

# DATA SHEET

# NEC

## NPN SILICON RF TWIN TRANSISTOR $\mu$ PA846TC

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

#### FEATURES

- 2 different built-in transistors (2SC5603, 2SC5676)
  - Q1: 13.5 GHz fr high-gain transistor  
 $f_T = 13.5 \text{ GHz TYP.}, |S_{21e}|^2 = 10.0 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 5 \text{ mA, } f = 2 \text{ GHz}$
  - Q2: Built in low voltage operation, low phase distortion transistor suited for OSC operation  
 $f_T = 5.5 \text{ GHz TYP.}, |S_{21e}|^2 = 4.0 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 10 \text{ mA, } f = 2 \text{ GHz}$
- Flat-lead 6-pin thin-type ultra super minimold package

#### BUILT-IN TRANSISTORS

	Q1	Q2
3-pin thin-type ultra super minimold part No.	2SC5603	2SC5676

#### ORDERING INFORMATION

Part Number	Quantity	Supplying Form
$\mu$ PA846TC	50 pcs (Non reel)	• 8 mm wide embossed taping
$\mu$ PA846TC-T1	3 kpcs/reel	• Pin 6 (Q1 Base), Pin 5 (Q2 Emitter), Pin 4 (Q2 Base) face the perforation side of the tape

**Remark** To order evaluation samples, consult your NEC sales representative.  
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 representative for availability and additional information.

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C)**

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V <sub>CB0</sub>	15	9	V
Collector to Emitter Voltage	V <sub>CEO</sub>	6	5.5	V
Emitter to Base Voltage	V <sub>EBO</sub>	2	1.5	V
Collector Current	I <sub>C</sub>	35	100	mA
Total Power Dissipation	P <sub>tot</sub> <sup>Note</sup>	200 in 1 element 230 in 2 elements		mW
Junction Temperature	T <sub>j</sub>	150		°C
Storage Temperature	T <sub>stg</sub>	-65 to +150		°C

**Note** Mounted on 1.08 cm<sup>2</sup> × 1.0 mm (t) glass epoxy substrate

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C)**

**(1) Q1**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I <sub>CB0</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0 mA	–	–	200	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>BE</sub> = 1 V, I <sub>C</sub> = 0 mA	–	–	200	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA	60	90	120	–
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2 GHz	12.0	13.5	–	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2 GHz	8.5	10.0	–	dB
Noise Figure	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>opt</sub>	–	1.3	2.5	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 0.5 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.25	0.5	pF

**(2) Q2**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I <sub>CB0</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0 mA	–	–	200	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>BE</sub> = 1 V, I <sub>C</sub> = 0 mA	–	–	200	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA	100	–	145	–
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz	4.0	5.5	–	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz	2.5	4.0	–	dB
Noise Figure	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 10 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>opt</sub>	–	1.8	3.0	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 0.5 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.9	1.2	pF

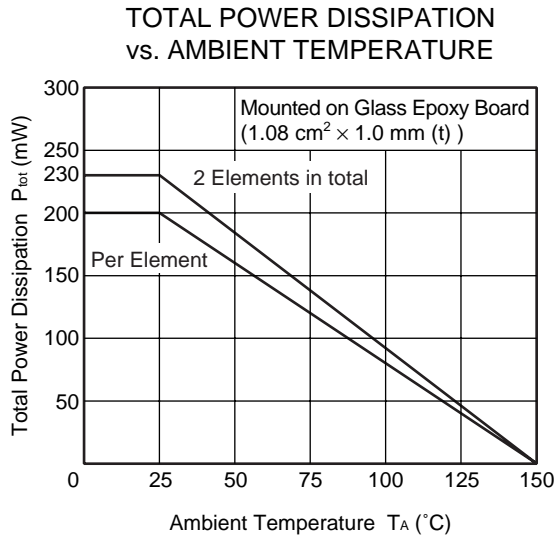
**Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

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

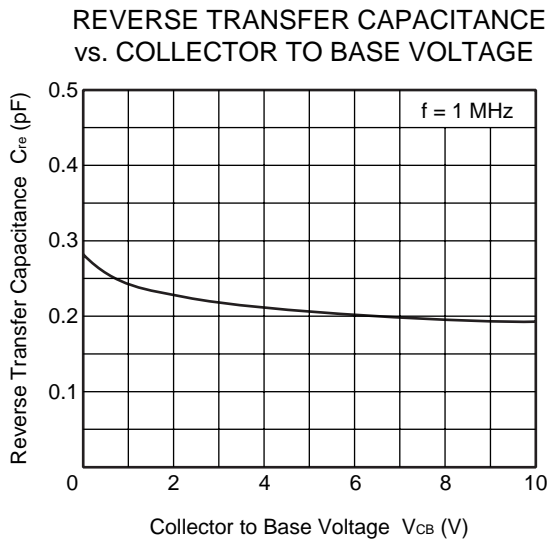
**hFE CLASSIFICATION**

Rank	FB
Marking	2F
hFE Value of Q1	60 to 120
hFE Value of Q2	100 to 145

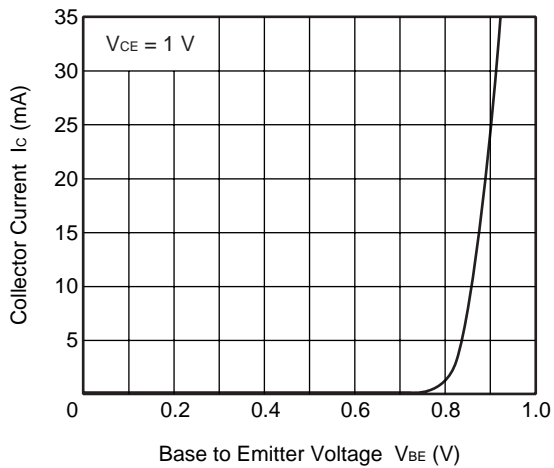
**TYPICAL CHARACTERISTICS (Unless otherwise specified,  $T_A = +25^\circ\text{C}$ )**



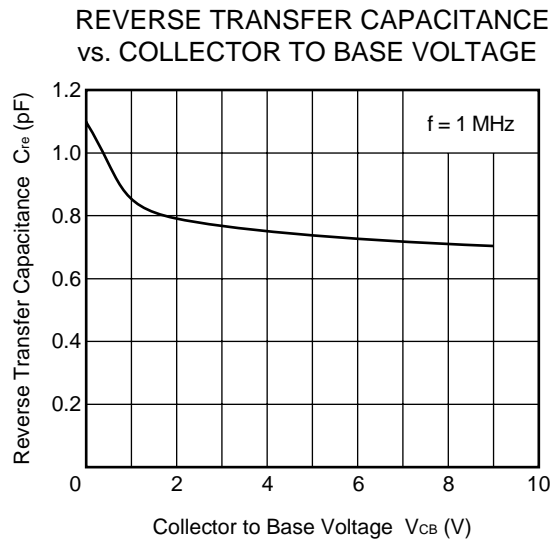
**Q1**



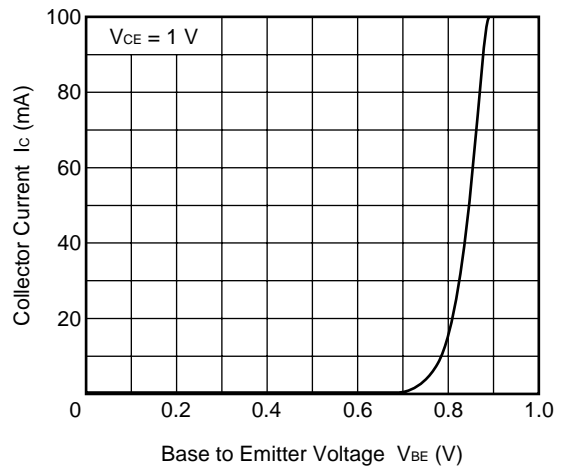
**COLLECTOR CURRENT vs.  
BASE TO EMITTER VOLTAGE**



**Q2**

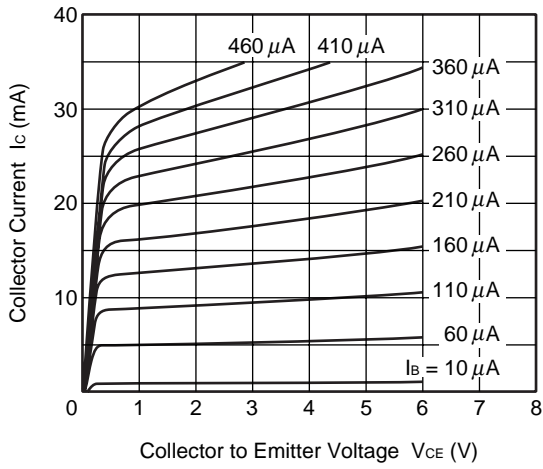


**COLLECTOR CURRENT vs.  
BASE TO EMITTER VOLTAGE**



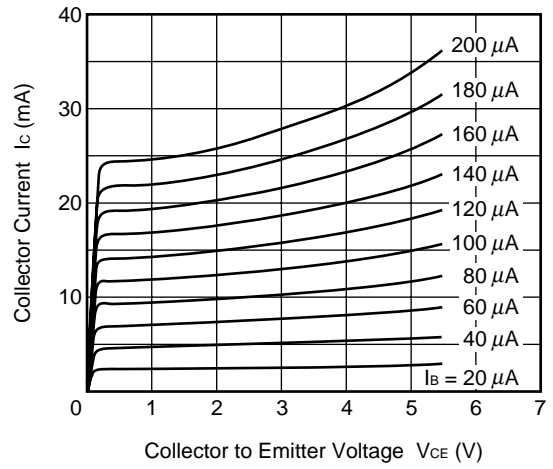
Q1

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

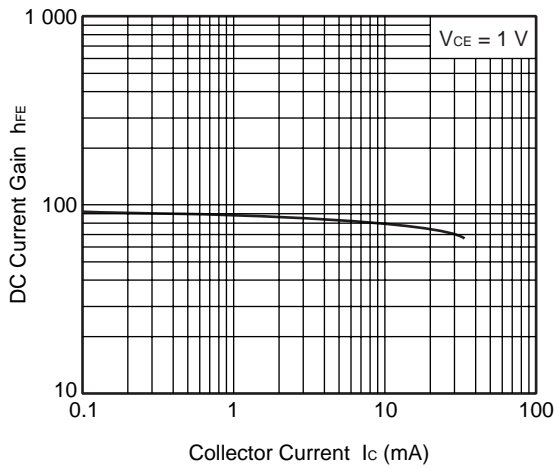


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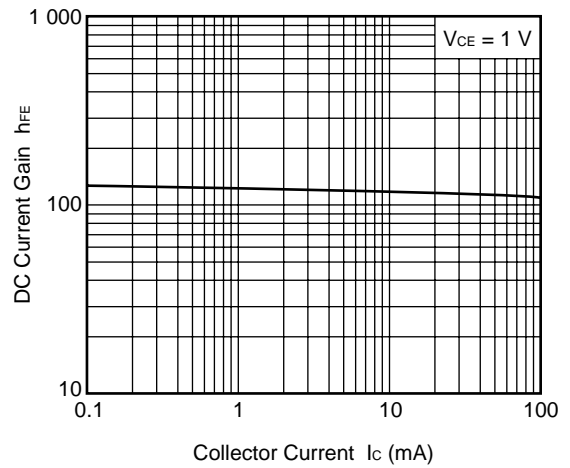
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT

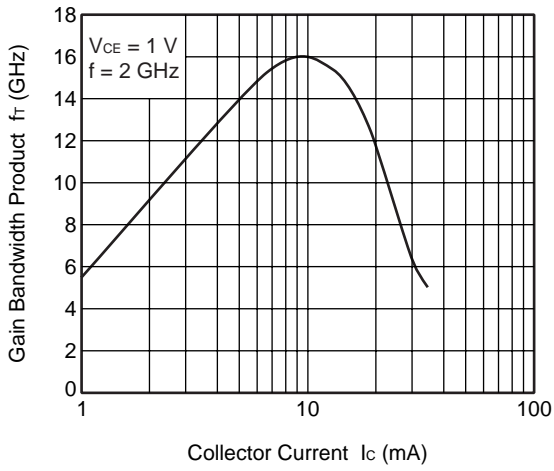


DC CURRENT GAIN vs. COLLECTOR CURRENT



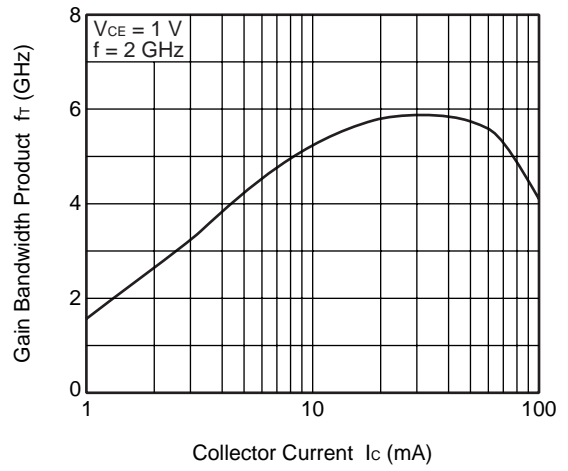
Q1

GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

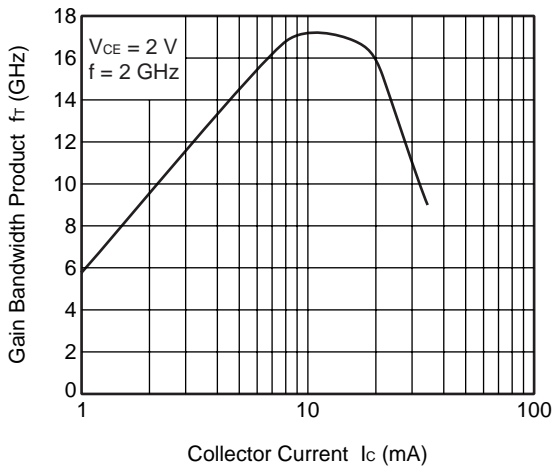


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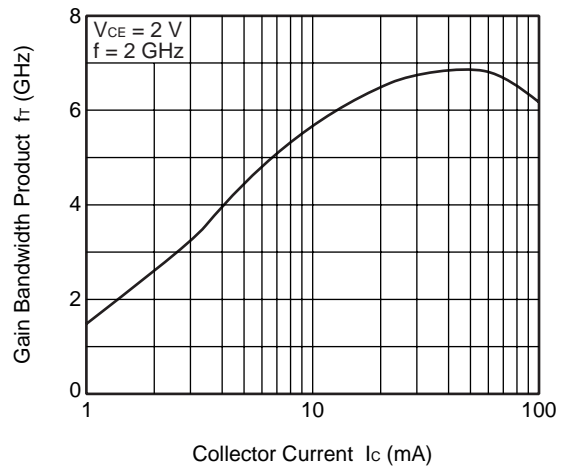
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

