

DATA SHEET

NEC

NPN SILICON RF TRANSISTOR 2SC5603

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

FEATURES

- High-gain transistor for buffer amplifier : $|S_{21e}|^2 = 10.0$ dB TYP. @ $V_{CE} = 1$ V, $I_c = 5$ mA, $f = 2$ GHz
- $f_T = 25$ GHz "UHS0" (Ultra High Speed Process) technology adopted
- Flat-lead 3-pin thin-type ultra super minimold package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5603	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC5603-T1	3 kpcs/reel	• Pin 3 (collector) face the perforation side of the tape

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

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V _{CBO}	15	V
Collector to Emitter Voltage	V _{CEO}	6	V
Emitter to Base Voltage	V _{EBO}	2	V
Collector Current	I _c	35	mA
Total Power Dissipation	P _{tot} ^{Note}	200	mW
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

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

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.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I _{CBO}	V _{CB} = 5 V, I _E = 0 mA	–	–	200	nA
Emitter Cut-off Current	I _{EBO}	V _{BE} = 1 V, I _C = 0 mA	–	–	200	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 1 V, I _C = 5 mA	60	–	120	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz	12.0	13.5	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz	8.5	10.0	–	dB
Noise Figure	NF	V _{CE} = 1 V, I _C = 5 mA, f = 2 GHz, Z _S = Z _{opt}	–	1.3	2.5	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 1 V, I _E = 0 mA, f = 1 MHz	–	0.25	0.5	pF

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

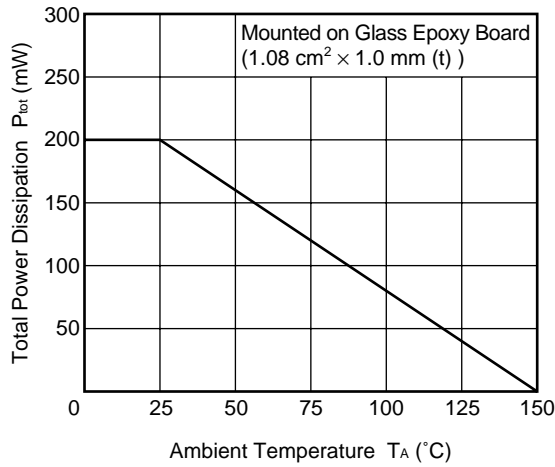
2. Collector to base capacitance measured using capacitance meter (self-balancing bridge method) when the emitter is connected to the guard pin

h_{FE} CLASSIFICATION

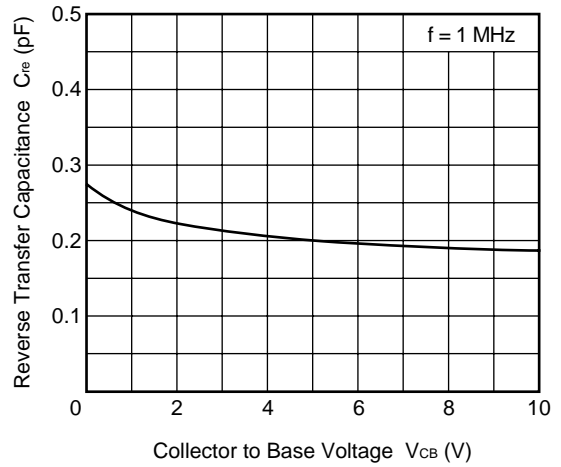
Rank	FB
Marking	TW
h _{FE} Value	60 to 120

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

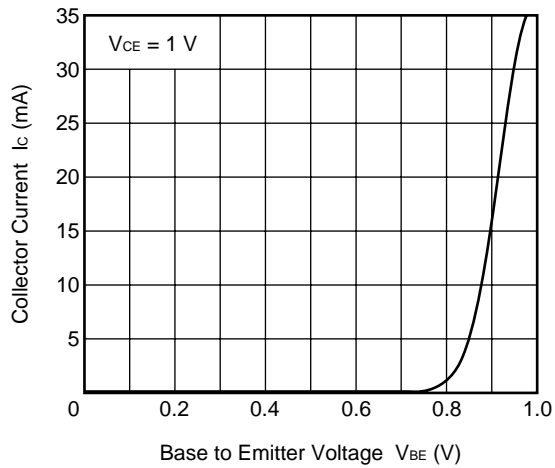
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



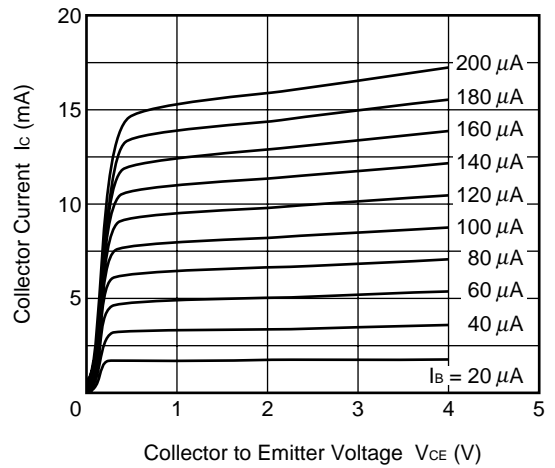
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



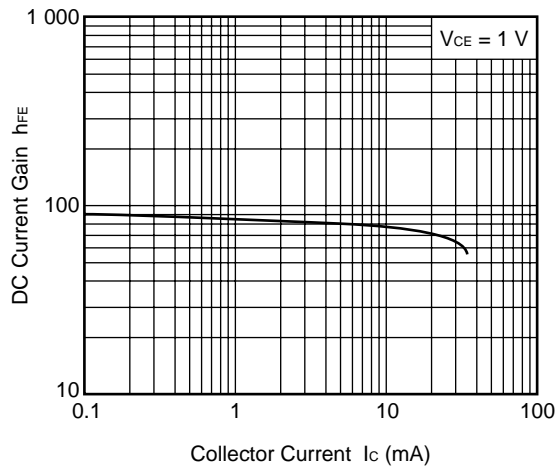
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



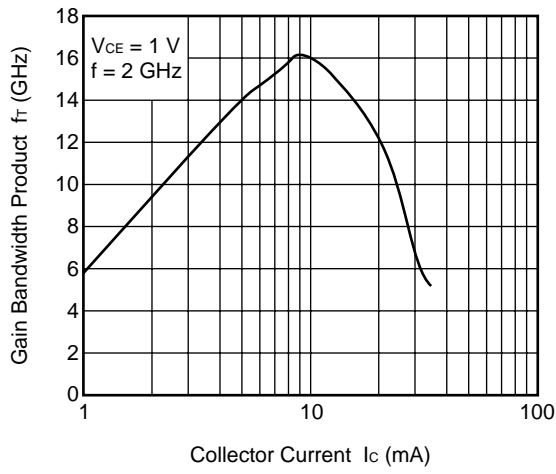
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



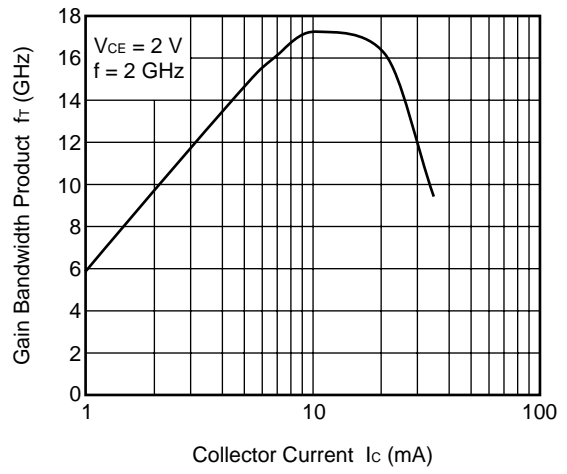
DC CURRENT GAIN vs. COLLECTOR CURRENT



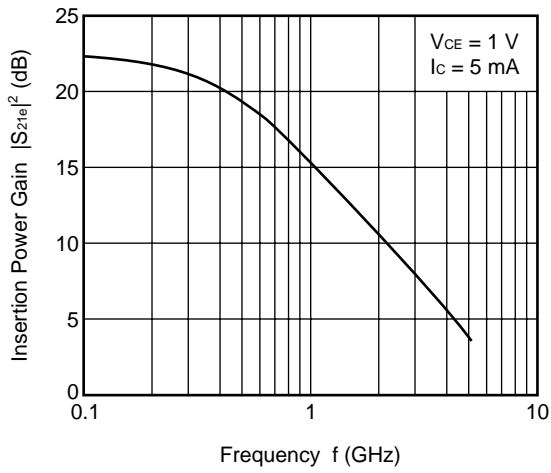
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



