

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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NPN SILICON RF TWIN TRANSISTOR

Phase-out/Discontinued

μPA891TC

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

FEATURES

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

BUILT-IN TRANSISTORS

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

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA891TC	50 pcs (Non reel)	8 mm wide embossed taping - Pin 6 (Q1 Base), Pin 5 (Q2 Emitter), Pin 4 (Q2 Base) face the perforation side of the tape
μPA891TC-T1	3 kpcs/reel	

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

ABSOLUTE MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	9	V
Collector to Emitter Voltage	V_{CEO}	5.5	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot} Note	200 in 1 element 230 in 2 elements	mW
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

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

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

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

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

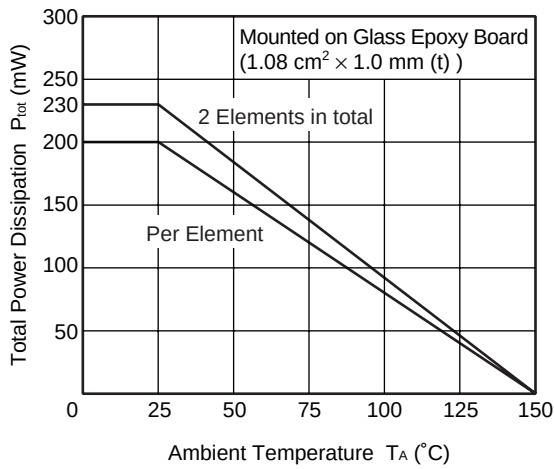
- Notes** 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

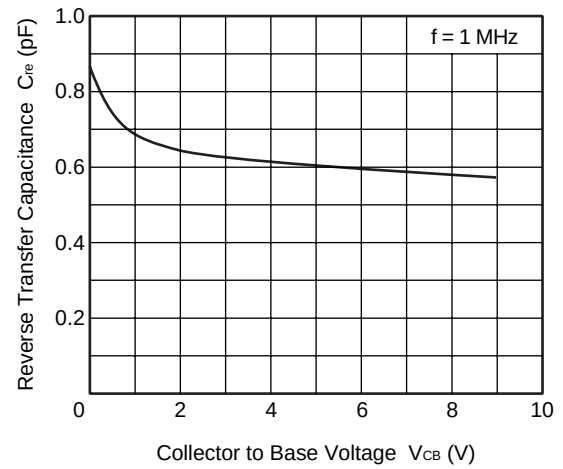
Rank	FB
Marking	4B
h _{FE} Value	100 to 160

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

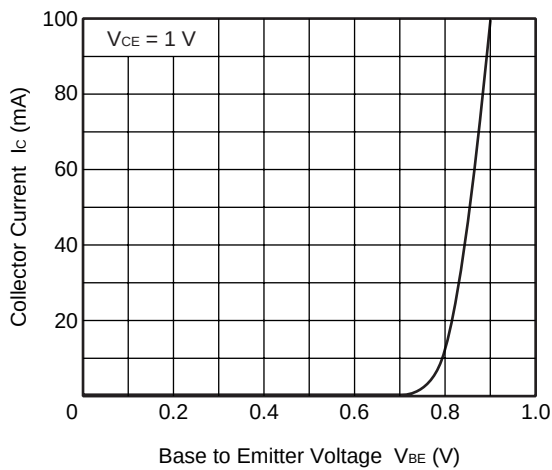
TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



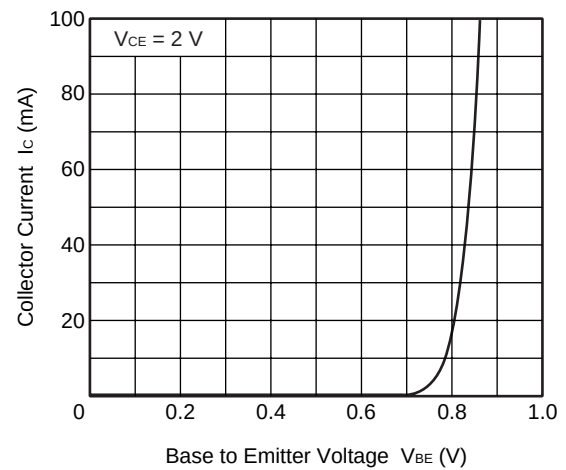
REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



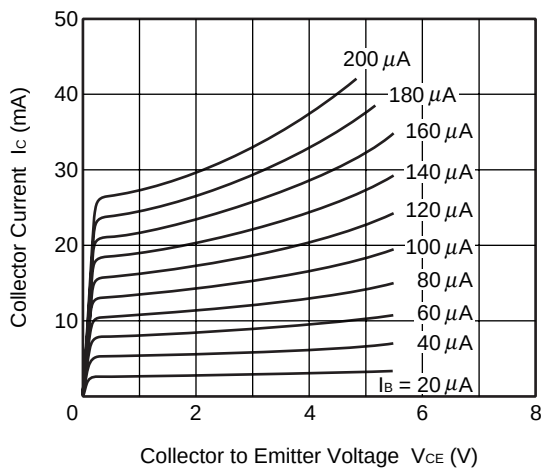
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



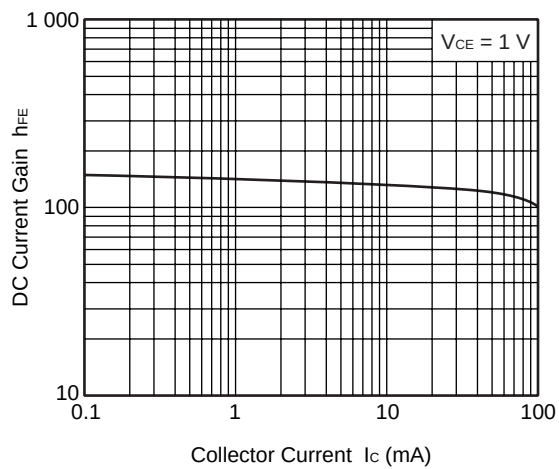
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



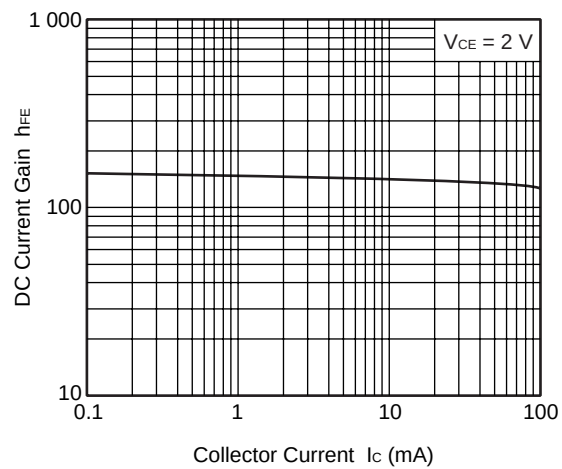
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



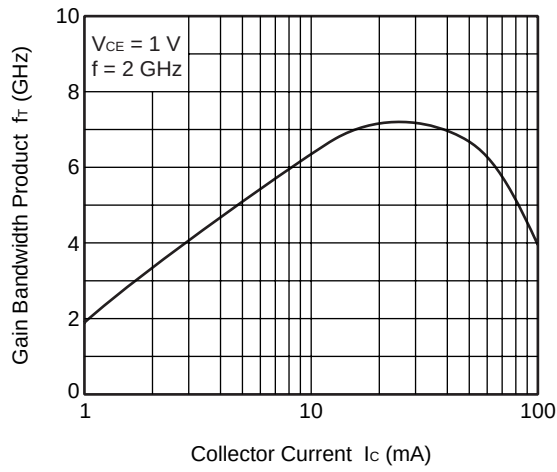
DC CURRENT GAIN vs.
COLLECTOR CURRENT



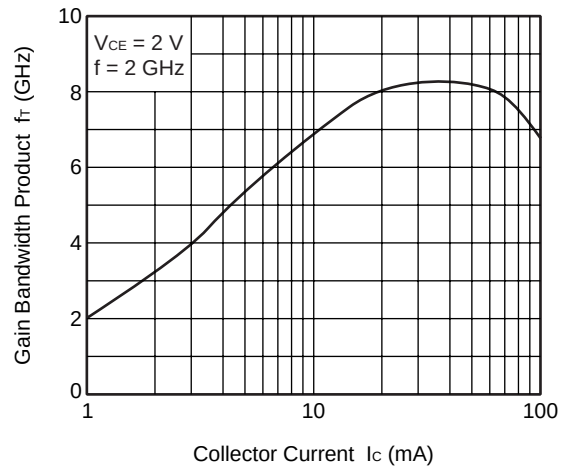
DC CURRENT GAIN vs.
COLLECTOR CURRENT



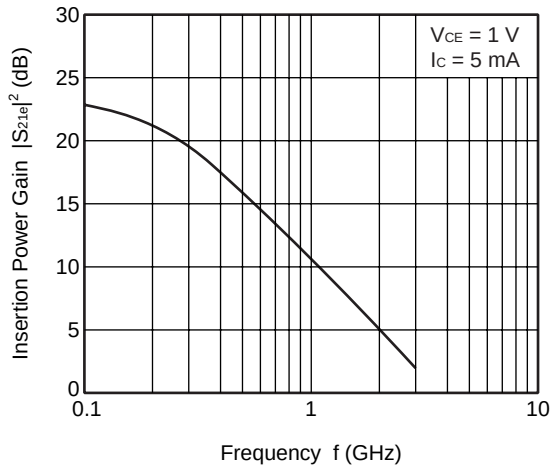
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