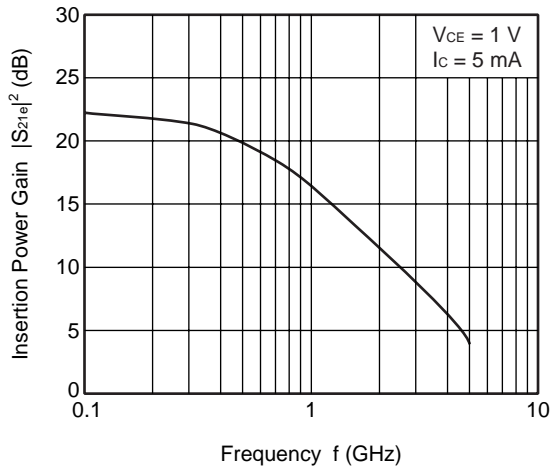


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



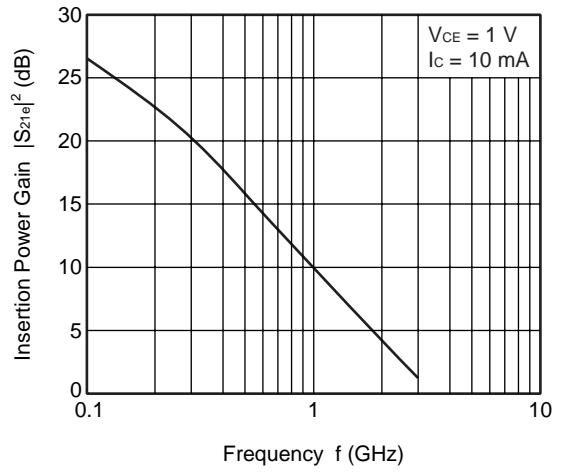
Q1

INSERTION POWER GAIN vs. FREQUENCY

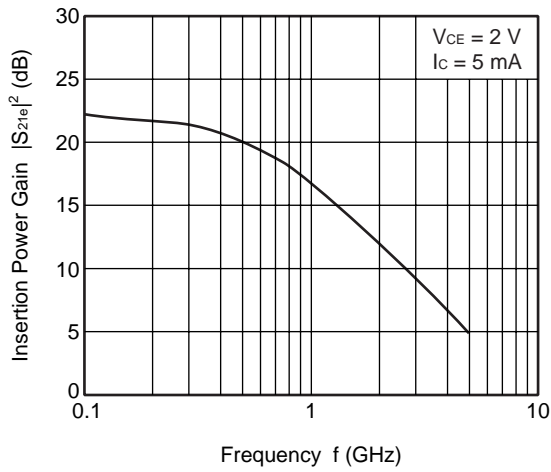


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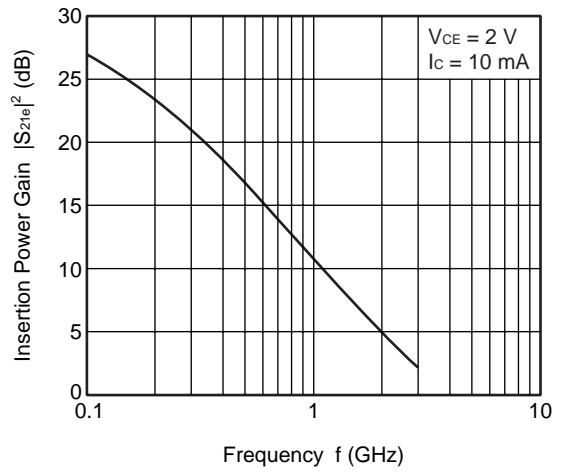
INSERTION POWER GAIN vs. FREQUENCY



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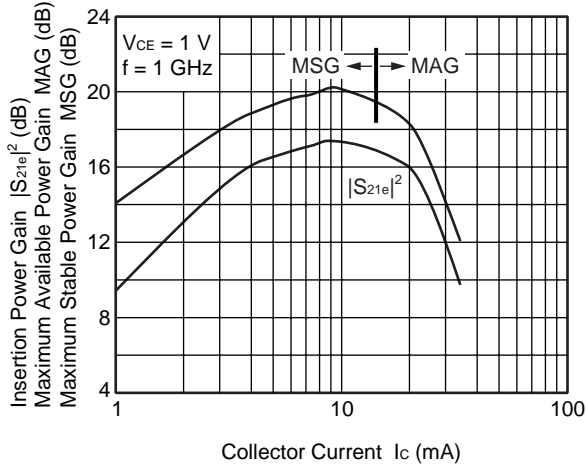


INSERTION POWER GAIN vs. FREQUENCY



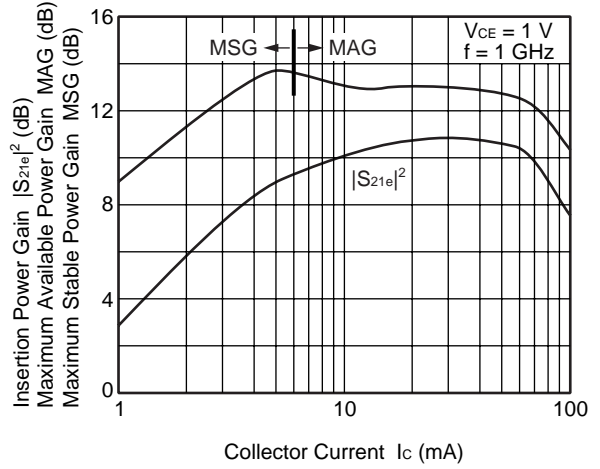
Q1

INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

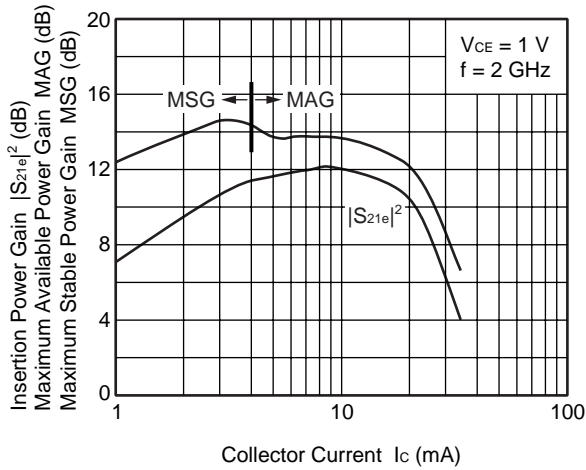


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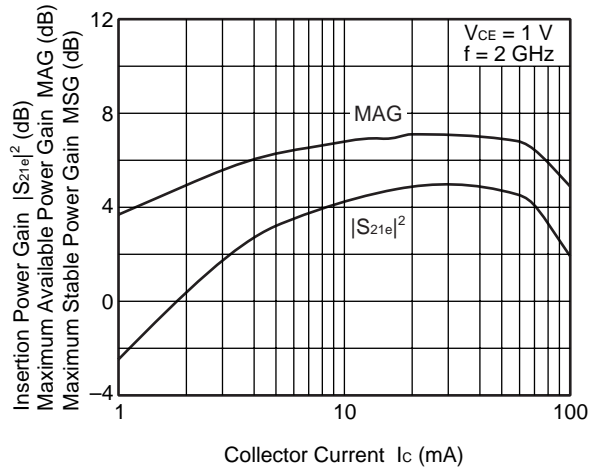
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



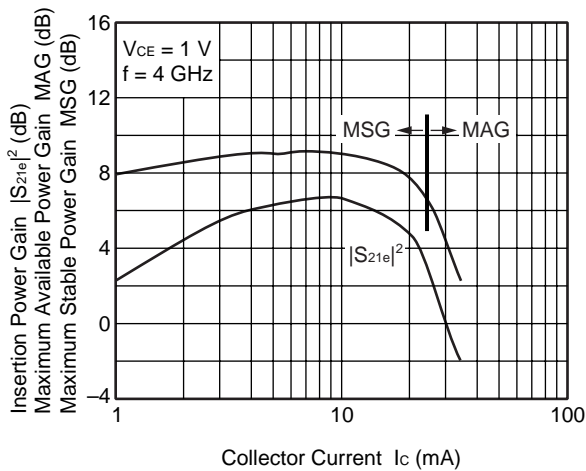
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



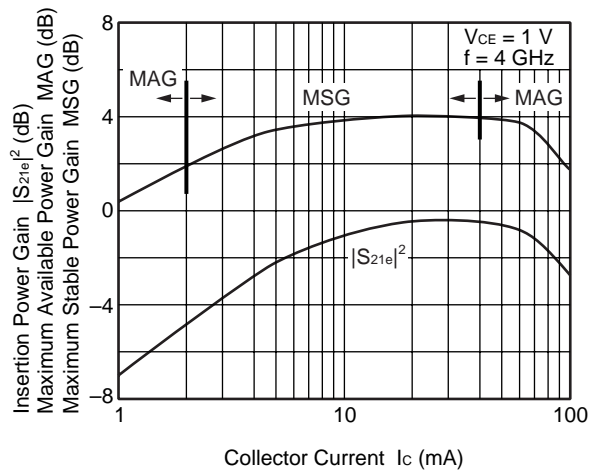
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



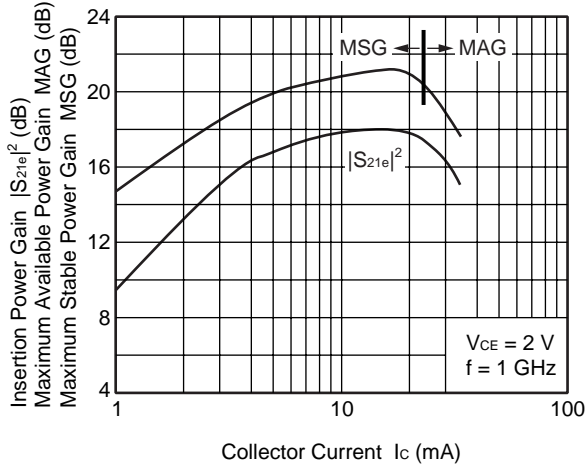
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT





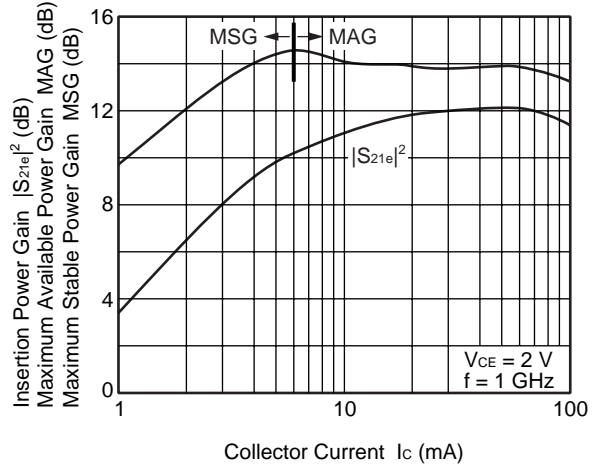
Q1

INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

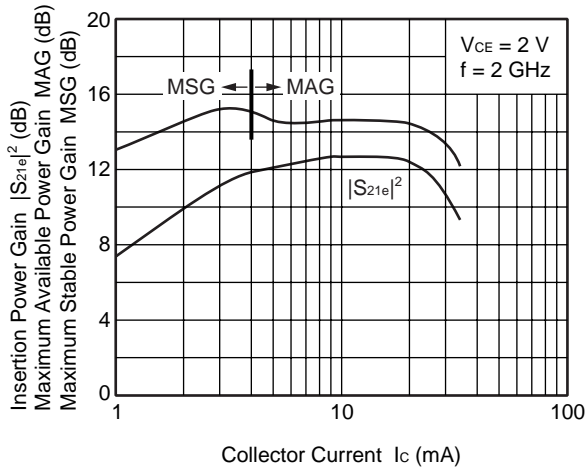


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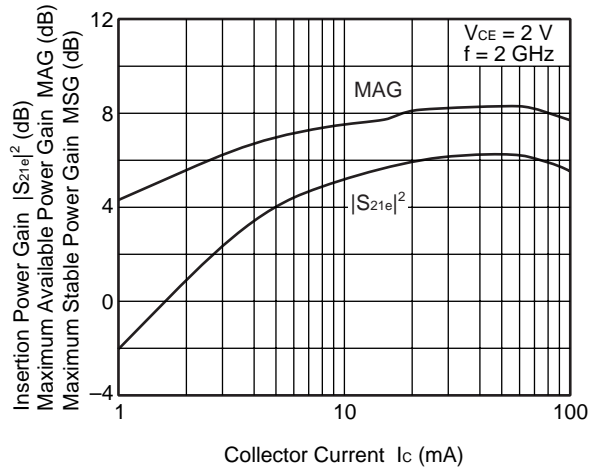
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



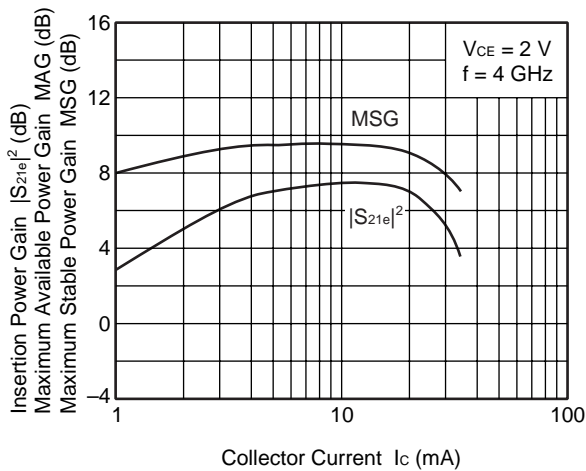
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



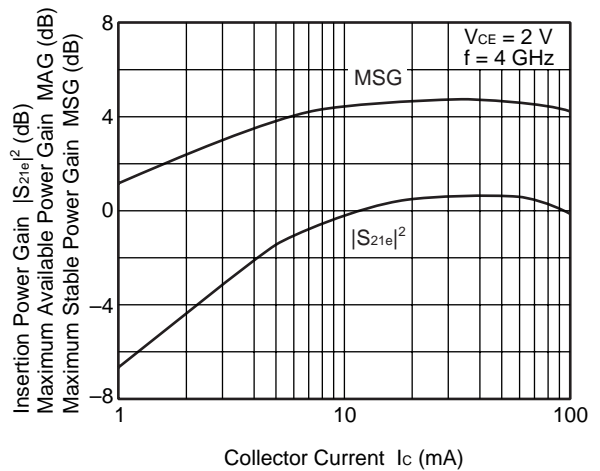
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

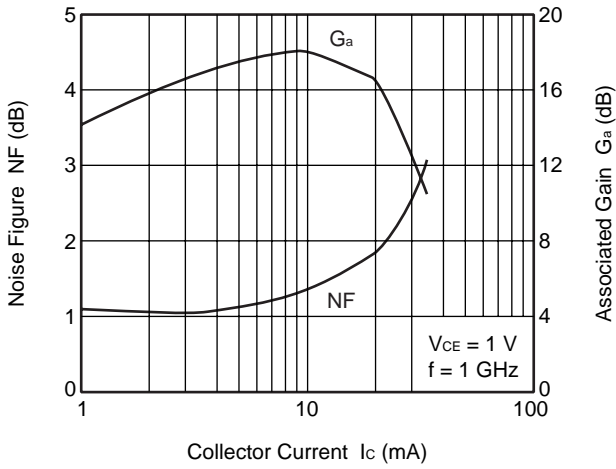


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



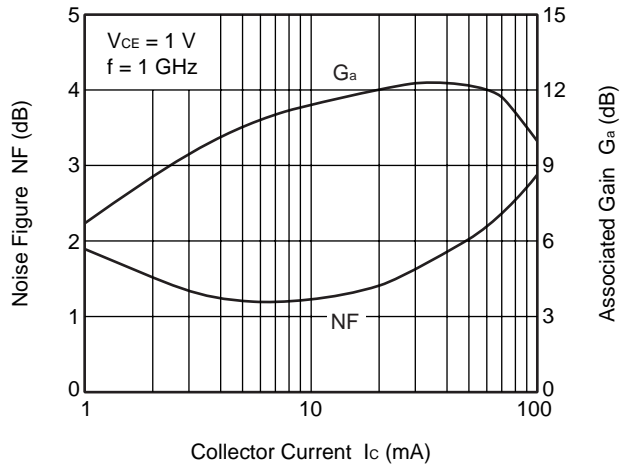
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

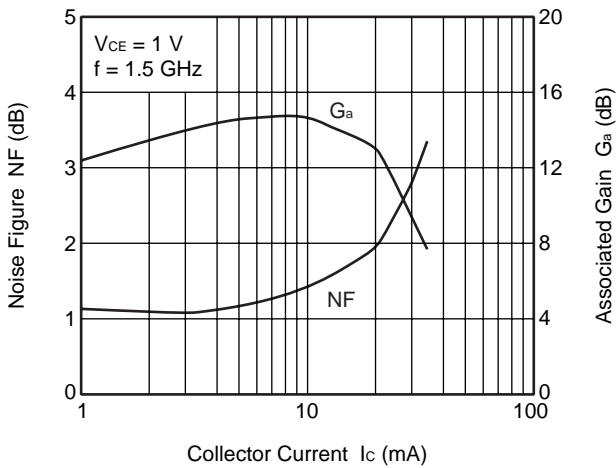


Q2

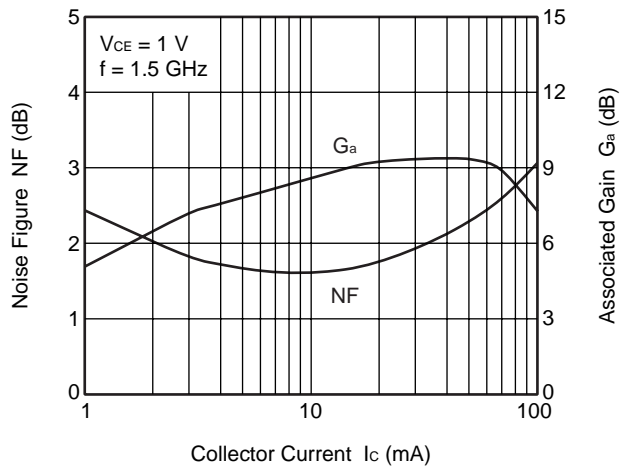
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



