NEC

NPN SILICON RF TRANSISTOR
2SC5786

NPN SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW NOISE FLAT-LEAD 3-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Ideal for 3 GHz or higher OSC applications
- Low noise, high gain
  f_T = 20 GHz TYP., $|S_{21e}|^2$ = 12 dB TYP. @ V_{CE} = 1 V, I_C = 20 mA, f = 2 GHz
  NF = 1.4 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{opt}$
- UHS0 technology (f_T = 25 GHz) adopted
- High reliability through use of gold electrodes
- Flat-lead 3-pin thin-type ultra super minimold package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5786	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC5786-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}	9.0	V
Collector to Emitter Voltage	V_{CEO}	3.0	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot} Note	105	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 PCB

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

Document No. P15785EJ1V0DS00 (1st edition)
Date Published September 2001 NS CP(K)
Printed in Japan

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_{BE} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 1 V, I_C = 5 mA	50	–	100	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 1 V, I_C = 20 mA, f = 2 GHz	17	20	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 20 mA, f = 2 GHz	10	12	–	dB
Noise Figure	NF	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.4	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 0.5 V, I_E = 0 mA, f = 1 MHz	–	0.22	0.30	pF

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

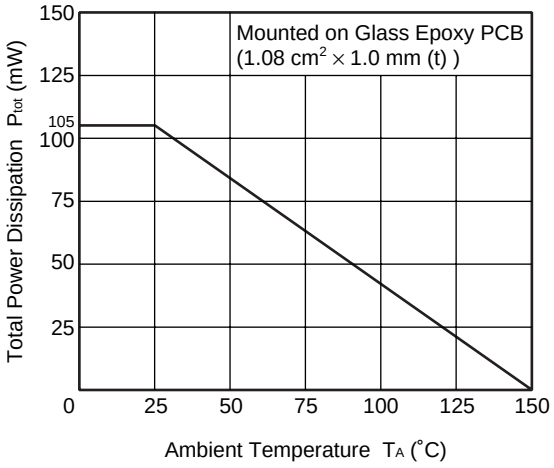
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

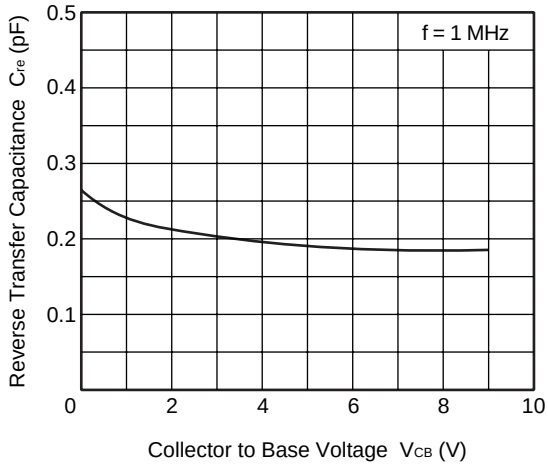
Rank	FB
Marking	UE
h_{FE} Value	50 to 100

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

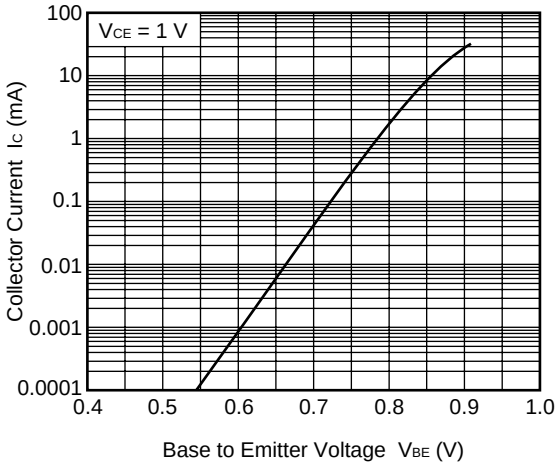
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



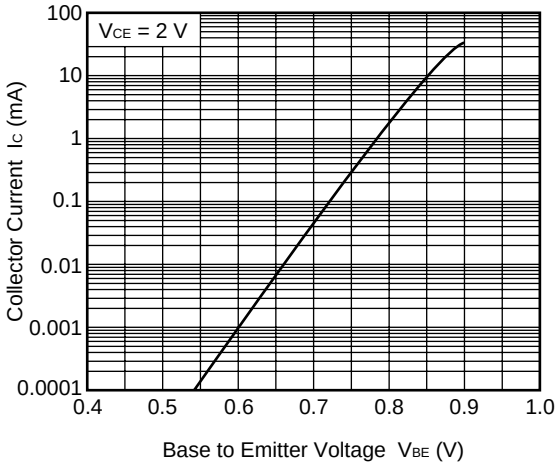
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



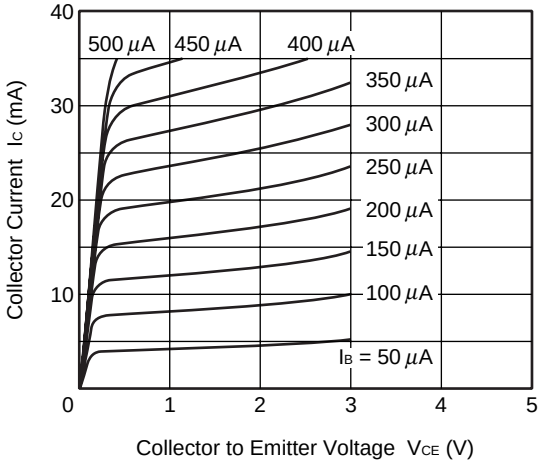
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



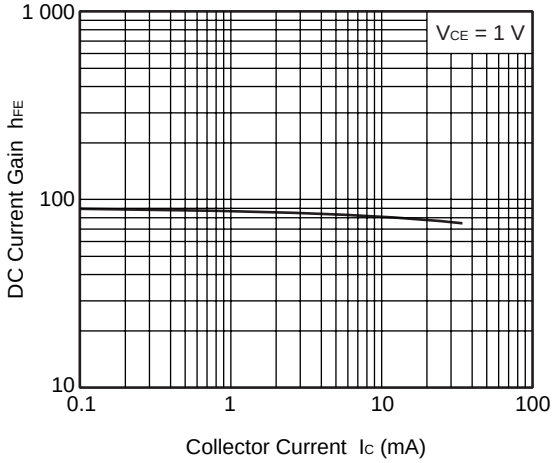
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



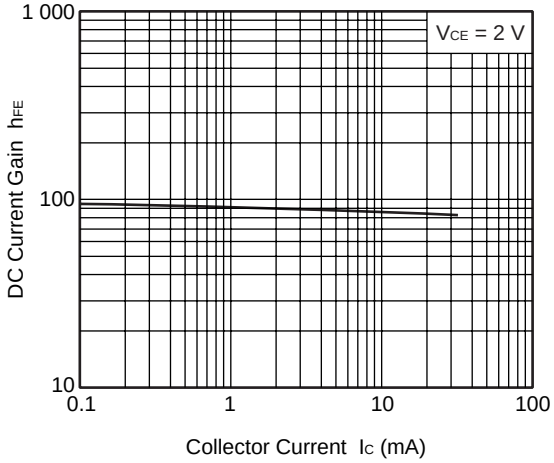
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