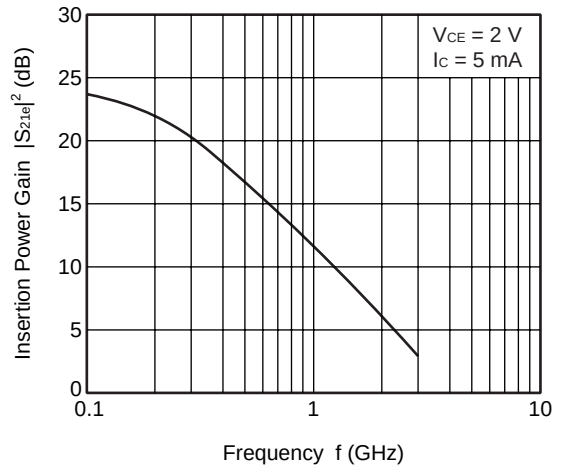
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



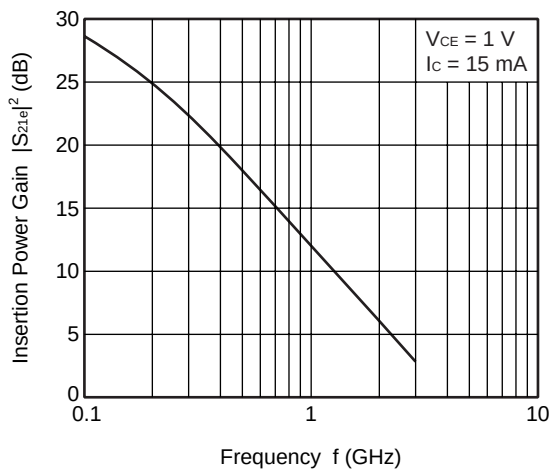
INSERTION POWER GAIN vs. FREQUENCY



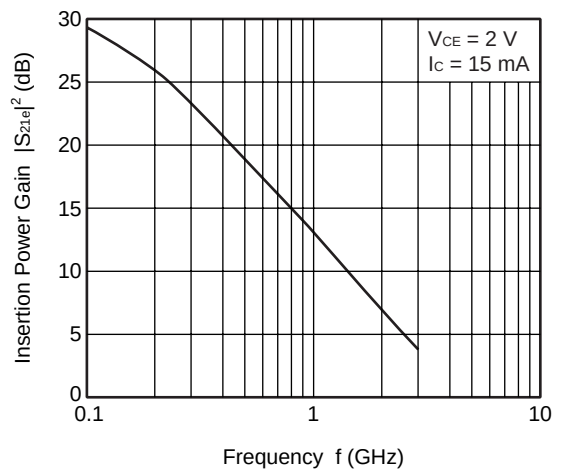
INSERTION POWER GAIN vs. FREQUENCY



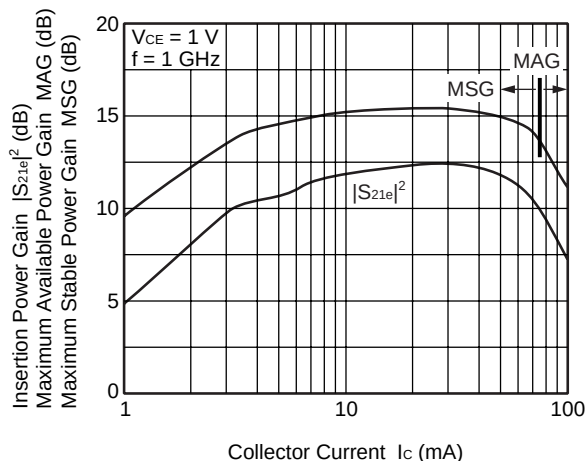
INSERTION POWER GAIN vs. FREQUENCY



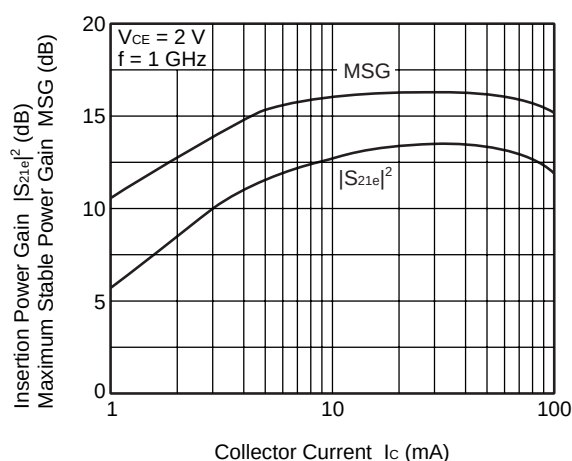
INSERTION POWER GAIN vs. FREQUENCY



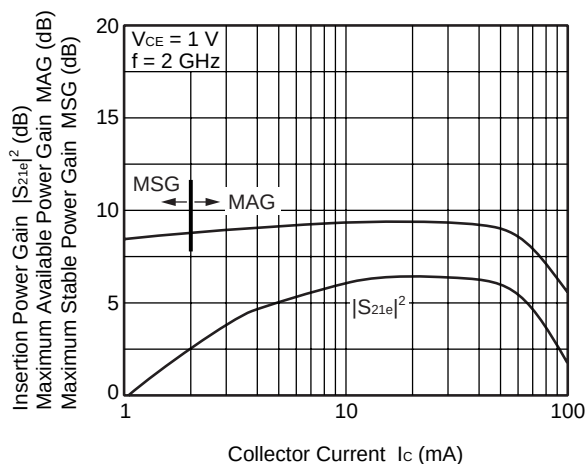
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



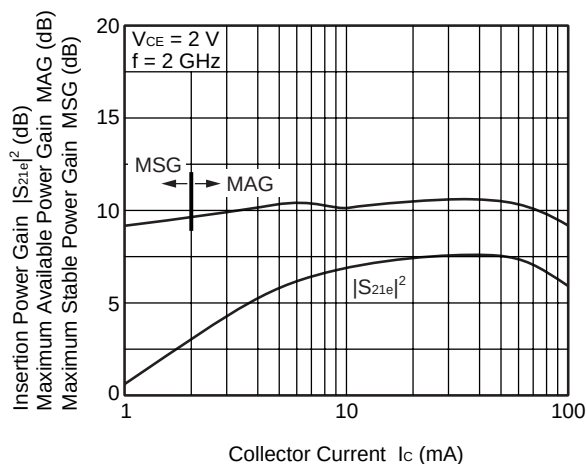
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



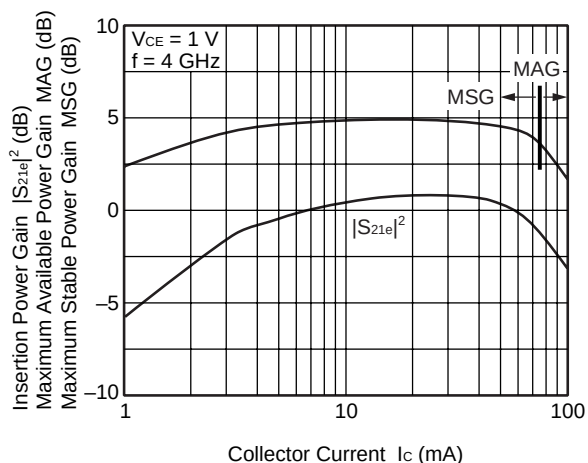
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