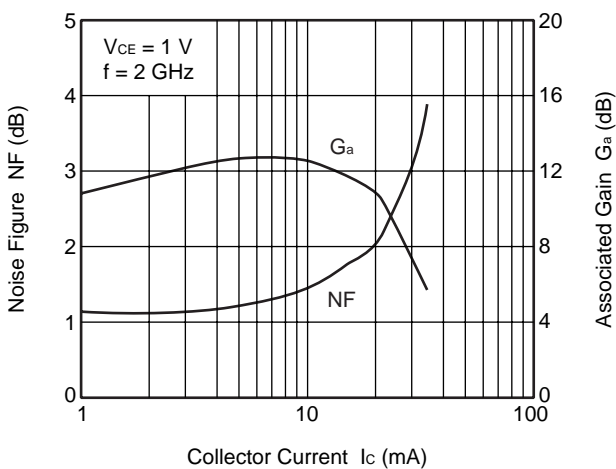
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



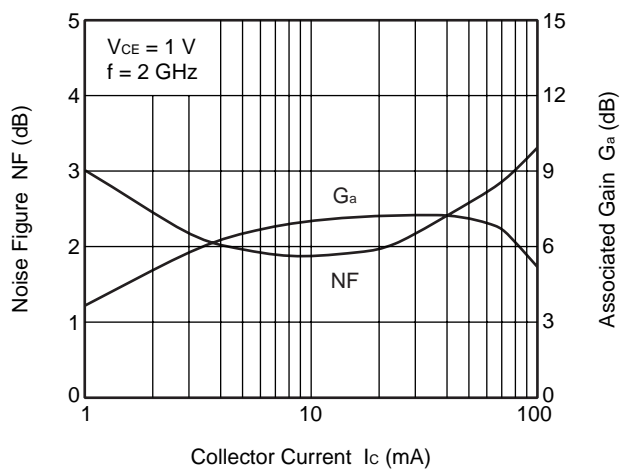
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

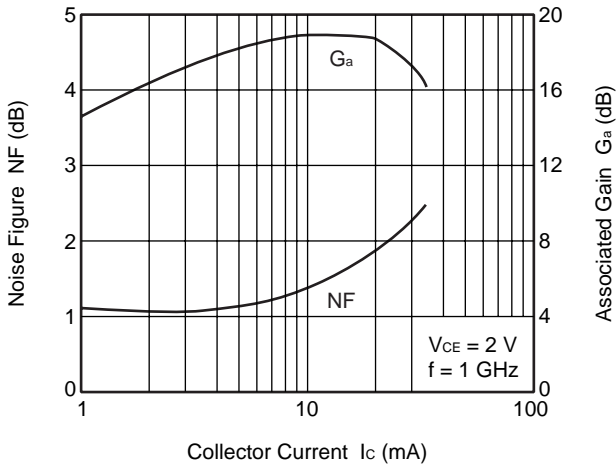


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



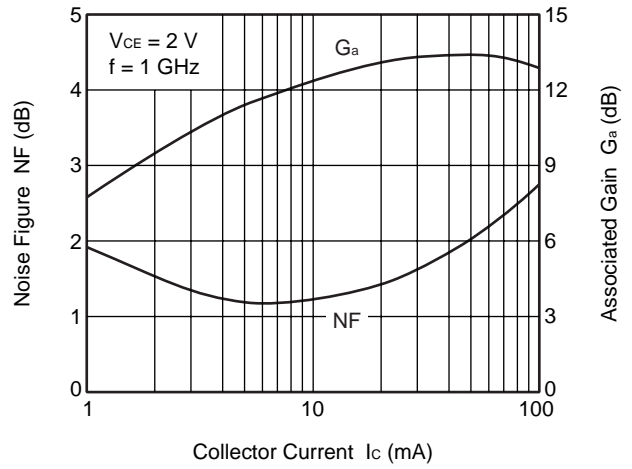
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

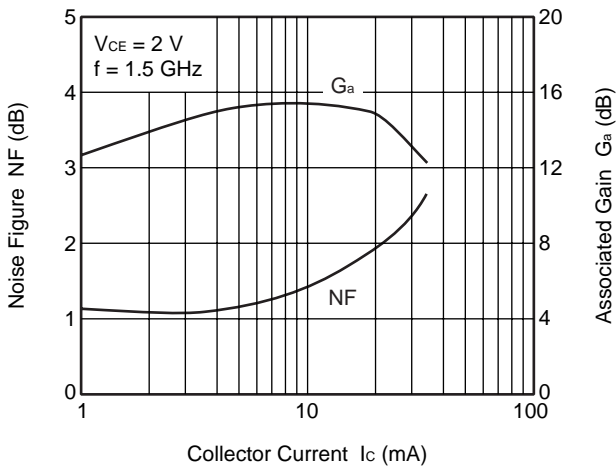


Q2

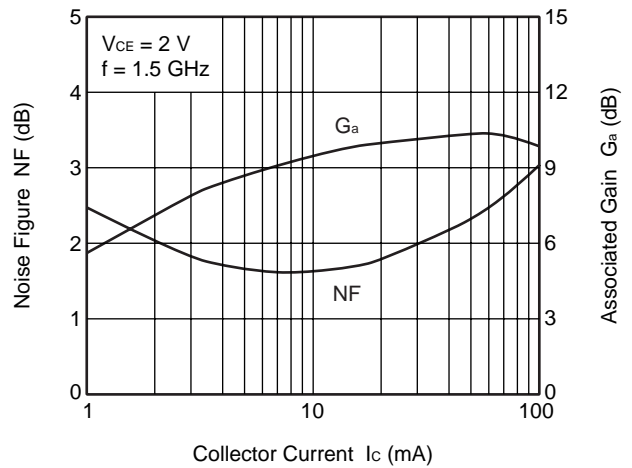
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



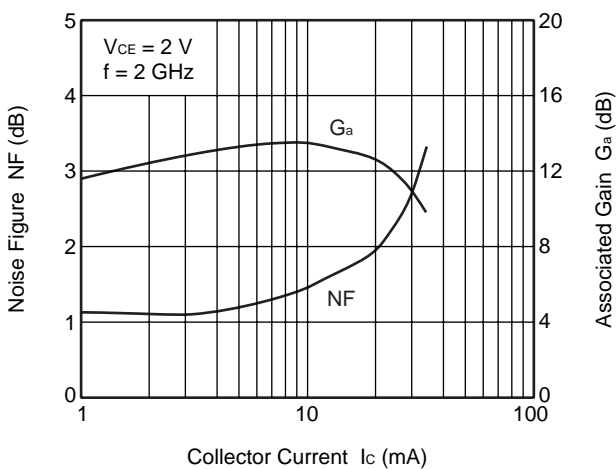
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



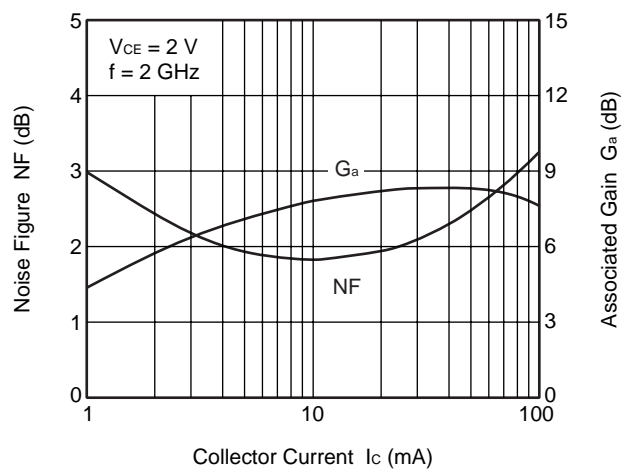
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



**Remark** The graphs indicate nominal characteristics.

S-PARAMETERS Q1

**Note** When  $K \geq 1$ , the MAG (Maximum Available Gain) is used.  $MAG = \left| \frac{S_{21}}{S_{12}} \right| (K - \sqrt{K^2 - 1})$

When  $K < 1$ , the MSG (Maximum Stable Gain) is used.  $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

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

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)	Note
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)			
0.1	0.950	-6.3	3.367	173.2	0.014	85.7	0.990	-4.5	0.049	23.89	
0.2	0.947	-12.0	3.295	168.0	0.029	81.8	0.983	-8.5	0.061	20.53	
0.3	0.934	-17.3	3.320	162.5	0.043	76.9	0.971	-12.8	0.106	18.88	
0.4	0.929	-23.0	3.260	156.4	0.056	72.4	0.958	-17.0	0.142	17.63	
0.5	0.910	-28.5	3.220	151.1	0.069	68.6	0.946	-21.0	0.163	16.72	
0.6	0.888	-34.0	3.173	145.7	0.080	64.8	0.928	-25.0	0.193	15.96	
0.7	0.862	-39.9	3.111	139.7	0.091	61.1	0.908	-29.0	0.225	15.36	
0.8	0.833	-44.8	3.060	134.8	0.100	57.5	0.887	-32.7	0.262	14.86	
0.9	0.801	-50.6	2.998	129.5	0.108	54.1	0.865	-36.5	0.294	14.43	
1.0	0.772	-55.6	2.933	124.5	0.115	50.7	0.843	-40.2	0.331	14.06	
1.1	0.747	-61.4	2.857	119.9	0.121	47.6	0.821	-43.7	0.352	13.72	
1.2	0.714	-67.0	2.788	114.7	0.126	44.5	0.798	-47.1	0.395	13.47	
1.3	0.692	-72.5	2.729	110.3	0.129	41.8	0.774	-50.6	0.423	13.25	
1.4	0.663	-77.7	2.650	105.8	0.132	39.3	0.751	-54.1	0.466	13.04	
1.5	0.637	-83.4	2.595	101.2	0.133	37.1	0.730	-57.1	0.504	12.89	
1.6	0.613	-88.5	2.511	97.0	0.134	35.2	0.710	-60.2	0.545	12.72	
1.7	0.590	-94.0	2.436	92.5	0.135	33.4	0.693	-63.0	0.588	12.57	
1.8	0.567	-100.1	2.400	89.2	0.133	31.9	0.672	-66.6	0.624	12.55	
1.9	0.543	-105.5	2.322	84.6	0.133	30.7	0.657	-69.5	0.680	12.42	
2.0	0.528	-110.5	2.261	80.6	0.131	29.9	0.641	-72.1	0.731	12.36	
2.1	0.508	-117.0	2.197	76.6	0.129	29.8	0.627	-75.3	0.783	12.31	
2.2	0.498	-122.3	2.148	72.9	0.126	30.3	0.613	-78.0	0.836	12.32	
2.3	0.485	-128.2	2.073	69.3	0.123	31.0	0.601	-81.0	0.899	12.27	
2.4	0.475	-133.2	2.009	65.7	0.120	32.1	0.593	-83.8	0.964	12.24	
2.5	0.466	-139.0	1.970	62.4	0.117	33.7	0.580	-86.7	1.027	11.24	
2.6	0.457	-144.2	1.901	58.7	0.115	35.8	0.574	-90.0	1.097	10.28	
2.7	0.454	-149.8	1.858	56.0	0.114	38.1	0.569	-92.9	1.136	9.88	
2.8	0.451	-155.1	1.807	53.0	0.114	41.4	0.566	-95.8	1.170	9.50	
2.9	0.454	-160.3	1.758	50.3	0.115	44.2	0.558	-98.2	1.199	9.14	
3.0	0.449	-165.4	1.685	47.2	0.118	47.4	0.551	-101.6	1.252	8.53	
4.0	0.536	150.7	1.299	19.2	0.214	61.5	0.582	-137.0	0.866	7.84	
5.0	0.646	120.2	0.940	0.0	0.333	47.5	0.658	-172.1	0.754	4.50	

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 3 mA, Z<sub>o</sub> = 50  $\Omega$

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.870	-11.3	8.868	168.9	0.014	78.0	0.978	-7.0	0.177	28.11
0.2	0.864	-18.3	8.486	162.2	0.027	78.8	0.957	-13.2	0.125	24.91
0.3	0.828	-27.1	8.367	153.4	0.040	73.1	0.923	-19.5	0.197	23.19
0.4	0.793	-35.7	7.941	145.2	0.051	68.0	0.884	-25.2	0.254	21.91
0.5	0.743	-43.1	7.528	138.1	0.060	64.0	0.842	-30.2	0.313	20.96
0.6	0.693	-50.6	7.166	131.3	0.068	60.4	0.800	-34.9	0.368	20.20
0.7	0.643	-57.7	6.701	124.7	0.075	57.3	0.755	-39.0	0.428	19.52
0.8	0.594	-64.0	6.347	119.2	0.081	55.1	0.714	-42.8	0.484	18.95
0.9	0.549	-70.5	5.980	113.8	0.086	53.2	0.678	-46.2	0.537	18.45
1.0	0.507	-76.7	5.647	108.8	0.090	51.6	0.644	-49.2	0.590	17.99
1.1	0.473	-82.5	5.310	104.4	0.093	50.6	0.610	-52.2	0.642	17.56
1.2	0.439	-88.8	5.015	99.8	0.096	49.5	0.583	-55.0	0.692	17.17
1.3	0.414	-94.3	4.763	96.1	0.099	48.9	0.556	-57.5	0.739	16.82
1.4	0.383	-100.1	4.525	92.2	0.102	48.7	0.532	-59.9	0.789	16.48
1.5	0.362	-106.0	4.316	88.5	0.104	48.6	0.512	-62.3	0.830	16.17
1.6	0.344	-111.8	4.099	85.1	0.107	48.8	0.493	-64.8	0.869	15.83
1.7	0.324	-117.8	3.915	81.7	0.110	49.0	0.478	-67.0	0.907	15.52
1.8	0.311	-124.3	3.755	78.9	0.113	49.5	0.462	-69.5	0.938	15.23
1.9	0.293	-131.3	3.601	75.4	0.116	49.7	0.449	-71.8	0.970	14.92
2.0	0.288	-136.7	3.457	72.3	0.119	50.2	0.437	-74.0	0.994	14.62
2.1	0.279	-143.6	3.313	69.3	0.122	51.0	0.425	-76.5	1.022	13.41
2.2	0.277	-149.4	3.206	66.5	0.126	51.9	0.416	-79.0	1.036	12.90
2.3	0.278	-155.0	3.073	63.7	0.129	52.6	0.408	-81.5	1.054	12.34
2.4	0.276	-160.1	2.961	61.0	0.133	53.3	0.401	-84.0	1.068	11.87
2.5	0.277	-166.1	2.877	58.4	0.137	53.9	0.392	-86.7	1.077	11.51
2.6	0.279	-171.4	2.770	55.5	0.142	54.6	0.388	-89.7	1.085	11.12
2.7	0.282	-176.2	2.686	53.4	0.147	54.9	0.384	-92.4	1.089	10.81
2.8	0.288	179.2	2.607	51.1	0.152	55.5	0.382	-95.4	1.084	10.57
2.9	0.294	174.9	2.521	49.0	0.157	55.7	0.378	-97.7	1.087	10.25
3.0	0.299	169.5	2.425	46.5	0.163	55.8	0.374	-101.1	1.095	9.84
4.0	0.423	137.5	1.893	22.9	0.245	53.4	0.412	-136.3	0.922	8.88
5.0	0.551	115.5	1.441	3.1	0.330	42.1	0.514	-169.3	0.820	6.40

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 5 mA, Z<sub>o</sub> = 50  $\Omega$