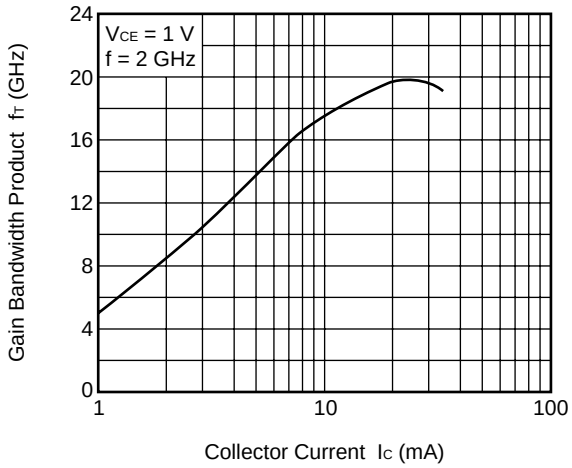
DC CURRENT GAIN vs.
COLLECTOR CURRENT



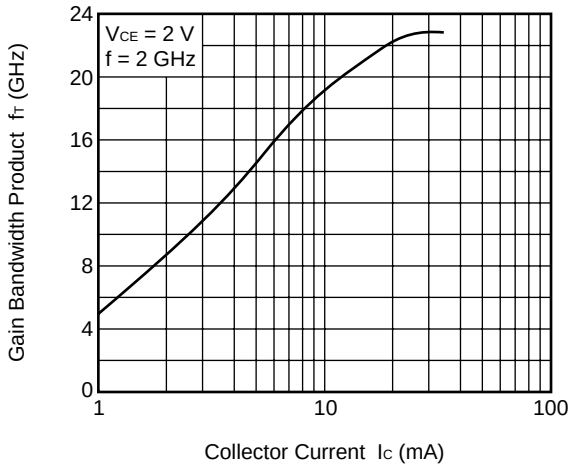
DC CURRENT GAIN vs.
COLLECTOR CURRENT



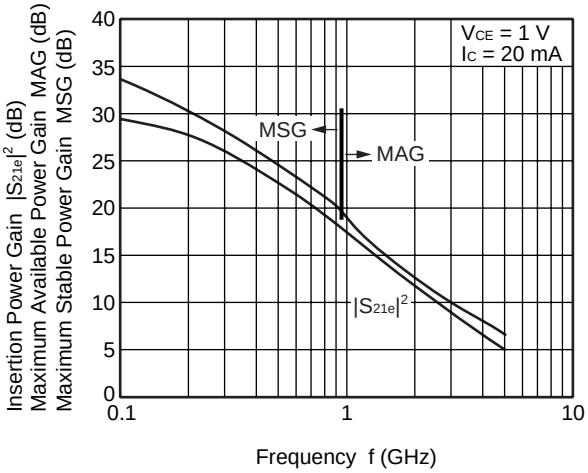
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



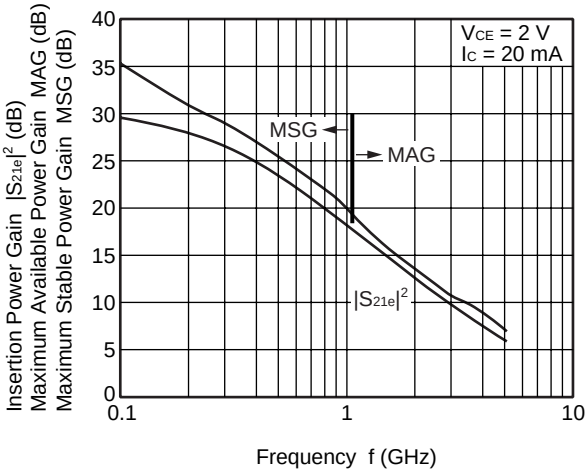
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



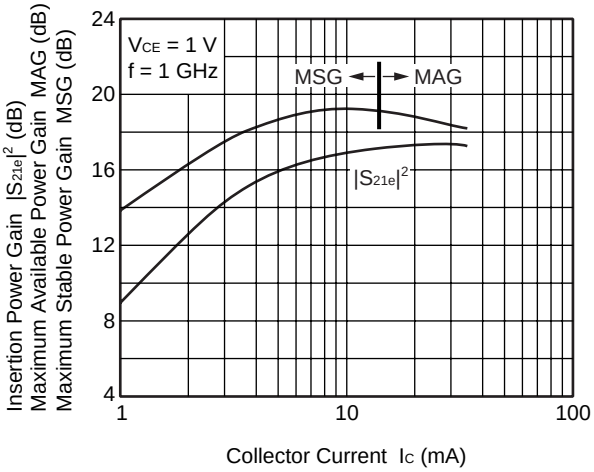
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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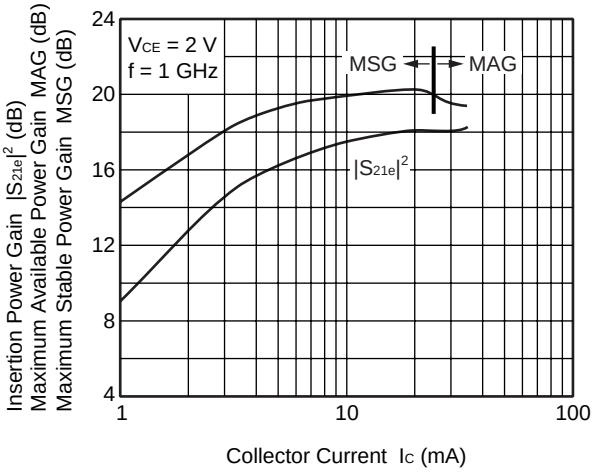
vs. COLLECTOR CURRENT



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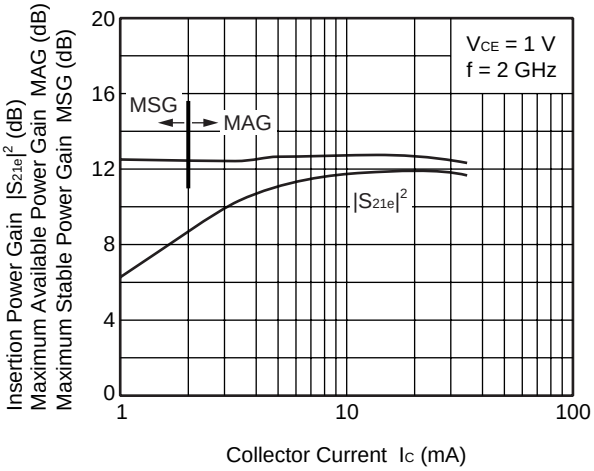
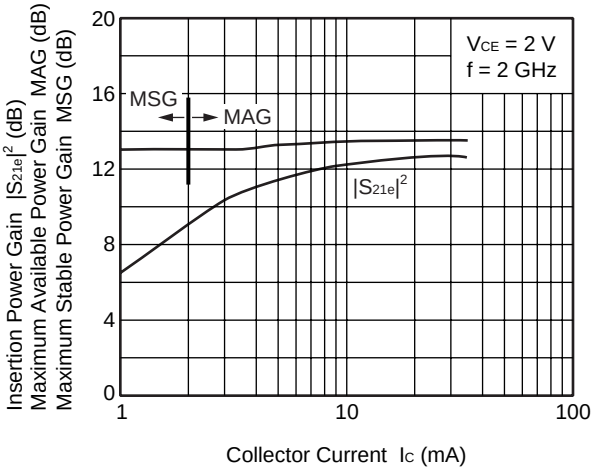
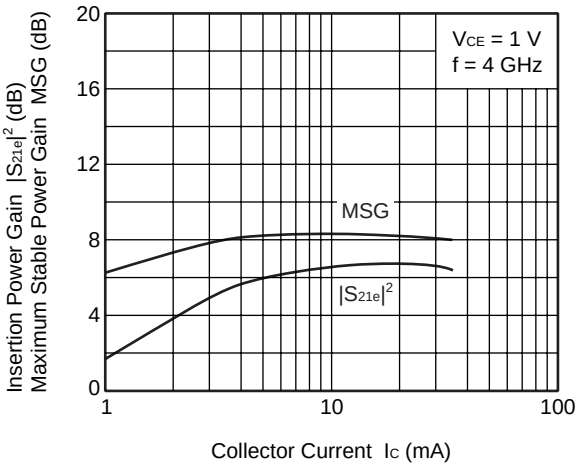
vs. COLLECTOR CURRENT