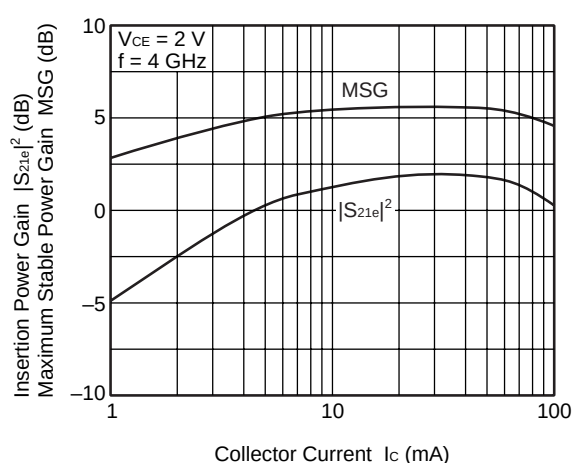
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



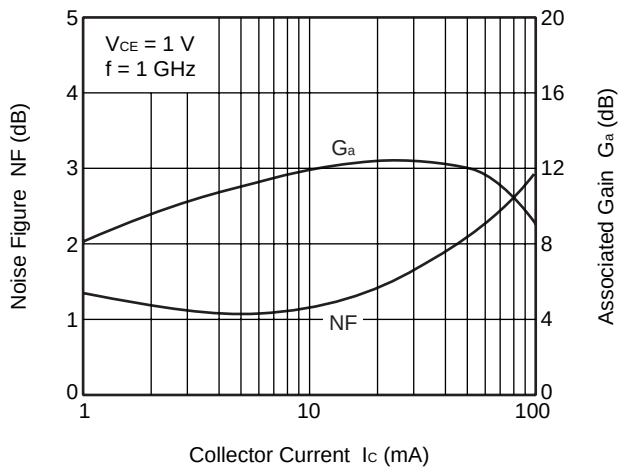
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



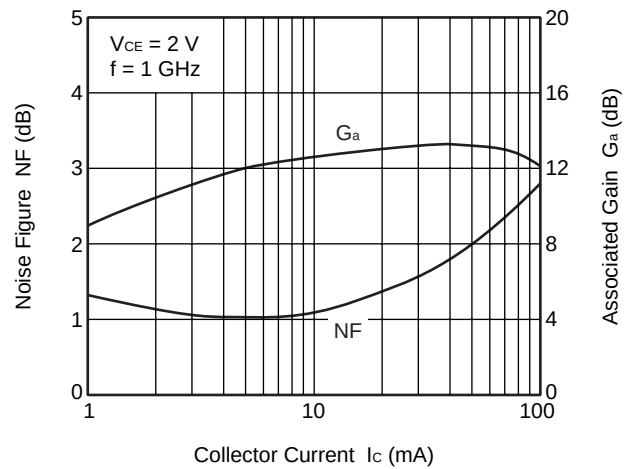
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



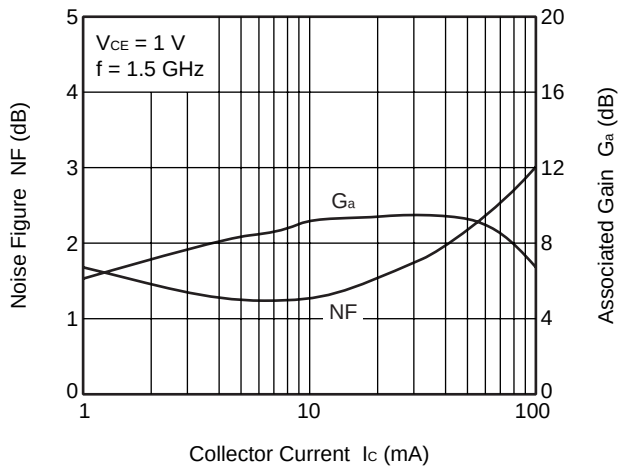
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



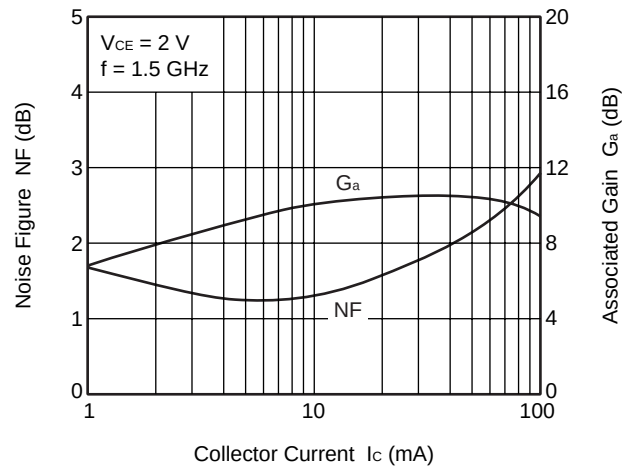
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



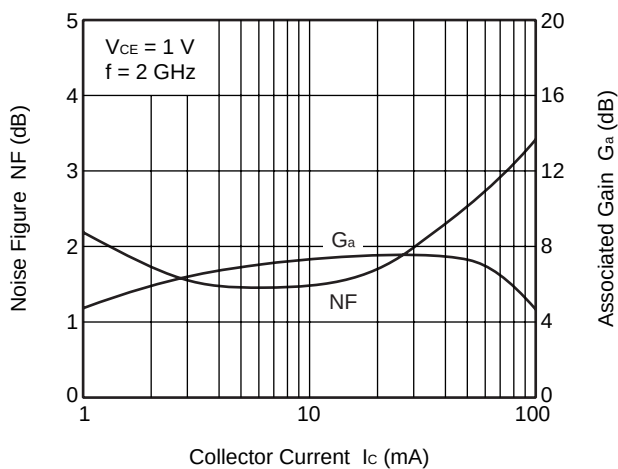
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



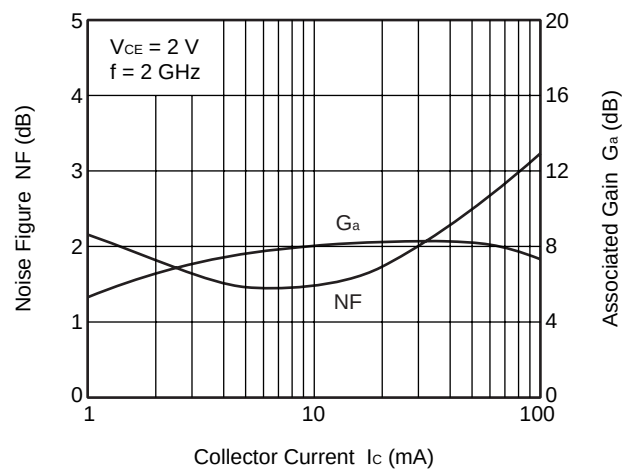
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

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

When $K < 1$, the MSG (Maximum Stable Power 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 ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.991	-19.4	3.621	166.8	0.048	87.1	0.999	-8.5	-0.113	18.76
0.2	0.984	-39.3	3.495	152.7	0.088	63.3	0.962	-15.4	0.147	15.98
0.3	0.946	-58.5	3.218	139.1	0.122	56.7	0.924	-22.5	0.113	14.22
0.4	0.896	-76.2	2.924	126.8	0.152	46.4	0.872	-28.3	0.171	12.84
0.5	0.851	-91.2	2.618	116.8	0.175	38.8	0.818	-33.2	0.208	11.75
0.6	0.816	-103.4	2.358	108.8	0.183	33.1	0.766	-37.2	0.241	11.09
0.7	0.790	-114.1	2.147	101.5	0.193	27.5	0.724	-40.7	0.288	10.45
0.8	0.787	-123.4	1.993	95.4	0.195	22.7	0.682	-43.6	0.316	10.10
0.9	0.774	-132.4	1.841	88.8	0.197	19.1	0.652	-46.3	0.356	9.69
1.0	0.771	-140.6	1.724	82.5	0.196	15.9	0.626	-48.9	0.387	9.45
1.1	0.760	-147.8	1.599	77.3	0.192	13.5	0.606	-51.4	0.431	9.21
1.2	0.751	-154.4	1.493	72.3	0.189	10.8	0.589	-53.9	0.484	8.98
1.3	0.744	-160.5	1.387	67.4	0.184	9.6	0.573	-56.6	0.542	8.78
1.4	0.738	-165.7	1.311	63.5	0.179	8.3	0.557	-59.7	0.598	8.65
1.5	0.737	-170.7	1.236	59.5	0.171	7.0	0.549	-62.8	0.657	8.59
1.6	0.737	-175.7	1.171	55.6	0.166	7.1	0.538	-65.6	0.713	8.50
1.7	0.741	-179.8	1.123	52.3	0.159	6.3	0.531	-69.4	0.755	8.50
1.8	0.750	-175.0	1.074	48.4	0.151	7.1	0.526	-72.6	0.785	8.51
1.9	0.750	-170.2	1.021	44.5	0.144	8.9	0.522	-76.2	0.854	8.49
2.0	0.752	-166.5	0.970	41.1	0.140	10.8	0.520	-80.3	0.918	8.42
2.1	0.752	-162.8	0.920	38.0	0.135	13.5	0.513	-84.5	1.012	7.69
2.2	0.756	-159.4	0.887	35.2	0.129	17.9	0.515	-88.9	1.064	6.84
2.3	0.757	-156.5	0.849	32.6	0.127	21.9	0.511	-93.0	1.131	6.05
2.4	0.767	-153.8	0.815	30.2	0.126	25.9	0.509	-98.0	1.141	5.82
2.5	0.772	-151.1	0.790	28.1	0.130	31.0	0.505	-102.7	1.130	5.64
2.6	0.771	-148.2	0.755	26.0	0.132	35.1	0.507	-107.2	1.193	4.92
2.7	0.782	-145.1	0.728	23.8	0.137	39.7	0.507	-111.8	1.157	4.86
2.8	0.782	-143.2	0.701	22.1	0.146	42.4	0.511	-116.4	1.139	4.54
2.9	0.781	-140.7	0.673	20.0	0.157	46.5	0.511	-120.8	1.145	4.02
3.0	0.785	-137.9	0.652	17.9	0.170	48.1	0.519	-125.6	1.079	4.13
4.0	0.824	-119.0	0.517	9.4	0.299	46.5	0.598	-173.1	0.911	2.38
5.0	0.820	-104.5	0.470	6.6	0.415	29.6	0.679	-153.2	0.966	0.54