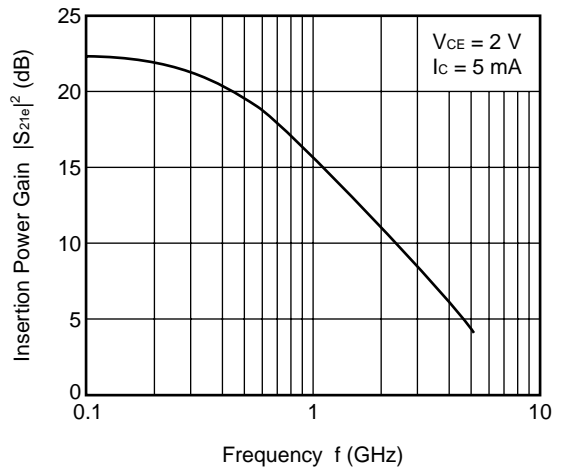
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



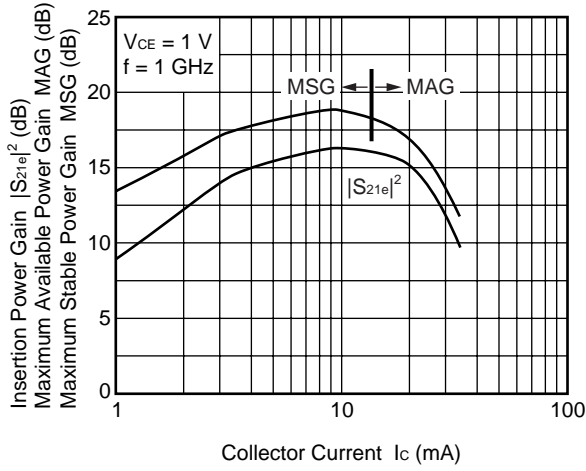
INSERTION POWER GAIN vs. FREQUENCY



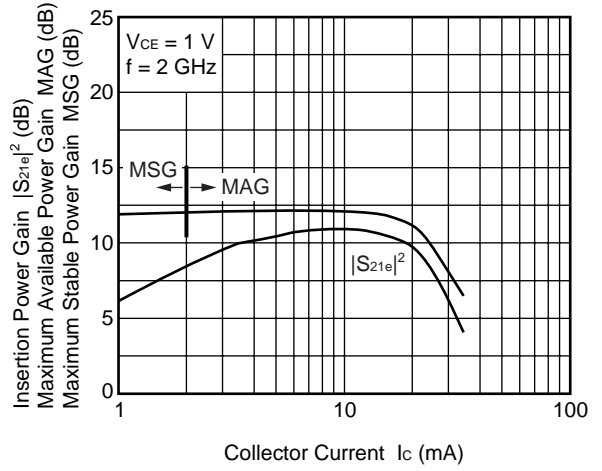
INSERTION POWER GAIN vs. FREQUENCY



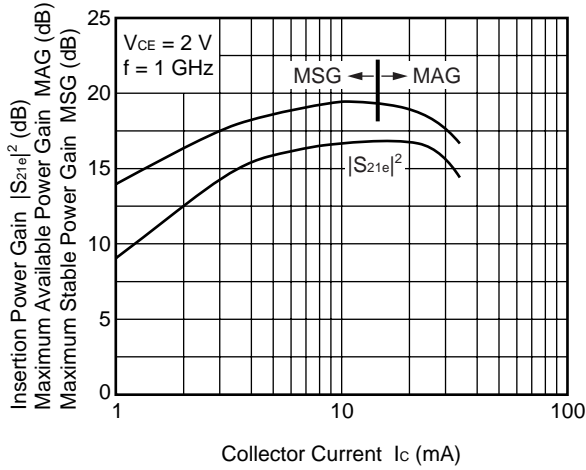
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



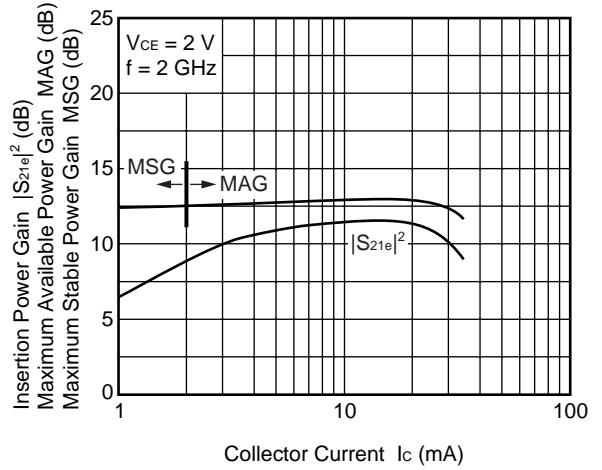
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



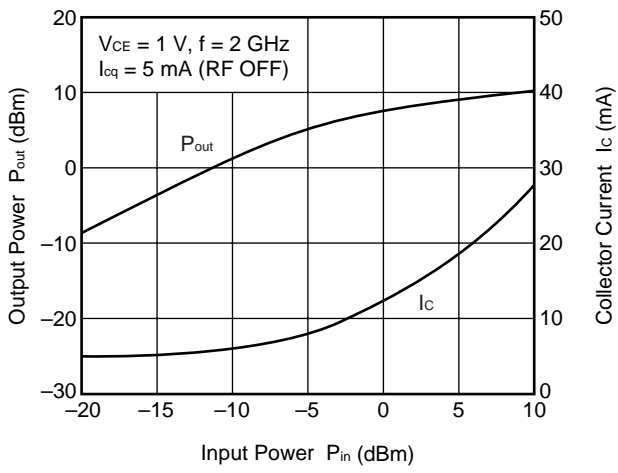
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



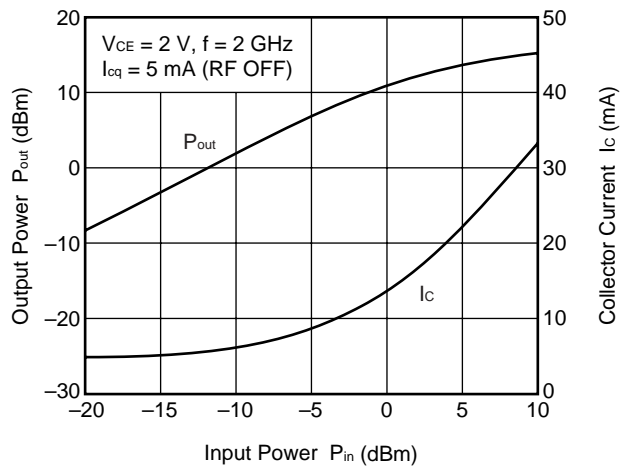
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



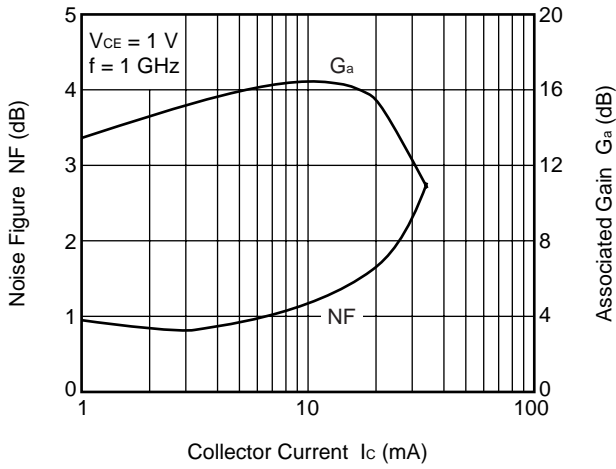
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



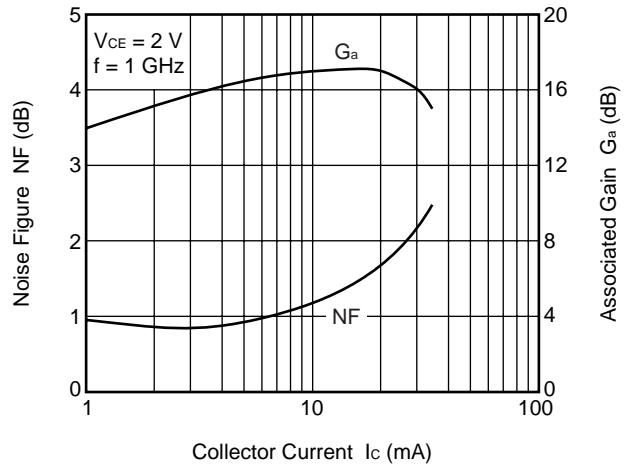
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