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.813	-13.3	12.993	166.3	0.013	76.7	0.968	-8.8	0.214	29.89
0.2	0.790	-23.5	12.210	157.4	0.027	76.1	0.930	-16.6	0.195	26.58
0.3	0.733	-34.4	11.705	147.0	0.038	71.1	0.877	-23.9	0.271	24.92
0.4	0.678	-44.3	10.756	137.4	0.047	66.1	0.818	-30.2	0.352	23.62
0.5	0.616	-53.0	9.904	129.8	0.055	62.5	0.760	-35.2	0.428	22.59
0.6	0.560	-60.6	9.132	122.9	0.061	60.2	0.705	-39.4	0.499	21.74
0.7	0.504	-68.0	8.334	116.4	0.066	58.2	0.656	-43.2	0.570	20.98
0.8	0.455	-74.6	7.726	111.1	0.071	57.0	0.613	-46.2	0.635	20.34
0.9	0.413	-81.3	7.158	106.1	0.076	56.2	0.575	-48.9	0.693	19.77
1.0	0.376	-88.1	6.656	101.5	0.080	55.7	0.542	-51.4	0.745	19.21
1.1	0.347	-94.0	6.194	97.6	0.084	55.5	0.513	-53.7	0.792	18.68
1.2	0.317	-101.1	5.776	93.6	0.088	55.3	0.487	-55.8	0.841	18.19
1.3	0.299	-106.7	5.450	90.2	0.091	55.5	0.466	-57.9	0.875	17.75
1.4	0.276	-113.4	5.111	86.8	0.095	55.7	0.446	-60.1	0.915	17.29
1.5	0.261	-120.3	4.854	83.5	0.099	56.0	0.429	-62.0	0.941	16.89
1.6	0.247	-126.4	4.587	80.4	0.104	56.4	0.414	-64.2	0.970	16.46
1.7	0.235	-133.0	4.361	77.4	0.108	56.6	0.402	-66.0	0.992	16.05
1.8	0.230	-140.0	4.160	75.1	0.113	57.0	0.389	-68.4	1.008	15.14
1.9	0.220	-148.1	3.974	72.0	0.118	57.1	0.379	-70.7	1.025	14.33
2.0	0.218	-153.4	3.808	69.2	0.123	57.3	0.369	-72.7	1.035	13.78
2.1	0.220	-160.7	3.638	66.5	0.128	57.7	0.361	-75.3	1.044	13.27
2.2	0.225	-166.5	3.515	64.1	0.133	58.1	0.352	-77.9	1.047	12.91
2.3	0.228	-171.7	3.363	61.6	0.138	58.3	0.346	-80.4	1.055	12.44
2.4	0.231	-176.7	3.238	59.2	0.143	58.3	0.341	-83.0	1.059	12.06
2.5	0.238	178.2	3.131	57.0	0.148	58.5	0.334	-85.7	1.062	11.72
2.6	0.243	173.5	3.018	54.2	0.154	58.3	0.330	-88.8	1.063	11.39
2.7	0.249	169.5	2.928	52.4	0.160	58.2	0.327	-91.8	1.061	11.12
2.8	0.255	165.3	2.834	50.3	0.166	58.2	0.325	-94.8	1.058	10.85
2.9	0.265	161.7	2.742	48.4	0.172	57.9	0.321	-97.3	1.057	10.57
3.0	0.271	157.2	2.638	46.1	0.178	57.5	0.319	-101.0	1.062	10.19
4.0	0.404	131.2	2.063	24.3	0.257	51.5	0.359	-137.7	0.933	9.05
5.0	0.531	112.4	1.591	5.4	0.333	40.1	0.464	-170.1	0.852	6.79

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 7 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.766	-16.1	16.147	164.6	0.012	76.9	0.957	-10.2	0.215	31.12
0.2	0.726	-27.4	14.889	153.7	0.026	74.9	0.904	-19.1	0.245	27.66
0.3	0.658	-40.2	13.930	142.1	0.036	69.1	0.835	-26.9	0.341	25.87
0.4	0.595	-50.9	12.489	132.2	0.044	65.5	0.764	-33.1	0.428	24.52
0.5	0.530	-59.7	11.260	124.4	0.051	62.7	0.699	-37.8	0.514	23.48
0.6	0.468	-68.0	10.194	117.6	0.056	60.7	0.642	-41.7	0.594	22.56
0.7	0.417	-75.3	9.170	111.3	0.062	59.8	0.590	-44.9	0.670	21.73
0.8	0.370	-82.9	8.401	106.2	0.067	59.2	0.549	-47.4	0.730	21.01
0.9	0.335	-89.4	7.702	101.6	0.071	59.2	0.515	-49.5	0.785	20.36
1.0	0.300	-96.9	7.114	97.4	0.075	59.2	0.485	-51.7	0.834	19.75
1.1	0.277	-103.2	6.567	93.8	0.080	59.3	0.459	-53.4	0.874	19.13
1.2	0.253	-110.5	6.112	90.1	0.084	59.3	0.437	-55.3	0.915	18.61
1.3	0.239	-117.0	5.735	86.9	0.089	59.6	0.419	-57.1	0.939	18.08
1.4	0.223	-124.0	5.358	84.0	0.094	59.8	0.401	-59.1	0.969	17.57
1.5	0.213	-131.4	5.077	80.9	0.098	60.1	0.387	-60.9	0.988	17.12
1.6	0.204	-138.3	4.783	77.9	0.104	60.4	0.375	-62.8	1.007	16.11
1.7	0.198	-145.9	4.547	75.2	0.109	60.5	0.364	-64.7	1.020	15.34
1.8	0.198	-152.5	4.315	73.0	0.114	60.7	0.354	-67.0	1.030	14.71
1.9	0.195	-161.0	4.126	70.1	0.120	60.5	0.345	-69.4	1.036	14.20
2.0	0.198	-166.0	3.954	67.6	0.125	60.6	0.337	-71.5	1.041	13.75
2.1	0.203	-173.9	3.775	65.1	0.131	60.7	0.329	-74.1	1.046	13.28
2.2	0.208	-178.0	3.635	62.7	0.137	60.8	0.322	-76.7	1.048	12.91
2.3	0.215	-176.9	3.477	60.4	0.142	60.7	0.317	-79.4	1.052	12.49
2.4	0.219	172.7	3.341	58.1	0.148	60.6	0.312	-82.1	1.054	12.10
2.5	0.229	168.2	3.231	56.0	0.154	60.4	0.306	-84.8	1.052	11.82
2.6	0.235	164.1	3.112	53.4	0.161	59.9	0.303	-88.2	1.052	11.48
2.7	0.244	160.3	3.021	51.5	0.166	59.7	0.300	-91.1	1.048	11.25
2.8	0.250	156.9	2.927	49.6	0.173	59.4	0.299	-94.4	1.044	11.00
2.9	0.260	154.2	2.829	47.8	0.179	58.9	0.296	-97.1	1.043	10.72
3.0	0.268	149.9	2.721	45.6	0.186	58.2	0.294	-100.9	1.045	10.35
4.0	0.404	127.1	2.129	24.6	0.264	50.9	0.335	-138.8	0.935	9.07
5.0	0.528	110.4	1.646	6.3	0.336	39.2	0.442	-171.0	0.866	6.90

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 10 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.695	-19.2	19.540	162.2	0.012	74.2	0.942	-12.0	0.270	31.96
0.2	0.647	-33.2	17.557	149.6	0.024	73.7	0.870	-21.7	0.300	28.55
0.3	0.573	-47.4	15.968	136.9	0.033	68.5	0.785	-29.8	0.410	26.84
0.4	0.500	-58.7	13.929	126.6	0.041	65.3	0.704	-35.6	0.519	25.31
0.5	0.436	-68.3	12.269	118.9	0.047	63.1	0.637	-39.9	0.611	24.20
0.6	0.382	-77.2	10.937	112.5	0.053	62.3	0.578	-43.0	0.689	23.18
0.7	0.336	-85.1	9.707	106.5	0.058	61.9	0.531	-45.4	0.763	22.27
0.8	0.295	-93.2	8.808	101.9	0.063	62.2	0.492	-47.4	0.820	21.48
0.9	0.267	-100.6	8.026	97.5	0.067	62.4	0.462	-49.1	0.866	20.75
1.0	0.239	-109.4	7.351	93.7	0.072	62.6	0.436	-50.8	0.908	20.07
1.1	0.223	-115.8	6.774	90.3	0.078	62.8	0.415	-52.3	0.938	19.41
1.2	0.208	-124.5	6.270	86.8	0.082	63.0	0.397	-53.9	0.969	18.81
1.3	0.200	-131.1	5.867	83.9	0.088	63.3	0.381	-55.5	0.987	18.26
1.4	0.190	-139.5	5.474	81.0	0.093	63.5	0.366	-57.4	1.008	17.14
1.5	0.186	-146.6	5.174	78.1	0.098	63.5	0.355	-59.0	1.019	16.37
1.6	0.183	-154.0	4.867	75.6	0.104	63.7	0.345	-60.9	1.032	15.61
1.7	0.183	-161.1	4.622	72.8	0.110	63.7	0.336	-62.9	1.038	15.06
1.8	0.185	-167.8	4.384	70.8	0.116	63.7	0.327	-65.1	1.043	14.51
1.9	0.189	-175.8	4.186	68.1	0.122	63.4	0.320	-67.6	1.043	14.07
2.0	0.193	-179.8	4.001	65.6	0.128	63.1	0.313	-69.9	1.046	13.64
2.1	0.203	173.9	3.817	63.2	0.134	63.1	0.306	-72.5	1.048	13.20
2.2	0.210	170.3	3.680	61.0	0.140	63.1	0.300	-75.3	1.046	12.89
2.3	0.219	166.1	3.517	58.9	0.146	62.8	0.296	-78.1	1.048	12.48
2.4	0.226	162.5	3.376	56.6	0.153	62.4	0.292	-80.9	1.048	12.12
2.5	0.235	158.6	3.266	54.7	0.159	62.0	0.287	-83.8	1.045	11.84
2.6	0.244	155.4	3.144	52.0	0.166	61.3	0.284	-87.3	1.040	11.54
2.7	0.254	152.2	3.051	50.4	0.172	60.9	0.281	-90.5	1.038	11.30
2.8	0.263	149.7	2.955	48.5	0.179	60.4	0.280	-93.8	1.032	11.09
2.9	0.272	146.8	2.855	46.8	0.185	59.8	0.278	-96.7	1.031	10.79
3.0	0.279	143.2	2.741	44.7	0.192	58.8	0.276	-100.7	1.035	10.41
4.0	0.416	124.0	2.144	24.2	0.270	50.5	0.321	-140.0	0.932	9.00
5.0	0.534	108.1	1.661	6.3	0.340	38.5	0.429	-172.1	0.873	6.89

V<sub>CE</sub> = 1 V, I<sub>C</sub> = 20 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.548	-35.2	23.507	155.4	0.015	74.4	0.861	-16.1	0.345	32.09
0.2	0.472	-57.4	19.533	138.3	0.024	68.5	0.743	-27.6	0.472	29.04
0.3	0.400	-79.7	16.410	124.3	0.032	65.1	0.634	-34.9	0.599	27.11
0.4	0.350	-96.4	13.500	114.3	0.038	63.2	0.551	-39.0	0.722	25.51
0.5	0.315	-110.1	11.428	107.0	0.043	63.3	0.492	-41.2	0.818	24.23
0.6	0.288	-123.0	9.895	101.4	0.049	63.7	0.447	-42.6	0.892	23.10
0.7	0.273	-133.7	8.613	96.4	0.054	64.2	0.414	-43.9	0.952	22.03
0.8	0.263	-144.4	7.705	92.0	0.059	65.3	0.388	-44.9	0.994	21.13
0.9	0.261	-152.2	6.944	88.2	0.065	65.8	0.369	-45.9	1.026	19.32
1.0	0.257	-161.0	6.316	84.7	0.070	66.4	0.353	-47.3	1.051	18.15
1.1	0.261	-166.4	5.781	81.7	0.076	66.8	0.341	-48.7	1.066	17.23
1.2	0.265	-173.7	5.317	78.5	0.082	67.0	0.330	-50.2	1.083	16.37
1.3	0.271	-178.5	4.954	75.8	0.088	67.3	0.320	-52.0	1.087	15.71
1.4	0.276	176.4	4.603	73.1	0.094	67.3	0.311	-54.1	1.097	14.99
1.5	0.283	171.8	4.343	70.3	0.100	67.4	0.304	-56.1	1.097	14.47
1.6	0.288	167.3	4.077	67.7	0.107	67.4	0.298	-58.4	1.101	13.89
1.7	0.295	163.7	3.862	65.2	0.113	67.1	0.293	-60.7	1.097	13.43
1.8	0.306	160.3	3.648	63.1	0.120	67.0	0.288	-63.4	1.095	12.95
1.9	0.316	155.8	3.481	60.4	0.127	66.5	0.284	-66.5	1.085	12.59
2.0	0.323	153.6	3.325	58.2	0.134	66.1	0.279	-69.2	1.081	12.21
2.1	0.336	150.3	3.164	55.6	0.141	65.8	0.275	-72.5	1.077	11.83
2.2	0.346	148.2	3.047	53.5	0.147	65.5	0.272	-75.8	1.067	11.57
2.3	0.357	145.8	2.908	51.3	0.155	64.9	0.269	-79.2	1.063	11.21
2.4	0.361	144.0	2.791	49.1	0.162	64.3	0.267	-82.6	1.061	10.86
2.5	0.372	141.2	2.690	47.2	0.169	63.8	0.265	-86.1	1.055	10.60
2.6	0.380	138.6	2.584	44.6	0.176	63.0	0.263	-90.2	1.050	10.29
2.7	0.391	136.9	2.508	42.9	0.183	62.4	0.263	-94.0	1.040	10.14
2.8	0.399	134.9	2.425	41.0	0.191	61.6	0.264	-97.9	1.033	9.93
2.9	0.409	133.0	2.343	39.3	0.198	60.8	0.264	-101.4	1.028	9.70
3.0	0.416	130.3	2.244	37.2	0.205	59.7	0.265	-105.8	1.033	9.29
4.0	0.545	114.1	1.727	16.7	0.288	49.3	0.330	-147.9	0.910	7.78
5.0	0.636	99.5	1.310	-0.5	0.355	36.0	0.449	-179.5	0.866	5.67

V<sub>CE</sub> = 2 V, I<sub>C</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.945	-6.0	3.352	173.8	0.012	82.6	0.992	-4.2	0.096	24.46
0.2	0.952	-11.1	3.285	168.3	0.026	81.5	0.985	-8.0	0.076	21.09
0.3	0.939	-16.2	3.318	163.3	0.038	77.7	0.974	-12.0	0.099	19.40
0.4	0.934	-21.8	3.259	157.4	0.050	73.6	0.962	-15.8	0.132	18.15
0.5	0.912	-26.8	3.223	152.2	0.060	69.6	0.953	-19.5	0.166	17.27
0.6	0.893	-32.3	3.185	147.1	0.071	66.1	0.936	-23.4	0.186	16.51
0.7	0.869	-37.7	3.129	141.3	0.080	62.5	0.916	-27.1	0.224	15.91
0.8	0.841	-42.6	3.087	136.4	0.088	59.1	0.897	-30.6	0.259	15.43
0.9	0.814	-47.9	3.025	131.3	0.096	55.9	0.878	-34.1	0.288	15.00
1.0	0.786	-53.0	2.974	126.5	0.102	52.6	0.859	-37.6	0.321	14.65
1.1	0.763	-58.2	2.894	122.0	0.107	49.6	0.836	-41.0	0.349	14.30
1.2	0.729	-63.8	2.834	116.9	0.111	46.7	0.815	-44.3	0.389	14.07
1.3	0.707	-68.9	2.777	112.7	0.114	44.2	0.793	-47.5	0.418	13.85
1.4	0.679	-74.1	2.706	108.3	0.117	41.8	0.772	-50.7	0.458	13.65
1.5	0.656	-79.5	2.656	103.6	0.118	39.8	0.752	-53.7	0.496	13.52
1.6	0.630	-84.3	2.573	99.4	0.119	38.1	0.733	-56.6	0.542	13.35
1.7	0.605	-89.5	2.501	95.1	0.119	36.5	0.716	-59.4	0.587	13.22
1.8	0.583	-95.5	2.472	91.7	0.118	35.3	0.696	-62.7	0.624	13.23
1.9	0.557	-100.8	2.394	87.2	0.117	34.4	0.681	-65.5	0.685	13.11
2.0	0.540	-105.9	2.332	83.1	0.116	34.1	0.667	-68.1	0.735	13.05
2.1	0.521	-111.9	2.269	79.1	0.113	34.3	0.653	-70.9	0.792	13.02
2.2	0.508	-117.3	2.219	75.4	0.110	35.3	0.639	-73.7	0.848	13.03
2.3	0.494	-122.4	2.153	72.0	0.108	36.6	0.628	-76.5	0.913	13.00
2.4	0.481	-127.6	2.089	68.2	0.105	38.5	0.619	-79.2	0.983	12.97
2.5	0.472	-133.4	2.049	64.9	0.103	40.7	0.605	-82.1	1.045	11.66
2.6	0.465	-138.9	1.986	61.1	0.102	43.5	0.599	-85.3	1.102	10.94
2.7	0.458	-144.2	1.938	58.4	0.102	46.6	0.596	-88.1	1.132	10.56
2.8	0.452	-149.4	1.884	55.3	0.104	50.4	0.592	-90.9	1.156	10.19
2.9	0.452	-154.9	1.829	52.8	0.106	53.8	0.585	-93.1	1.181	9.78
3.0	0.447	-160.1	1.760	49.5	0.111	57.1	0.577	-96.4	1.211	9.24
4.0	0.527	154.6	1.372	20.9	0.221	68.0	0.607	-131.6	0.773	7.92
5.0	0.642	122.5	0.989	0.6	0.348	50.8	0.676	-168.0	0.688	4.53

