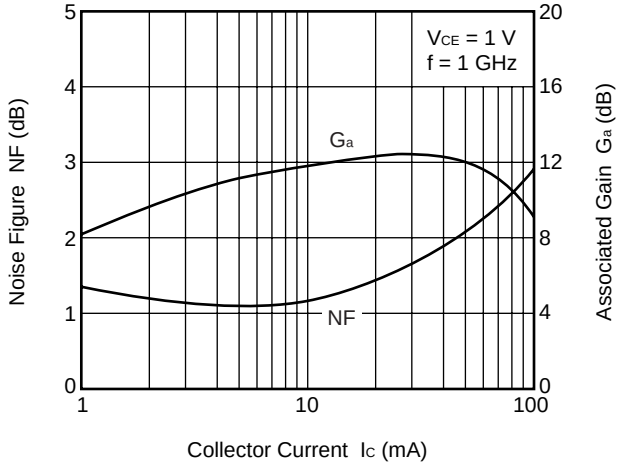
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



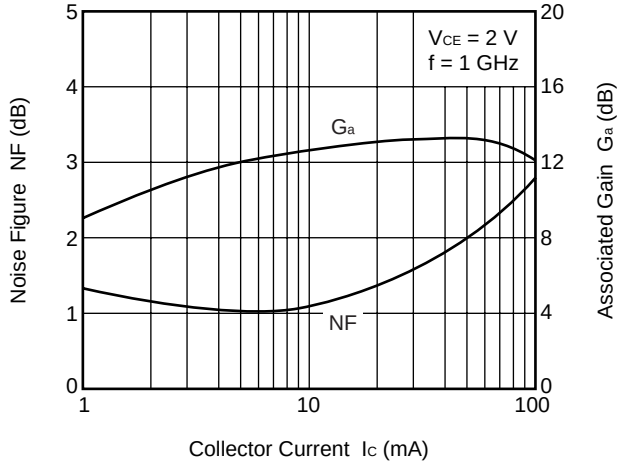
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



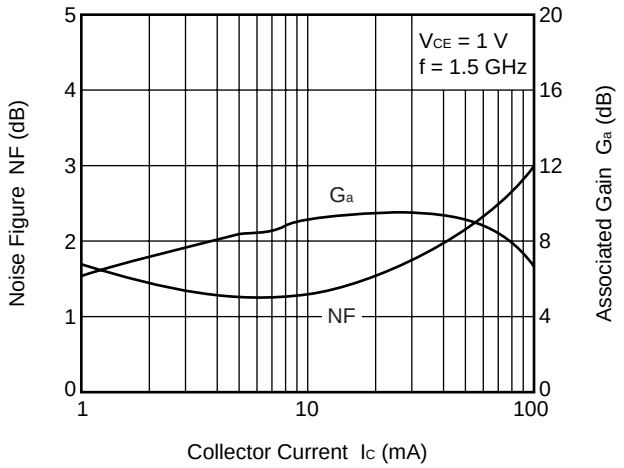
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



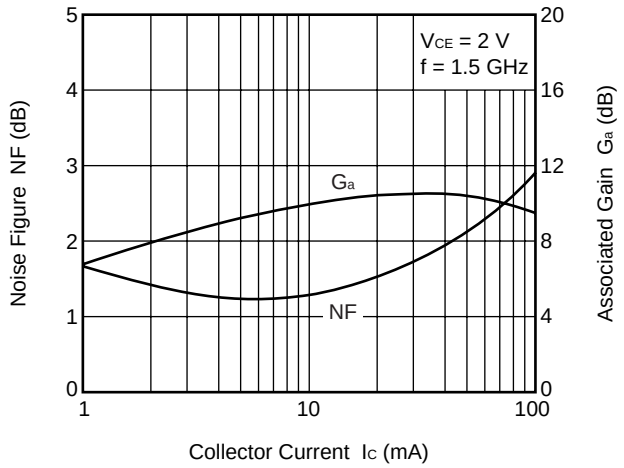
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



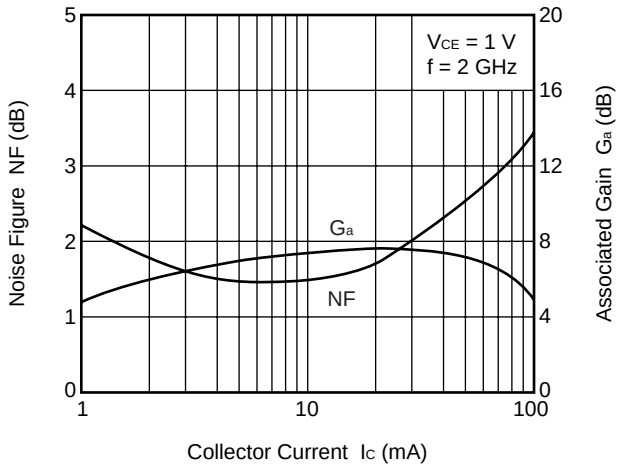
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