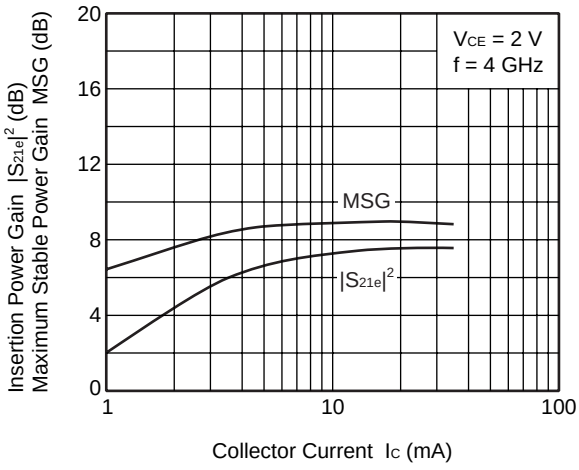
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



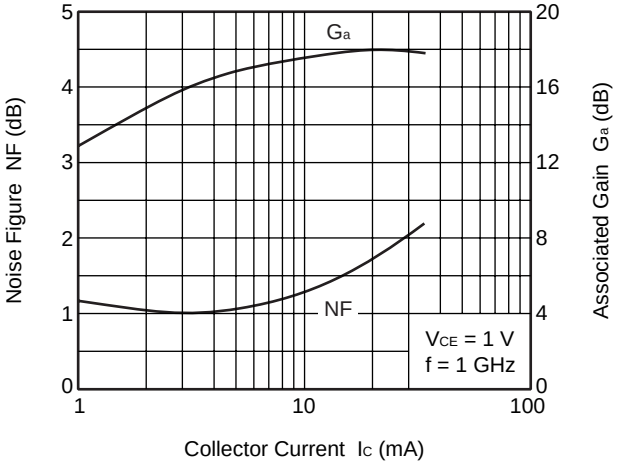
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



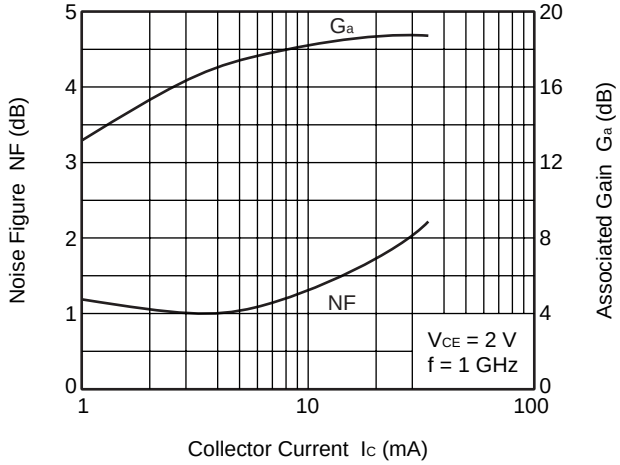
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



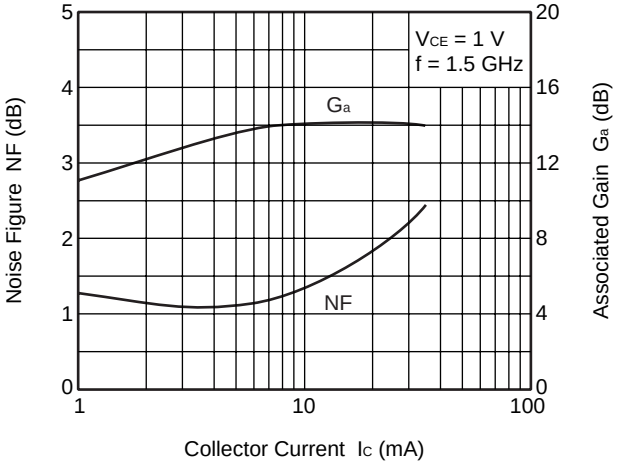
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



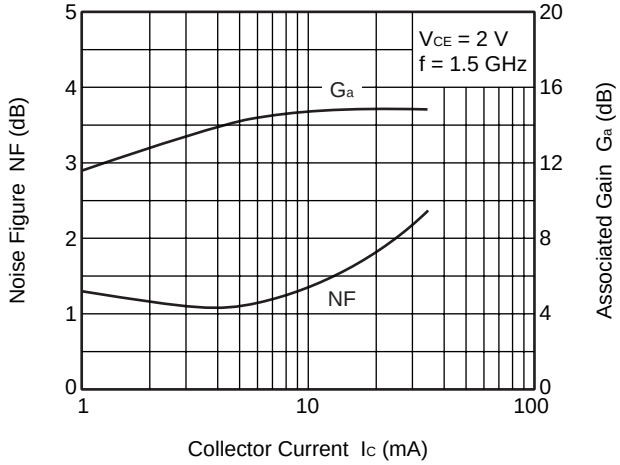
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



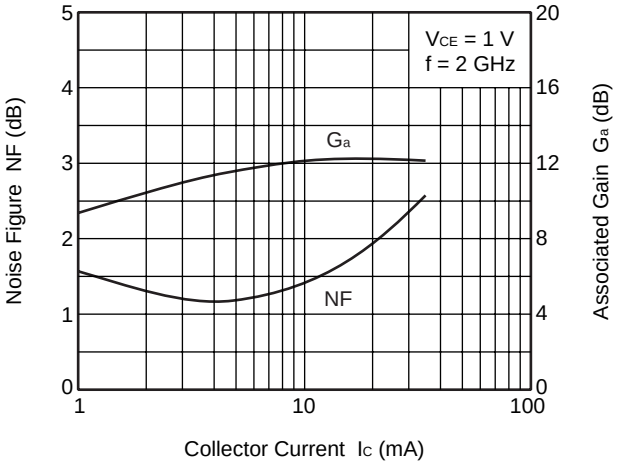
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