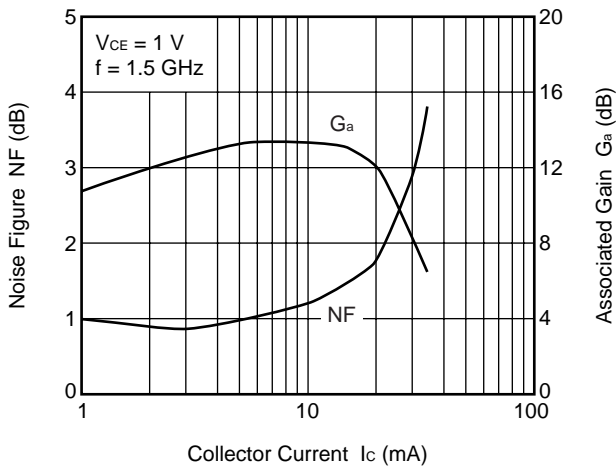
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



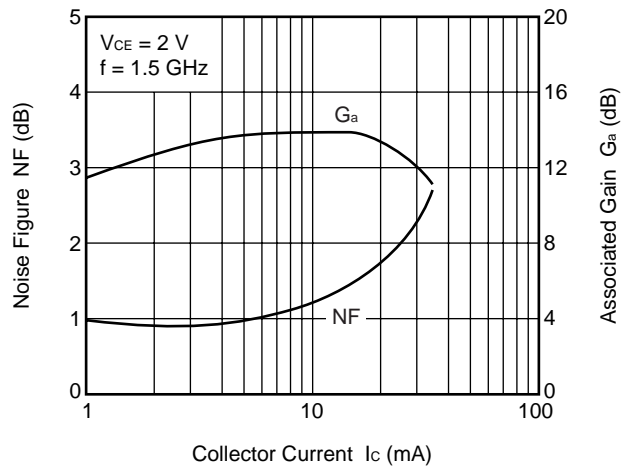
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



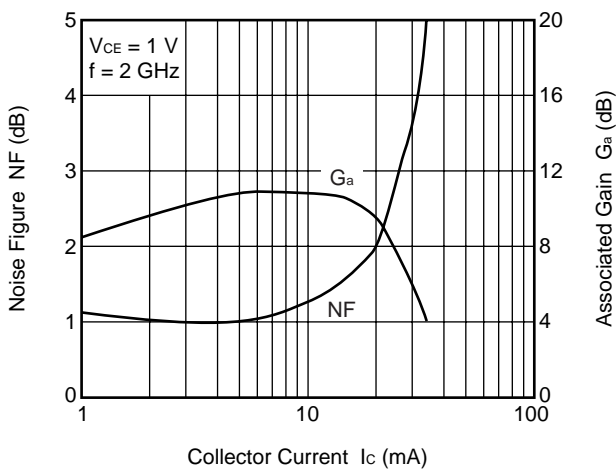
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



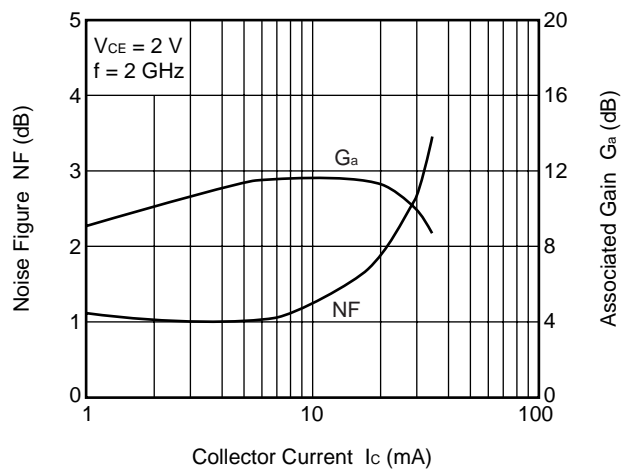
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



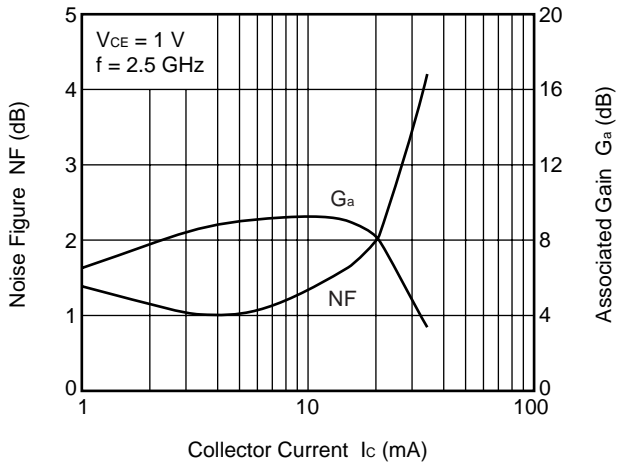
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



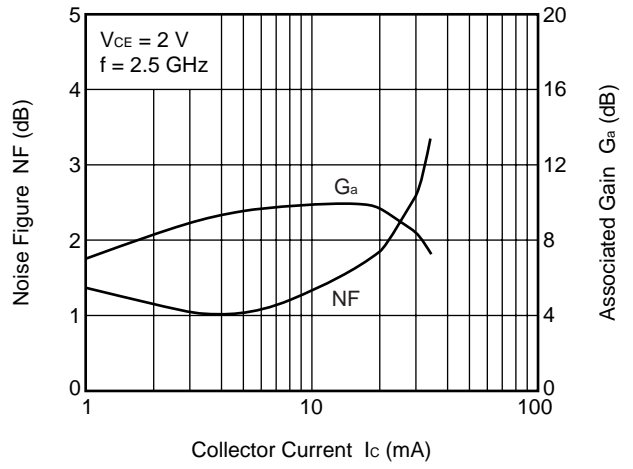
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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 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 ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG ^{Note} (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.947	-5.9	3.474	173.2	0.018	84.9	0.994	-5.0	0.057	22.85
0.2	0.944	-12.8	3.464	166.9	0.035	80.6	0.989	-10.0	0.065	20.01
0.3	0.933	-18.7	3.415	160.6	0.051	76.2	0.971	-14.4	0.110	18.24
0.4	0.909	-24.2	3.333	154.4	0.067	71.3	0.952	-19.4	0.159	16.99
0.5	0.890	-30.7	3.278	147.8	0.081	67.2	0.931	-23.9	0.191	16.09
0.6	0.859	-36.4	3.193	141.7	0.093	63.0	0.902	-28.5	0.235	15.36
0.7	0.831	-42.0	3.105	136.4	0.104	59.2	0.875	-32.8	0.268	14.75
0.8	0.795	-47.4	3.012	130.8	0.113	55.5	0.844	-37.0	0.318	14.26
0.9	0.766	-53.2	2.916	125.3	0.121	52.1	0.818	-41.1	0.352	13.83
1.0	0.733	-58.6	2.833	120.1	0.127	49.4	0.788	-45.1	0.393	13.49
1.1	0.707	-63.9	2.752	115.3	0.132	46.8	0.763	-48.7	0.426	13.20
1.2	0.678	-68.9	2.652	110.8	0.135	44.6	0.737	-52.2	0.466	12.93
1.3	0.651	-74.2	2.582	106.2	0.138	42.7	0.714	-55.7	0.504	12.73
1.4	0.627	-79.0	2.488	101.8	0.139	41.0	0.689	-59.3	0.551	12.53
1.5	0.601	-83.8	2.415	97.3	0.139	39.7	0.669	-62.6	0.599	12.38
1.6	0.578	-88.6	2.347	93.1	0.139	38.8	0.644	-65.9	0.657	12.29
1.7	0.553	-93.2	2.263	89.2	0.138	38.3	0.625	-69.2	0.716	12.16
1.8	0.533	-97.6	2.185	85.1	0.137	38.2	0.604	-72.4	0.782	12.04
1.9	0.523	-102.2	2.122	81.9	0.134	38.5	0.589	-75.7	0.828	11.98
2.0	0.501	-107.0	2.061	78.2	0.132	39.4	0.568	-79.1	0.909	11.92
2.1	0.497	-111.5	2.015	74.5	0.130	40.9	0.558	-82.9	0.943	11.90
2.2	0.480	-116.8	1.958	71.1	0.128	42.7	0.543	-86.6	1.014	11.11
2.3	0.479	-120.7	1.923	67.9	0.128	45.0	0.543	-89.9	1.020	10.91
2.4	0.473	-125.9	1.883	64.7	0.128	47.9	0.531	-93.7	1.052	10.27
2.5	0.467	-129.8	1.823	61.8	0.129	51.0	0.528	-96.8	1.084	9.73
2.6	0.472	-134.7	1.779	58.9	0.131	54.5	0.524	-101.2	1.084	9.56
2.7	0.464	-138.6	1.736	55.9	0.135	57.7	0.521	-104.3	1.097	9.19
2.8	0.473	-142.4	1.697	53.4	0.140	61.0	0.525	-107.9	1.052	9.43
2.9	0.465	-145.9	1.659	51.3	0.147	63.8	0.516	-110.7	1.063	8.98
3.0	0.465	-149.7	1.599	49.3	0.155	66.9	0.510	-114.2	1.071	8.51
4.0	0.531	178.4	1.234	26.7	0.297	70.5	0.557	-153.8	0.772	6.19
5.0	0.604	151.0	0.917	11.0	0.435	55.8	0.637	173.4	0.755	3.24