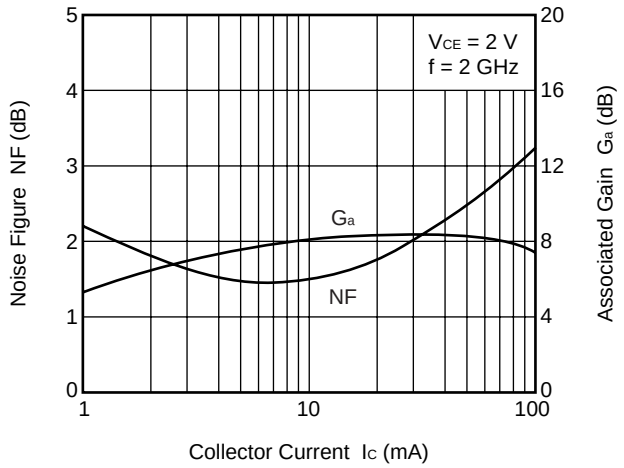
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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 = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.879	–34.2	9.505	156.9	0.049	71.7	0.931	–18.0
0.2	0.791	–64.2	8.170	137.6	0.082	57.5	0.795	–32.8
0.3	0.724	–87.6	6.755	124.1	0.103	48.3	0.665	–42.4
0.4	0.667	–105.5	5.654	113.4	0.115	42.8	0.564	–49.1
0.5	0.630	–119.7	4.819	105.3	0.122	39.5	0.485	–53.3
0.6	0.606	–131.3	4.165	98.7	0.127	37.8	0.427	–56.7
0.7	0.593	–140.5	3.672	93.3	0.131	37.2	0.382	–59.2
0.8	0.584	–148.2	3.270	88.4	0.135	37.1	0.348	–61.7
0.9	0.579	–155.4	2.952	84.0	0.138	37.4	0.320	–64.1
1.0	0.576	–161.3	2.688	79.8	0.141	38.3	0.299	–66.5
1.1	0.575	–166.5	2.473	76.1	0.144	39.3	0.280	–69.2
1.2	0.572	–171.2	2.285	73.1	0.148	40.5	0.266	–71.9
1.3	0.578	–175.8	2.141	69.6	0.151	41.9	0.254	–75.0
1.4	0.581	–179.6	1.999	66.5	0.156	43.3	0.243	–78.1
1.5	0.587	176.6	1.882	63.5	0.161	44.6	0.236	–81.8
1.6	0.589	173.4	1.771	60.6	0.166	46.0	0.228	–85.6
1.7	0.594	170.2	1.685	57.8	0.171	47.4	0.222	–89.5
1.8	0.602	167.4	1.603	55.4	0.178	48.7	0.219	–93.8
1.9	0.606	164.6	1.522	53.0	0.185	49.7	0.216	–98.4
2.0	0.613	162.0	1.456	50.6	0.193	50.8	0.215	–102.8
2.1	0.623	159.9	1.395	48.2	0.200	52.1	0.213	–107.7
2.2	0.624	157.8	1.345	46.2	0.209	53.3	0.216	–112.2
2.3	0.633	155.8	1.295	43.8	0.218	54.0	0.220	–117.6
2.4	0.636	153.9	1.253	41.9	0.226	54.6	0.222	–122.2
2.5	0.645	152.0	1.215	40.0	0.236	55.1	0.228	–127.5
2.6	0.645	150.4	1.169	38.3	0.246	55.6	0.235	–131.7
2.7	0.653	148.7	1.142	36.6	0.256	55.9	0.244	–136.5
2.8	0.655	147.0	1.102	34.8	0.266	56.1	0.250	–140.9
2.9	0.659	145.6	1.075	32.7	0.276	56.0	0.262	–144.4
3.0	0.664	143.5	1.057	31.8	0.287	55.8	0.267	–148.8
4.0	0.708	128.4	0.843	20.3	0.405	48.5	0.388	178.6
5.0	0.743	117.6	0.697	14.6	0.488	39.7	0.508	156.5

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.798	–44.9	14.116	150.2	0.043	66.9	0.873	–26.2
0.2	0.692	–81.1	11.134	128.8	0.071	53.6	0.678	–44.4
0.3	0.621	–105.4	8.632	115.7	0.085	47.0	0.528	–54.7
0.4	0.582	–122.8	6.951	106.2	0.093	44.8	0.427	–61.6
0.5	0.558	–135.8	5.786	99.3	0.100	44.0	0.355	–66.0
0.6	0.545	–145.7	4.929	93.8	0.106	44.6	0.304	–69.8
0.7	0.538	–153.6	4.295	89.2	0.112	45.6	0.266	–72.8
0.8	0.534	–159.9	3.799	85.0	0.119	46.8	0.238	–76.0
0.9	0.536	–165.9	3.413	81.3	0.125	47.8	0.215	–79.2
1.0	0.534	–170.8	3.094	77.8	0.132	49.2	0.197	–82.4
1.1	0.536	–175.0	2.839	74.5	0.140	50.2	0.183	–86.5
1.2	0.535	–179.3	2.614	71.8	0.147	51.2	0.172	–90.4
1.3	0.542	177.2	2.438	68.8	0.154	52.1	0.164	–94.7
1.4	0.547	174.1	2.277	65.9	0.163	53.0	0.156	–99.3
1.5	0.554	170.7	2.138	63.4	0.171	53.5	0.152	–104.6
1.6	0.556	167.9	2.008	60.7	0.179	54.0	0.148	–109.9
1.7	0.564	165.1	1.911	58.3	0.188	54.5	0.146	–115.2
1.8	0.571	162.9	1.814	56.1	0.197	54.8	0.146	–120.7
1.9	0.577	160.3	1.726	53.8	0.206	55.0	0.147	–126.2
2.0	0.586	158.2	1.647	51.7	0.215	55.0	0.149	–131.1
2.1	0.592	156.4	1.577	49.4	0.224	55.5	0.152	–136.7
2.2	0.596	154.5	1.515	47.6	0.234	55.7	0.157	–141.1
2.3	0.602	153.0	1.463	45.4	0.244	55.6	0.166	–146.4
2.4	0.607	151.0	1.416	43.5	0.253	55.5	0.171	–150.5
2.5	0.614	149.6	1.369	41.7	0.262	55.3	0.181	–155.0
2.6	0.619	147.8	1.318	40.1	0.272	55.2	0.189	–158.4
2.7	0.624	146.5	1.285	38.4	0.282	55.1	0.200	–162.2
2.8	0.629	144.9	1.242	36.7	0.291	54.7	0.208	–165.8
2.9	0.629	143.6	1.214	34.7	0.300	54.3	0.219	–168.2
3.0	0.636	141.7	1.193	33.7	0.309	53.9	0.227	–171.5
4.0	0.685	128.4	0.956	21.4	0.411	45.7	0.345	166.0
5.0	0.728	118.0	0.782	13.7	0.483	38.3	0.464	150.0