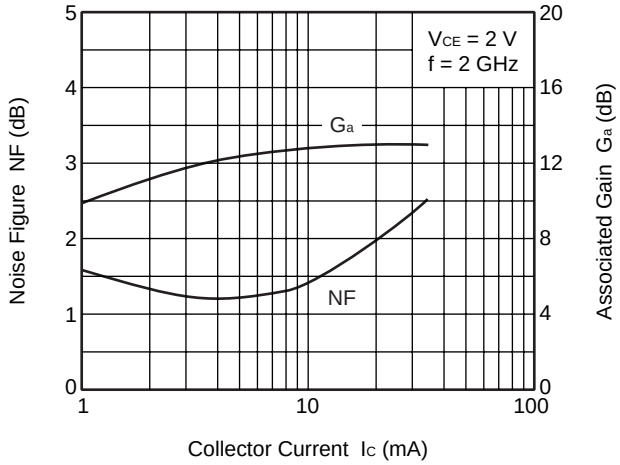
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.942	–6.9	3.672	174.9	0.016	81.4	0.994	–4.4
0.2	0.932	–14.3	3.554	166.2	0.032	79.8	0.984	–8.7
0.3	0.926	–21.3	3.492	160.2	0.048	74.9	0.969	–12.9
0.4	0.904	–28.0	3.423	153.5	0.062	70.8	0.950	–17.0
0.5	0.879	–35.0	3.333	147.4	0.075	66.1	0.929	–21.1
0.6	0.851	–41.5	3.253	141.4	0.086	61.8	0.904	–25.0
0.7	0.820	–47.9	3.153	135.9	0.096	57.9	0.876	–28.6
0.8	0.791	–54.3	3.066	130.2	0.105	54.6	0.850	–32.2
0.9	0.761	–60.5	2.949	124.8	0.111	51.2	0.821	–35.4
1.0	0.732	–66.5	2.850	119.7	0.117	48.5	0.794	–38.6
1.1	0.702	–72.5	2.761	114.9	0.120	45.9	0.767	–41.6
1.2	0.677	–78.0	2.669	110.6	0.124	43.8	0.740	–44.3
1.3	0.654	–83.5	2.579	105.8	0.125	42.0	0.716	–47.2
1.4	0.627	–89.1	2.497	101.7	0.126	40.4	0.695	–50.0
1.5	0.605	–94.5	2.417	97.6	0.125	39.4	0.672	–52.7
1.6	0.587	–99.6	2.334	93.8	0.125	38.5	0.654	–55.4
1.7	0.567	–105.2	2.260	89.8	0.123	38.5	0.635	–58.2
1.8	0.549	–110.2	2.203	86.3	0.121	38.6	0.618	–60.9
1.9	0.532	–114.9	2.123	82.9	0.119	39.2	0.603	–63.8
2.0	0.522	–120.2	2.068	79.0	0.117	40.4	0.590	–66.6
2.1	0.513	–125.4	2.003	75.8	0.115	42.1	0.576	–69.5
2.2	0.504	–129.9	1.945	72.4	0.114	44.6	0.564	–72.6
2.3	0.499	–134.8	1.882	69.4	0.113	47.2	0.554	–75.8
2.4	0.496	–139.3	1.817	66.5	0.114	50.2	0.546	–79.2
2.5	0.491	–143.6	1.765	63.4	0.115	53.7	0.538	–82.4
2.6	0.492	–147.6	1.710	60.6	0.117	57.3	0.534	–85.9
2.7	0.492	–151.2	1.664	58.0	0.121	60.8	0.527	–89.2
2.8	0.492	–154.8	1.619	55.3	0.127	63.9	0.522	–92.4
2.9	0.493	–158.3	1.580	53.0	0.134	66.6	0.516	–96.3
3.0	0.496	–161.7	1.528	50.7	0.143	69.3	0.515	–100.0
4.0	0.550	169.8	1.207	28.6	0.282	73.3	0.530	–137.0
5.0	0.643	148.2	0.937	13.3	0.415	58.5	0.599	–177.4

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.848	–11.3	9.544	170.0	0.015	80.0	0.976	–7.3
0.2	0.820	–21.6	9.021	159.4	0.031	76.6	0.946	–14.3
0.3	0.784	–31.8	8.557	150.5	0.043	71.7	0.902	–20.6
0.4	0.732	–40.9	8.053	141.6	0.055	67.3	0.850	–26.1
0.5	0.679	–49.4	7.482	134.2	0.064	63.3	0.797	–31.0
0.6	0.629	–57.0	6.976	127.1	0.071	60.0	0.746	–35.1
0.7	0.581	–64.1	6.488	121.4	0.078	58.1	0.696	–38.5
0.8	0.536	–70.5	6.042	115.8	0.083	56.5	0.653	–41.4
0.9	0.500	–77.0	5.608	110.6	0.088	55.3	0.613	–44.1
1.0	0.464	–82.8	5.245	106.2	0.092	54.9	0.578	–46.3
1.1	0.438	–89.1	4.926	102.0	0.096	54.5	0.545	–48.6
1.2	0.410	–94.5	4.634	98.4	0.099	54.5	0.516	–50.5
1.3	0.388	–99.7	4.365	94.5	0.103	54.9	0.492	–52.4
1.4	0.370	–105.1	4.140	91.3	0.106	55.4	0.470	–54.3
1.5	0.352	–109.6	3.937	88.0	0.110	56.1	0.450	–56.1
1.6	0.340	–114.8	3.740	85.1	0.114	56.7	0.432	–58.0
1.7	0.326	–120.2	3.572	82.0	0.118	57.7	0.415	–60.1
1.8	0.317	–125.1	3.425	79.3	0.122	58.5	0.400	–62.2
1.9	0.310	–129.9	3.269	76.9	0.126	59.3	0.386	–64.4
2.0	0.305	–134.7	3.145	73.8	0.131	60.1	0.375	–66.7
2.1	0.305	–140.1	3.027	71.5	0.136	61.0	0.364	–69.2
2.2	0.301	–144.4	2.922	68.9	0.141	61.8	0.353	–71.9
2.3	0.300	–148.9	2.809	66.7	0.147	62.4	0.344	–74.8
2.4	0.302	–153.2	2.705	64.4	0.152	63.0	0.338	–77.8
2.5	0.306	–157.0	2.615	61.9	0.158	63.6	0.331	–80.9
2.6	0.308	–160.5	2.520	59.9	0.165	64.3	0.327	–84.0
2.7	0.314	–163.6	2.450	57.7	0.171	64.6	0.322	–87.0
2.8	0.318	–166.2	2.378	55.7	0.179	64.9	0.319	–90.2
2.9	0.320	–168.9	2.320	53.8	0.186	65.1	0.314	–93.6
3.0	0.327	–171.7	2.244	51.9	0.194	65.4	0.311	–97.1
4.0	0.401	167.2	1.792	32.6	0.292	62.8	0.320	–133.8
5.0	0.528	150.0	1.449	15.5	0.389	53.3	0.414	–174.3