V<sub>CE</sub> = 2 V, I<sub>C</sub> = 3 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.882	-10.4	8.868	169.0	0.010	88.9	0.982	-6.3	0.021	29.46
0.2	0.868	-16.9	8.512	163.0	0.025	79.9	0.963	-11.9	0.123	25.39
0.3	0.837	-25.4	8.409	154.5	0.035	74.0	0.933	-17.6	0.192	23.79
0.4	0.803	-33.1	8.015	146.6	0.045	69.3	0.895	-22.9	0.255	22.49
0.5	0.756	-40.0	7.641	139.8	0.053	65.5	0.860	-27.5	0.309	21.57
0.6	0.709	-47.0	7.272	133.1	0.061	62.2	0.818	-31.8	0.366	20.76
0.7	0.663	-53.6	6.852	126.7	0.067	59.6	0.780	-35.7	0.418	20.11
0.8	0.612	-59.4	6.510	121.1	0.072	57.3	0.740	-39.1	0.482	19.56
0.9	0.569	-65.5	6.150	115.8	0.076	55.4	0.706	-42.1	0.535	19.06
1.0	0.525	-71.1	5.813	110.9	0.080	54.1	0.672	-45.0	0.591	18.61
1.1	0.491	-76.5	5.489	106.6	0.084	53.0	0.642	-47.7	0.639	18.17
1.2	0.456	-82.4	5.197	102.0	0.086	52.1	0.616	-50.2	0.692	17.80
1.3	0.430	-87.7	4.949	98.3	0.089	51.8	0.590	-52.4	0.736	17.45
1.4	0.398	-92.7	4.701	94.5	0.092	51.7	0.566	-54.9	0.788	17.11
1.5	0.376	-98.1	4.498	90.8	0.094	51.8	0.546	-56.8	0.831	16.81
1.6	0.351	-103.4	4.285	87.3	0.097	52.1	0.529	-59.1	0.873	16.47
1.7	0.332	-108.9	4.082	83.8	0.099	52.6	0.514	-61.1	0.909	16.14
1.8	0.315	-115.1	3.926	81.2	0.102	53.4	0.498	-63.4	0.940	15.86
1.9	0.296	-121.1	3.768	77.6	0.105	53.7	0.486	-65.7	0.969	15.54
2.0	0.288	-126.5	3.624	74.5	0.108	54.6	0.474	-67.5	0.992	15.24
2.1	0.276	-133.7	3.485	71.4	0.112	55.5	0.464	-69.8	1.015	14.18
2.2	0.273	-139.1	3.370	68.6	0.115	56.7	0.453	-72.1	1.029	13.63
2.3	0.267	-144.7	3.237	65.9	0.119	57.6	0.446	-74.4	1.046	13.03
2.4	0.262	-150.1	3.122	63.1	0.123	58.4	0.439	-76.7	1.060	12.56
2.5	0.261	-156.2	3.030	60.6	0.127	59.2	0.431	-79.1	1.065	12.21
2.6	0.260	-161.6	2.920	57.6	0.132	60.0	0.426	-81.8	1.073	11.80
2.7	0.264	-166.4	2.841	55.5	0.137	60.4	0.422	-84.5	1.068	11.58
2.8	0.267	-171.7	2.763	53.2	0.143	61.2	0.420	-87.1	1.058	11.39
2.9	0.272	-176.5	2.670	51.1	0.148	61.5	0.415	-89.3	1.059	11.07
3.0	0.273	178.3	2.568	48.6	0.155	61.6	0.411	-92.6	1.065	10.64
4.0	0.398	143.1	2.027	24.6	0.243	59.1	0.443	-126.8	0.866	9.22
5.0	0.534	119.1	1.542	3.9	0.337	46.3	0.539	-162.0	0.762	6.61

V<sub>CE</sub> = 2 V, I<sub>C</sub> = 5 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.820	-12.0	13.017	166.8	0.011	78.5	0.973	-7.9	0.198	30.82
0.2	0.797	-21.2	12.240	158.4	0.023	77.7	0.940	-14.9	0.186	27.26
0.3	0.752	-31.3	11.824	148.4	0.033	71.7	0.892	-21.5	0.275	25.53
0.4	0.697	-40.6	10.947	139.3	0.041	67.9	0.837	-27.0	0.349	24.22
0.5	0.637	-48.2	10.131	131.8	0.048	64.7	0.786	-31.5	0.424	23.22
0.6	0.578	-55.6	9.379	124.9	0.055	62.3	0.734	-35.5	0.494	22.36
0.7	0.526	-62.1	8.621	118.4	0.059	60.5	0.689	-38.8	0.566	21.63
0.8	0.472	-68.2	8.019	113.1	0.064	59.3	0.646	-41.7	0.633	20.99
0.9	0.433	-74.3	7.436	108.0	0.068	58.6	0.611	-44.1	0.688	20.39
1.0	0.390	-80.1	6.939	103.6	0.072	58.3	0.579	-46.4	0.743	19.84
1.1	0.360	-85.4	6.465	99.8	0.076	58.0	0.552	-48.3	0.791	19.32
1.2	0.329	-91.2	6.046	95.7	0.079	58.0	0.528	-50.1	0.838	18.84
1.3	0.307	-96.9	5.716	92.2	0.083	58.3	0.506	-52.0	0.873	18.39
1.4	0.281	-102.3	5.371	89.0	0.086	58.7	0.485	-54.0	0.915	17.94
1.5	0.264	-108.1	5.098	85.6	0.090	59.1	0.469	-55.7	0.942	17.53
1.6	0.246	-113.6	4.831	82.7	0.094	59.7	0.456	-57.4	0.968	17.10
1.7	0.232	-119.8	4.595	79.6	0.098	60.2	0.444	-59.2	0.988	16.69
1.8	0.223	-126.9	4.383	77.2	0.103	60.7	0.431	-61.2	1.003	15.96
1.9	0.210	-133.8	4.202	74.1	0.108	60.9	0.422	-63.2	1.016	15.13
2.0	0.207	-139.4	4.023	71.4	0.113	61.3	0.412	-65.1	1.025	14.57
2.1	0.202	-147.3	3.856	68.7	0.117	61.8	0.404	-67.3	1.034	14.04
2.2	0.202	-153.5	3.725	66.2	0.122	62.4	0.396	-69.5	1.037	13.66
2.3	0.202	-159.6	3.569	63.8	0.127	62.7	0.390	-71.8	1.044	13.20
2.4	0.204	-164.1	3.439	61.3	0.133	63.0	0.384	-74.1	1.046	12.83
2.5	0.207	-170.6	3.330	59.1	0.138	63.1	0.377	-76.5	1.047	12.50
2.6	0.210	-175.7	3.211	56.4	0.144	63.1	0.373	-79.5	1.045	12.18
2.7	0.217	179.5	3.118	54.5	0.149	63.1	0.369	-82.0	1.041	11.96
2.8	0.223	175.1	3.026	52.3	0.156	63.2	0.368	-84.8	1.032	11.78
2.9	0.230	170.5	2.928	50.6	0.162	62.9	0.363	-87.0	1.031	11.48
3.0	0.236	165.7	2.813	48.1	0.168	62.5	0.360	-90.5	1.034	11.09
4.0	0.369	136.8	2.227	26.1	0.252	57.0	0.390	-125.9	0.888	9.46
5.0	0.507	116.8	1.723	6.4	0.337	44.5	0.488	-160.8	0.799	7.09



V<sub>CE</sub> = 2 V, I<sub>c</sub> = 7 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.775	-14.4	16.201	165.1	0.010	77.4	0.965	-9.1	0.218	32.01
0.2	0.733	-24.8	15.032	155.0	0.022	76.5	0.919	-16.9	0.238	28.29
0.3	0.679	-35.9	14.146	143.9	0.031	70.8	0.856	-23.8	0.338	26.57
0.4	0.616	-45.7	12.789	134.2	0.039	67.6	0.792	-29.4	0.423	25.17
0.5	0.552	-53.8	11.592	126.4	0.045	64.4	0.733	-33.8	0.511	24.13
0.6	0.492	-61.3	10.552	119.7	0.051	63.1	0.677	-37.1	0.586	23.19
0.7	0.439	-68.0	9.547	113.5	0.055	62.2	0.630	-40.0	0.658	22.37
0.8	0.389	-73.9	8.789	108.3	0.060	61.8	0.591	-42.2	0.724	21.67
0.9	0.351	-79.9	8.075	103.7	0.064	61.6	0.558	-44.1	0.778	21.02
1.0	0.313	-86.1	7.462	99.5	0.068	61.4	0.528	-46.0	0.830	20.40
1.1	0.288	-91.2	6.914	95.9	0.072	61.9	0.503	-47.4	0.870	19.80
1.2	0.260	-98.0	6.435	92.3	0.076	62.1	0.483	-49.2	0.908	19.26
1.3	0.243	-103.5	6.057	89.1	0.081	62.4	0.464	-50.6	0.935	18.76
1.4	0.224	-109.5	5.677	86.0	0.085	62.9	0.447	-52.3	0.963	18.24
1.5	0.208	-115.7	5.370	83.0	0.089	63.3	0.433	-53.9	0.984	17.78
1.6	0.194	-121.6	5.074	80.1	0.094	63.6	0.421	-55.6	1.003	16.96
1.7	0.185	-129.1	4.823	77.5	0.099	63.9	0.412	-57.2	1.013	16.16
1.8	0.180	-136.2	4.592	75.1	0.104	64.3	0.401	-59.1	1.022	15.54
1.9	0.172	-144.7	4.391	72.3	0.110	64.3	0.393	-61.2	1.027	15.01
2.0	0.170	-150.9	4.208	69.7	0.115	64.5	0.385	-63.0	1.031	14.55
2.1	0.170	-158.3	4.020	67.2	0.121	64.7	0.378	-65.3	1.037	14.06
2.2	0.176	-164.3	3.882	64.8	0.126	64.9	0.370	-67.6	1.033	13.76
2.3	0.181	-170.4	3.713	62.6	0.132	65.0	0.365	-69.9	1.036	13.33
2.4	0.182	-174.7	3.579	60.3	0.138	64.9	0.360	-72.3	1.036	12.98
2.5	0.189	179.3	3.457	58.2	0.143	64.8	0.354	-74.7	1.035	12.67
2.6	0.192	174.8	3.342	55.6	0.150	64.5	0.350	-77.7	1.033	12.37
2.7	0.201	170.5	3.240	53.8	0.156	64.3	0.347	-80.2	1.027	12.17
2.8	0.209	166.5	3.141	51.8	0.162	64.1	0.345	-83.1	1.020	11.99
2.9	0.217	162.6	3.039	50.0	0.169	63.6	0.341	-85.5	1.018	11.73
3.0	0.224	157.9	2.922	47.7	0.175	63.0	0.338	-89.0	1.020	11.35
4.0	0.361	132.9	2.313	26.7	0.258	56.2	0.367	-125.4	0.896	9.53
5.0	0.499	114.7	1.802	7.4	0.339	43.7	0.466	-160.4	0.814	7.26

V<sub>CE</sub> = 2 V, I<sub>c</sub> = 10 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.712	-16.6	19.733	163.1	0.009	75.6	0.954	-10.5	0.263	33.30
0.2	0.669	-28.8	17.864	151.1	0.022	75.3	0.893	-19.0	0.295	29.15
0.3	0.595	-41.5	16.408	139.0	0.029	70.5	0.815	-26.2	0.405	27.49
0.4	0.526	-51.9	14.487	128.9	0.036	67.3	0.741	-31.4	0.508	26.01
0.5	0.461	-60.1	12.844	121.3	0.042	65.4	0.680	-35.1	0.599	24.88
0.6	0.402	-67.5	11.479	114.8	0.047	64.6	0.623	-37.9	0.681	23.87
0.7	0.353	-74.1	10.257	108.9	0.051	64.4	0.578	-40.1	0.755	23.00
0.8	0.310	-80.4	9.349	104.1	0.056	64.6	0.540	-41.6	0.812	22.20
0.9	0.276	-86.5	8.516	99.9	0.060	64.9	0.512	-43.1	0.861	21.49
1.0	0.243	-93.2	7.839	95.9	0.065	65.1	0.485	-44.6	0.904	20.81
1.1	0.225	-98.7	7.226	92.5	0.070	65.5	0.465	-45.8	0.932	20.13
1.2	0.202	-106.0	6.707	89.2	0.074	65.9	0.449	-47.1	0.961	19.55
1.3	0.189	-112.7	6.265	86.2	0.079	66.1	0.432	-48.5	0.981	18.97
1.4	0.174	-119.2	5.877	83.4	0.084	66.5	0.418	-50.2	1.000	18.34
1.5	0.165	-126.5	5.557	80.5	0.089	66.8	0.407	-51.5	1.011	17.29
1.6	0.156	-133.8	5.234	77.8	0.095	67.1	0.397	-53.1	1.022	16.52
1.7	0.150	-141.1	4.974	75.3	0.100	67.2	0.389	-54.8	1.026	15.96
1.8	0.148	-149.1	4.724	73.2	0.106	67.3	0.381	-56.7	1.032	15.41
1.9	0.147	-158.5	4.512	70.5	0.112	67.1	0.374	-58.9	1.031	14.97
2.0	0.150	-164.0	4.319	68.1	0.118	67.0	0.367	-60.7	1.032	14.56
2.1	0.154	-172.3	4.127	65.7	0.123	67.2	0.360	-63.0	1.033	14.13
2.2	0.162	-177.2	3.980	63.5	0.129	67.1	0.354	-65.3	1.028	13.85
2.3	0.169	178.3	3.805	61.4	0.135	66.9	0.349	-67.7	1.030	13.43
2.4	0.174	173.7	3.665	59.1	0.141	66.6	0.345	-70.2	1.028	13.12
2.5	0.183	168.8	3.542	57.2	0.148	66.4	0.340	-72.7	1.024	12.85
2.6	0.189	164.3	3.412	54.6	0.154	65.8	0.336	-75.6	1.022	12.54
2.7	0.200	161.1	3.313	53.0	0.161	65.4	0.333	-78.4	1.015	12.40
2.8	0.207	158.3	3.212	51.1	0.167	65.0	0.331	-81.4	1.008	12.27
2.9	0.216	154.5	3.108	49.4	0.174	64.4	0.327	-83.8	1.006	12.05
3.0	0.224	150.7	2.993	47.2	0.181	63.7	0.324	-87.4	1.007	11.67
4.0	0.362	129.7	2.365	26.6	0.263	56.0	0.352	-124.8	0.896	9.54
5.0	0.499	113.0	1.844	7.9	0.341	43.0	0.450	-160.2	0.822	7.33