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.905	-33.5	10.568	158.4	0.046	75.5	0.939	-19.2	0.021	23.62
0.2	0.856	-64.3	9.334	138.9	0.072	54.9	0.817	-32.8	0.153	21.11
0.3	0.777	-88.9	7.733	123.8	0.095	45.6	0.697	-43.2	0.223	19.11
0.4	0.715	-108.7	6.456	112.2	0.108	39.4	0.592	-50.5	0.300	17.76
0.5	0.674	-123.2	5.436	103.7	0.118	35.9	0.512	-55.3	0.379	16.64
0.6	0.654	-134.4	4.702	97.4	0.119	33.8	0.447	-58.9	0.450	15.96
0.7	0.641	-143.6	4.126	91.9	0.124	32.5	0.400	-61.7	0.519	15.23
0.8	0.642	-150.9	3.714	87.1	0.128	31.5	0.363	-64.3	0.567	14.64
0.9	0.636	-158.3	3.350	82.2	0.130	31.9	0.331	-66.2	0.631	14.11
1.0	0.636	-164.4	3.059	77.6	0.133	31.7	0.309	-69.0	0.678	13.63
1.1	0.631	-169.8	2.808	73.8	0.135	32.6	0.292	-70.7	0.737	13.19
1.2	0.626	-174.9	2.601	70.1	0.136	32.8	0.277	-73.5	0.799	12.81
1.3	0.627	-179.2	2.395	66.3	0.142	33.7	0.264	-76.5	0.835	12.27
1.4	0.625	177.0	2.234	63.3	0.146	34.9	0.251	-79.8	0.883	11.86
1.5	0.628	173.1	2.100	60.2	0.146	35.8	0.242	-83.4	0.931	11.57
1.6	0.633	169.2	1.983	57.0	0.151	36.1	0.233	-87.3	0.953	11.19
1.7	0.638	165.9	1.883	54.5	0.154	36.4	0.227	-91.5	0.977	10.87
1.8	0.647	162.2	1.790	51.2	0.156	37.9	0.221	-95.2	0.994	10.58
1.9	0.651	158.5	1.696	48.4	0.163	39.2	0.216	-99.6	1.011	9.55
2.0	0.657	155.7	1.611	45.2	0.169	39.7	0.212	-104.5	1.017	9.00
2.1	0.659	152.9	1.531	42.6	0.173	39.9	0.210	-110.1	1.045	8.16
2.2	0.663	150.6	1.464	40.1	0.179	40.9	0.212	-115.0	1.054	7.71
2.3	0.669	148.4	1.399	37.7	0.186	41.8	0.209	-119.4	1.058	7.29
2.4	0.678	146.3	1.353	35.6	0.192	42.4	0.213	-125.6	1.046	7.17
2.5	0.682	144.1	1.307	33.2	0.200	42.5	0.215	-130.9	1.038	6.95
2.6	0.684	142.1	1.250	31.1	0.204	42.8	0.220	-135.4	1.060	6.37
2.7	0.695	139.7	1.209	28.7	0.212	43.4	0.223	-140.7	1.041	6.32
2.8	0.695	138.2	1.161	26.7	0.219	42.9	0.232	-144.9	1.051	5.87
2.9	0.696	136.1	1.126	24.4	0.229	43.4	0.237	-149.6	1.047	5.59
3.0	0.704	133.7	1.097	22.1	0.238	43.2	0.250	-153.8	1.022	5.73
4.0	0.762	118.6	0.845	6.2	0.317	37.7	0.383	168.8	0.932	4.25
5.0	0.787	105.6	0.673	-3.7	0.404	25.2	0.507	145.0	0.918	2.22

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.857	-40.6	14.145	154.1	0.043	71.9	0.902	-24.7	0.065	25.14
0.2	0.790	-76.0	11.832	132.6	0.065	51.7	0.735	-41.3	0.194	22.59
0.3	0.706	-102.1	9.354	117.7	0.082	44.1	0.597	-52.2	0.289	20.60
0.4	0.656	-121.4	7.570	107.1	0.091	39.6	0.488	-59.9	0.388	19.19
0.5	0.624	-134.9	6.276	99.4	0.099	38.4	0.411	-64.4	0.482	18.02
0.6	0.612	-144.9	5.368	93.7	0.103	38.2	0.352	-68.6	0.563	17.17
0.7	0.605	-153.2	4.679	88.8	0.111	37.9	0.308	-71.1	0.629	16.27
0.8	0.607	-159.8	4.194	84.5	0.113	37.9	0.277	-74.4	0.685	15.70
0.9	0.604	-166.3	3.768	80.0	0.119	39.0	0.250	-76.9	0.737	15.00
1.0	0.608	-171.8	3.427	75.9	0.123	39.4	0.229	-80.0	0.780	14.45
1.1	0.602	-176.4	3.125	72.3	0.128	40.5	0.213	-81.9	0.834	13.87
1.2	0.603	179.2	2.887	68.9	0.133	40.8	0.202	-85.8	0.872	13.38
1.3	0.599	175.1	2.656	65.5	0.139	41.9	0.190	-89.9	0.917	12.83
1.4	0.603	171.6	2.477	62.7	0.145	42.1	0.179	-93.9	0.940	12.31
1.5	0.607	168.5	2.321	59.8	0.150	42.4	0.172	-99.2	0.968	11.91
1.6	0.614	164.6	2.192	57.0	0.157	42.9	0.164	-104.1	0.974	11.44
1.7	0.619	161.4	2.080	54.4	0.163	42.5	0.160	-109.2	0.986	11.06
1.8	0.628	158.0	1.973	51.4	0.167	43.5	0.156	-114.1	1.001	10.55
1.9	0.629	154.6	1.870	48.5	0.174	44.3	0.155	-120.5	1.020	9.45
2.0	0.637	152.1	1.777	45.7	0.181	43.6	0.154	-125.6	1.018	9.10
2.1	0.641	149.4	1.682	43.3	0.188	43.8	0.155	-132.6	1.036	8.37
2.2	0.646	147.7	1.609	40.8	0.193	43.7	0.161	-137.6	1.038	8.00
2.3	0.650	145.1	1.535	38.5	0.200	43.7	0.160	-142.9	1.054	7.44
2.4	0.657	143.2	1.480	36.3	0.207	43.7	0.167	-148.9	1.046	7.23
2.5	0.666	141.1	1.427	34.2	0.215	43.3	0.170	-154.2	1.035	7.07
2.6	0.662	138.8	1.363	32.2	0.220	43.6	0.178	-158.1	1.069	6.32
2.7	0.669	137.2	1.317	30.3	0.226	44.0	0.183	-162.8	1.066	6.07
2.8	0.672	136.3	1.279	28.5	0.236	43.3	0.194	-165.2	1.048	5.99
2.9	0.675	134.2	1.242	26.1	0.247	43.4	0.204	-169.8	1.042	5.77
3.0	0.685	132.1	1.213	23.8	0.255	42.5	0.217	-173.0	1.017	5.98
4.0	0.749	117.2	0.930	6.9	0.322	35.2	0.351	156.9	0.954	4.61
5.0	0.779	105.0	0.744	-3.7	0.400	23.3	0.468	138.0	0.929	2.70