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.649	–67.5	21.588	138.8	0.036	61.8	0.742	–41.0
0.2	0.553	–108.2	14.622	116.9	0.054	53.3	0.497	–62.4
0.3	0.519	–130.6	10.550	105.8	0.063	51.8	0.358	–74.0
0.4	0.502	–144.9	8.209	98.3	0.072	53.4	0.279	–82.4
0.5	0.495	–155.1	6.684	93.0	0.082	55.1	0.225	–88.7
0.6	0.493	–162.3	5.624	88.7	0.091	56.9	0.190	–95.1
0.7	0.494	–167.8	4.880	85.0	0.102	58.3	0.165	–101.1
0.8	0.493	–172.3	4.293	81.7	0.112	59.4	0.149	–107.2
0.9	0.498	–177.2	3.839	78.7	0.122	60.0	0.136	–113.9
1.0	0.501	179.1	3.474	75.6	0.133	60.7	0.127	–120.2
1.1	0.505	175.8	3.179	72.8	0.143	60.9	0.123	–127.3
1.2	0.507	172.8	2.920	70.5	0.154	61.0	0.121	–133.6
1.3	0.515	169.8	2.722	67.9	0.164	61.0	0.121	–139.3
1.4	0.520	167.2	2.537	65.4	0.175	61.0	0.122	–145.8
1.5	0.526	164.5	2.377	63.1	0.186	60.5	0.126	–151.3
1.6	0.531	162.1	2.229	60.7	0.196	60.2	0.130	–156.7
1.7	0.539	159.9	2.116	58.6	0.206	59.8	0.135	–161.7
1.8	0.548	158.1	2.011	56.6	0.217	59.4	0.141	–166.1
1.9	0.554	155.9	1.911	54.6	0.228	58.8	0.149	–170.1
2.0	0.561	154.4	1.823	52.5	0.238	58.1	0.155	–173.5
2.1	0.569	152.6	1.747	50.6	0.248	57.9	0.163	–177.2
2.2	0.570	151.3	1.676	49.1	0.258	57.5	0.170	–179.8
2.3	0.580	150.0	1.614	46.8	0.269	56.7	0.182	177.4
2.4	0.583	148.1	1.558	45.0	0.278	56.1	0.189	174.8
2.5	0.590	146.7	1.508	43.3	0.287	55.5	0.200	172.5
2.6	0.594	145.4	1.454	42.0	0.298	54.9	0.208	170.6
2.7	0.602	144.0	1.416	40.2	0.307	54.4	0.220	168.5
2.8	0.606	142.8	1.369	38.5	0.316	53.8	0.228	166.1
2.9	0.606	141.8	1.338	36.6	0.324	53.2	0.239	165.3
3.0	0.612	139.9	1.317	35.7	0.333	52.5	0.246	163.1
4.0	0.662	127.7	1.059	23.3	0.421	43.1	0.345	150.2
5.0	0.711	118.2	0.873	14.8	0.481	36.2	0.445	140.3