$V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$, $Z_o = 50\ \Omega$

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	0.859	-10.1	8.996	169.5	0.017	83.5	0.982	-8.0	0.090	27.31
0.2	0.840	-20.4	8.728	159.3	0.032	76.4	0.955	-15.6	0.165	24.29
0.3	0.800	-29.7	8.296	150.3	0.046	72.2	0.906	-22.1	0.222	22.52
0.4	0.746	-37.8	7.774	141.8	0.059	67.4	0.855	-28.4	0.300	21.22
0.5	0.690	-46.2	7.278	133.8	0.068	63.5	0.801	-33.7	0.368	20.27
0.6	0.636	-53.3	6.762	126.7	0.077	60.4	0.743	-38.5	0.443	19.46
0.7	0.587	-59.9	6.299	121.1	0.084	58.1	0.693	-42.5	0.505	18.77
0.8	0.539	-66.0	5.839	115.2	0.089	56.5	0.645	-46.1	0.576	18.17
0.9	0.500	-71.8	5.436	110.2	0.094	55.3	0.607	-49.4	0.632	17.62
1.0	0.463	-77.5	5.099	105.4	0.098	54.7	0.568	-52.4	0.691	17.15
1.1	0.433	-82.9	4.791	101.3	0.102	54.5	0.539	-55.0	0.739	16.70
1.2	0.408	-88.0	4.492	97.5	0.106	54.8	0.509	-57.4	0.788	16.25
1.3	0.382	-93.4	4.244	93.7	0.110	54.9	0.487	-59.8	0.831	15.85
1.4	0.362	-97.6	4.024	90.1	0.114	55.4	0.463	-62.5	0.874	15.47
1.5	0.343	-102.6	3.826	86.6	0.118	56.0	0.445	-64.8	0.909	15.10
1.6	0.325	-107.4	3.644	83.4	0.122	56.6	0.426	-67.2	0.947	14.74
1.7	0.310	-112.3	3.468	80.4	0.127	57.6	0.411	-69.7	0.977	14.37
1.8	0.296	-116.4	3.313	77.4	0.131	58.2	0.394	-72.1	1.009	13.44
1.9	0.290	-121.0	3.165	75.0	0.136	58.9	0.383	-75.0	1.027	12.66
2.0	0.279	-126.8	3.047	72.2	0.141	59.8	0.366	-77.7	1.049	11.99
2.1	0.282	-131.1	2.942	69.4	0.146	60.7	0.361	-81.2	1.049	11.69
2.2	0.275	-137.4	2.836	66.9	0.152	61.4	0.350	-84.4	1.063	11.19
2.3	0.281	-140.6	2.753	64.3	0.158	62.0	0.350	-87.2	1.047	11.08
2.4	0.283	-145.9	2.675	61.8	0.165	62.7	0.341	-90.8	1.045	10.81
2.5	0.285	-149.5	2.583	59.5	0.172	63.3	0.338	-93.4	1.044	10.49
2.6	0.295	-153.7	2.510	57.5	0.179	63.9	0.334	-97.8	1.031	10.39
2.7	0.293	-157.3	2.438	55.2	0.186	64.3	0.332	-100.6	1.030	10.11
2.8	0.306	-160.4	2.378	53.0	0.194	64.7	0.336	-104.3	1.006	10.40
2.9	0.303	-163.4	2.315	51.1	0.203	64.9	0.329	-106.5	1.007	10.07
3.0	0.306	-165.8	2.245	49.6	0.210	65.3	0.324	-109.8	1.010	9.68
4.0	0.401	169.9	1.783	30.0	0.315	61.4	0.377	-148.8	0.871	7.53
5.0	0.502	148.1	1.385	12.4	0.419	51.1	0.488	179.8	0.805	5.19

$V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

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	0.806	-13.4	13.052	166.5	0.017	82.2	0.968	-10.1	0.130	28.96
0.2	0.751	-26.6	12.356	153.8	0.031	75.5	0.919	-19.4	0.214	26.02
0.3	0.687	-37.6	11.390	143.2	0.043	70.2	0.848	-26.8	0.316	24.27
0.4	0.621	-46.6	10.289	133.8	0.053	66.1	0.775	-33.3	0.416	22.89
0.5	0.556	-55.7	9.299	125.5	0.061	63.4	0.706	-38.2	0.501	21.82
0.6	0.496	-63.0	8.416	118.6	0.068	61.5	0.642	-42.4	0.589	20.93
0.7	0.449	-69.3	7.662	113.2	0.074	60.8	0.589	-45.6	0.657	20.14
0.8	0.404	-75.6	6.963	107.9	0.080	60.4	0.540	-48.4	0.728	19.41
0.9	0.369	-81.5	6.382	103.2	0.085	60.1	0.505	-50.7	0.784	18.76
1.0	0.337	-87.0	5.908	99.1	0.090	60.4	0.471	-53.1	0.835	18.16
1.1	0.317	-92.4	5.488	95.3	0.095	60.9	0.445	-55.1	0.873	17.60
1.2	0.297	-97.5	5.102	92.3	0.101	61.7	0.420	-56.8	0.909	17.04
1.3	0.281	-103.2	4.791	88.9	0.107	62.1	0.402	-58.7	0.935	16.53
1.4	0.266	-107.6	4.507	85.8	0.112	62.7	0.384	-60.9	0.962	16.04
1.5	0.250	-113.1	4.266	82.8	0.118	63.2	0.369	-62.8	0.983	15.58
1.6	0.240	-118.2	4.043	79.9	0.124	63.8	0.353	-64.9	1.002	14.85
1.7	0.230	-123.5	3.834	77.3	0.130	64.2	0.340	-67.2	1.018	13.86
1.8	0.221	-128.4	3.654	74.6	0.137	64.5	0.325	-69.4	1.034	13.14
1.9	0.220	-132.4	3.483	72.5	0.144	64.8	0.317	-72.4	1.039	12.63
2.0	0.215	-139.4	3.346	69.9	0.150	65.0	0.302	-75.0	1.050	12.11
2.1	0.220	-142.8	3.220	67.5	0.157	65.4	0.299	-78.6	1.045	11.83
2.2	0.219	-150.1	3.095	65.2	0.164	65.5	0.290	-81.8	1.050	11.39
2.3	0.227	-152.6	2.999	62.9	0.172	65.5	0.291	-84.6	1.035	11.28
2.4	0.236	-157.9	2.907	60.6	0.179	65.6	0.283	-88.3	1.029	11.06
2.5	0.239	-160.8	2.809	58.7	0.187	65.6	0.280	-90.8	1.026	10.79
2.6	0.252	-164.8	2.725	56.8	0.195	65.7	0.276	-95.6	1.016	10.69
2.7	0.251	-168.5	2.641	54.6	0.203	65.5	0.275	-98.4	1.014	10.41
2.8	0.265	-170.5	2.571	52.7	0.211	65.4	0.278	-102.5	0.999	10.86
2.9	0.265	-173.5	2.502	50.7	0.220	65.1	0.273	-104.4	0.997	10.56
3.0	0.269	-175.5	2.431	49.4	0.228	65.1	0.267	-107.7	0.997	10.28
4.0	0.371	164.5	1.939	31.3	0.326	59.1	0.317	-148.5	0.899	7.75
5.0	0.472	145.2	1.535	14.5	0.419	49.1	0.433	-179.4	0.840	5.64