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.793	-52.5	18.676	148.3	0.036	75.5	0.849	-32.7	-0.011	27.17
0.2	0.705	-91.2	14.443	125.2	0.055	47.4	0.631	-51.5	0.271	24.19
0.3	0.632	-116.9	10.828	111.4	0.068	44.5	0.490	-63.1	0.395	22.04
0.4	0.601	-134.5	8.561	101.8	0.078	42.2	0.386	-71.2	0.513	20.42
0.5	0.581	-146.5	6.991	95.3	0.085	43.9	0.319	-76.8	0.612	19.13
0.6	0.576	-155.0	5.919	90.4	0.090	44.9	0.268	-81.6	0.699	18.19
0.7	0.573	-162.1	5.127	86.0	0.098	44.8	0.232	-85.3	0.757	17.18
0.8	0.576	-167.8	4.573	82.0	0.104	45.6	0.206	-89.8	0.804	16.45
0.9	0.578	-173.2	4.096	78.0	0.112	46.9	0.183	-94.2	0.842	15.64
1.0	0.584	-177.7	3.709	74.4	0.118	47.6	0.169	-98.9	0.871	14.96
1.1	0.579	178.1	3.394	71.0	0.126	48.5	0.156	-102.0	0.907	14.30
1.2	0.579	174.0	3.123	68.0	0.132	48.8	0.147	-107.7	0.938	13.73
1.3	0.581	170.8	2.868	64.9	0.142	49.4	0.143	-113.0	0.956	13.06
1.4	0.581	167.7	2.675	62.4	0.150	49.2	0.135	-118.4	0.974	12.51
1.5	0.588	164.9	2.510	59.8	0.154	48.8	0.134	-125.1	0.995	12.11
1.6	0.593	161.4	2.353	57.0	0.165	49.0	0.131	-131.4	0.995	11.53
1.7	0.600	158.6	2.240	54.6	0.171	48.2	0.135	-137.9	1.003	10.85
1.8	0.609	155.5	2.125	51.7	0.177	48.7	0.134	-143.8	1.009	10.23
1.9	0.613	152.5	2.012	49.1	0.186	48.3	0.136	-149.7	1.012	9.68
2.0	0.621	150.3	1.915	46.4	0.193	47.6	0.139	-154.8	1.011	9.33
2.1	0.624	147.8	1.810	44.2	0.200	46.8	0.147	-161.6	1.029	8.51
2.2	0.631	146.1	1.729	41.9	0.208	47.1	0.155	-165.1	1.026	8.20
2.3	0.635	143.8	1.648	39.6	0.216	46.5	0.157	-169.7	1.034	7.70
2.4	0.642	142.4	1.591	37.6	0.224	45.8	0.170	-174.5	1.026	7.53
2.5	0.650	140.5	1.540	35.6	0.233	45.4	0.175	-178.7	1.015	7.46
2.6	0.651	138.4	1.476	33.5	0.237	44.8	0.185	178.9	1.032	6.85
2.7	0.664	136.6	1.422	31.2	0.244	44.2	0.193	174.3	1.022	6.74
2.8	0.662	135.3	1.368	29.3	0.252	43.8	0.202	172.7	1.030	6.29
2.9	0.663	133.1	1.327	27.2	0.263	43.4	0.212	169.6	1.027	6.02
3.0	0.671	131.1	1.297	25.1	0.270	42.4	0.222	167.6	1.014	6.08
4.0	0.733	117.7	1.008	8.8	0.335	34.3	0.353	146.8	0.962	4.79
5.0	0.768	105.6	0.811	-2.8	0.404	22.0	0.456	132.1	0.934	3.03

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.732	-63.5	22.710	143.1	0.039	53.8	0.785	-39.4	0.253	27.70
0.2	0.643	-104.7	16.341	119.4	0.049	45.4	0.550	-60.5	0.351	25.20
0.3	0.586	-128.8	11.832	106.8	0.057	45.6	0.413	-72.6	0.500	23.14
0.4	0.571	-144.3	9.170	98.5	0.067	45.5	0.319	-81.7	0.618	21.33
0.5	0.557	-155.0	7.454	92.6	0.076	48.1	0.261	-88.2	0.716	19.89
0.6	0.558	-162.1	6.290	88.1	0.083	50.2	0.219	-94.3	0.789	18.80
0.7	0.557	-168.5	5.434	84.0	0.093	50.7	0.189	-99.9	0.834	17.67
0.8	0.564	-173.4	4.821	80.5	0.100	52.0	0.168	-106.1	0.870	16.83
0.9	0.565	-178.1	4.311	76.8	0.109	52.4	0.151	-111.7	0.897	15.96
1.0	0.570	177.9	3.906	73.2	0.118	52.9	0.142	-118.2	0.914	15.19
1.1	0.566	174.0	3.558	70.2	0.126	53.6	0.132	-122.8	0.948	14.52
1.2	0.568	170.6	3.282	67.4	0.135	53.2	0.129	-130.1	0.962	13.86
1.3	0.568	167.6	3.008	64.4	0.144	53.4	0.127	-136.0	0.980	13.19
1.4	0.570	164.7	2.811	62.0	0.154	53.2	0.125	-142.4	0.987	12.61
1.5	0.579	162.0	2.626	59.5	0.160	53.1	0.128	-148.7	0.999	12.14
1.6	0.584	158.9	2.467	56.9	0.170	52.0	0.132	-154.8	0.999	11.61
1.7	0.592	156.1	2.335	54.6	0.177	51.2	0.138	-160.0	1.006	10.74
1.8	0.600	153.5	2.219	51.7	0.184	51.1	0.141	-165.6	1.009	10.24
1.9	0.604	150.5	2.103	49.4	0.194	50.9	0.146	-171.0	1.010	9.73
2.0	0.611	148.4	1.992	46.7	0.202	49.7	0.154	-174.7	1.013	9.25
2.1	0.616	146.2	1.892	44.6	0.209	48.4	0.163	179.9	1.024	8.63
2.2	0.623	144.4	1.804	42.3	0.218	48.5	0.171	177.5	1.019	8.34
2.3	0.629	142.5	1.728	40.1	0.227	48.0	0.175	173.2	1.018	8.00
2.4	0.636	141.0	1.662	38.2	0.234	46.9	0.188	170.0	1.016	7.73
2.5	0.644	139.2	1.607	36.1	0.243	45.9	0.195	166.8	1.006	7.71
2.6	0.646	137.4	1.537	34.2	0.247	45.5	0.205	165.1	1.021	7.03
2.7	0.654	135.4	1.483	32.1	0.256	44.8	0.214	161.6	1.017	6.83
2.8	0.655	134.1	1.427	30.2	0.263	43.5	0.222	160.0	1.022	6.44
2.9	0.654	132.4	1.381	28.1	0.272	43.3	0.232	157.4	1.027	6.04
3.0	0.664	130.2	1.355	26.0	0.280	42.3	0.243	155.8	1.011	6.22
4.0	0.726	117.2	1.050	10.0	0.343	33.4	0.362	139.8	0.969	4.86
5.0	0.757	105.5	0.850	-1.8	0.406	20.9	0.453	127.1	0.949	3.21