V_{CE} = 1 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.490	–97.1	27.833	127.2	0.028	58.2	0.585	–57.5
0.2	0.476	–135.0	16.651	107.8	0.041	57.8	0.351	–81.8
0.3	0.468	–152.3	11.528	99.1	0.052	60.9	0.250	–95.9
0.4	0.470	–161.6	8.803	93.3	0.064	63.9	0.198	–107.7
0.5	0.472	–168.5	7.120	89.0	0.076	65.6	0.166	–117.6
0.6	0.475	–173.6	5.979	85.3	0.088	66.8	0.149	–127.3
0.7	0.480	–178.0	5.160	82.4	0.100	67.4	0.139	–135.9
0.8	0.480	178.9	4.534	79.5	0.113	67.6	0.135	–143.4
0.9	0.486	175.3	4.042	76.7	0.125	67.3	0.132	–150.8
1.0	0.490	172.3	3.655	74.0	0.137	67.2	0.133	–156.7
1.1	0.496	169.7	3.340	71.6	0.150	66.7	0.137	–162.5
1.2	0.497	167.2	3.067	69.5	0.162	66.1	0.141	–167.0
1.3	0.505	164.9	2.851	67.1	0.174	65.5	0.146	–170.8
1.4	0.513	162.5	2.660	64.8	0.185	64.8	0.152	–175.0
1.5	0.521	160.6	2.489	62.7	0.197	63.9	0.160	–178.3
1.6	0.525	158.5	2.337	60.4	0.208	63.2	0.167	178.2
1.7	0.532	156.8	2.217	58.5	0.219	62.4	0.175	175.2
1.8	0.541	155.0	2.101	56.5	0.231	61.6	0.183	172.3
1.9	0.546	153.0	1.994	54.8	0.242	60.6	0.192	169.9
2.0	0.556	151.6	1.904	52.9	0.253	59.5	0.199	167.6
2.1	0.563	149.8	1.823	50.9	0.263	59.0	0.208	165.3
2.2	0.564	148.9	1.749	49.5	0.274	58.2	0.215	163.5
2.3	0.571	147.5	1.683	47.4	0.284	57.2	0.227	161.6
2.4	0.578	146.2	1.625	45.8	0.294	56.3	0.234	159.8
2.5	0.585	144.9	1.574	44.1	0.303	55.6	0.245	158.3
2.6	0.589	143.6	1.518	42.7	0.314	54.7	0.252	156.8
2.7	0.595	142.3	1.475	41.0	0.323	54.1	0.263	155.4
2.8	0.599	141.0	1.428	39.5	0.332	53.3	0.272	153.3
2.9	0.601	140.0	1.395	37.6	0.340	52.5	0.281	153.0
3.0	0.606	138.7	1.371	36.7	0.348	51.8	0.287	151.3
4.0	0.653	126.9	1.105	24.6	0.430	41.5	0.371	141.2
5.0	0.702	117.9	0.917	15.8	0.482	34.8	0.456	133.7

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.879	–30.3	9.607	158.2	0.042	72.7	0.941	–15.6
0.2	0.803	–60.1	8.400	139.9	0.074	59.7	0.820	–28.8
0.3	0.723	–82.5	7.040	126.5	0.094	50.5	0.698	–37.4
0.4	0.672	–100.2	5.943	115.9	0.105	45.1	0.601	–43.4
0.5	0.630	–114.6	5.099	107.6	0.113	41.7	0.523	–46.9
0.6	0.599	–126.4	4.429	101.0	0.118	40.0	0.466	–49.6
0.7	0.586	–136.2	3.912	95.6	0.122	39.2	0.421	–51.5
0.8	0.574	–144.0	3.489	90.6	0.125	39.2	0.387	–53.5
0.9	0.566	–151.4	3.151	86.2	0.129	39.6	0.359	–55.1
1.0	0.560	–157.8	2.871	82.0	0.131	40.5	0.336	–56.8
1.1	0.559	–163.2	2.646	78.3	0.135	41.5	0.317	–59.0
1.2	0.556	–168.1	2.440	75.2	0.138	42.8	0.302	–60.9
1.3	0.560	–173.1	2.286	71.8	0.141	44.1	0.289	–63.3
1.4	0.564	–177.1	2.138	68.7	0.146	45.7	0.278	–65.6
1.5	0.568	179.0	2.010	65.8	0.151	47.0	0.268	–68.6
1.6	0.570	175.6	1.891	62.8	0.156	48.6	0.259	–71.7
1.7	0.577	172.3	1.803	60.2	0.161	50.1	0.251	–74.8
1.8	0.582	169.5	1.711	57.7	0.168	51.4	0.246	–78.3
1.9	0.587	166.4	1.628	55.2	0.175	52.6	0.240	–82.2
2.0	0.597	163.8	1.554	52.7	0.183	53.7	0.236	–86.1
2.1	0.603	161.6	1.492	50.4	0.190	55.2	0.232	–90.3
2.2	0.603	159.5	1.434	48.5	0.198	56.3	0.231	–94.6
2.3	0.612	157.6	1.386	46.2	0.207	57.1	0.231	–99.8
2.4	0.616	155.2	1.337	44.2	0.216	57.8	0.230	–104.2
2.5	0.624	153.5	1.294	42.2	0.225	58.3	0.232	–109.6
2.6	0.630	151.9	1.249	40.5	0.236	58.9	0.236	–114.0
2.7	0.637	150.2	1.219	38.7	0.246	59.3	0.241	–119.2
2.8	0.642	148.3	1.174	36.8	0.256	59.4	0.245	–123.9
2.9	0.642	146.9	1.146	34.8	0.266	59.3	0.252	–128.1
3.0	0.647	144.8	1.127	33.8	0.277	59.2	0.255	–132.9
4.0	0.695	129.7	0.893	21.6	0.400	51.9	0.362	–170.9
5.0	0.735	118.6	0.728	14.8	0.489	42.6	0.485	163.1