V<sub>CE</sub> = 2 V, I<sub>c</sub> = 20 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.571	-24.2	25.447	158.5	0.010	71.7	0.924	-12.7	0.348	34.22
0.2	0.504	-40.5	21.885	143.2	0.019	73.4	0.829	-22.2	0.420	30.59
0.3	0.429	-56.4	18.984	129.8	0.026	69.8	0.732	-28.6	0.554	28.68
0.4	0.360	-68.5	15.960	119.8	0.031	68.0	0.652	-32.4	0.675	27.06
0.5	0.308	-79.4	13.698	112.5	0.036	67.8	0.594	-34.6	0.762	25.75
0.6	0.266	-88.3	11.985	106.6	0.042	68.3	0.545	-36.0	0.834	24.60
0.7	0.229	-97.6	10.506	101.3	0.046	68.8	0.510	-37.0	0.896	23.55
0.8	0.202	-106.0	9.448	97.2	0.051	69.6	0.482	-37.9	0.939	22.66
0.9	0.184	-115.4	8.546	93.2	0.056	70.4	0.463	-38.6	0.969	21.83
1.0	0.168	-125.1	7.810	89.7	0.061	70.9	0.446	-39.7	0.992	21.06
1.1	0.161	-132.5	7.159	86.8	0.067	71.4	0.432	-40.7	1.007	19.79
1.2	0.153	-142.1	6.606	83.7	0.072	71.4	0.420	-41.8	1.027	18.65
1.3	0.152	-148.7	6.160	81.0	0.077	71.8	0.409	-43.1	1.034	17.90
1.4	0.152	-157.2	5.737	78.5	0.083	72.1	0.401	-44.8	1.040	17.18
1.5	0.154	-164.5	5.418	75.7	0.088	72.1	0.393	-46.3	1.042	16.62
1.6	0.154	-171.1	5.095	73.4	0.094	72.2	0.387	-48.0	1.045	16.02
1.7	0.159	-176.7	4.830	71.0	0.100	72.0	0.381	-49.9	1.042	15.57
1.8	0.166	177.8	4.583	68.9	0.107	72.0	0.375	-51.8	1.040	15.12
1.9	0.175	170.9	4.375	66.4	0.113	71.6	0.370	-54.1	1.032	14.78
2.0	0.181	168.0	4.190	64.1	0.120	71.4	0.365	-56.2	1.026	14.46
2.1	0.195	162.9	3.997	61.8	0.126	71.3	0.361	-58.7	1.021	14.12
2.2	0.203	160.7	3.855	59.7	0.132	71.0	0.356	-61.2	1.014	13.92
2.3	0.213	157.9	3.682	57.7	0.139	70.7	0.352	-63.7	1.012	13.57
2.4	0.220	155.2	3.543	55.5	0.146	70.1	0.349	-66.4	1.005	13.41
2.5	0.231	152.2	3.421	53.7	0.152	69.8	0.345	-69.1	1.000	13.42
2.6	0.238	148.8	3.293	51.2	0.160	69.0	0.342	-72.3	0.996	13.14
2.7	0.249	147.2	3.201	49.6	0.166	68.5	0.339	-75.1	0.988	12.85
2.8	0.256	144.7	3.103	47.7	0.174	67.8	0.338	-78.3	0.980	12.52
2.9	0.266	142.7	2.996	46.0	0.181	67.0	0.335	-81.0	0.976	12.19
3.0	0.279	139.5	2.879	43.8	0.188	66.1	0.333	-84.8	0.974	11.85
4.0	0.419	123.6	2.271	23.4	0.275	56.8	0.366	-123.9	0.859	9.17
5.0	0.549	108.5	1.756	4.6	0.355	42.8	0.466	-160.7	0.793	6.95

S-PARAMETERS Q2

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.949	-29.1	3.647	160.7	0.058	74.9	0.973	-10.2	0.039	17.99
0.2	0.915	-53.0	3.304	144.2	0.104	60.0	0.913	-19.3	0.119	15.02
0.3	0.875	-74.8	2.935	130.2	0.138	48.0	0.841	-26.2	0.170	13.28
0.4	0.830	-92.7	2.587	117.9	0.160	38.7	0.774	-31.7	0.236	12.09
0.5	0.802	-108.1	2.280	107.5	0.173	31.0	0.717	-36.0	0.291	11.19
0.6	0.777	-121.1	2.039	98.8	0.180	25.0	0.671	-39.8	0.349	10.55
0.7	0.761	-131.9	1.836	91.1	0.183	20.0	0.634	-43.1	0.409	10.02
0.8	0.750	-141.1	1.656	84.3	0.182	16.1	0.607	-46.3	0.470	9.58
0.9	0.740	-149.5	1.514	78.0	0.180	12.7	0.589	-49.5	0.532	9.24
1.0	0.736	-156.8	1.388	72.3	0.176	10.0	0.572	-52.7	0.597	8.96
1.1	0.734	-163.5	1.288	67.2	0.171	8.0	0.560	-55.9	0.658	8.77
1.2	0.734	-169.6	1.188	62.2	0.164	6.4	0.549	-59.4	0.737	8.60
1.3	0.735	-175.1	1.116	57.6	0.157	5.5	0.542	-62.9	0.810	8.53
1.4	0.736	179.7	1.040	53.4	0.149	5.2	0.536	-66.2	0.904	8.43
1.5	0.734	174.8	0.983	49.3	0.141	5.1	0.530	-70.0	1.017	7.62
1.6	0.733	172.1	0.924	46.5	0.129	8.2	0.525	-73.2	1.186	5.93
1.7	0.748	167.3	0.887	42.8	0.127	10.3	0.523	-77.3	1.165	5.98
1.8	0.750	162.9	0.834	39.1	0.121	12.5	0.518	-81.3	1.298	5.10
1.9	0.736	159.4	0.779	36.3	0.111	16.1	0.511	-85.3	1.648	3.74
2.0	0.748	157.9	0.754	34.8	0.110	25.7	0.509	-89.3	1.627	3.70
2.1	0.771	154.7	0.731	31.8	0.116	31.7	0.508	-94.3	1.434	4.09
2.2	0.775	151.7	0.705	29.2	0.121	36.8	0.506	-99.8	1.407	3.87
2.3	0.778	148.7	0.679	26.7	0.128	41.5	0.504	-105.5	1.390	3.53
2.4	0.788	146.0	0.658	24.0	0.137	45.4	0.502	-111.7	1.299	3.54
2.5	0.792	143.4	0.633	22.1	0.148	48.5	0.503	-118.1	1.251	3.30
2.6	0.797	140.7	0.610	20.2	0.161	50.6	0.507	-124.9	1.192	3.13
2.7	0.801	138.3	0.592	18.3	0.175	52.0	0.513	-131.8	1.149	2.96
2.8	0.805	136.0	0.572	16.9	0.188	52.6	0.523	-137.9	1.104	2.86
2.9	0.805	133.8	0.556	15.3	0.203	52.4	0.530	-144.2	1.092	2.53
3.0	0.807	131.0	0.545	14.1	0.218	51.9	0.539	-150.5	1.067	2.41
4.0	0.826	111.9	0.449	12.3	0.357	38.8	0.639	168.9	1.009	0.41
5.0	0.806	101.9	0.476	4.4	0.459	17.5	0.648	125.3	1.047	-1.17

V<sub>CE</sub> = 1 V, I<sub>C</sub> = 3 mA, Z<sub>O</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.854	-43.6	9.529	151.8	0.053	67.7	0.911	-21.3	0.102	22.56
0.2	0.793	-77.1	7.818	132.0	0.087	51.7	0.756	-36.6	0.180	19.55
0.3	0.737	-101.8	6.307	117.8	0.105	41.3	0.620	-46.0	0.270	17.79
0.4	0.696	-120.2	5.172	106.9	0.115	35.1	0.520	-52.2	0.360	16.54
0.5	0.673	-134.1	4.335	98.5	0.120	31.2	0.449	-56.4	0.448	15.58
0.6	0.658	-144.7	3.726	91.7	0.123	29.2	0.396	-60.0	0.536	14.81
0.7	0.653	-153.7	3.265	85.8	0.125	28.0	0.359	-63.1	0.612	14.15
0.8	0.645	-161.0	2.896	80.6	0.127	27.5	0.332	-65.9	0.695	13.57
0.9	0.643	-167.5	2.601	76.0	0.129	27.3	0.311	-68.9	0.770	13.05
1.0	0.642	-173.5	2.365	71.6	0.130	27.8	0.295	-72.1	0.844	12.60
1.1	0.643	-178.5	2.175	67.6	0.132	28.5	0.284	-75.2	0.905	12.18
1.2	0.646	176.8	1.997	63.8	0.133	29.6	0.272	-78.9	0.974	11.77
1.3	0.650	172.5	1.861	60.0	0.135	30.7	0.266	-82.1	1.022	10.49
1.4	0.651	168.3	1.733	56.4	0.137	31.8	0.261	-85.4	1.078	9.30
1.5	0.650	164.6	1.627	52.8	0.139	32.8	0.254	-89.1	1.140	8.40
1.6	0.652	163.0	1.523	50.6	0.141	36.0	0.247	-92.1	1.214	7.56
1.7	0.667	159.0	1.460	47.2	0.148	36.7	0.246	-96.0	1.162	7.51
1.8	0.669	155.4	1.371	43.9	0.152	37.4	0.242	-100.8	1.208	6.80
1.9	0.655	152.7	1.285	41.4	0.153	38.9	0.232	-105.8	1.348	5.72
2.0	0.670	152.2	1.241	39.5	0.161	42.3	0.228	-109.5	1.293	5.63
2.1	0.693	149.8	1.204	36.5	0.171	43.4	0.228	-115.0	1.187	5.86
2.2	0.702	147.2	1.157	33.9	0.179	44.0	0.227	-121.6	1.168	5.62
2.3	0.706	144.8	1.112	31.2	0.188	44.5	0.228	-128.8	1.159	5.30
2.4	0.715	142.5	1.075	28.2	0.196	44.9	0.232	-135.8	1.133	5.16
2.5	0.724	140.4	1.039	25.9	0.205	45.1	0.240	-143.0	1.108	5.04
2.6	0.733	138.2	1.002	23.5	0.215	44.9	0.252	-150.2	1.082	4.93
2.7	0.738	136.1	0.968	21.2	0.224	44.9	0.266	-156.9	1.072	4.71
2.8	0.743	134.2	0.934	18.9	0.233	44.6	0.282	-162.6	1.063	4.49
2.9	0.747	132.2	0.909	16.6	0.243	44.1	0.301	-167.5	1.045	4.44
3.0	0.749	130.0	0.887	14.9	0.252	43.5	0.317	-172.5	1.040	4.24
4.0	0.792	112.8	0.660	3.1	0.352	33.4	0.471	159.1	0.951	2.74
5.0	0.799	103.2	0.568	-6.3	0.445	16.4	0.545	121.1	0.989	1.06

V<sub>CE</sub> = 1 V, I<sub>C</sub> = 5 mA, Z<sub>O</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.777	-56.6	14.087	145.1	0.048	63.9	0.847	-30.6	0.133	24.64
0.2	0.705	-93.9	10.573	123.8	0.073	47.8	0.636	-49.4	0.264	21.58
0.3	0.657	-118.7	8.073	110.4	0.085	40.4	0.487	-60.4	0.382	19.76
0.4	0.635	-135.1	6.390	101.0	0.092	37.3	0.388	-67.7	0.491	18.40
0.5	0.621	-147.3	5.262	93.8	0.097	36.1	0.323	-72.8	0.595	17.33
0.6	0.613	-156.6	4.475	88.0	0.102	36.2	0.277	-77.5	0.690	16.43
0.7	0.611	-164.1	3.885	83.0	0.106	36.7	0.246	-81.6	0.768	15.62
0.8	0.606	-170.2	3.428	78.5	0.111	37.6	0.222	-86.1	0.849	14.90
0.9	0.609	-175.9	3.073	74.4	0.116	38.4	0.206	-90.1	0.905	14.23
1.0	0.609	179.0	2.786	70.6	0.121	39.5	0.193	-94.6	0.961	13.62
1.1	0.611	174.8	2.547	67.0	0.126	40.4	0.185	-98.8	1.004	12.66
1.2	0.615	170.7	2.342	63.6	0.132	41.3	0.177	-103.3	1.042	11.23
1.3	0.620	167.0	2.176	60.1	0.138	42.0	0.173	-107.6	1.067	10.40
1.4	0.622	163.3	2.023	57.1	0.144	42.6	0.169	-111.9	1.097	9.58
1.5	0.620	159.9	1.898	53.7	0.150	42.8	0.166	-116.5	1.135	8.80
1.6	0.622	158.9	1.775	51.6	0.155	44.8	0.158	-120.9	1.173	8.07
1.7	0.639	155.2	1.697	48.4	0.164	44.6	0.160	-125.3	1.127	7.97
1.8	0.641	152.1	1.595	45.3	0.171	44.2	0.160	-131.1	1.152	7.34
1.9	0.627	149.6	1.493	42.8	0.175	44.4	0.156	-138.6	1.242	6.36
2.0	0.641	149.5	1.440	41.2	0.184	46.2	0.152	-143.5	1.206	6.20
2.1	0.666	147.3	1.397	38.5	0.195	46.2	0.156	-149.3	1.128	6.38
2.2	0.672	145.2	1.342	35.8	0.203	45.8	0.162	-156.1	1.119	6.10
2.3	0.679	143.0	1.289	33.2	0.212	45.4	0.170	-163.3	1.112	5.81
2.4	0.691	140.7	1.245	30.3	0.221	45.0	0.181	-169.8	1.089	5.70
2.5	0.698	138.9	1.199	28.1	0.229	44.4	0.195	-175.7	1.079	5.47
2.6	0.705	136.8	1.157	25.7	0.238	43.7	0.211	-179.6	1.068	5.28
2.7	0.712	134.9	1.119	23.7	0.247	43.3	0.229	174.7	1.061	5.06
2.8	0.720	133.1	1.081	21.3	0.254	42.6	0.247	171.1	1.048	4.94
2.9	0.727	131.2	1.052	19.0	0.263	41.8	0.267	168.2	1.032	4.94
3.0	0.726	129.2	1.023	17.0	0.270	41.0	0.284	165.1	1.040	4.56
4.0	0.773	112.8	0.774	3.7	0.355	30.6	0.423	148.1	0.964	3.39
5.0	0.791	103.7	0.641	-8.4	0.437	15.3	0.506	115.7	0.975	1.67