V_{CE} = 1 V, I_C = 20 mA, Z₀ = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.581	-93.3	30.515	130.3	0.025	59.7	0.642	-56.5	0.285	30.92
0.2	0.551	-131.2	18.907	109.2	0.036	45.6	0.399	-80.4	0.551	27.19
0.3	0.535	-150.6	13.075	99.3	0.043	56.4	0.293	-95.0	0.745	24.85
0.4	0.535	-161.8	9.967	92.8	0.057	56.0	0.229	-107.7	0.814	22.41
0.5	0.535	-169.3	8.020	88.1	0.069	58.7	0.192	-117.4	0.869	20.66
0.6	0.537	-174.2	6.742	84.4	0.078	62.2	0.171	-127.6	0.920	19.39
0.7	0.540	-178.7	5.797	81.0	0.088	61.4	0.155	-135.9	0.944	18.20
0.8	0.549	177.6	5.132	77.8	0.099	61.0	0.148	-143.1	0.949	17.16
0.9	0.551	174.1	4.565	74.8	0.109	61.5	0.145	-151.1	0.967	16.24
1.0	0.558	170.8	4.128	71.5	0.119	61.1	0.145	-156.9	0.972	15.41
1.1	0.555	167.8	3.762	68.7	0.130	61.2	0.143	-161.8	0.983	14.62
1.2	0.557	165.0	3.470	66.2	0.139	60.0	0.148	-167.5	0.991	13.97
1.3	0.559	162.3	3.178	63.4	0.151	59.8	0.152	-171.6	0.997	13.24
1.4	0.563	160.1	2.966	61.4	0.162	58.2	0.157	-176.9	0.997	12.63
1.5	0.568	157.5	2.769	58.8	0.170	57.5	0.164	-179.8	1.005	11.67
1.6	0.576	154.9	2.607	56.5	0.182	56.7	0.172	-176.0	1.000	11.56
1.7	0.583	152.4	2.461	54.3	0.188	54.7	0.180	-172.5	1.006	10.69
1.8	0.591	150.1	2.329	51.5	0.197	54.5	0.187	-168.9	1.006	10.26
1.9	0.598	147.3	2.213	49.3	0.209	53.3	0.195	-166.1	1.000	10.19
2.0	0.604	145.4	2.097	46.8	0.216	52.1	0.203	-163.3	1.005	9.44
2.1	0.609	143.4	1.983	44.9	0.223	50.9	0.215	-160.1	1.017	8.70
2.2	0.617	142.1	1.894	42.8	0.232	50.2	0.225	-158.9	1.013	8.44
2.3	0.620	140.3	1.806	40.7	0.241	49.1	0.231	-155.3	1.017	7.96
2.4	0.629	138.9	1.745	38.7	0.249	47.7	0.242	-153.1	1.010	7.84
2.5	0.638	137.2	1.683	36.9	0.259	47.1	0.249	-150.8	1.001	7.92
2.6	0.638	135.5	1.610	35.0	0.265	46.1	0.258	-149.4	1.012	7.17
2.7	0.649	133.8	1.552	32.8	0.271	45.0	0.267	-146.8	1.009	7.00
2.8	0.649	132.5	1.493	31.0	0.278	43.8	0.274	-145.6	1.015	6.55
2.9	0.648	130.5	1.450	29.1	0.289	43.4	0.284	-143.9	1.017	6.20
3.0	0.660	128.8	1.417	27.1	0.295	42.0	0.293	-142.7	1.005	6.39
4.0	0.720	116.3	1.102	11.5	0.354	31.9	0.400	-130.1	0.979	4.93
5.0	0.753	105.2	0.896	-0.1	0.411	19.3	0.470	-119.4	0.962	3.39

V_{CE} = 2 V, I_C = 1 mA, Z₀ = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.984	-19.1	3.923	167.5	0.040	78.7	0.998	-7.6	0.028	19.96
0.2	0.989	-38.3	3.801	153.9	0.074	65.8	0.969	-13.9	0.110	17.10
0.3	0.942	-56.7	3.506	140.8	0.103	58.0	0.934	-20.3	0.113	15.32
0.4	0.898	-74.0	3.202	128.8	0.132	48.9	0.884	-25.7	0.160	13.84
0.5	0.853	-88.8	2.883	119.0	0.152	40.7	0.835	-30.3	0.204	12.78
0.6	0.816	-101.2	2.597	111.1	0.159	35.2	0.785	-33.9	0.235	12.12
0.7	0.791	-111.8	2.363	104.4	0.168	30.0	0.746	-37.1	0.272	11.49
0.8	0.781	-121.2	2.199	98.2	0.170	25.5	0.706	-39.8	0.308	11.11
0.9	0.768	-130.3	2.033	91.9	0.173	22.0	0.675	-42.1	0.348	10.71
1.0	0.766	-138.7	1.903	85.9	0.172	19.0	0.649	-44.4	0.376	10.44
1.1	0.754	-145.9	1.762	80.6	0.168	16.9	0.629	-46.6	0.427	10.21
1.2	0.745	-152.8	1.650	75.8	0.165	14.7	0.611	-48.8	0.475	9.99
1.3	0.735	-158.9	1.534	71.1	0.162	13.5	0.595	-51.2	0.540	9.77
1.4	0.727	-164.2	1.446	67.2	0.157	12.5	0.581	-53.9	0.602	9.63
1.5	0.727	-169.4	1.367	63.3	0.151	11.7	0.571	-56.7	0.656	9.56
1.6	0.729	-174.5	1.294	59.5	0.147	11.8	0.559	-59.2	0.710	9.45
1.7	0.731	-179.0	1.240	56.2	0.142	11.3	0.553	-62.4	0.754	9.42
1.8	0.739	176.0	1.184	52.1	0.135	13.7	0.547	-65.1	0.792	9.44
1.9	0.737	171.3	1.126	48.6	0.131	15.4	0.541	-68.4	0.858	9.34
2.0	0.743	167.4	1.072	45.0	0.127	18.0	0.537	-72.2	0.899	9.25
2.1	0.742	163.5	1.019	42.1	0.123	20.1	0.529	-75.8	0.998	9.18
2.2	0.746	160.3	0.977	39.0	0.120	25.3	0.529	-80.0	1.043	7.85
2.3	0.745	157.1	0.937	36.7	0.121	29.3	0.527	-83.5	1.085	7.11
2.4	0.754	154.5	0.903	34.3	0.121	33.6	0.520	-88.2	1.105	6.77
2.5	0.758	151.6	0.873	32.0	0.125	38.1	0.516	-92.4	1.105	6.48
2.6	0.758	148.7	0.837	29.7	0.128	42.5	0.514	-96.8	1.150	5.80
2.7	0.768	145.7	0.806	27.7	0.134	46.2	0.513	-101.2	1.106	5.80
2.8	0.769	143.8	0.777	25.6	0.143	48.5	0.515	-105.4	1.084	5.58
2.9	0.765	141.3	0.747	23.6	0.156	51.5	0.513	-109.5	1.086	5.02
3.0	0.774	138.4	0.725	21.3	0.168	52.9	0.518	-114.4	1.010	5.73
4.0	0.813	119.4	0.569	10.4	0.297	50.4	0.576	-162.6	0.869	2.83
5.0	0.816	105.0	0.498	6.5	0.419	33.1	0.654	-161.3	0.927	0.75

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.939	-28.4	9.630	161.3	0.036	84.0	0.964	-14.7	-0.098	24.25
0.2	0.887	-55.9	8.779	143.3	0.066	56.2	0.866	-26.0	0.184	21.23
0.3	0.805	-79.1	7.497	128.6	0.086	49.6	0.767	-35.0	0.200	19.40
0.4	0.742	-98.6	6.405	116.9	0.100	42.7	0.673	-41.2	0.268	18.05
0.5	0.693	-113.8	5.459	108.0	0.111	38.7	0.595	-45.4	0.339	16.92
0.6	0.667	-125.5	4.762	101.3	0.114	35.8	0.532	-48.4	0.406	16.22
0.7	0.647	-135.2	4.207	95.5	0.120	33.2	0.484	-50.7	0.475	15.46
0.8	0.644	-143.4	3.803	90.6	0.120	32.3	0.445	-52.6	0.527	15.02
0.9	0.635	-151.3	3.446	85.7	0.124	31.8	0.415	-54.0	0.584	14.45
1.0	0.635	-158.0	3.157	80.8	0.126	31.6	0.390	-55.7	0.629	14.00
1.1	0.628	-163.9	2.903	76.6	0.126	32.3	0.373	-57.2	0.694	13.64
1.2	0.624	-169.4	2.694	72.9	0.128	32.3	0.355	-59.3	0.747	13.23
1.3	0.620	-174.1	2.470	69.4	0.130	33.5	0.341	-61.4	0.810	12.79
1.4	0.618	-178.2	2.313	66.2	0.133	34.3	0.327	-63.8	0.855	12.39
1.5	0.620	-177.4	2.176	62.9	0.134	35.0	0.316	-66.6	0.904	12.10
1.6	0.624	-173.3	2.053	59.8	0.138	36.7	0.304	-69.0	0.928	11.71
1.7	0.629	-169.5	1.954	57.1	0.140	36.7	0.296	-72.4	0.956	11.44
1.8	0.637	-165.7	1.854	53.7	0.142	38.7	0.289	-75.2	0.984	11.17
1.9	0.639	-162.0	1.761	50.7	0.148	40.5	0.281	-78.0	0.996	10.75
2.0	0.645	-159.0	1.676	47.4	0.153	41.1	0.276	-82.4	1.006	9.93
2.1	0.647	-155.7	1.589	45.0	0.157	41.9	0.265	-86.6	1.044	8.76
2.2	0.655	-153.4	1.526	42.4	0.162	43.4	0.266	-90.9	1.035	8.58
2.3	0.656	-150.7	1.458	39.9	0.168	44.4	0.262	-94.1	1.051	7.99
2.4	0.665	-148.8	1.406	37.6	0.174	44.6	0.258	-100.1	1.044	7.79
2.5	0.672	-146.4	1.359	35.4	0.182	45.7	0.255	-104.3	1.029	7.70
2.6	0.673	-144.2	1.300	33.3	0.186	46.3	0.255	-108.9	1.054	7.02
2.7	0.685	-142.0	1.256	30.8	0.194	47.0	0.253	-114.2	1.029	7.07
2.8	0.687	-140.1	1.210	28.8	0.202	47.0	0.259	-118.6	1.027	6.79
2.9	0.684	-137.8	1.165	26.5	0.212	47.5	0.259	-123.2	1.040	6.18
3.0	0.695	-135.6	1.139	24.1	0.221	47.7	0.268	-128.1	1.000	7.00
4.0	0.755	-119.7	0.873	7.3	0.307	42.7	0.369	-174.8	0.899	4.54
5.0	0.786	-106.5	0.695	-3.1	0.403	29.5	0.492	-156.0	0.872	2.37