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.773	–14.8	14.225	166.7	0.015	77.9	0.958	–9.6
0.2	0.720	–26.9	13.042	154.0	0.028	75.7	0.907	–18.4
0.3	0.667	–38.7	11.989	143.3	0.040	70.0	0.839	–25.7
0.4	0.602	–49.1	10.868	133.6	0.049	66.6	0.766	–31.5
0.5	0.537	–57.7	9.792	125.9	0.057	64.1	0.698	–36.1
0.6	0.484	–65.5	8.890	119.1	0.064	62.1	0.638	–39.9
0.7	0.438	–72.6	8.049	113.5	0.070	61.3	0.587	–42.5
0.8	0.398	–79.1	7.350	108.4	0.075	61.0	0.541	–44.8
0.9	0.365	–85.0	6.724	104.0	0.080	60.9	0.503	–46.7
1.0	0.336	–90.7	6.196	100.0	0.085	61.3	0.471	–48.2
1.1	0.312	–96.9	5.758	96.4	0.090	61.5	0.442	–49.9
1.2	0.294	–102.1	5.379	93.3	0.096	61.9	0.417	–51.2
1.3	0.279	–107.1	5.037	89.9	0.101	62.5	0.396	–52.6
1.4	0.266	–112.4	4.741	87.1	0.106	63.0	0.378	–54.1
1.5	0.257	–117.7	4.481	84.3	0.111	63.4	0.360	–55.6
1.6	0.246	–122.5	4.241	81.9	0.117	63.8	0.345	–57.3
1.7	0.240	–127.8	4.036	79.1	0.123	64.3	0.331	–59.1
1.8	0.235	–132.4	3.853	76.8	0.129	64.6	0.318	–61.0
1.9	0.230	–137.8	3.668	74.5	0.135	64.8	0.306	–63.1
2.0	0.233	–143.1	3.515	71.9	0.142	65.0	0.296	–65.3
2.1	0.231	–148.9	3.380	69.7	0.148	65.3	0.286	–67.8
2.2	0.232	–152.9	3.254	67.4	0.155	65.4	0.277	–70.4
2.3	0.236	–157.5	3.122	65.6	0.161	65.4	0.269	–73.6
2.4	0.242	–161.2	3.006	63.6	0.168	65.4	0.262	–76.6
2.5	0.246	–165.3	2.902	61.4	0.175	65.3	0.256	–79.9
2.6	0.250	–168.7	2.797	59.7	0.182	65.3	0.253	–83.2
2.7	0.256	–170.8	2.710	57.8	0.190	65.1	0.247	–86.5
2.8	0.263	–173.2	2.635	56.1	0.197	64.7	0.244	–89.8
2.9	0.267	–175.9	2.569	54.2	0.205	64.6	0.240	–93.4
3.0	0.274	–178.1	2.487	52.6	0.212	64.4	0.237	–97.1
4.0	0.351	164.2	1.985	35.0	0.301	59.3	0.242	–136.5
5.0	0.482	149.7	1.632	19.1	0.385	50.4	0.340	–177.9

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.691	–17.3	17.902	164.0	0.014	78.9	0.941	–11.5
0.2	0.640	–31.1	16.067	149.9	0.027	75.6	0.871	–21.4
0.3	0.573	–43.8	14.311	138.3	0.037	68.9	0.785	–29.2
0.4	0.505	–54.5	12.614	128.3	0.046	67.1	0.702	–34.9
0.5	0.444	–63.2	11.129	120.8	0.053	65.7	0.628	–39.0
0.6	0.392	–71.4	9.922	114.2	0.059	64.6	0.567	–42.1
0.7	0.352	–78.0	8.891	109.1	0.066	64.4	0.517	–44.2
0.8	0.314	–83.7	8.030	104.3	0.071	64.7	0.476	–46.0
0.9	0.289	–89.6	7.285	100.2	0.077	64.9	0.441	–47.3
1.0	0.265	–95.4	6.681	96.6	0.083	65.4	0.411	–48.6
1.1	0.248	–101.5	6.176	93.3	0.089	65.8	0.386	–49.7
1.2	0.232	–106.6	5.743	90.5	0.095	66.1	0.365	–50.7
1.3	0.223	–111.8	5.349	87.4	0.102	66.4	0.346	–52.0
1.4	0.212	–117.3	5.029	84.8	0.108	66.7	0.329	–53.3
1.5	0.205	–122.3	4.734	82.4	0.114	67.0	0.314	–54.6
1.6	0.198	–128.1	4.483	80.1	0.121	67.0	0.301	–56.2
1.7	0.196	–133.6	4.253	77.6	0.127	67.2	0.287	–57.8
1.8	0.195	–138.7	4.057	75.5	0.134	67.3	0.276	–59.8
1.9	0.192	–143.8	3.864	73.6	0.141	67.2	0.265	–61.8
2.0	0.195	–149.3	3.698	71.1	0.148	67.0	0.256	–64.2
2.1	0.202	–154.6	3.550	69.1	0.155	67.0	0.246	–66.8
2.2	0.203	–159.0	3.414	67.0	0.162	66.8	0.237	–69.5
2.3	0.207	–163.1	3.274	65.2	0.169	66.5	0.229	–72.8
2.4	0.213	–166.8	3.146	63.4	0.177	66.2	0.223	–76.0
2.5	0.221	–171.0	3.039	61.4	0.184	65.9	0.217	–79.6
2.6	0.225	–173.7	2.928	59.6	0.191	65.5	0.214	–83.2
2.7	0.232	–176.2	2.842	57.9	0.199	65.2	0.209	–86.6
2.8	0.239	–178.4	2.753	56.2	0.206	64.7	0.206	–90.1
2.9	0.243	179.2	2.684	54.4	0.214	64.3	0.202	–93.9
3.0	0.249	177.1	2.597	53.0	0.222	63.9	0.199	–98.0
4.0	0.328	161.4	2.073	36.2	0.307	57.6	0.205	–140.2
5.0	0.458	148.3	1.713	20.9	0.385	48.9	0.304	178.5

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.613	–19.7	22.058	161.1	0.013	80.1	0.917	–13.6
0.2	0.549	–35.8	19.183	145.4	0.025	74.4	0.826	–24.7
0.3	0.476	–49.3	16.513	133.0	0.034	70.7	0.724	–32.6
0.4	0.405	–60.0	14.189	123.2	0.042	69.0	0.632	–37.9
0.5	0.347	–68.9	12.272	115.9	0.049	68.1	0.559	–41.3
0.6	0.304	–76.0	10.772	109.8	0.056	67.9	0.500	–43.7
0.7	0.270	–82.6	9.543	105.1	0.063	68.1	0.454	–45.1
0.8	0.242	–88.9	8.558	100.8	0.070	68.5	0.416	–46.5
0.9	0.220	–94.8	7.731	97.1	0.076	68.8	0.385	–47.3
1.0	0.202	–100.6	7.066	93.7	0.083	69.2	0.359	–48.2
1.1	0.191	–107.1	6.498	90.7	0.090	69.3	0.338	–49.0
1.2	0.180	–112.9	6.024	88.2	0.096	69.4	0.318	–49.9
1.3	0.174	–118.2	5.614	85.3	0.104	69.5	0.302	–50.9
1.4	0.168	–123.7	5.254	83.0	0.111	69.5	0.287	–52.1
1.5	0.165	–129.3	4.944	80.7	0.118	69.6	0.274	–53.5
1.6	0.162	–134.8	4.665	78.5	0.125	69.4	0.262	–55.0
1.7	0.163	–140.8	4.425	76.4	0.132	69.3	0.250	–56.6
1.8	0.162	–145.9	4.212	74.2	0.139	69.0	0.239	–58.6
1.9	0.162	–151.7	4.004	72.3	0.146	68.7	0.229	–60.7
2.0	0.168	–156.6	3.832	70.1	0.154	68.4	0.220	–63.1
2.1	0.174	–162.3	3.676	68.1	0.161	68.1	0.211	–65.8
2.2	0.180	–165.7	3.537	66.2	0.169	67.8	0.203	–68.7
2.3	0.187	–170.1	3.393	64.5	0.176	67.3	0.195	–72.2
2.4	0.195	–173.5	3.261	62.8	0.184	66.8	0.189	–75.6
2.5	0.201	–177.1	3.145	60.9	0.192	66.2	0.184	–79.7
2.6	0.207	–179.9	3.029	59.5	0.199	65.8	0.180	–83.6
2.7	0.215	177.9	2.937	57.7	0.207	65.3	0.177	–87.3
2.8	0.221	176.3	2.845	56.1	0.215	64.6	0.174	–91.4
2.9	0.228	174.6	2.777	54.6	0.223	64.1	0.169	–95.2
3.0	0.235	172.4	2.686	53.3	0.230	63.6	0.167	–99.7
4.0	0.314	158.6	2.139	37.2	0.313	56.3	0.176	–145.7
5.0	0.442	146.8	1.775	22.5	0.386	47.6	0.279	173.7