$V_{CE} = 1\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

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	0.732	-16.4	16.182	164.1	0.015	83.6	0.954	-11.8	0.135	30.24
0.2	0.677	-31.1	14.961	149.7	0.029	73.7	0.888	-22.2	0.280	27.09
0.3	0.604	-43.1	13.358	138.1	0.040	69.6	0.800	-29.9	0.392	25.22
0.4	0.530	-52.7	11.776	128.5	0.049	66.2	0.716	-36.1	0.504	23.78
0.5	0.466	-61.8	10.411	120.2	0.057	64.6	0.642	-40.5	0.597	22.64
0.6	0.409	-69.5	9.262	113.7	0.063	63.7	0.577	-44.0	0.683	21.66
0.7	0.366	-76.1	8.316	108.5	0.070	63.4	0.526	-46.4	0.752	20.78
0.8	0.325	-82.4	7.489	103.6	0.075	63.7	0.483	-48.6	0.816	19.98
0.9	0.297	-88.4	6.817	99.4	0.081	63.9	0.450	-50.4	0.863	19.24
1.0	0.271	-94.3	6.270	95.5	0.087	64.5	0.419	-52.4	0.904	18.56
1.1	0.255	-99.7	5.806	92.1	0.093	65.0	0.397	-53.8	0.932	17.94
1.2	0.240	-105.2	5.377	89.3	0.100	65.6	0.375	-55.4	0.959	17.32
1.3	0.228	-111.0	5.027	86.2	0.106	66.1	0.360	-57.1	0.976	16.75
1.4	0.217	-115.9	4.716	83.4	0.113	66.4	0.345	-59.0	0.995	16.22
1.5	0.206	-121.2	4.444	80.5	0.119	66.8	0.332	-60.8	1.009	15.13
1.6	0.199	-126.6	4.214	78.0	0.126	67.0	0.318	-62.8	1.020	14.37
1.7	0.193	-132.5	3.988	75.6	0.134	67.2	0.307	-65.0	1.028	13.72
1.8	0.188	-137.8	3.800	73.0	0.141	67.3	0.294	-67.2	1.037	13.13
1.9	0.189	-141.4	3.617	71.0	0.148	67.3	0.286	-70.3	1.041	12.64
2.0	0.187	-149.3	3.468	68.7	0.156	67.4	0.273	-72.8	1.047	12.16
2.1	0.194	-151.8	3.333	66.4	0.163	67.4	0.271	-76.6	1.041	11.87
2.2	0.199	-159.5	3.205	64.3	0.170	67.3	0.262	-79.8	1.042	11.50
2.3	0.209	-161.1	3.102	62.1	0.179	67.0	0.264	-82.7	1.026	11.41
2.4	0.221	-165.9	3.005	59.9	0.187	66.9	0.256	-86.6	1.019	11.21
2.5	0.222	-168.9	2.900	58.0	0.195	66.6	0.253	-89.1	1.019	10.90
2.6	0.237	-172.3	2.810	56.3	0.203	66.4	0.249	-94.3	1.011	10.79
2.7	0.241	-175.5	2.722	54.2	0.211	66.1	0.248	-97.2	1.006	10.63
2.8	0.255	-177.0	2.652	52.3	0.219	65.7	0.251	-101.4	0.993	10.82
2.9	0.254	-179.5	2.585	50.5	0.229	65.2	0.246	-103.5	0.990	10.53
3.0	0.257	178.3	2.509	49.1	0.237	65.0	0.241	-106.8	0.993	10.26
4.0	0.361	161.0	2.003	31.9	0.332	58.1	0.291	-148.8	0.909	7.80
5.0	0.465	143.1	1.595	15.3	0.421	48.1	0.407	-179.7	0.855	5.79

$V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$, $Z_0 = 50\ \Omega$

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	0.645	-20.6	19.601	161.4	0.015	80.0	0.937	-13.7	0.208	31.04
0.2	0.592	-36.7	17.495	145.0	0.028	73.0	0.848	-25.1	0.345	28.02
0.3	0.508	-50.3	15.128	132.8	0.037	69.8	0.744	-32.7	0.475	26.06
0.4	0.434	-60.4	12.979	123.1	0.046	67.2	0.651	-38.3	0.598	24.53
0.5	0.373	-70.3	11.229	115.3	0.053	66.4	0.579	-41.8	0.691	23.26
0.6	0.324	-77.6	9.861	109.1	0.059	66.4	0.517	-44.4	0.776	22.21
0.7	0.289	-84.9	8.741	104.3	0.066	66.4	0.471	-46.1	0.835	21.22
0.8	0.256	-91.6	7.824	99.6	0.072	67.2	0.432	-47.7	0.889	20.34
0.9	0.233	-97.7	7.087	95.9	0.079	67.6	0.404	-49.0	0.927	19.54
1.0	0.216	-104.6	6.482	92.3	0.085	68.2	0.377	-50.5	0.957	18.80
1.1	0.205	-110.3	5.980	89.3	0.092	68.5	0.359	-51.7	0.976	18.12
1.2	0.196	-116.0	5.524	86.6	0.099	69.1	0.340	-53.1	0.994	17.45
1.3	0.188	-122.6	5.154	83.9	0.107	69.4	0.328	-54.6	1.005	16.42
1.4	0.182	-127.2	4.827	81.1	0.114	69.6	0.314	-56.5	1.016	15.50
1.5	0.176	-133.6	4.555	78.5	0.121	69.8	0.304	-58.2	1.022	14.84
1.6	0.174	-139.1	4.302	76.0	0.129	69.8	0.292	-60.2	1.029	14.20
1.7	0.173	-145.1	4.071	73.7	0.136	69.8	0.282	-62.4	1.033	13.63
1.8	0.169	-150.4	3.869	71.4	0.144	69.5	0.270	-64.7	1.040	13.06
1.9	0.174	-154.1	3.681	69.5	0.152	69.4	0.264	-67.8	1.041	12.61
2.0	0.176	-161.2	3.533	67.3	0.160	69.3	0.251	-70.4	1.042	12.19
2.1	0.185	-163.1	3.391	65.1	0.168	69.1	0.250	-74.4	1.035	11.91
2.2	0.195	-169.5	3.255	62.9	0.175	68.7	0.242	-77.7	1.034	11.55
2.3	0.203	-170.8	3.151	61.0	0.184	68.3	0.245	-80.8	1.020	11.46
2.4	0.215	-174.8	3.048	58.8	0.193	68.0	0.237	-84.8	1.014	11.26
2.5	0.222	-176.8	2.941	57.0	0.201	67.6	0.235	-87.5	1.010	11.05
2.6	0.238	-179.5	2.852	55.4	0.210	67.2	0.230	-92.9	1.001	11.14
2.7	0.240	177.1	2.761	53.4	0.218	66.7	0.229	-95.9	0.999	11.02
2.8	0.255	176.1	2.688	51.6	0.227	66.2	0.233	-100.5	0.986	10.74
2.9	0.255	173.7	2.616	49.7	0.236	65.5	0.229	-102.5	0.984	10.45
3.0	0.260	172.2	2.541	48.5	0.244	65.3	0.223	-105.9	0.985	10.17
4.0	0.366	156.9	2.036	31.7	0.340	57.5	0.275	-149.5	0.911	7.78
5.0	0.470	140.6	1.622	15.7	0.425	47.3	0.392	179.7	0.864	5.82