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.851	-39.0	15.112	155.3	0.035	66.6	0.912	-21.9	0.135	26.34
0.2	0.782	-71.7	12.744	134.3	0.057	53.4	0.758	-36.6	0.218	23.50
0.3	0.693	-97.3	10.222	119.5	0.070	49.0	0.624	-46.3	0.290	21.65
0.4	0.638	-116.7	8.302	108.8	0.082	42.9	0.516	-52.4	0.405	20.03
0.5	0.601	-130.4	6.897	101.1	0.089	41.6	0.441	-56.1	0.499	18.89
0.6	0.587	-141.0	5.911	95.5	0.092	40.7	0.383	-58.9	0.581	18.08
0.7	0.576	-149.5	5.156	90.5	0.099	40.9	0.342	-60.5	0.649	17.19
0.8	0.577	-156.5	4.615	86.4	0.102	41.6	0.306	-62.2	0.706	16.56
0.9	0.573	-163.0	4.155	82.1	0.109	42.4	0.282	-63.9	0.752	15.83
1.0	0.576	-168.7	3.779	77.8	0.113	42.6	0.260	-65.5	0.796	15.26
1.1	0.571	-173.5	3.453	74.4	0.117	44.4	0.246	-66.9	0.845	14.70
1.2	0.570	-178.0	3.187	71.1	0.122	44.3	0.231	-69.3	0.883	14.16
1.3	0.569	-177.9	2.929	67.8	0.129	45.1	0.218	-71.6	0.918	13.56
1.4	0.569	-174.3	2.740	64.9	0.135	46.0	0.206	-74.6	0.949	13.09
1.5	0.575	-170.6	2.566	62.2	0.139	46.6	0.197	-78.2	0.973	12.68
1.6	0.580	-167.0	2.418	59.5	0.147	47.0	0.188	-81.7	0.977	12.16
1.7	0.585	-163.7	2.295	56.9	0.151	46.2	0.181	-86.1	0.996	11.82
1.8	0.597	-160.5	2.181	53.8	0.158	47.7	0.172	-89.9	0.991	11.41
1.9	0.600	-157.0	2.065	51.2	0.165	48.0	0.165	-93.8	1.004	10.60
2.0	0.605	-154.4	1.961	48.3	0.174	47.4	0.164	-99.0	1.001	10.36
2.1	0.609	-151.8	1.860	46.0	0.177	47.6	0.155	-105.4	1.031	9.12
2.2	0.615	-149.7	1.777	43.6	0.185	48.1	0.158	-110.6	1.026	8.84
2.3	0.621	-147.8	1.702	41.3	0.192	47.9	0.154	-115.2	1.029	8.43
2.4	0.630	-145.8	1.639	39.2	0.199	47.6	0.157	-122.8	1.022	8.25
2.5	0.636	-143.7	1.586	37.0	0.208	47.8	0.155	-128.5	1.012	8.16
2.6	0.639	-141.4	1.520	34.9	0.213	47.2	0.159	-133.1	1.025	7.57
2.7	0.650	-139.5	1.463	32.8	0.220	47.0	0.160	-139.4	1.018	7.42
2.8	0.651	-138.0	1.412	30.7	0.227	46.6	0.166	-143.8	1.022	7.04
2.9	0.650	-136.1	1.363	28.5	0.238	46.8	0.171	-149.3	1.025	6.62
3.0	0.660	-133.6	1.335	26.2	0.246	45.9	0.182	-153.2	0.999	7.35
4.0	0.727	-119.4	1.027	9.1	0.319	39.2	0.305	-168.2	0.930	5.08
5.0	0.766	-106.9	0.821	-3.0	0.398	26.9	0.425	-146.9	0.891	3.14

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.802	-45.9	18.711	151.1	0.032	69.2	0.878	-27.4	0.085	27.68
0.2	0.723	-81.9	15.009	129.1	0.051	50.4	0.681	-43.1	0.271	24.70
0.3	0.629	-107.3	11.524	114.8	0.061	48.0	0.546	-52.9	0.379	22.75
0.4	0.588	-126.5	9.192	104.9	0.072	44.9	0.436	-59.0	0.498	21.07
0.5	0.562	-139.3	7.548	97.9	0.080	44.8	0.368	-62.6	0.593	19.77
0.6	0.551	-148.8	6.424	92.8	0.083	46.6	0.313	-65.1	0.683	18.87
0.7	0.547	-156.7	5.569	88.2	0.091	45.3	0.275	-66.9	0.744	17.88
0.8	0.550	-162.5	4.976	84.5	0.097	47.0	0.247	-69.1	0.785	17.11
0.9	0.550	-168.4	4.460	80.4	0.104	47.8	0.223	-70.6	0.824	16.32
1.0	0.554	-173.6	4.045	76.6	0.110	48.7	0.203	-72.9	0.859	15.65
1.1	0.549	-178.1	3.698	73.3	0.117	50.0	0.191	-74.4	0.895	15.01
1.2	0.549	177.8	3.404	70.2	0.122	50.2	0.177	-77.8	0.930	14.45
1.3	0.548	174.2	3.128	67.1	0.131	50.5	0.169	-80.9	0.950	13.78
1.4	0.549	170.9	2.924	64.6	0.138	50.1	0.156	-84.2	0.970	13.26
1.5	0.556	167.6	2.740	62.0	0.144	50.9	0.148	-89.3	0.988	12.81
1.6	0.562	164.1	2.574	59.3	0.153	51.0	0.141	-94.4	0.989	12.26
1.7	0.567	161.3	2.441	56.7	0.158	50.3	0.136	-99.2	1.000	11.88
1.8	0.577	158.1	2.314	53.9	0.164	51.0	0.129	-104.2	1.007	10.98
1.9	0.582	154.9	2.194	51.2	0.174	50.7	0.125	-109.7	1.005	10.59
2.0	0.591	152.4	2.087	48.5	0.181	50.0	0.125	-115.5	1.001	10.44
2.1	0.595	150.2	1.973	46.4	0.188	49.5	0.121	-124.0	1.019	9.37
2.2	0.602	148.0	1.887	44.1	0.195	49.7	0.127	-130.2	1.019	9.02
2.3	0.606	146.0	1.804	41.9	0.202	49.2	0.123	-135.3	1.027	8.51
2.4	0.613	144.4	1.738	39.9	0.211	48.7	0.130	-143.2	1.017	8.36
2.5	0.621	142.3	1.682	37.7	0.219	48.2	0.132	-148.7	1.008	8.31
2.6	0.624	140.6	1.608	35.7	0.223	48.0	0.137	-153.3	1.023	7.65
2.7	0.636	138.5	1.550	33.5	0.231	47.4	0.142	-160.2	1.014	7.54
2.8	0.635	137.1	1.495	31.7	0.239	46.4	0.149	-163.6	1.020	7.11
2.9	0.637	135.1	1.446	29.3	0.249	46.5	0.158	-168.3	1.018	6.83
3.0	0.646	133.0	1.415	27.2	0.256	45.6	0.168	-171.3	1.001	7.21
4.0	0.714	119.1	1.091	10.4	0.325	37.7	0.296	158.1	0.947	5.26
5.0	0.753	106.9	0.872	-2.2	0.399	25.6	0.407	140.8	0.912	3.40