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.802	–40.4	14.368	152.0	0.038	69.0	0.890	–22.7
0.2	0.697	–75.5	11.589	131.3	0.064	56.0	0.712	–38.9
0.3	0.623	–99.1	9.110	118.2	0.078	49.7	0.566	–47.9
0.4	0.576	–116.7	7.387	108.5	0.086	46.9	0.465	–53.5
0.5	0.543	–130.0	6.174	101.4	0.093	45.9	0.392	–56.6
0.6	0.529	–140.4	5.273	95.8	0.099	46.4	0.340	–59.1
0.7	0.518	–148.6	4.614	91.2	0.105	47.4	0.301	–60.8
0.8	0.514	–155.6	4.083	87.1	0.111	48.6	0.272	–62.7
0.9	0.510	–162.1	3.670	83.4	0.118	49.6	0.247	–64.5
1.0	0.510	–167.4	3.329	79.8	0.124	51.0	0.229	–66.4
1.1	0.512	–171.7	3.059	76.6	0.131	52.1	0.212	–69.0
1.2	0.510	–176.1	2.813	73.8	0.138	53.1	0.200	–71.6
1.3	0.517	179.8	2.626	70.8	0.145	54.1	0.189	–74.3
1.4	0.522	176.5	2.453	68.0	0.153	55.0	0.179	–77.6
1.5	0.528	173.1	2.301	65.5	0.161	55.5	0.171	–81.4
1.6	0.530	169.9	2.162	62.8	0.169	56.2	0.164	–85.6
1.7	0.538	167.4	2.057	60.4	0.177	56.7	0.158	–89.7
1.8	0.545	165.0	1.952	58.2	0.186	57.2	0.153	–94.6
1.9	0.550	162.3	1.854	55.9	0.195	57.4	0.150	–99.7
2.0	0.560	160.1	1.770	53.6	0.205	57.5	0.148	–104.7
2.1	0.569	158.0	1.697	51.5	0.213	58.1	0.146	–110.4
2.2	0.568	156.3	1.634	49.8	0.222	58.3	0.147	–115.4
2.3	0.578	154.8	1.573	47.4	0.232	58.3	0.150	–121.6
2.4	0.583	152.9	1.518	45.7	0.241	58.1	0.153	–126.8
2.5	0.590	151.4	1.470	43.7	0.250	58.0	0.158	–132.8
2.6	0.593	149.7	1.420	42.2	0.261	58.0	0.164	–137.1
2.7	0.602	148.2	1.382	40.3	0.270	57.8	0.172	–142.2
2.8	0.607	146.7	1.336	38.6	0.279	57.6	0.177	–146.8
2.9	0.609	145.5	1.302	36.7	0.289	57.2	0.187	–150.4
3.0	0.615	143.3	1.279	35.6	0.299	56.8	0.193	–154.9
4.0	0.667	129.9	1.020	22.7	0.404	48.9	0.307	176.0
5.0	0.718	119.4	0.827	14.1	0.481	40.9	0.432	156.5

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.654	–60.6	22.387	141.1	0.033	65.9	0.772	–35.4
0.2	0.553	–101.1	15.613	119.3	0.050	54.9	0.533	–54.3
0.3	0.501	–124.0	11.386	108.0	0.059	54.0	0.389	–63.2
0.4	0.477	–138.7	8.895	100.4	0.068	55.0	0.305	–68.8
0.5	0.463	–149.6	7.269	94.7	0.077	56.3	0.247	–72.2
0.6	0.458	–157.6	6.123	90.5	0.086	58.3	0.208	–75.7
0.7	0.460	–164.0	5.297	86.7	0.095	59.7	0.179	–78.6
0.8	0.460	–168.8	4.672	83.4	0.105	60.8	0.158	–81.9
0.9	0.463	–173.8	4.185	80.4	0.115	61.5	0.141	–85.6
1.0	0.465	–177.9	3.783	77.3	0.125	62.2	0.128	–89.6
1.1	0.468	178.7	3.465	74.5	0.135	62.4	0.118	–95.0
1.2	0.470	175.1	3.182	72.3	0.146	62.6	0.110	–100.2
1.3	0.477	172.3	2.964	69.8	0.155	62.7	0.105	–105.9
1.4	0.484	169.4	2.764	67.2	0.166	62.6	0.100	–112.5
1.5	0.492	166.6	2.588	65.1	0.176	62.4	0.099	–119.4
1.6	0.496	164.4	2.429	62.7	0.186	62.1	0.098	–126.9
1.7	0.503	162.2	2.306	60.5	0.196	61.8	0.098	–133.6
1.8	0.513	160.1	2.189	58.5	0.207	61.4	0.101	–140.4
1.9	0.519	158.0	2.079	56.5	0.216	60.8	0.105	–146.9
2.0	0.528	156.1	1.982	54.5	0.227	60.3	0.109	–152.2
2.1	0.535	154.3	1.901	52.6	0.236	60.0	0.114	–157.9
2.2	0.538	153.2	1.824	51.0	0.247	59.7	0.120	–162.1
2.3	0.547	151.6	1.757	48.8	0.257	59.0	0.130	–166.8
2.4	0.550	150.0	1.694	47.1	0.266	58.4	0.136	–170.6
2.5	0.560	148.7	1.639	45.4	0.275	57.9	0.147	–174.4
2.6	0.566	147.2	1.582	43.8	0.286	57.3	0.154	–176.9
2.7	0.572	145.8	1.538	42.2	0.295	56.8	0.165	179.9
2.8	0.576	144.6	1.490	40.5	0.304	56.2	0.173	176.9
2.9	0.578	143.6	1.453	38.6	0.313	55.5	0.184	175.5
3.0	0.585	141.8	1.425	37.7	0.321	55.0	0.191	172.6
4.0	0.639	129.6	1.140	24.9	0.412	45.8	0.295	157.1
5.0	0.696	119.8	0.936	15.5	0.477	38.7	0.403	145.6