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

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	0.485	-34.7	23.640	154.0	0.015	77.4	0.857	-18.3	0.357	31.85
0.2	0.409	-61.8	19.383	134.2	0.027	70.2	0.722	-30.6	0.510	28.60
0.3	0.340	-81.4	15.540	121.4	0.034	67.2	0.602	-36.8	0.672	26.54
0.4	0.292	-96.3	12.708	112.1	0.042	68.0	0.515	-40.2	0.785	24.78
0.5	0.263	-109.8	10.633	105.2	0.049	68.5	0.456	-41.7	0.871	23.37
0.6	0.242	-121.1	9.132	99.8	0.056	69.6	0.410	-42.7	0.934	22.13
0.7	0.230	-130.1	8.006	95.8	0.063	70.3	0.378	-43.2	0.974	21.03
0.8	0.223	-139.3	7.081	91.6	0.070	71.3	0.352	-44.0	1.010	19.43
0.9	0.222	-145.5	6.369	88.3	0.078	71.9	0.334	-44.9	1.029	18.10
1.0	0.220	-152.2	5.795	85.2	0.085	72.3	0.316	-46.3	1.045	17.03
1.1	0.224	-157.2	5.327	82.3	0.093	72.9	0.305	-47.4	1.050	16.22
1.2	0.227	-161.2	4.897	79.9	0.101	73.1	0.292	-48.9	1.059	15.38
1.3	0.231	-165.9	4.567	77.1	0.109	73.4	0.285	-50.8	1.059	14.75
1.4	0.234	-169.5	4.270	74.7	0.117	73.3	0.276	-53.0	1.059	14.13
1.5	0.238	-173.5	4.012	72.1	0.125	73.3	0.270	-55.2	1.058	13.58
1.6	0.243	-177.1	3.788	69.7	0.134	73.2	0.261	-57.6	1.058	13.05
1.7	0.248	179.8	3.573	67.5	0.142	72.9	0.255	-60.3	1.058	12.53
1.8	0.253	176.2	3.397	65.3	0.151	72.6	0.245	-63.0	1.058	12.05
1.9	0.261	174.8	3.224	63.5	0.159	72.2	0.241	-66.9	1.055	11.62
2.0	0.270	170.8	3.085	61.3	0.168	71.8	0.231	-70.0	1.051	11.24
2.1	0.279	170.3	2.959	59.1	0.177	71.5	0.232	-74.8	1.040	10.99
2.2	0.294	166.2	2.840	56.8	0.186	70.9	0.225	-78.8	1.035	10.70
2.3	0.302	165.9	2.747	54.8	0.196	70.3	0.230	-82.6	1.018	10.66
2.4	0.319	164.2	2.655	52.5	0.205	69.7	0.225	-87.4	1.006	10.66
2.5	0.325	162.6	2.563	50.8	0.215	69.2	0.224	-90.6	0.999	10.77
2.6	0.341	161.1	2.480	49.0	0.224	68.6	0.222	-96.7	0.990	10.45
2.7	0.345	159.1	2.400	46.9	0.233	68.0	0.223	-100.4	0.985	10.12
2.8	0.362	158.5	2.332	45.0	0.243	67.2	0.229	-105.5	0.968	9.83
2.9	0.363	156.7	2.277	42.9	0.253	66.4	0.228	-108.3	0.962	9.54
3.0	0.367	155.5	2.215	41.9	0.262	66.0	0.225	-112.0	0.962	9.27
4.0	0.474	143.7	1.756	25.4	0.364	56.4	0.299	-156.6	0.883	6.83
5.0	0.564	129.7	1.366	9.9	0.450	44.8	0.426	173.3	0.850	4.82

$V_{CE} = 2\text{ V}$, $I_C = 1\text{ mA}$, $Z_0 = 50\ \Omega$

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	0.966	-6.1	3.457	173.3	0.015	83.5	0.995	-4.7	0.072	23.62
0.2	0.949	-11.9	3.449	167.4	0.031	81.4	0.991	-9.4	0.060	20.47
0.3	0.935	-17.6	3.406	161.4	0.046	76.8	0.973	-13.6	0.108	18.72
0.4	0.916	-23.0	3.336	155.3	0.060	72.1	0.957	-18.2	0.156	17.46
0.5	0.897	-29.1	3.282	148.9	0.073	68.3	0.938	-22.5	0.186	16.54
0.6	0.868	-34.6	3.208	143.0	0.084	64.2	0.911	-27.0	0.229	15.82
0.7	0.839	-39.9	3.123	137.8	0.094	60.5	0.885	-30.9	0.268	15.20
0.8	0.810	-45.3	3.033	132.3	0.102	57.1	0.856	-35.0	0.307	14.72
0.9	0.778	-50.8	2.944	127.0	0.110	54.0	0.832	-38.8	0.343	14.29
1.0	0.746	-55.8	2.866	121.8	0.115	51.1	0.803	-42.7	0.388	13.97
1.1	0.719	-61.0	2.787	117.1	0.119	48.7	0.781	-46.1	0.420	13.68
1.2	0.691	-66.1	2.693	112.7	0.123	46.7	0.754	-49.6	0.461	13.41
1.3	0.663	-70.9	2.626	108.2	0.125	44.8	0.733	-52.8	0.502	13.23
1.4	0.640	-75.5	2.536	103.9	0.126	43.3	0.708	-56.2	0.551	13.04
1.5	0.616	-80.3	2.467	99.2	0.126	42.2	0.688	-59.5	0.598	12.91
1.6	0.589	-85.0	2.399	95.1	0.125	41.6	0.665	-62.6	0.658	12.82
1.7	0.566	-89.3	2.320	91.3	0.125	41.5	0.646	-65.7	0.718	12.70
1.8	0.544	-93.6	2.243	87.2	0.123	41.6	0.626	-68.9	0.789	12.60
1.9	0.534	-98.0	2.177	83.9	0.121	42.3	0.610	-72.1	0.838	12.54
2.0	0.509	-102.9	2.122	80.2	0.120	43.6	0.589	-75.2	0.921	12.49
2.1	0.505	-107.1	2.076	76.6	0.118	45.5	0.580	-79.0	0.953	12.47
2.2	0.488	-112.6	2.017	73.1	0.116	47.9	0.565	-82.4	1.023	11.46
2.3	0.486	-116.3	1.985	70.0	0.117	50.7	0.565	-85.7	1.020	11.43
2.4	0.478	-121.5	1.943	66.9	0.118	54.3	0.553	-89.1	1.053	10.76
2.5	0.472	-125.4	1.883	63.9	0.120	57.7	0.549	-92.3	1.075	10.29
2.6	0.474	-130.2	1.839	60.8	0.123	61.6	0.546	-96.5	1.062	10.22
2.7	0.466	-134.0	1.794	57.9	0.128	64.9	0.541	-99.6	1.066	9.89
2.8	0.474	-137.9	1.757	55.3	0.135	68.3	0.546	-103.1	1.010	10.53
2.9	0.465	-141.6	1.713	53.1	0.143	71.1	0.535	-105.8	1.020	9.90
3.0	0.465	-145.3	1.652	51.0	0.152	73.9	0.528	-109.4	1.019	9.50
4.0	0.526	-178.3	1.282	28.0	0.304	74.7	0.571	-149.4	0.719	6.25
5.0	0.603	153.3	0.955	11.5	0.449	58.3	0.646	176.9	0.713	3.28

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

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	0.862	-9.9	8.988	170.0	0.015	84.3	0.984	-7.3	0.076	27.73
0.2	0.845	-19.4	8.745	160.1	0.029	78.1	0.961	-14.3	0.144	24.77
0.3	0.807	-27.7	8.341	151.4	0.041	73.0	0.916	-20.3	0.224	23.04
0.4	0.758	-35.4	7.844	143.2	0.053	68.7	0.868	-26.2	0.294	21.69
0.5	0.707	-43.3	7.354	135.4	0.062	64.8	0.818	-31.0	0.364	20.73
0.6	0.652	-49.8	6.887	128.5	0.070	62.1	0.764	-35.5	0.438	19.95
0.7	0.604	-56.0	6.422	122.6	0.076	59.8	0.717	-39.3	0.502	19.26
0.8	0.555	-61.9	5.978	117.0	0.081	58.3	0.671	-42.7	0.570	18.66
0.9	0.516	-67.3	5.577	111.9	0.086	57.2	0.633	-45.6	0.630	18.11
1.0	0.476	-72.5	5.243	107.2	0.090	56.8	0.596	-48.5	0.690	17.64
1.1	0.447	-77.4	4.937	103.0	0.094	56.6	0.568	-50.8	0.738	17.21
1.2	0.421	-82.0	4.634	99.3	0.098	57.0	0.539	-53.2	0.787	16.75
1.3	0.394	-87.0	4.401	95.5	0.101	57.4	0.517	-55.4	0.828	16.37
1.4	0.374	-91.1	4.152	92.1	0.105	57.9	0.494	-57.7	0.873	15.96
1.5	0.354	-95.6	3.965	88.5	0.109	58.7	0.477	-59.8	0.907	15.61
1.6	0.333	-99.9	3.781	85.2	0.113	59.6	0.458	-62.0	0.945	15.25
1.7	0.316	-104.4	3.600	82.2	0.117	60.6	0.442	-64.3	0.976	14.87
1.8	0.299	-108.8	3.443	79.2	0.122	61.5	0.426	-66.5	1.006	14.04
1.9	0.292	-112.9	3.294	76.7	0.126	62.4	0.414	-69.1	1.025	13.20
2.0	0.279	-118.3	3.172	73.8	0.131	63.4	0.397	-71.5	1.046	12.51
2.1	0.279	-122.4	3.065	71.1	0.136	64.5	0.393	-74.8	1.044	12.23
2.2	0.270	-128.7	2.958	68.6	0.142	65.4	0.381	-77.6	1.055	11.74
2.3	0.275	-131.9	2.877	66.0	0.149	66.1	0.382	-80.2	1.035	11.72
2.4	0.276	-137.5	2.795	63.6	0.156	66.9	0.372	-83.5	1.030	11.48
2.5	0.274	-140.9	2.704	61.3	0.163	67.7	0.369	-85.9	1.027	11.20
2.6	0.284	-145.6	2.626	59.3	0.170	68.4	0.364	-90.0	1.014	11.17
2.7	0.279	-149.2	2.553	56.9	0.178	68.8	0.362	-92.5	1.009	11.00
2.8	0.293	-152.5	2.489	54.8	0.186	69.2	0.365	-96.0	0.983	11.27
2.9	0.288	-155.4	2.422	52.9	0.195	69.4	0.358	-98.0	0.985	10.95
3.0	0.291	-158.4	2.349	51.2	0.203	70.0	0.351	-101.2	0.986	10.64
4.0	0.385	175.5	1.873	31.3	0.313	65.7	0.395	-140.4	0.834	7.76
5.0	0.491	152.2	1.459	12.8	0.426	54.3	0.502	-174.0	0.763	5.35