V_{CE} = 1 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.414	–28.8	29.752	155.4	0.013	77.7	0.854	–17.8
0.2	0.355	–46.0	24.239	137.1	0.023	75.8	0.723	–30.5
0.3	0.294	–59.8	19.605	124.4	0.031	73.8	0.602	–37.9
0.4	0.240	–71.8	16.145	115.2	0.039	73.4	0.510	–42.0
0.5	0.202	–81.3	13.588	108.8	0.047	73.5	0.443	–44.1
0.6	0.175	–88.8	11.712	103.5	0.054	73.9	0.394	–45.3
0.7	0.157	–96.4	10.249	99.5	0.062	74.0	0.356	–45.9
0.8	0.141	–103.4	9.113	95.8	0.069	74.2	0.327	–46.4
0.9	0.129	–109.9	8.173	92.7	0.077	74.2	0.303	–46.7
1.0	0.122	–116.7	7.429	89.8	0.085	74.1	0.283	–47.2
1.1	0.119	–124.6	6.799	87.2	0.093	74.0	0.265	–47.7
1.2	0.119	–131.2	6.286	84.9	0.100	73.6	0.250	–48.4
1.3	0.119	–136.3	5.841	82.4	0.108	73.1	0.237	–49.4
1.4	0.119	–142.4	5.457	80.3	0.116	72.8	0.225	–50.6
1.5	0.121	–147.5	5.127	78.3	0.124	72.4	0.213	–51.9
1.6	0.125	–154.0	4.846	76.4	0.132	71.9	0.203	–53.6
1.7	0.128	–158.6	4.573	74.5	0.140	71.3	0.192	–55.4
1.8	0.135	–162.5	4.352	72.6	0.148	70.9	0.183	–57.7
1.9	0.137	–167.6	4.136	70.9	0.156	70.3	0.174	–60.1
2.0	0.149	–172.4	3.953	68.8	0.164	69.6	0.166	–63.0
2.1	0.157	–176.2	3.786	67.0	0.172	69.1	0.158	–66.2
2.2	0.164	–179.6	3.636	65.2	0.180	68.5	0.150	–69.8
2.3	0.173	177.4	3.485	63.7	0.188	67.7	0.143	–74.1
2.4	0.182	174.1	3.350	62.1	0.195	67.0	0.137	–78.3
2.5	0.192	171.9	3.231	60.4	0.204	66.2	0.133	–83.7
2.6	0.200	169.8	3.113	59.0	0.211	65.4	0.130	–88.9
2.7	0.208	168.2	3.013	57.5	0.219	64.6	0.126	–94.0
2.8	0.214	167.2	2.916	55.9	0.227	63.9	0.125	–98.7
2.9	0.222	165.9	2.845	54.4	0.235	63.2	0.122	–104.2
3.0	0.229	164.0	2.756	53.2	0.242	62.4	0.120	–109.7
4.0	0.308	153.4	2.181	38.1	0.323	54.0	0.146	–162.4
5.0	0.430	143.3	1.809	24.3	0.390	45.2	0.261	162.5

V_{CE} = 2 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.935	–6.0	3.603	175.3	0.014	86.0	0.994	–4.0
0.2	0.937	–13.3	3.478	166.7	0.029	80.4	0.986	–7.9
0.3	0.932	–20.0	3.419	161.2	0.042	75.8	0.973	–11.8
0.4	0.913	–26.4	3.363	154.8	0.055	71.7	0.957	–15.5
0.5	0.888	–32.9	3.285	148.8	0.067	67.4	0.937	–19.4
0.6	0.861	–39.1	3.206	143.1	0.077	63.4	0.915	–23.1
0.7	0.833	–45.1	3.121	137.8	0.086	59.5	0.891	–26.4
0.8	0.804	–51.3	3.044	132.2	0.093	56.3	0.867	–29.7
0.9	0.777	–57.3	2.940	127.1	0.100	53.2	0.841	–32.7
1.0	0.746	–63.1	2.849	122.0	0.105	50.5	0.816	–35.8
1.1	0.720	–68.7	2.766	117.4	0.108	48.1	0.791	–38.6
1.2	0.692	–74.4	2.680	112.9	0.111	46.1	0.765	–41.2
1.3	0.668	–79.6	2.596	108.3	0.112	44.3	0.743	–43.9
1.4	0.641	–84.8	2.520	104.2	0.113	43.0	0.723	–46.5
1.5	0.618	–90.2	2.443	100.1	0.112	42.1	0.703	–49.1
1.6	0.599	–95.3	2.363	96.3	0.111	41.5	0.684	–51.7
1.7	0.580	–100.4	2.298	92.4	0.110	41.6	0.667	–54.3
1.8	0.560	–105.4	2.240	88.9	0.108	42.1	0.651	–56.9
1.9	0.545	–110.3	2.165	85.4	0.106	42.9	0.635	–59.6
2.0	0.530	–115.4	2.110	81.6	0.104	44.9	0.623	–62.5
2.1	0.519	–120.5	2.047	78.3	0.102	47.1	0.610	–65.3
2.2	0.509	–125.3	1.990	74.8	0.101	50.1	0.598	–68.3
2.3	0.502	–129.7	1.925	72.0	0.101	53.2	0.588	–71.2
2.4	0.498	–134.4	1.864	68.8	0.102	56.9	0.580	–74.4
2.5	0.493	–138.9	1.813	65.6	0.105	60.9	0.572	–77.5
2.6	0.491	–142.7	1.757	63.2	0.108	65.3	0.567	–80.6
2.7	0.489	–146.3	1.711	60.7	0.113	69.1	0.562	–83.6
2.8	0.490	–150.2	1.666	58.0	0.120	72.1	0.556	–86.9
2.9	0.488	–153.8	1.625	55.6	0.129	74.9	0.548	–90.5
3.0	0.491	–157.5	1.572	53.1	0.139	77.5	0.548	–94.1
4.0	0.542	173.2	1.252	30.6	0.288	78.7	0.555	–130.6
5.0	0.636	150.4	0.972	14.5	0.427	61.7	0.613	–172.4