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.494	–87.3	29.582	130.0	0.027	61.6	0.621	–49.5
0.2	0.449	–126.7	18.203	110.0	0.039	60.1	0.378	–69.3
0.3	0.432	–145.5	12.701	101.0	0.049	62.4	0.264	–78.9
0.4	0.427	–156.5	9.708	94.8	0.060	65.2	0.202	–86.3
0.5	0.426	–164.3	7.867	90.4	0.071	66.8	0.161	–92.2
0.6	0.429	–169.8	6.599	86.9	0.083	68.0	0.135	–98.7
0.7	0.432	–174.4	5.699	83.9	0.094	68.6	0.116	–105.3
0.8	0.434	–178.5	5.010	81.0	0.106	68.7	0.105	–112.2
0.9	0.440	178.2	4.470	78.3	0.118	68.7	0.096	–120.2
1.0	0.444	174.8	4.035	75.7	0.130	68.5	0.091	–127.4
1.1	0.448	172.3	3.691	73.3	0.141	68.1	0.090	–135.7
1.2	0.452	169.4	3.390	71.2	0.153	67.6	0.091	–142.8
1.3	0.459	167.0	3.154	68.9	0.164	67.1	0.093	–149.0
1.4	0.465	164.9	2.935	66.7	0.176	66.4	0.096	–155.9
1.5	0.474	162.5	2.753	64.6	0.187	65.6	0.102	–161.2
1.6	0.481	160.2	2.583	62.4	0.198	65.0	0.108	–166.9
1.7	0.486	158.6	2.445	60.4	0.208	64.2	0.114	–171.7
1.8	0.497	157.1	2.322	58.6	0.220	63.4	0.122	–176.1
1.9	0.503	154.7	2.205	56.7	0.230	62.5	0.130	–179.7
2.0	0.515	153.7	2.101	54.9	0.241	61.6	0.137	177.1
2.1	0.520	152.0	2.011	53.0	0.251	61.0	0.145	173.7
2.2	0.524	150.6	1.930	51.6	0.261	60.3	0.152	171.4
2.3	0.532	149.5	1.859	49.6	0.272	59.3	0.164	169.1
2.4	0.536	148.2	1.790	47.8	0.282	58.5	0.172	166.8
2.5	0.544	147.1	1.732	46.2	0.291	57.8	0.183	164.8
2.6	0.550	145.7	1.670	44.8	0.302	57.0	0.190	163.1
2.7	0.557	144.4	1.622	43.3	0.311	56.3	0.201	161.2
2.8	0.561	143.1	1.570	41.6	0.319	55.5	0.210	158.9
2.9	0.565	142.1	1.531	39.7	0.328	54.8	0.219	158.5
3.0	0.570	140.3	1.506	38.7	0.336	54.0	0.226	156.5
4.0	0.627	129.1	1.205	26.3	0.420	44.1	0.317	146.0
5.0	0.684	119.9	0.993	17.0	0.477	37.1	0.410	137.7

V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.884	–29.6	9.655	158.7	0.040	73.3	0.945	–14.9
0.2	0.811	–58.1	8.482	140.7	0.072	60.9	0.829	–27.6
0.3	0.733	–80.6	7.138	127.5	0.091	51.5	0.710	–36.0
0.4	0.674	–98.1	6.060	116.8	0.102	45.9	0.614	–41.8
0.5	0.630	–112.5	5.211	108.6	0.110	42.4	0.537	–45.1
0.6	0.598	–124.2	4.527	101.8	0.115	40.8	0.479	–47.7
0.7	0.582	–134.0	4.000	96.5	0.119	39.9	0.434	–49.4
0.8	0.568	–142.2	3.571	91.6	0.123	40.0	0.400	–51.2
0.9	0.560	–149.9	3.230	87.0	0.126	40.3	0.372	–52.8
1.0	0.557	–156.3	2.947	82.9	0.129	41.2	0.349	–54.4
1.1	0.552	–161.8	2.712	79.2	0.132	42.2	0.329	–56.4
1.2	0.549	–166.8	2.503	76.1	0.136	43.5	0.314	–58.1
1.3	0.553	–171.7	2.346	72.7	0.139	44.9	0.301	–60.1
1.4	0.555	–175.8	2.194	69.6	0.144	46.4	0.288	–62.4
1.5	0.558	–179.6	2.058	66.7	0.149	47.7	0.280	–65.2
1.6	0.564	176.5	1.943	63.7	0.153	49.2	0.269	–68.0
1.7	0.568	173.3	1.849	61.1	0.159	50.7	0.262	–70.9
1.8	0.576	170.6	1.755	58.6	0.166	52.1	0.255	–74.3
1.9	0.580	167.3	1.669	56.0	0.172	53.4	0.249	–77.9
2.0	0.589	164.7	1.596	53.7	0.180	54.4	0.244	–81.6
2.1	0.595	162.3	1.531	51.3	0.187	56.0	0.239	–85.5
2.2	0.597	160.2	1.472	49.4	0.195	57.2	0.238	–89.6
2.3	0.605	158.4	1.421	47.0	0.204	57.9	0.236	–94.6
2.4	0.608	156.1	1.376	45.0	0.213	58.6	0.235	–98.9
2.5	0.616	154.2	1.328	43.1	0.222	59.1	0.235	–104.2
2.6	0.622	152.6	1.281	41.3	0.233	59.8	0.238	–108.6
2.7	0.627	150.7	1.248	39.6	0.243	60.1	0.242	–113.8
2.8	0.633	148.9	1.207	37.6	0.253	60.3	0.244	–118.4
2.9	0.634	147.6	1.176	35.8	0.263	60.1	0.250	–122.7
3.0	0.639	145.4	1.151	34.6	0.274	60.1	0.252	–127.6
4.0	0.689	130.4	0.914	22.1	0.397	53.0	0.353	–167.2
5.0	0.732	119.0	0.745	15.1	0.489	43.5	0.476	165.6