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

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	0.800	-11.4	13.112	166.9	0.014	82.9	0.974	-9.3	0.138	29.72
0.2	0.761	-24.4	12.461	154.8	0.027	76.1	0.930	-17.7	0.217	26.58
0.3	0.703	-34.5	11.503	144.7	0.039	71.1	0.864	-24.5	0.316	24.72
0.4	0.638	-43.0	10.459	135.4	0.048	67.7	0.796	-30.4	0.410	23.37
0.5	0.574	-51.2	9.514	127.2	0.056	65.1	0.731	-34.9	0.498	22.33
0.6	0.514	-57.9	8.646	120.3	0.062	63.5	0.670	-38.8	0.584	21.44
0.7	0.465	-64.0	7.888	114.8	0.068	62.6	0.620	-41.6	0.653	20.64
0.8	0.420	-69.2	7.191	109.5	0.073	62.2	0.573	-44.2	0.726	19.92
0.9	0.384	-74.8	6.607	104.9	0.078	62.1	0.538	-46.4	0.779	19.27
1.0	0.351	-79.7	6.131	100.7	0.083	62.6	0.505	-48.4	0.832	18.68
1.1	0.328	-84.8	5.705	97.0	0.088	63.2	0.480	-50.1	0.870	18.12
1.2	0.306	-89.3	5.307	93.9	0.093	63.9	0.455	-51.8	0.907	17.55
1.3	0.286	-94.0	4.994	90.6	0.098	64.5	0.437	-53.4	0.935	17.06
1.4	0.268	-97.9	4.700	87.6	0.104	65.2	0.419	-55.2	0.962	16.56
1.5	0.253	-102.1	4.447	84.4	0.110	65.8	0.406	-56.9	0.981	16.08
1.6	0.240	-107.3	4.223	81.6	0.115	66.4	0.390	-58.8	0.999	15.64
1.7	0.228	-112.3	4.004	79.0	0.121	67.1	0.378	-60.8	1.014	14.46
1.8	0.215	-117.0	3.821	76.3	0.128	67.5	0.363	-62.8	1.030	13.70
1.9	0.214	-120.4	3.643	74.3	0.134	68.0	0.354	-65.4	1.035	13.19
2.0	0.203	-127.8	3.500	71.6	0.141	68.3	0.339	-67.5	1.045	12.66
2.1	0.208	-130.9	3.377	69.3	0.147	68.7	0.336	-70.8	1.036	12.44
2.2	0.206	-138.8	3.249	67.0	0.154	69.0	0.326	-73.5	1.040	12.02
2.3	0.211	-141.8	3.151	64.8	0.162	69.0	0.328	-76.2	1.023	11.96
2.4	0.216	-147.3	3.054	62.5	0.170	69.2	0.319	-79.4	1.017	11.76
2.5	0.219	-150.1	2.953	60.5	0.177	69.4	0.316	-81.7	1.012	11.55
2.6	0.232	-155.0	2.866	58.6	0.185	69.5	0.311	-86.0	1.000	11.89
2.7	0.230	-158.6	2.781	56.4	0.194	69.4	0.308	-88.6	0.996	11.57
2.8	0.244	-161.1	2.710	54.5	0.202	69.3	0.310	-92.3	0.979	11.28
2.9	0.242	-164.5	2.634	52.6	0.210	69.0	0.304	-94.1	0.979	10.98
3.0	0.247	-166.5	2.556	51.1	0.219	69.0	0.297	-97.3	0.978	10.68
4.0	0.347	170.9	2.055	32.7	0.321	63.1	0.336	-137.6	0.867	8.06
5.0	0.458	150.0	1.632	15.1	0.422	52.7	0.446	-171.2	0.800	5.87

$V_{CE} = 2\text{ V}$, $I_C = 7\text{ mA}$, $Z_0 = 50\ \Omega$

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	0.734	-14.1	16.263	164.7	0.013	82.2	0.963	-10.7	0.165	30.81
0.2	0.691	-28.5	15.110	151.0	0.026	74.7	0.903	-20.1	0.274	27.62
0.3	0.620	-39.2	13.572	139.7	0.036	71.1	0.822	-27.0	0.387	25.75
0.4	0.548	-48.0	12.059	130.2	0.045	68.2	0.743	-32.8	0.496	24.29
0.5	0.482	-56.6	10.729	122.0	0.052	66.4	0.673	-36.7	0.590	23.18
0.6	0.426	-62.9	9.574	115.4	0.058	65.4	0.611	-39.9	0.678	22.17
0.7	0.381	-68.9	8.615	110.2	0.064	65.3	0.562	-42.0	0.747	21.31
0.8	0.338	-74.2	7.795	105.2	0.069	65.5	0.518	-44.0	0.813	20.51
0.9	0.310	-79.4	7.106	101.0	0.075	65.6	0.487	-45.6	0.859	19.78
1.0	0.280	-84.4	6.538	97.1	0.080	66.4	0.458	-47.1	0.901	19.10
1.1	0.260	-89.2	6.059	93.8	0.086	67.2	0.436	-48.4	0.930	18.48
1.2	0.245	-93.7	5.614	90.9	0.092	67.9	0.414	-49.7	0.958	17.85
1.3	0.230	-98.8	5.272	87.8	0.098	68.4	0.400	-51.2	0.972	17.30
1.4	0.215	-102.9	4.940	85.0	0.105	68.9	0.385	-52.8	0.992	16.74
1.5	0.203	-108.1	4.670	82.1	0.111	69.4	0.373	-54.4	1.002	15.94
1.6	0.193	-113.2	4.426	79.5	0.118	69.8	0.359	-56.1	1.014	15.04
1.7	0.185	-118.3	4.186	77.1	0.124	70.1	0.349	-58.0	1.023	14.34
1.8	0.176	-123.7	3.993	74.7	0.131	70.2	0.335	-59.9	1.032	13.73
1.9	0.175	-127.4	3.805	72.8	0.138	70.4	0.327	-62.5	1.034	13.26
2.0	0.170	-134.7	3.652	70.5	0.146	70.4	0.314	-64.6	1.038	12.79
2.1	0.176	-138.0	3.514	68.2	0.152	70.7	0.312	-68.0	1.031	12.54
2.2	0.177	-146.4	3.378	66.1	0.160	70.6	0.302	-70.7	1.032	12.16
2.3	0.186	-148.8	3.279	63.9	0.168	70.4	0.304	-73.4	1.013	12.19
2.4	0.193	-154.3	3.173	61.8	0.177	70.3	0.296	-76.6	1.007	12.04
2.5	0.197	-157.0	3.066	59.9	0.185	70.3	0.293	-79.0	1.002	11.94
2.6	0.210	-161.5	2.973	58.2	0.193	70.1	0.287	-83.4	0.993	11.88
2.7	0.211	-165.4	2.883	56.1	0.201	69.7	0.285	-86.0	0.990	11.56
2.8	0.226	-167.0	2.809	54.3	0.209	69.5	0.287	-89.9	0.974	11.28
2.9	0.222	-170.0	2.731	52.5	0.218	69.0	0.281	-91.6	0.975	10.98
3.0	0.227	-172.1	2.651	51.1	0.227	68.8	0.274	-94.8	0.975	10.68
4.0	0.333	167.9	2.133	33.5	0.326	62.1	0.309	-136.2	0.880	8.15
5.0	0.445	148.5	1.707	16.3	0.422	51.8	0.418	-170.4	0.819	6.06