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 7 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.711	-67.6	17.534	139.8	0.045	60.3	0.791	-38.1	0.180	25.95
0.2	0.646	-106.4	12.290	118.3	0.064	46.8	0.552	-59.4	0.339	22.85
0.3	0.617	-129.6	9.051	105.9	0.073	41.4	0.406	-71.6	0.476	20.92
0.4	0.599	-144.9	7.070	97.5	0.080	40.6	0.318	-80.3	0.602	19.46
0.5	0.592	-155.4	5.771	91.0	0.086	41.1	0.261	-87.3	0.708	18.25
0.6	0.589	-163.5	4.875	85.8	0.092	42.3	0.223	-93.7	0.796	17.23
0.7	0.590	-170.2	4.225	81.3	0.099	43.4	0.196	-99.9	0.865	16.32
0.8	0.588	-175.5	3.716	77.3	0.105	44.6	0.179	-106.1	0.929	15.48
0.9	0.592	179.3	3.325	73.5	0.112	45.5	0.167	-111.7	0.971	14.71
1.0	0.593	174.9	3.008	70.0	0.120	46.4	0.159	-117.5	1.009	13.42
1.1	0.596	171.0	2.750	66.7	0.127	47.1	0.154	-122.9	1.037	12.18
1.2	0.599	167.1	2.526	63.4	0.135	47.4	0.151	-128.2	1.063	11.20
1.3	0.604	163.8	2.345	60.3	0.142	47.7	0.150	-132.9	1.076	10.48
1.4	0.607	160.5	2.175	57.3	0.150	47.7	0.149	-137.7	1.096	9.72
1.5	0.608	157.2	2.043	54.2	0.157	47.4	0.149	-143.0	1.116	9.07
1.6	0.608	156.5	1.913	52.1	0.164	48.7	0.145	-148.5	1.143	8.37
1.7	0.625	153.2	1.825	49.0	0.174	47.9	0.148	-152.2	1.104	8.23
1.8	0.627	150.0	1.715	46.2	0.182	47.2	0.151	-158.3	1.124	7.60
1.9	0.614	148.1	1.607	43.7	0.187	46.8	0.154	-165.6	1.193	6.69
2.0	0.628	148.1	1.547	42.2	0.196	47.8	0.153	-171.2	1.162	6.52
2.1	0.652	146.0	1.500	39.4	0.208	47.4	0.159	-176.1	1.102	6.65
2.2	0.661	144.1	1.437	36.9	0.216	46.6	0.169	178.3	1.093	6.37
2.3	0.667	141.7	1.380	34.4	0.225	45.8	0.181	173.2	1.088	6.06
2.4	0.679	139.7	1.331	31.5	0.234	45.0	0.194	168.4	1.071	5.93
2.5	0.687	138.0	1.283	29.4	0.242	44.3	0.210	164.3	1.063	5.70
2.6	0.695	136.0	1.238	27.1	0.251	43.3	0.226	160.9	1.053	5.52
2.7	0.702	134.0	1.197	25.1	0.259	42.6	0.244	158.0	1.047	5.32
2.8	0.708	132.3	1.156	22.8	0.267	41.8	0.262	155.6	1.043	5.11
2.9	0.714	130.5	1.125	20.4	0.274	40.9	0.280	154.1	1.032	5.04
3.0	0.715	128.5	1.096	18.7	0.281	40.0	0.295	152.0	1.036	4.76
4.0	0.764	112.8	0.832	4.8	0.359	29.0	0.415	140.2	0.973	3.66
5.0	0.787	104.1	0.690	-8.3	0.434	14.4	0.492	111.2	0.970	2.02

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 10 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.644	-80.5	21.251	133.7	0.040	57.4	0.716	-47.4	0.242	27.28
0.2	0.602	-120.4	13.876	112.9	0.055	46.7	0.467	-71.4	0.430	24.05
0.3	0.585	-141.2	9.945	101.9	0.063	45.2	0.336	-85.5	0.589	22.00
0.4	0.578	-154.0	7.648	94.4	0.070	46.1	0.263	-96.7	0.716	20.37
0.5	0.572	-163.0	6.202	88.6	0.078	47.7	0.218	-106.1	0.817	19.02
0.6	0.572	-170.0	5.223	83.8	0.086	49.3	0.191	-114.8	0.889	17.84
0.7	0.575	-175.7	4.515	79.8	0.094	50.4	0.174	-123.0	0.940	16.81
0.8	0.576	179.5	3.965	76.1	0.103	51.5	0.164	-130.7	0.984	15.87
0.9	0.580	175.0	3.545	72.7	0.112	52.1	0.159	-137.5	1.011	14.37
1.0	0.581	170.9	3.200	69.4	0.121	52.4	0.157	-143.5	1.038	13.05
1.1	0.583	167.5	2.928	66.3	0.130	52.8	0.156	-148.6	1.052	12.13
1.2	0.591	164.1	2.685	63.4	0.139	52.5	0.157	-153.7	1.063	11.34
1.3	0.592	161.0	2.489	60.3	0.148	52.4	0.159	-158.0	1.076	10.59
1.4	0.597	158.0	2.313	57.4	0.157	51.8	0.161	-162.5	1.085	9.91
1.5	0.597	155.0	2.168	54.4	0.165	51.2	0.165	-167.1	1.100	9.26
1.6	0.599	154.5	2.030	52.5	0.173	51.8	0.164	-172.6	1.118	8.61
1.7	0.616	151.1	1.935	49.5	0.184	50.6	0.168	-175.8	1.083	8.46
1.8	0.616	148.3	1.816	46.7	0.193	49.5	0.175	179.3	1.101	7.80
1.9	0.602	146.2	1.705	44.5	0.198	48.7	0.182	173.4	1.159	6.94
2.0	0.618	146.5	1.642	42.9	0.208	49.1	0.184	168.3	1.128	6.80
2.1	0.641	144.7	1.586	40.3	0.219	48.4	0.191	164.6	1.083	6.84
2.2	0.651	142.8	1.518	37.8	0.228	47.3	0.202	160.5	1.075	6.56
2.3	0.657	140.8	1.457	35.3	0.237	46.2	0.215	156.8	1.071	6.26
2.4	0.668	138.6	1.407	32.4	0.245	45.2	0.229	153.4	1.060	6.09
2.5	0.677	137.0	1.354	30.7	0.254	44.1	0.245	150.4	1.052	5.88
2.6	0.683	135.2	1.305	28.4	0.262	43.0	0.259	148.1	1.048	5.63
2.7	0.692	133.3	1.263	26.4	0.270	42.2	0.278	145.9	1.041	5.47
2.8	0.700	131.7	1.220	24.2	0.277	41.2	0.294	144.2	1.035	5.30
2.9	0.705	130.1	1.187	21.8	0.284	40.2	0.310	143.4	1.030	5.15
3.0	0.707	127.9	1.159	20.1	0.291	39.2	0.323	141.9	1.029	4.95
4.0	0.756	112.6	0.886	6.1	0.363	27.6	0.423	133.0	0.979	3.87
5.0	0.780	104.5	0.731	-7.7	0.431	13.5	0.490	106.6	0.976	2.29

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 20 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.533	-110.4	27.125	122.6	0.030	55.8	0.569	-67.4	0.402	29.58
0.2	0.546	-143.9	15.913	104.6	0.040	52.2	0.350	-96.4	0.647	25.95
0.3	0.552	-158.6	10.999	95.9	0.050	55.1	0.264	-115.1	0.798	23.39
0.4	0.554	-168.0	8.356	89.8	0.060	57.7	0.225	-129.5	0.894	21.41
0.5	0.557	-174.2	6.731	85.2	0.071	59.3	0.206	-141.0	0.951	19.78
0.6	0.558	-179.4	5.641	81.3	0.081	60.6	0.198	-150.3	0.990	18.40
0.7	0.561	-176.4	4.848	77.6	0.092	61.0	0.195	-157.7	1.015	16.44
0.8	0.564	-172.8	4.262	74.5	0.103	61.1	0.196	-163.8	1.031	15.08
0.9	0.568	-168.9	3.803	71.5	0.114	60.7	0.198	-168.9	1.042	13.97
1.0	0.572	-165.6	3.433	68.4	0.125	60.1	0.202	-173.1	1.049	13.03
1.1	0.575	-162.7	3.137	65.7	0.136	59.6	0.206	-176.7	1.054	12.20
1.2	0.579	-159.7	2.875	62.9	0.147	58.6	0.211	-179.7	1.060	11.42
1.3	0.584	-156.9	2.663	60.1	0.157	57.8	0.215	-176.7	1.062	10.77
1.4	0.589	-154.1	2.472	57.5	0.168	56.6	0.220	-173.6	1.065	10.13
1.5	0.588	-151.6	2.317	54.6	0.177	55.3	0.225	-170.4	1.074	9.50
1.6	0.588	-151.5	2.166	53.0	0.186	55.2	0.228	-165.9	1.088	8.84
1.7	0.605	-148.4	2.065	50.1	0.198	53.6	0.233	-163.5	1.061	8.67
1.8	0.607	-145.9	1.939	47.4	0.208	52.0	0.242	-160.1	1.071	8.08
1.9	0.593	-144.0	1.818	45.3	0.213	50.7	0.252	-155.8	1.113	7.25
2.0	0.607	-144.4	1.747	43.9	0.224	50.5	0.257	-151.7	1.094	7.05
2.1	0.630	-142.9	1.687	41.3	0.235	49.4	0.264	-148.8	1.060	7.06
2.2	0.641	-141.0	1.613	38.9	0.244	47.9	0.275	-145.7	1.054	6.78
2.3	0.649	-139.0	1.547	36.6	0.253	46.6	0.288	-143.0	1.050	6.48
2.4	0.660	-137.4	1.492	33.9	0.262	45.3	0.301	-140.5	1.041	6.32
2.5	0.669	-135.7	1.436	32.0	0.270	44.0	0.315	-138.2	1.037	6.09
2.6	0.677	-133.9	1.381	29.8	0.278	42.5	0.329	-136.4	1.032	5.85
2.7	0.683	-132.1	1.335	28.0	0.286	41.6	0.345	-134.8	1.032	5.60
2.8	0.692	-130.4	1.289	25.9	0.293	40.5	0.360	-133.5	1.027	5.43
2.9	0.697	-128.9	1.252	23.5	0.299	39.3	0.373	-133.0	1.024	5.27
3.0	0.699	-126.9	1.224	22.0	0.305	38.3	0.383	-131.7	1.025	5.07
4.0	0.746	-112.2	0.944	8.3	0.371	25.7	0.458	-124.0	0.932	4.05
5.0	0.772	-104.5	0.781	-6.0	0.430	12.0	0.508	-100.2	0.986	2.59

V<sub>CE</sub> = 2 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.946	-26.4	3.632	161.6	0.049	76.6	0.979	-8.7	0.049	18.71
0.2	0.923	-49.9	3.319	146.5	0.089	62.1	0.929	-16.2	0.112	15.72
0.3	0.882	-71.0	2.976	133.1	0.119	50.5	0.868	-22.4	0.162	13.98
0.4	0.843	-88.8	2.646	121.1	0.139	41.3	0.809	-27.3	0.221	12.78
0.5	0.811	-104.3	2.366	110.8	0.152	33.7	0.758	-31.1	0.277	11.92
0.6	0.785	-117.2	2.121	102.1	0.159	27.9	0.717	-34.4	0.332	11.24
0.7	0.769	-128.1	1.900	94.7	0.162	22.9	0.683	-37.4	0.389	10.68
0.8	0.756	-137.8	1.732	87.8	0.163	18.9	0.657	-40.3	0.446	10.27
0.9	0.745	-146.4	1.574	81.6	0.161	15.5	0.636	-43.2	0.515	9.91
1.0	0.738	-154.2	1.463	76.0	0.157	12.9	0.621	-46.0	0.572	9.68
1.1	0.735	-160.8	1.346	70.9	0.153	10.9	0.608	-49.1	0.641	9.45
1.2	0.733	-167.2	1.246	66.1	0.147	9.3	0.598	-52.0	0.719	9.29
1.3	0.735	-173.0	1.169	61.5	0.140	8.7	0.590	-55.2	0.793	9.23
1.4	0.736	-178.3	1.085	57.4	0.133	8.4	0.584	-58.2	0.889	9.11
1.5	0.734	-176.6	1.027	53.0	0.126	8.5	0.577	-61.4	1.005	8.67
1.6	0.731	-173.3	0.969	50.3	0.115	11.6	0.573	-64.2	1.173	6.74
1.7	0.745	-168.6	0.929	46.7	0.113	14.8	0.567	-67.8	1.163	6.70
1.8	0.748	-164.2	0.872	43.1	0.108	17.2	0.563	-71.3	1.290	5.84
1.9	0.734	-160.6	0.820	40.2	0.100	21.4	0.554	-74.9	1.623	4.52
2.0	0.744	-158.6	0.787	38.6	0.098	31.3	0.551	-78.3	1.644	4.34
2.1	0.762	-155.7	0.765	35.7	0.104	38.4	0.547	-82.6	1.459	4.63
2.2	0.770	-152.5	0.736	33.3	0.111	43.9	0.544	-87.4	1.395	4.49
2.3	0.771	-149.6	0.714	30.7	0.118	48.8	0.541	-92.4	1.363	4.22
2.4	0.781	-146.7	0.692	27.9	0.128	52.6	0.534	-98.1	1.258	4.26
2.5	0.786	-144.1	0.670	26.0	0.140	55.4	0.530	-104.1	1.199	4.09
2.6	0.791	-141.5	0.645	24.0	0.154	57.5	0.531	-110.6	1.134	4.00
2.7	0.793	-138.9	0.629	22.1	0.168	58.8	0.533	-117.1	1.094	3.87
2.8	0.796	-136.5	0.608	20.1	0.182	59.1	0.537	-123.4	1.056	3.78
2.9	0.799	-134.2	0.590	18.5	0.197	58.7	0.541	-129.7	1.030	3.70
3.0	0.799	-131.7	0.574	17.5	0.213	58.1	0.542	-136.0	1.029	3.26
4.0	0.820	-112.2	0.467	14.0	0.357	43.6	0.626	-179.8	0.978	1.17
5.0	0.799	-102.1	0.488	5.4	0.468	20.8	0.631	-132.7	1.034	-0.94

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

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.861	-39.9	9.639	153.9	0.045	70.3	0.927	-17.8	0.094	23.32
0.2	0.804	-71.0	8.066	135.0	0.075	54.5	0.793	-30.8	0.179	20.33
0.3	0.743	-95.4	6.631	120.8	0.093	44.2	0.669	-38.9	0.267	18.54
0.4	0.695	-114.1	5.488	109.9	0.102	37.9	0.571	-44.1	0.357	17.30
0.5	0.670	-128.6	4.647	101.4	0.108	33.9	0.503	-47.4	0.439	16.34
0.6	0.650	-139.9	4.005	94.4	0.111	31.7	0.452	-49.9	0.528	15.56
0.7	0.643	-149.1	3.518	88.6	0.114	30.3	0.414	-52.1	0.602	14.90
0.8	0.634	-157.1	3.135	83.4	0.116	29.9	0.386	-54.3	0.683	14.34
0.9	0.631	-164.1	2.816	78.7	0.117	30.0	0.363	-56.5	0.761	13.82
1.0	0.630	-170.0	2.556	74.3	0.118	30.2	0.348	-58.8	0.833	13.35
1.1	0.629	-175.5	2.352	70.3	0.120	31.2	0.334	-61.3	0.898	12.93
1.2	0.630	179.4	2.161	66.5	0.121	32.2	0.323	-63.9	0.969	12.52
1.3	0.634	175.0	2.014	62.7	0.123	33.3	0.316	-66.5	1.017	11.36
1.4	0.636	170.7	1.873	59.3	0.125	34.7	0.307	-69.3	1.074	10.09
1.5	0.635	166.8	1.760	55.8	0.127	35.9	0.300	-72.2	1.138	9.16
1.6	0.635	164.7	1.648	53.2	0.128	39.1	0.292	-74.3	1.212	8.31
1.7	0.652	160.8	1.575	50.0	0.135	40.2	0.289	-77.6	1.159	8.25
1.8	0.654	157.1	1.483	46.8	0.139	41.0	0.282	-81.4	1.200	7.57
1.9	0.640	154.5	1.390	44.2	0.140	42.6	0.271	-85.0	1.334	6.50
2.0	0.649	153.6	1.336	42.3	0.148	46.3	0.262	-87.8	1.309	6.23
2.1	0.675	151.0	1.298	39.4	0.158	47.9	0.258	-92.3	1.190	6.51
2.2	0.683	148.8	1.246	36.8	0.166	48.7	0.253	-97.7	1.168	6.27
2.3	0.688	146.2	1.200	34.1	0.175	49.2	0.249	-103.6	1.154	5.99
2.4	0.703	143.9	1.164	31.1	0.184	49.6	0.245	-110.2	1.102	6.08
2.5	0.705	141.7	1.123	29.0	0.193	49.9	0.245	-117.4	1.100	5.73
2.6	0.715	139.7	1.085	26.4	0.203	49.8	0.248	-125.1	1.068	5.68
2.7	0.722	137.4	1.049	24.2	0.213	49.9	0.255	-132.7	1.051	5.55
2.8	0.727	135.5	1.014	21.7	0.222	49.5	0.265	-139.5	1.037	5.43
2.9	0.734	133.5	0.988	19.3	0.232	49.0	0.277	-146.0	1.012	5.63
3.0	0.736	131.2	0.962	17.5	0.242	48.3	0.289	-152.5	1.007	5.48
4.0	0.784	113.7	0.708	4.4	0.347	37.9	0.435	171.4	0.915	3.10
5.0	0.794	103.8	0.597	-6.0	0.448	19.9	0.512	129.2	0.959	1.24