V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.806	–39.1	14.409	152.8	0.037	71.7	0.895	–21.5
0.2	0.713	–72.7	11.717	132.4	0.062	57.2	0.725	–37.1
0.3	0.625	–96.4	9.270	119.2	0.076	50.2	0.581	–45.8
0.4	0.574	–113.7	7.549	109.5	0.085	47.6	0.481	–51.3
0.5	0.543	–127.4	6.322	102.5	0.091	46.5	0.407	–54.1
0.6	0.522	–137.9	5.405	96.7	0.098	47.0	0.354	–56.4
0.7	0.513	–146.3	4.735	92.1	0.104	47.9	0.315	–57.8
0.8	0.506	–153.5	4.190	87.9	0.110	49.1	0.285	–59.4
0.9	0.504	–160.3	3.767	84.2	0.116	50.0	0.260	–61.0
1.0	0.499	–165.7	3.420	80.5	0.122	51.5	0.241	–62.6
1.1	0.500	–170.4	3.136	77.3	0.129	52.5	0.224	–64.8
1.2	0.499	–174.8	2.890	74.6	0.136	53.6	0.211	–67.0
1.3	0.506	–178.7	2.698	71.6	0.143	54.5	0.200	–69.5
1.4	0.511	177.8	2.516	68.8	0.151	55.5	0.189	–72.3
1.5	0.517	174.4	2.361	66.3	0.159	56.0	0.181	–75.8
1.6	0.519	171.2	2.221	63.7	0.167	56.6	0.172	–79.6
1.7	0.527	168.5	2.111	61.3	0.174	57.2	0.165	–83.4
1.8	0.536	166.1	2.005	58.9	0.183	57.7	0.160	–87.6
1.9	0.541	163.2	1.905	56.7	0.192	57.9	0.155	–92.5
2.0	0.550	161.0	1.820	54.5	0.202	58.1	0.152	–97.2
2.1	0.557	159.0	1.742	52.4	0.210	58.6	0.148	–102.3
2.2	0.558	157.3	1.676	50.5	0.219	59.0	0.149	–107.4
2.3	0.568	155.9	1.616	48.4	0.229	58.9	0.150	–113.7
2.4	0.575	153.6	1.559	46.4	0.238	58.8	0.151	–118.8
2.5	0.580	152.1	1.509	44.6	0.247	58.7	0.155	–125.2
2.6	0.586	150.5	1.457	42.9	0.257	58.7	0.159	–129.6
2.7	0.593	149.0	1.419	41.2	0.267	58.6	0.166	–135.3
2.8	0.597	147.4	1.369	39.4	0.276	58.3	0.170	–140.1
2.9	0.600	146.1	1.338	37.4	0.285	57.9	0.179	–144.1
3.0	0.605	144.1	1.309	36.3	0.295	57.5	0.183	–148.9
4.0	0.660	130.5	1.045	23.3	0.401	49.8	0.294	179.5
5.0	0.712	120.0	0.847	14.5	0.480	41.9	0.420	158.9