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

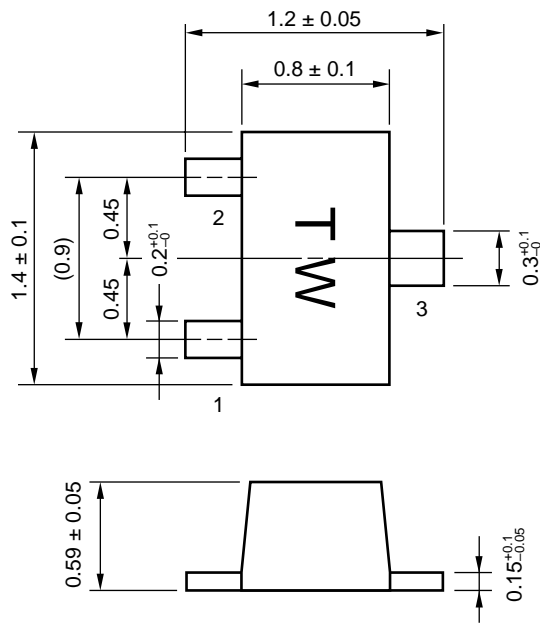
Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.663	-18.0	19.742	162.2	0.013	80.7	0.949	-12.2	0.203	31.69
0.2	0.608	-33.1	17.798	146.6	0.025	74.7	0.869	-22.4	0.333	28.59
0.3	0.529	-44.5	15.556	134.7	0.034	71.2	0.773	-29.3	0.470	26.61
0.4	0.456	-53.3	13.439	125.0	0.042	68.8	0.687	-34.4	0.590	25.08
0.5	0.393	-61.7	11.696	117.2	0.048	68.2	0.615	-37.5	0.686	23.82
0.6	0.342	-68.6	10.304	110.9	0.054	68.1	0.557	-39.9	0.767	22.79
0.7	0.303	-74.2	9.195	106.1	0.061	68.6	0.512	-41.3	0.826	21.82
0.8	0.267	-79.5	8.229	101.6	0.066	69.2	0.474	-42.7	0.883	20.93
0.9	0.243	-84.9	7.456	97.6	0.072	69.5	0.446	-43.8	0.921	20.13
1.0	0.218	-89.8	6.833	94.2	0.079	70.1	0.421	-45.0	0.953	19.39
1.1	0.206	-94.9	6.310	91.0	0.085	70.8	0.403	-45.9	0.971	18.70
1.2	0.195	-99.0	5.837	88.5	0.092	71.3	0.385	-47.1	0.989	18.04
1.3	0.183	-105.0	5.459	85.6	0.099	71.8	0.374	-48.4	0.997	17.43
1.4	0.174	-109.5	5.108	83.0	0.106	72.0	0.360	-50.0	1.008	16.30
1.5	0.165	-115.1	4.812	80.4	0.113	72.3	0.351	-51.4	1.015	15.57
1.6	0.157	-120.7	4.560	77.9	0.120	72.4	0.339	-53.1	1.021	14.93
1.7	0.152	-126.4	4.309	75.6	0.127	72.4	0.330	-55.0	1.026	14.32
1.8	0.145	-132.0	4.113	73.4	0.135	72.4	0.317	-56.8	1.031	13.78
1.9	0.149	-136.4	3.912	71.5	0.142	72.5	0.310	-59.5	1.031	13.34
2.0	0.145	-144.2	3.756	69.3	0.150	72.3	0.298	-61.5	1.032	12.90
2.1	0.155	-147.6	3.609	67.1	0.157	72.1	0.296	-65.1	1.023	12.67
2.2	0.158	-155.6	3.467	65.1	0.165	72.0	0.287	-67.8	1.023	12.30
2.3	0.170	-157.3	3.360	63.1	0.173	71.6	0.289	-70.5	1.006	12.41
2.4	0.181	-161.9	3.252	61.0	0.182	71.3	0.281	-73.9	0.999	12.53
2.5	0.183	-164.7	3.142	59.2	0.190	71.1	0.279	-76.2	0.995	12.18
2.6	0.200	-168.8	3.047	57.6	0.199	70.8	0.272	-80.7	0.985	11.86
2.7	0.201	-171.6	2.953	55.7	0.207	70.4	0.271	-83.3	0.981	11.53
2.8	0.217	-173.2	2.876	53.9	0.216	69.9	0.272	-87.3	0.967	11.25
2.9	0.215	-175.8	2.794	52.0	0.225	69.3	0.268	-89.0	0.968	10.95
3.0	0.219	-177.7	2.716	50.9	0.233	69.1	0.260	-92.1	0.968	10.66
4.0	0.329	164.5	2.188	33.8	0.331	61.6	0.292	-134.9	0.886	8.20
5.0	0.441	146.3	1.760	16.8	0.425	51.1	0.401	-169.6	0.829	6.17

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

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	0.523	-22.4	25.341	156.8	0.011	77.8	0.913	-14.9	0.340	33.61
0.2	0.433	-44.6	21.510	138.5	0.022	73.5	0.797	-25.7	0.478	29.97
0.3	0.356	-58.7	17.679	125.8	0.030	72.2	0.684	-31.3	0.631	27.76
0.4	0.298	-69.1	14.672	116.6	0.037	71.8	0.598	-34.6	0.745	26.02
0.5	0.250	-78.9	12.399	109.4	0.043	72.3	0.538	-36.0	0.831	24.59
0.6	0.215	-86.4	10.718	103.9	0.049	73.1	0.489	-36.9	0.897	23.36
0.7	0.192	-93.6	9.430	99.6	0.056	73.8	0.456	-37.3	0.935	22.24
0.8	0.169	-101.9	8.363	95.5	0.063	74.5	0.427	-37.9	0.972	21.24
0.9	0.157	-109.0	7.535	92.2	0.069	74.9	0.409	-38.6	0.993	20.35
1.0	0.147	-115.7	6.872	89.1	0.076	75.6	0.390	-39.5	1.010	18.94
1.1	0.143	-121.9	6.321	86.3	0.084	76.1	0.379	-40.4	1.015	18.05
1.2	0.143	-127.5	5.823	84.1	0.091	76.4	0.365	-41.3	1.023	17.15
1.3	0.141	-133.8	5.439	81.6	0.098	76.6	0.358	-42.7	1.023	16.51
1.4	0.137	-138.8	5.078	79.2	0.106	76.6	0.348	-44.3	1.027	15.81
1.5	0.138	-144.4	4.784	76.6	0.113	76.7	0.341	-45.9	1.024	15.29
1.6	0.139	-150.1	4.519	74.5	0.121	76.6	0.332	-47.8	1.025	14.75
1.7	0.141	-155.0	4.266	72.4	0.129	76.4	0.325	-49.8	1.024	14.23
1.8	0.143	-161.0	4.065	70.2	0.137	76.2	0.315	-51.8	1.024	13.76
1.9	0.148	-162.6	3.867	68.5	0.145	75.9	0.309	-54.7	1.022	13.34
2.0	0.154	-169.3	3.707	66.3	0.154	75.6	0.298	-56.8	1.019	12.96
2.1	0.164	-170.4	3.561	64.3	0.162	75.4	0.297	-60.6	1.010	12.81
2.2	0.175	-176.5	3.421	62.3	0.170	75.0	0.290	-63.3	1.005	12.58
2.3	0.186	-176.4	3.313	60.4	0.179	74.4	0.293	-66.4	0.989	12.67
2.4	0.202	-179.9	3.208	58.3	0.188	74.0	0.285	-69.8	0.978	12.31
2.5	0.207	178.3	3.098	56.6	0.197	73.5	0.283	-72.4	0.973	11.97
2.6	0.225	176.6	3.004	54.8	0.206	73.1	0.277	-77.0	0.962	11.63
2.7	0.228	173.7	2.909	52.9	0.216	72.5	0.277	-79.7	0.958	11.30
2.8	0.242	173.1	2.827	51.2	0.224	71.9	0.279	-84.0	0.945	11.00
2.9	0.246	171.2	2.754	49.4	0.234	71.2	0.275	-85.7	0.941	10.71
3.0	0.249	169.4	2.676	48.1	0.243	70.8	0.268	-88.9	0.942	10.42
4.0	0.365	156.9	2.155	31.3	0.346	62.0	0.302	-133.4	0.863	7.94
5.0	0.481	141.1	1.716	14.6	0.441	50.5	0.414	-169.3	0.811	5.90

PACKAGE DIMENSIONS

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



PIN CONNECTIONS

- 1. Emitter
- 2. Base
- 3. Collector

[MEMO]

[MEMO]

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