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.858	–9.8	9.570	170.4	0.014	87.1	0.979	–6.6
0.2	0.826	–19.9	9.071	160.3	0.027	77.5	0.953	–12.8
0.3	0.797	–29.1	8.623	151.7	0.039	73.0	0.914	–18.7
0.4	0.750	–37.5	8.147	143.1	0.049	68.7	0.867	–23.7
0.5	0.694	–45.4	7.623	136.0	0.057	64.9	0.819	–28.1
0.6	0.647	–52.9	7.132	129.1	0.064	61.8	0.770	–31.9
0.7	0.597	–59.5	6.655	123.3	0.070	59.8	0.725	–35.0
0.8	0.553	–65.4	6.222	117.7	0.075	58.4	0.684	–37.9
0.9	0.516	–71.4	5.798	112.7	0.079	57.2	0.645	–40.1
1.0	0.479	–76.6	5.433	108.3	0.083	57.0	0.610	–42.3
1.1	0.449	–82.5	5.117	104.1	0.087	57.0	0.579	–44.2
1.2	0.419	–87.1	4.819	100.6	0.090	57.1	0.552	–45.9
1.3	0.397	–92.3	4.565	96.7	0.094	57.5	0.528	–47.6
1.4	0.374	–97.0	4.319	93.5	0.097	58.3	0.507	–49.2
1.5	0.356	–101.5	4.098	90.2	0.100	59.1	0.488	–50.9
1.6	0.339	–106.4	3.919	87.4	0.104	59.9	0.471	–52.6
1.7	0.324	–111.0	3.742	84.3	0.108	60.8	0.454	–54.5
1.8	0.316	–116.0	3.589	81.6	0.112	61.9	0.439	–56.3
1.9	0.304	–120.5	3.434	78.9	0.116	62.8	0.427	–58.3
2.0	0.295	–125.7	3.304	75.9	0.120	63.8	0.416	–60.3
2.1	0.291	–131.2	3.178	73.5	0.125	64.8	0.404	–62.6
2.2	0.287	–135.8	3.071	71.0	0.130	65.8	0.394	–65.0
2.3	0.285	–139.9	2.955	68.7	0.136	66.6	0.385	–67.6
2.4	0.284	–144.2	2.845	66.3	0.142	67.3	0.378	–70.3
2.5	0.284	–148.5	2.754	63.9	0.148	68.0	0.371	–73.1
2.6	0.286	–151.9	2.660	62.1	0.155	68.9	0.367	–75.7
2.7	0.290	–155.4	2.581	60.0	0.162	69.3	0.361	–78.4
2.8	0.294	–158.3	2.508	58.0	0.169	69.6	0.357	–81.2
2.9	0.297	–160.8	2.443	55.9	0.177	69.8	0.351	–84.4
3.0	0.305	–164.3	2.369	54.1	0.185	70.2	0.349	–87.7
4.0	0.376	173.6	1.909	34.6	0.286	67.8	0.347	–122.1
5.0	0.510	155.0	1.550	17.0	0.392	57.5	0.425	–164.7

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.787	–12.9	14.269	167.3	0.013	78.0	0.964	–8.6
0.2	0.738	–24.5	13.184	155.0	0.025	76.3	0.919	–16.4
0.3	0.683	–35.3	12.158	144.9	0.035	71.4	0.857	–23.0
0.4	0.621	–44.3	11.108	135.5	0.044	68.6	0.790	–28.2
0.5	0.558	–52.4	10.064	127.9	0.051	65.8	0.728	–32.5
0.6	0.504	–59.4	9.170	121.2	0.057	63.9	0.670	–35.7
0.7	0.456	–65.6	8.355	115.7	0.063	63.1	0.621	–38.3
0.8	0.414	–71.7	7.650	110.4	0.068	63.0	0.580	–40.3
0.9	0.378	–76.6	7.023	106.0	0.073	62.9	0.543	–41.9
1.0	0.348	–81.4	6.487	101.9	0.078	63.3	0.511	–43.2
1.1	0.323	–87.1	6.037	98.3	0.082	63.7	0.483	–44.7
1.2	0.300	–91.5	5.640	95.2	0.088	64.4	0.460	–45.6
1.3	0.284	–95.9	5.289	91.9	0.092	64.9	0.438	–46.8
1.4	0.266	–100.1	4.982	89.0	0.098	65.5	0.422	–48.1
1.5	0.254	–105.1	4.709	86.3	0.103	66.2	0.404	–49.2
1.6	0.242	–109.7	4.463	83.7	0.108	66.6	0.391	–50.7
1.7	0.231	–115.2	4.248	81.2	0.114	67.2	0.376	–52.1
1.8	0.223	–119.3	4.066	78.9	0.119	67.7	0.365	–53.8
1.9	0.214	–124.1	3.877	76.7	0.125	68.0	0.353	–55.5
2.0	0.213	–129.4	3.718	74.1	0.131	68.4	0.343	–57.4
2.1	0.211	–136.0	3.572	72.0	0.138	68.7	0.333	–59.6
2.2	0.210	–139.7	3.442	69.7	0.144	69.0	0.323	–61.6
2.3	0.211	–145.5	3.307	67.8	0.151	69.1	0.315	–64.4
2.4	0.214	–149.3	3.186	65.8	0.157	69.1	0.308	–66.8
2.5	0.216	–154.0	3.077	63.7	0.164	69.1	0.302	–69.7
2.6	0.219	–157.5	2.968	61.8	0.171	69.1	0.297	–72.7
2.7	0.224	–161.1	2.879	59.9	0.178	68.9	0.291	–75.4
2.8	0.228	–163.6	2.791	58.1	0.186	68.7	0.287	–78.3
2.9	0.235	–166.9	2.724	56.3	0.194	68.6	0.281	–81.4
3.0	0.241	–169.3	2.641	54.7	0.201	68.5	0.278	–84.7
4.0	0.316	171.9	2.126	37.1	0.292	63.9	0.268	–120.3
5.0	0.453	155.0	1.764	20.5	0.383	54.6	0.343	–165.1

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.725	–15.3	17.998	164.9	0.013	78.2	0.950	–10.1
0.2	0.661	–27.9	16.255	151.2	0.024	74.7	0.888	–19.0
0.3	0.595	–39.1	14.604	140.0	0.033	71.6	0.809	–26.0
0.4	0.527	–48.3	13.005	130.3	0.041	68.7	0.732	–31.1
0.5	0.464	–56.4	11.543	122.8	0.048	67.6	0.662	–34.8
0.6	0.414	–63.1	10.325	116.2	0.054	66.6	0.605	–37.6
0.7	0.368	–68.6	9.282	111.1	0.060	66.4	0.557	–39.3
0.8	0.330	–73.8	8.411	106.4	0.065	66.6	0.518	–40.7
0.9	0.302	–78.6	7.660	102.3	0.071	66.9	0.484	–42.0
1.0	0.274	–83.1	7.033	98.6	0.076	67.4	0.455	–42.9
1.1	0.253	–88.8	6.513	95.3	0.082	67.9	0.430	–43.9
1.2	0.235	–92.6	6.049	92.4	0.088	68.3	0.410	–44.7
1.3	0.223	–97.3	5.656	89.5	0.094	68.6	0.392	–45.6
1.4	0.207	–101.7	5.323	86.8	0.099	69.0	0.377	–46.6
1.5	0.200	–106.8	5.019	84.3	0.105	69.5	0.361	–47.7
1.6	0.190	–111.6	4.756	82.1	0.111	69.7	0.349	–49.0
1.7	0.181	–116.9	4.506	79.8	0.118	69.8	0.336	–50.3
1.8	0.178	–121.7	4.305	77.4	0.124	70.0	0.325	–51.8
1.9	0.173	–126.9	4.100	75.6	0.131	70.0	0.315	–53.5
2.0	0.169	–132.7	3.929	73.2	0.137	70.0	0.306	–55.4
2.1	0.171	–138.9	3.772	71.2	0.144	70.1	0.295	–57.5
2.2	0.172	–143.8	3.635	69.1	0.151	70.0	0.286	–59.7
2.3	0.176	–149.4	3.488	67.4	0.158	69.8	0.279	–62.4
2.4	0.179	–153.9	3.356	65.5	0.166	69.5	0.272	–65.1
2.5	0.183	–158.4	3.241	63.5	0.173	69.2	0.265	–67.9
2.6	0.186	–161.7	3.123	61.8	0.180	69.0	0.261	–71.0
2.7	0.194	–165.0	3.031	60.0	0.187	68.7	0.254	–73.7
2.8	0.198	–167.6	2.936	58.4	0.194	68.1	0.250	–76.7
2.9	0.203	–169.8	2.865	56.7	0.202	67.8	0.244	–79.9
3.0	0.209	–172.9	2.775	55.1	0.210	67.5	0.241	–83.4
4.0	0.287	170.2	2.231	38.5	0.297	61.9	0.226	–120.6
5.0	0.424	155.3	1.863	23.0	0.381	53.1	0.300	–166.7