V_{CE} = 3 V, I_C = 10 mA, Z_O = 50 Ω

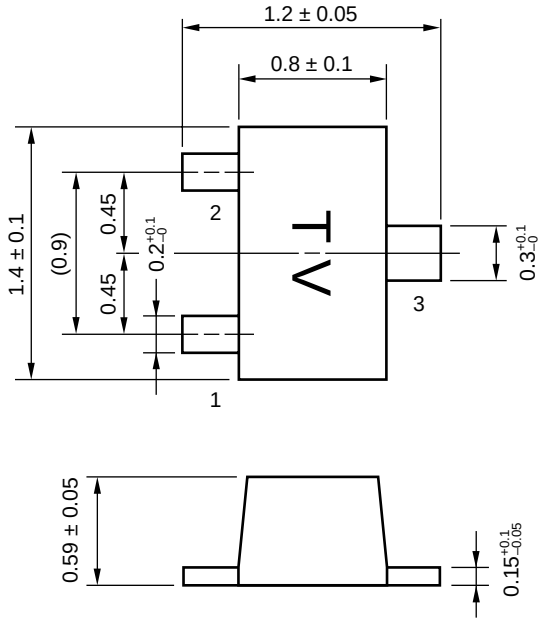
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.667	–57.8	22.559	142.2	0.032	64.7	0.784	–33.7
0.2	0.554	–97.1	15.904	120.4	0.048	55.6	0.548	–51.9
0.3	0.497	–120.2	11.665	109.0	0.058	53.8	0.404	–60.2
0.4	0.468	–136.0	9.134	101.2	0.067	55.4	0.317	–65.4
0.5	0.457	–146.9	7.491	95.6	0.076	56.7	0.258	–68.2
0.6	0.448	–155.3	6.312	91.1	0.085	58.6	0.218	–70.9
0.7	0.447	–162.0	5.465	87.4	0.094	60.0	0.188	–73.1
0.8	0.447	–167.0	4.819	84.1	0.104	61.1	0.167	–75.7
0.9	0.449	–172.1	4.306	81.0	0.113	61.6	0.148	–78.6
1.0	0.452	–176.4	3.896	78.0	0.123	62.4	0.135	–81.8
1.1	0.454	–179.9	3.568	75.3	0.133	62.7	0.123	–86.3
1.2	0.457	176.5	3.278	73.0	0.143	62.9	0.114	–90.8
1.3	0.464	173.4	3.052	70.5	0.153	63.0	0.108	–95.8
1.4	0.469	170.4	2.850	68.0	0.163	63.1	0.101	–101.9
1.5	0.477	167.8	2.670	65.8	0.174	62.7	0.098	–108.4
1.6	0.481	165.4	2.503	63.4	0.184	62.5	0.095	–115.8
1.7	0.488	163.2	2.377	61.3	0.193	62.2	0.093	–122.7
1.8	0.497	161.1	2.257	59.3	0.204	61.8	0.094	–130.2
1.9	0.503	158.9	2.146	57.3	0.214	61.4	0.096	–137.2
2.0	0.513	157.2	2.044	55.4	0.224	60.8	0.099	–143.3
2.1	0.521	155.4	1.956	53.4	0.233	60.6	0.103	–149.9
2.2	0.524	153.9	1.880	51.9	0.243	60.3	0.108	–154.8
2.3	0.534	152.5	1.811	49.7	0.254	59.5	0.117	–160.3
2.4	0.539	150.8	1.746	47.8	0.263	59.0	0.123	–164.7
2.5	0.548	149.5	1.690	46.2	0.272	58.5	0.133	–169.2
2.6	0.551	148.1	1.631	44.7	0.282	57.9	0.139	–172.0
2.7	0.558	146.7	1.584	43.1	0.292	57.4	0.150	–175.7
2.8	0.562	145.3	1.531	41.3	0.300	56.8	0.158	–179.2
2.9	0.567	144.2	1.495	39.5	0.309	56.2	0.168	179.2
3.0	0.572	142.6	1.469	38.4	0.318	55.5	0.175	176.0
4.0	0.628	130.4	1.174	25.5	0.409	46.6	0.279	159.4
5.0	0.690	120.6	0.961	15.8	0.474	39.5	0.389	147.3

V_{CE} = 3 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
0.1	0.496	–82.4	30.372	130.8	0.026	61.5	0.633	–47.3
0.2	0.441	–123.5	18.789	110.7	0.038	60.8	0.388	–66.1
0.3	0.421	–142.9	13.144	101.7	0.048	62.8	0.271	–74.7
0.4	0.413	–153.8	10.072	95.6	0.059	65.5	0.207	–81.2
0.5	0.411	–162.0	8.149	91.1	0.070	66.9	0.165	–85.9
0.6	0.413	–168.3	6.838	87.4	0.082	68.2	0.137	–91.0
0.7	0.415	–173.2	5.896	84.5	0.093	68.8	0.117	–96.5
0.8	0.416	–176.8	5.193	81.6	0.105	69.0	0.104	–102.5
0.9	0.422	179.5	4.634	79.0	0.116	68.8	0.093	–109.5
1.0	0.424	176.1	4.177	76.4	0.128	68.7	0.086	–116.4
1.1	0.430	173.3	3.820	74.0	0.139	68.4	0.083	–125.1
1.2	0.433	170.3	3.511	71.9	0.151	67.9	0.082	–132.7
1.3	0.442	167.8	3.268	69.6	0.162	67.4	0.082	–139.7
1.4	0.450	165.6	3.043	67.4	0.173	66.8	0.085	–147.8
1.5	0.457	163.4	2.850	65.5	0.185	66.0	0.089	–154.0
1.6	0.463	161.4	2.674	63.2	0.195	65.3	0.094	–160.8
1.7	0.470	159.7	2.535	61.2	0.206	64.6	0.100	–166.6
1.8	0.480	157.6	2.403	59.4	0.217	63.8	0.107	–171.6
1.9	0.484	155.9	2.282	57.5	0.228	62.9	0.114	–176.0
2.0	0.496	154.4	2.174	55.7	0.239	62.0	0.121	–179.7
2.1	0.506	152.9	2.083	53.9	0.248	61.5	0.129	176.6
2.2	0.505	151.6	1.997	52.5	0.258	60.8	0.136	174.2
2.3	0.516	150.3	1.922	50.3	0.269	59.9	0.148	171.4
2.4	0.521	148.8	1.852	48.7	0.279	59.0	0.155	168.9
2.5	0.530	147.6	1.790	47.2	0.287	58.2	0.167	166.6
2.6	0.534	146.6	1.729	45.6	0.298	57.5	0.174	164.8
2.7	0.540	145.4	1.683	44.1	0.307	56.8	0.185	162.9
2.8	0.548	143.7	1.625	42.4	0.316	56.0	0.193	160.4
2.9	0.550	142.8	1.584	40.6	0.325	55.3	0.203	160.0
3.0	0.557	141.2	1.558	39.6	0.333	54.6	0.210	157.7
4.0	0.612	129.9	1.245	27.1	0.417	44.8	0.301	147.1
5.0	0.675	120.7	1.026	17.5	0.475	37.9	0.396	138.7

PACKAGE DIMENSIONS

FLAT-LEAD 3-PIN THIN-TYPE ULTRA SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

[MEMO]

[MEMO]

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