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

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.787	-50.8	14.534	147.6	0.042	66.4	0.872	-25.6	0.140	25.41
0.2	0.709	-86.8	11.208	126.8	0.064	50.6	0.679	-41.7	0.264	22.42
0.3	0.654	-111.5	8.697	113.4	0.076	43.4	0.533	-50.5	0.377	20.58
0.4	0.621	-129.1	6.955	103.6	0.083	39.9	0.435	-55.8	0.489	19.22
0.5	0.602	-142.0	5.751	96.3	0.088	38.5	0.369	-59.0	0.593	18.14
0.6	0.592	-152.1	4.906	90.3	0.093	38.5	0.321	-61.7	0.686	17.23
0.7	0.590	-159.9	4.264	85.3	0.097	39.1	0.286	-64.1	0.765	16.43
0.8	0.585	-166.5	3.771	80.8	0.101	40.0	0.262	-66.5	0.840	15.70
0.9	0.584	-172.7	3.379	76.8	0.106	40.9	0.242	-69.0	0.902	15.03
1.0	0.584	-177.9	3.064	72.8	0.111	41.9	0.228	-71.6	0.956	14.41
1.1	0.586	177.4	2.805	69.4	0.116	42.9	0.216	-74.6	0.998	13.83
1.2	0.591	173.1	2.574	66.0	0.122	43.8	0.207	-77.5	1.035	12.12
1.3	0.594	169.3	2.395	62.6	0.127	44.6	0.200	-80.6	1.062	11.24
1.4	0.597	165.6	2.223	59.5	0.133	45.3	0.193	-83.7	1.092	10.39
1.5	0.597	162.1	2.086	56.3	0.138	45.8	0.185	-87.4	1.126	9.64
1.6	0.596	160.6	1.951	54.0	0.143	47.6	0.176	-89.8	1.171	8.85
1.7	0.613	157.1	1.868	50.9	0.152	47.6	0.174	-93.4	1.119	8.79
1.8	0.618	153.9	1.751	48.0	0.159	47.4	0.167	-98.6	1.142	8.14
1.9	0.609	151.4	1.642	45.4	0.163	47.7	0.158	-103.7	1.214	7.25
2.0	0.616	150.8	1.573	43.7	0.170	49.3	0.149	-107.6	1.208	6.91
2.1	0.638	148.9	1.526	41.0	0.181	49.9	0.145	-113.2	1.136	7.01
2.2	0.647	147.0	1.464	38.5	0.190	49.6	0.143	-120.6	1.120	6.76
2.3	0.656	144.5	1.413	35.9	0.199	49.3	0.143	-128.6	1.101	6.59
2.4	0.668	142.5	1.368	33.0	0.207	49.0	0.145	-137.3	1.075	6.52
2.5	0.675	140.5	1.317	30.9	0.216	48.5	0.152	-146.1	1.067	6.26
2.6	0.684	138.6	1.269	28.4	0.226	47.8	0.162	-154.0	1.053	6.10
2.7	0.691	136.3	1.228	26.3	0.234	47.4	0.175	-161.6	1.045	5.91
2.8	0.698	134.4	1.187	23.8	0.242	46.7	0.190	-167.6	1.034	5.78
2.9	0.704	132.9	1.158	21.5	0.251	46.0	0.208	-172.5	1.019	5.81
3.0	0.708	130.7	1.127	19.7	0.259	45.2	0.224	-177.3	1.016	5.61
4.0	0.762	114.1	0.843	4.9	0.347	34.6	0.371	159.2	0.932	3.85
5.0	0.784	105.1	0.687	-8.1	0.438	18.7	0.461	123.0	0.941	1.96

V<sub>CE</sub> = 2 V, I<sub>C</sub> = 7 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.735	-59.8	18.153	142.8	0.038	63.2	0.821	-31.9	0.170	26.84
0.2	0.651	-98.5	13.172	121.5	0.057	49.7	0.598	-49.7	0.326	23.63
0.3	0.604	-122.8	9.884	108.8	0.066	44.3	0.449	-59.1	0.469	21.72
0.4	0.580	-138.7	7.752	100.0	0.073	43.0	0.356	-64.7	0.595	20.27
0.5	0.569	-149.7	6.354	93.4	0.079	43.3	0.295	-68.5	0.699	19.06
0.6	0.562	-159.1	5.383	88.1	0.085	44.5	0.251	-72.0	0.790	18.03
0.7	0.562	-166.0	4.670	83.5	0.091	45.4	0.221	-75.0	0.859	17.12
0.8	0.561	-171.9	4.112	79.4	0.097	46.7	0.199	-78.3	0.918	16.28
0.9	0.560	-177.4	3.681	75.7	0.104	47.6	0.183	-81.6	0.966	15.51
1.0	0.563	-177.9	3.330	72.1	0.110	48.5	0.170	-85.5	1.002	14.51
1.1	0.566	-173.5	3.048	68.8	0.117	49.2	0.161	-89.1	1.029	13.11
1.2	0.568	-169.7	2.795	65.7	0.124	49.7	0.152	-93.1	1.057	12.05
1.3	0.573	-166.1	2.593	62.4	0.131	50.1	0.147	-97.1	1.074	11.29
1.4	0.576	-162.7	2.410	59.6	0.139	50.2	0.141	-101.1	1.092	10.54
1.5	0.576	-159.4	2.259	56.5	0.146	50.0	0.136	-105.9	1.114	9.86
1.6	0.578	-158.3	2.113	54.3	0.152	51.3	0.127	-109.7	1.142	9.15
1.7	0.595	-154.9	2.018	51.4	0.162	50.7	0.126	-113.9	1.098	9.04
1.8	0.599	-152.1	1.896	48.6	0.170	50.0	0.123	-120.6	1.115	8.42
1.9	0.589	-149.7	1.778	46.1	0.175	49.7	0.117	-128.6	1.174	7.55
2.0	0.597	-149.4	1.705	44.4	0.183	50.8	0.110	-135.1	1.165	7.23
2.1	0.620	-147.6	1.650	41.9	0.193	50.8	0.110	-141.7	1.109	7.30
2.2	0.630	-145.8	1.583	39.5	0.202	50.0	0.113	-150.3	1.094	7.06
2.3	0.637	-143.4	1.524	36.9	0.212	49.4	0.119	-159.0	1.084	6.80
2.4	0.651	-141.4	1.473	34.0	0.220	48.7	0.127	-167.3	1.063	6.72
2.5	0.659	-139.7	1.419	32.1	0.229	47.9	0.139	-174.5	1.055	6.49
2.6	0.668	-137.9	1.367	29.7	0.238	47.0	0.153	-179.7	1.044	6.31
2.7	0.675	-135.8	1.323	27.5	0.246	46.3	0.170	-174.4	1.038	6.11
2.8	0.684	-134.0	1.280	25.2	0.254	45.5	0.188	-170.4	1.030	5.97
2.9	0.690	-132.3	1.246	22.8	0.262	44.6	0.206	-167.8	1.019	5.93
3.0	0.693	-130.2	1.213	20.9	0.269	43.7	0.222	-164.7	1.018	5.72
4.0	0.750	-114.3	0.913	6.0	0.350	32.8	0.355	-150.0	0.946	4.17
5.0	0.777	-105.6	0.741	-7.9	0.432	17.8	0.443	-117.8	0.944	2.34

V<sub>CE</sub> = 2 V, I<sub>C</sub> = 10 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.654	-72.0	22.270	137.2	0.035	60.3	0.757	-39.4	0.237	28.01
0.2	0.585	-111.3	15.077	116.0	0.049	49.7	0.510	-58.9	0.426	24.87
0.3	0.562	-133.9	10.941	104.6	0.058	47.2	0.369	-69.1	0.577	22.77
0.4	0.546	-147.9	8.471	96.7	0.065	47.9	0.286	-75.9	0.709	21.18
0.5	0.541	-157.9	6.891	90.8	0.072	49.3	0.232	-81.1	0.804	19.81
0.6	0.536	-165.7	5.810	86.0	0.079	51.0	0.196	-86.2	0.882	18.65
0.7	0.538	-171.9	5.016	81.8	0.087	52.1	0.170	-90.9	0.935	17.61
0.8	0.540	-177.0	4.420	78.1	0.095	53.3	0.152	-96.4	0.976	16.68
0.9	0.541	-178.1	3.950	74.7	0.103	53.8	0.140	-101.4	1.008	15.28
1.0	0.546	-173.8	3.571	71.4	0.112	54.3	0.131	-106.9	1.028	14.03
1.1	0.548	-170.0	3.264	68.3	0.120	54.5	0.125	-112.1	1.045	13.04
1.2	0.552	-166.5	2.991	65.4	0.128	54.5	0.120	-117.5	1.063	12.14
1.3	0.557	-163.3	2.774	62.3	0.137	54.3	0.118	-122.6	1.070	11.45
1.4	0.559	-159.9	2.574	59.6	0.145	53.9	0.116	-127.9	1.083	10.72
1.5	0.562	-157.2	2.415	56.7	0.153	53.4	0.114	-134.0	1.095	10.10
1.6	0.561	-156.3	2.258	54.6	0.160	54.0	0.108	-140.6	1.118	9.39
1.7	0.580	-153.1	2.152	51.8	0.171	53.1	0.109	-144.8	1.081	9.25
1.8	0.582	-150.4	2.022	49.1	0.180	52.0	0.112	-152.3	1.094	8.64
1.9	0.573	-148.1	1.898	46.7	0.185	51.3	0.113	-161.1	1.141	7.82
2.0	0.582	-147.9	1.818	45.1	0.194	51.7	0.111	-169.3	1.134	7.49
2.1	0.605	-146.5	1.757	42.7	0.204	51.4	0.114	-175.2	1.088	7.54
2.2	0.616	-144.8	1.686	40.2	0.214	50.4	0.123	-178.3	1.073	7.32
2.3	0.623	-142.6	1.620	37.8	0.223	49.5	0.134	-172.2	1.068	7.01
2.4	0.636	-140.7	1.563	35.0	0.231	48.5	0.146	-166.7	1.053	6.89
2.5	0.644	-139.0	1.505	33.0	0.240	47.5	0.161	-162.1	1.048	6.63
2.6	0.657	-137.0	1.452	30.7	0.249	46.4	0.176	-158.9	1.033	6.55
2.7	0.663	-135.1	1.403	28.7	0.257	45.6	0.194	-155.7	1.033	6.26
2.8	0.671	-133.5	1.357	26.4	0.264	44.6	0.212	-153.4	1.027	6.09
2.9	0.677	-131.8	1.319	24.0	0.272	43.6	0.229	-152.2	1.019	6.01
3.0	0.681	-129.8	1.287	22.3	0.279	42.6	0.243	-150.3	1.017	5.84
4.0	0.738	-114.2	0.977	7.4	0.354	31.2	0.357	-141.0	0.958	4.41
5.0	0.770	-106.0	0.791	-7.4	0.429	16.8	0.438	-112.3	0.949	2.66

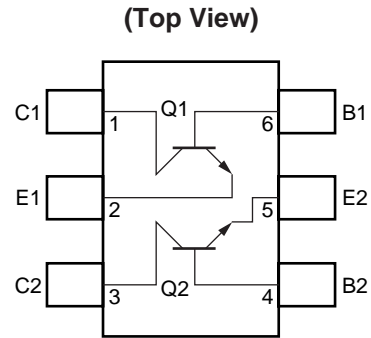
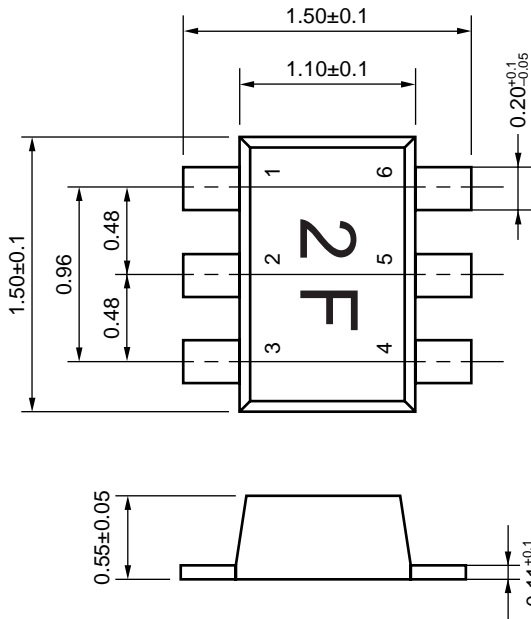


V<sub>CE</sub> = 2 V, I<sub>c</sub> = 20 mA, Z<sub>o</sub> = 50 Ω

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.520	-99.6	29.539	126.1	0.026	59.3	0.609	-56.0	0.385	30.50
0.2	0.510	-135.7	17.809	107.3	0.037	54.9	0.367	-78.6	0.635	26.79
0.3	0.506	-152.7	12.427	98.0	0.047	57.1	0.257	-92.3	0.790	24.26
0.4	0.506	-163.1	9.466	91.8	0.056	59.0	0.200	-103.4	0.885	22.29
0.5	0.506	-170.2	7.632	87.0	0.065	60.7	0.166	-113.3	0.947	20.67
0.6	0.509	-176.1	6.401	83.0	0.075	62.1	0.147	-123.1	0.985	19.29
0.7	0.514	179.3	5.514	79.5	0.085	62.2	0.136	-131.8	1.009	17.54
0.8	0.516	175.3	4.832	76.1	0.095	62.3	0.131	-140.0	1.027	16.03
0.9	0.519	171.1	4.320	73.1	0.105	61.9	0.129	-147.3	1.041	14.89
1.0	0.525	167.2	3.886	70.0	0.114	61.5	0.131	-154.5	1.056	13.86
1.1	0.515	164.5	3.522	67.5	0.124	62.8	0.124	-161.7	1.085	12.75
1.2	0.526	162.2	3.253	65.1	0.137	61.4	0.127	-163.1	1.061	12.24
1.3	0.533	159.4	3.021	62.2	0.147	60.2	0.132	-166.7	1.058	11.65
1.4	0.541	157.0	2.806	59.8	0.157	59.1	0.135	-171.0	1.057	11.06
1.5	0.545	154.5	2.636	57.1	0.167	58.0	0.139	-175.3	1.057	10.52
1.6	0.550	152.5	2.463	54.7	0.177	57.0	0.143	-179.8	1.061	9.93
1.7	0.558	150.4	2.340	52.3	0.186	55.9	0.147	175.6	1.056	9.55
1.8	0.567	148.3	2.202	49.8	0.196	54.7	0.153	171.0	1.054	9.08
1.9	0.568	146.0	2.082	47.3	0.205	53.1	0.161	166.4	1.063	8.53
2.0	0.572	143.9	1.979	45.0	0.214	51.7	0.170	162.1	1.067	8.07
2.1	0.557	143.9	1.865	43.4	0.217	49.6	0.188	157.3	1.117	7.26
2.2	0.595	143.9	1.822	41.7	0.226	50.9	0.191	150.3	1.067	7.48
2.3	0.607	141.5	1.752	39.0	0.238	49.6	0.202	147.6	1.050	7.31
2.4	0.619	139.5	1.688	36.3	0.246	48.3	0.215	144.8	1.040	7.13
2.5	0.629	137.9	1.622	34.5	0.255	47.0	0.230	142.3	1.035	6.88
2.6	0.640	136.1	1.561	32.2	0.264	45.7	0.244	140.5	1.028	6.70
2.7	0.646	134.2	1.508	30.3	0.272	44.7	0.261	138.7	1.027	6.43
2.8	0.656	132.5	1.456	28.1	0.279	43.6	0.277	137.5	1.023	6.25
2.9	0.663	130.9	1.420	25.8	0.286	42.5	0.291	137.1	1.016	6.17
3.0	0.666	129.1	1.384	24.3	0.293	41.4	0.303	135.9	1.017	5.96
4.0	0.723	113.9	1.055	9.6	0.362	28.9	0.390	129.3	0.977	4.65
5.0	0.758	106.3	0.855	-5.4	0.426	14.9	0.452	104.1	0.967	3.03

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. Base (Q2)
- 5. Emitter (Q2)
- 6. Base (Q1)

[MEMO]

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