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

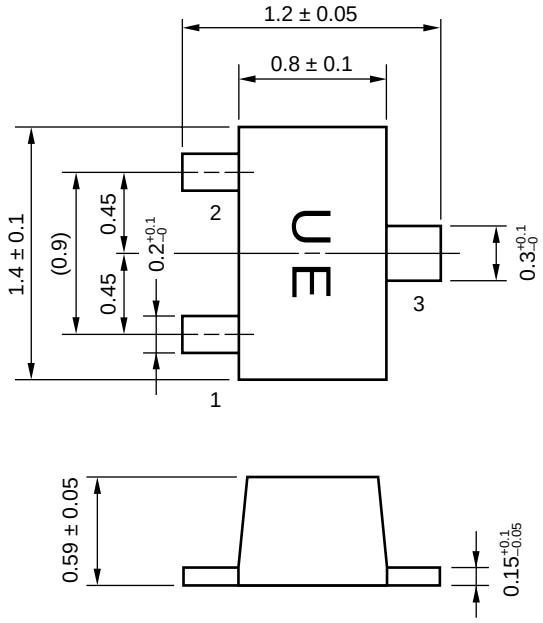
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.630	–17.3	22.317	162.1	0.011	77.6	0.931	–11.9
0.2	0.570	–31.2	19.574	146.9	0.023	75.4	0.848	–21.8
0.3	0.501	–43.2	17.045	135.0	0.031	72.2	0.754	–28.8
0.4	0.430	–52.0	14.741	125.1	0.038	71.0	0.669	–33.3
0.5	0.370	–59.3	12.812	117.9	0.045	69.8	0.599	–36.5
0.6	0.326	–65.5	11.324	111.6	0.051	69.6	0.543	–38.5
0.7	0.289	–70.8	10.054	107.1	0.057	69.9	0.498	–39.6
0.8	0.254	–75.2	9.035	102.7	0.064	70.3	0.463	–40.6
0.9	0.231	–79.1	8.176	99.0	0.069	70.7	0.433	–41.2
1.0	0.211	–84.0	7.476	95.6	0.076	71.1	0.408	–41.7
1.1	0.195	–88.6	6.884	92.6	0.082	71.4	0.387	–42.5
1.2	0.180	–93.2	6.394	90.1	0.089	71.6	0.369	–43.1
1.3	0.169	–97.5	5.954	87.3	0.095	71.7	0.353	–43.8
1.4	0.160	–102.2	5.591	85.0	0.102	71.8	0.339	–44.7
1.5	0.153	–107.0	5.265	82.7	0.108	72.0	0.326	–45.7
1.6	0.147	–112.2	4.962	80.6	0.115	71.9	0.315	–46.9
1.7	0.141	–117.6	4.715	78.5	0.122	71.9	0.303	–48.2
1.8	0.138	–124.2	4.486	76.5	0.129	71.6	0.293	–49.6
1.9	0.136	–129.8	4.278	74.7	0.136	71.4	0.283	–51.3
2.0	0.135	–135.5	4.098	72.5	0.143	71.2	0.274	–53.2
2.1	0.140	–143.4	3.930	70.6	0.150	71.0	0.265	–55.3
2.2	0.139	–147.8	3.787	68.7	0.157	70.7	0.256	–57.6
2.3	0.146	–154.1	3.628	67.1	0.165	70.4	0.248	–60.3
2.4	0.151	–158.8	3.491	65.3	0.172	69.8	0.242	–63.0
2.5	0.157	–162.9	3.370	63.4	0.179	69.4	0.235	–66.1
2.6	0.160	–167.0	3.245	61.6	0.186	69.0	0.230	–69.1
2.7	0.171	–169.7	3.147	60.0	0.194	68.4	0.224	–71.9
2.8	0.174	–172.3	3.051	58.3	0.202	67.8	0.221	–75.1
2.9	0.180	–174.8	2.974	56.7	0.210	67.3	0.214	–78.5
3.0	0.188	–177.5	2.880	55.3	0.217	66.9	0.210	–82.0
4.0	0.264	167.7	2.309	39.7	0.301	60.4	0.193	–121.6
5.0	0.402	154.2	1.936	24.8	0.380	51.6	0.266	–169.9

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.454	–23.7	30.510	156.8	0.010	78.5	0.881	–15.2
0.2	0.396	–36.8	25.143	139.0	0.020	75.9	0.762	–26.3
0.3	0.326	–47.9	20.608	126.6	0.028	75.6	0.650	–32.7
0.4	0.269	–56.8	17.101	117.3	0.035	75.2	0.562	–35.9
0.5	0.225	–61.6	14.463	110.8	0.042	75.3	0.498	–37.4
0.6	0.194	–66.6	12.513	105.4	0.049	75.3	0.450	–38.3
0.7	0.171	–71.9	10.979	101.4	0.056	75.5	0.414	–38.4
0.8	0.150	–75.6	9.774	97.7	0.063	75.8	0.387	–38.7
0.9	0.134	–77.4	8.793	94.5	0.070	75.7	0.364	–38.7
1.0	0.123	–83.3	8.004	91.6	0.077	76.0	0.344	–38.9
1.1	0.113	–89.0	7.333	89.2	0.084	75.9	0.328	–39.2
1.2	0.106	–93.6	6.777	86.9	0.092	75.5	0.313	–39.6
1.3	0.101	–99.0	6.298	84.4	0.099	75.2	0.301	–40.3
1.4	0.095	–104.9	5.907	82.4	0.106	75.1	0.290	–41.1
1.5	0.092	–110.0	5.543	80.3	0.113	74.7	0.279	–42.0
1.6	0.091	–118.1	5.231	78.5	0.121	74.4	0.269	–43.2
1.7	0.089	–125.3	4.954	76.7	0.128	74.1	0.260	–44.5
1.8	0.090	–131.8	4.701	74.8	0.136	73.5	0.250	–46.0
1.9	0.091	–138.6	4.484	73.3	0.143	72.9	0.241	–47.7
2.0	0.095	–145.6	4.288	71.3	0.151	72.6	0.233	–49.6
2.1	0.103	–154.3	4.110	69.6	0.158	72.0	0.224	–51.8
2.2	0.105	–160.1	3.955	67.9	0.166	71.4	0.215	–54.2
2.3	0.114	–164.2	3.787	66.4	0.173	70.8	0.208	–57.0
2.4	0.120	–169.3	3.644	64.8	0.181	70.1	0.201	–59.9
2.5	0.128	–173.7	3.517	63.1	0.189	69.4	0.194	–63.2
2.6	0.133	–176.8	3.386	61.6	0.197	68.9	0.189	–66.6
2.7	0.144	–179.8	3.283	60.1	0.204	68.2	0.184	–69.6
2.8	0.150	178.5	3.178	58.5	0.212	67.4	0.180	–73.2
2.9	0.156	177.1	3.098	57.1	0.220	66.8	0.173	–76.6
3.0	0.164	175.1	2.999	55.8	0.227	66.2	0.169	–80.5
4.0	0.243	163.2	2.397	41.1	0.308	58.5	0.149	–125.6
5.0	0.376	151.2	2.011	27.0	0.381	49.7	0.228	–176.9

PACKAGE DIMENSIONS

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



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

[MEMO]

[MEMO]

[MEMO]

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