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

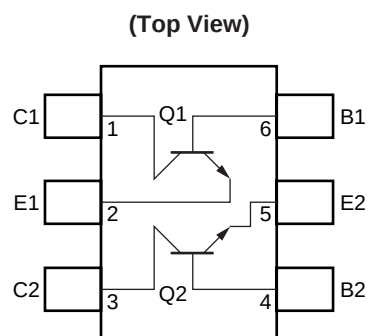
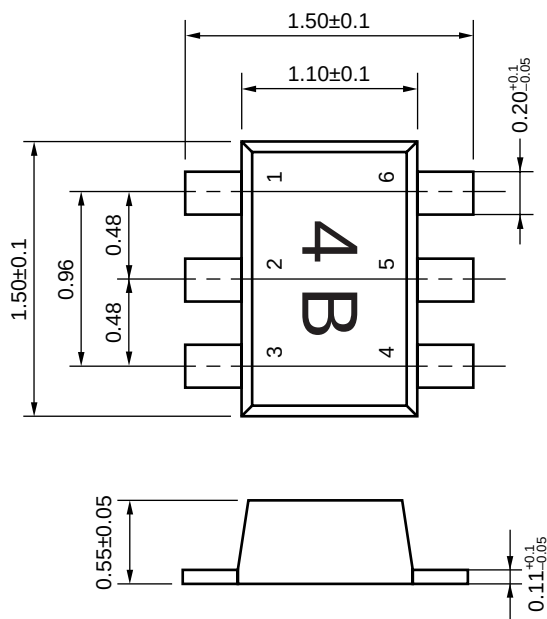
Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.750	-56.5	23.514	146.0	0.027	64.8	0.823	-33.9	0.112	29.36
0.2	0.644	-95.7	17.490	122.6	0.045	47.2	0.593	-51.3	0.357	25.88
0.3	0.572	-120.7	12.917	109.5	0.054	46.3	0.456	-60.9	0.490	23.82
0.4	0.541	-137.5	10.084	100.7	0.063	48.6	0.356	-67.2	0.612	22.06
0.5	0.526	-149.2	8.204	94.5	0.073	49.9	0.292	-70.9	0.700	20.53
0.6	0.523	-157.4	6.928	89.9	0.077	52.7	0.245	-74.0	0.781	19.52
0.7	0.521	-163.9	5.995	85.9	0.086	52.5	0.212	-76.3	0.825	18.41
0.8	0.523	-169.3	5.321	82.3	0.093	53.4	0.187	-79.3	0.868	17.58
0.9	0.527	-174.6	4.765	78.7	0.102	54.0	0.166	-81.7	0.888	16.68
1.0	0.531	-178.7	4.312	75.1	0.108	54.9	0.153	-85.3	0.919	16.02
1.1	0.526	177.4	3.932	72.2	0.117	55.8	0.139	-87.4	0.942	15.26
1.2	0.528	173.5	3.628	69.5	0.125	55.4	0.128	-92.4	0.962	14.64
1.3	0.529	170.1	3.328	66.6	0.135	55.2	0.122	-96.6	0.972	13.92
1.4	0.534	167.5	3.108	63.9	0.143	55.3	0.112	-101.6	0.980	13.36
1.5	0.537	164.5	2.906	61.5	0.149	55.0	0.110	-108.4	0.998	12.89
1.6	0.543	161.3	2.723	58.8	0.160	54.0	0.107	-115.8	0.994	12.30
1.7	0.551	158.6	2.583	56.8	0.165	53.3	0.104	-122.9	1.004	11.55
1.8	0.562	155.9	2.448	54.1	0.172	53.6	0.101	-129.8	1.005	11.11
1.9	0.567	152.4	2.323	51.5	0.181	53.0	0.100	-136.5	1.008	10.54
2.0	0.574	150.6	2.204	48.8	0.190	51.8	0.104	-143.6	1.005	10.19
2.1	0.578	148.1	2.090	46.8	0.197	51.6	0.109	-152.9	1.021	9.39
2.2	0.586	146.6	1.996	44.7	0.205	51.1	0.117	-156.8	1.016	9.13
2.3	0.591	144.5	1.905	42.4	0.214	50.1	0.117	-163.6	1.017	8.70
2.4	0.600	142.7	1.836	40.4	0.222	49.4	0.126	-169.5	1.011	8.54
2.5	0.607	141.2	1.774	38.5	0.230	48.7	0.132	-174.4	1.005	8.45
2.6	0.610	139.5	1.698	36.6	0.236	48.2	0.141	-177.7	1.015	7.82
2.7	0.622	137.2	1.636	34.4	0.242	47.6	0.147	177.2	1.011	7.64
2.8	0.624	136.0	1.578	32.5	0.250	46.6	0.156	175.1	1.013	7.31
2.9	0.624	134.2	1.527	30.4	0.261	46.2	0.167	171.3	1.013	6.99
3.0	0.636	132.0	1.493	28.4	0.267	45.3	0.176	169.7	0.997	7.47
4.0	0.702	119.0	1.156	11.7	0.333	36.2	0.301	147.8	0.956	5.41
5.0	0.744	106.9	0.927	-0.8	0.400	24.1	0.401	134.1	0.927	3.64

$V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$, $Z_0 = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.576	-82.7	32.751	133.7	0.019	74.7	0.684	-47.8	0.229	32.37
0.2	0.516	-122.3	20.941	111.9	0.033	49.5	0.430	-67.0	0.558	27.98
0.3	0.491	-143.9	14.639	101.4	0.039	56.1	0.309	-77.0	0.743	25.75
0.4	0.490	-156.1	11.171	94.7	0.051	59.8	0.235	-85.3	0.819	23.37
0.5	0.484	-164.6	9.005	89.8	0.065	60.6	0.188	-90.6	0.859	21.41
0.6	0.489	-170.0	7.567	86.3	0.072	63.7	0.157	-97.0	0.914	20.24
0.7	0.489	-175.5	6.505	82.5	0.082	62.6	0.134	-102.3	0.936	18.99
0.8	0.496	-179.0	5.770	79.5	0.090	62.8	0.119	-108.6	0.957	18.08
0.9	0.499	176.8	5.143	76.4	0.102	63.4	0.107	-115.2	0.959	17.03
1.0	0.506	173.6	4.652	73.3	0.112	62.7	0.101	-122.0	0.962	16.18
1.1	0.504	170.4	4.245	70.5	0.121	62.9	0.094	-127.8	0.979	15.47
1.2	0.507	167.5	3.891	67.9	0.130	61.6	0.092	-135.7	0.987	14.76
1.3	0.510	164.8	3.578	65.4	0.141	61.2	0.093	-142.2	0.989	14.03
1.4	0.514	162.2	3.339	63.2	0.151	60.2	0.091	-150.6	0.993	13.44
1.5	0.521	160.0	3.125	61.0	0.159	59.8	0.097	-157.2	0.999	12.94
1.6	0.527	157.0	2.931	58.4	0.171	58.4	0.102	-163.1	0.994	12.35
1.7	0.534	154.7	2.767	56.5	0.177	57.0	0.110	-168.7	1.002	11.67
1.8	0.545	152.2	2.633	53.7	0.184	56.7	0.115	-174.5	1.000	11.46
1.9	0.548	149.4	2.488	51.5	0.195	56.0	0.120	-179.7	1.002	10.79
2.0	0.560	147.7	2.358	49.3	0.205	54.3	0.129	176.7	0.996	10.61
2.1	0.565	145.5	2.233	47.1	0.210	53.3	0.139	171.2	1.009	9.69
2.2	0.571	143.9	2.132	45.1	0.221	52.6	0.149	169.6	1.004	9.45
2.3	0.575	142.3	2.034	42.9	0.229	51.4	0.156	165.1	1.009	8.91
2.4	0.586	140.8	1.960	41.0	0.237	50.5	0.167	162.2	1.002	8.87
2.5	0.594	139.3	1.892	39.1	0.246	49.5	0.174	158.6	0.997	8.86
2.6	0.595	137.6	1.809	37.3	0.252	48.6	0.183	156.7	1.008	8.00
2.7	0.610	135.7	1.743	35.2	0.258	47.4	0.192	153.6	1.002	8.02
2.8	0.609	134.4	1.678	33.5	0.265	46.5	0.198	152.8	1.009	7.42
2.9	0.610	132.5	1.627	31.3	0.276	46.0	0.210	150.2	1.008	7.15
3.0	0.620	130.6	1.588	29.4	0.283	44.7	0.218	149.4	0.999	7.50
4.0	0.689	118.1	1.231	13.3	0.343	34.7	0.334	135.3	0.972	5.55
5.0	0.733	106.8	0.996	0.9	0.403	22.3	0.412	124.5	0.946	3.93

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)

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