

DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR μ PA891TD

NPN SILICON RF TRANSISTOR (WITH 2 ELEMENTS) IN A 6-PIN LEAD-LESS 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 ($2 \times 2\text{SC5600}$)
- 6-pin lead-less minimold package

BUILT-IN TRANSISTORS

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

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μ PA891TD	50 pcs (Non reel)	8 mm wide embossed taping - Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape
μ PA891TD-T3	10 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}	190 in 1 element 210 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.

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)

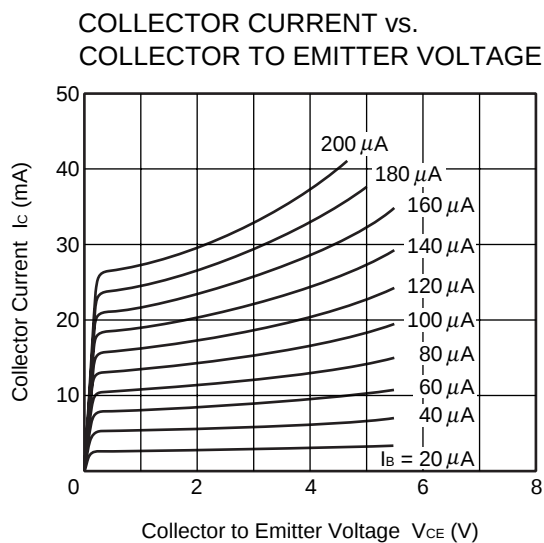
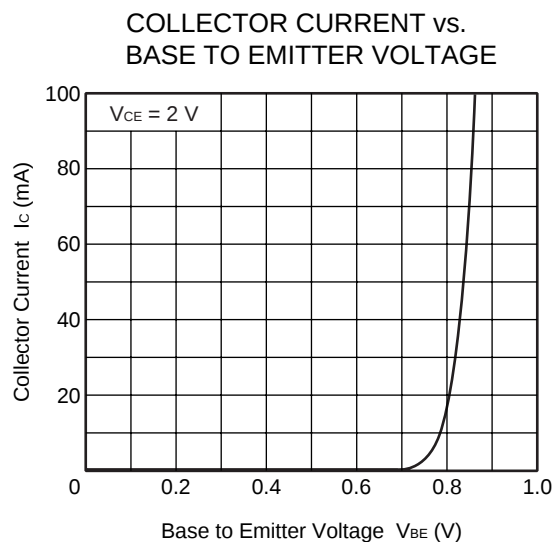
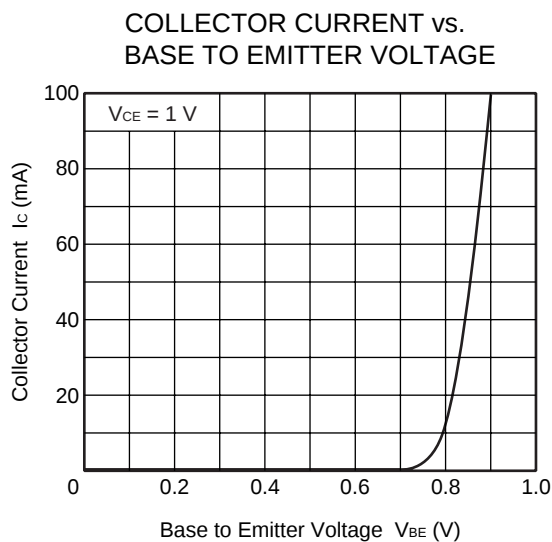
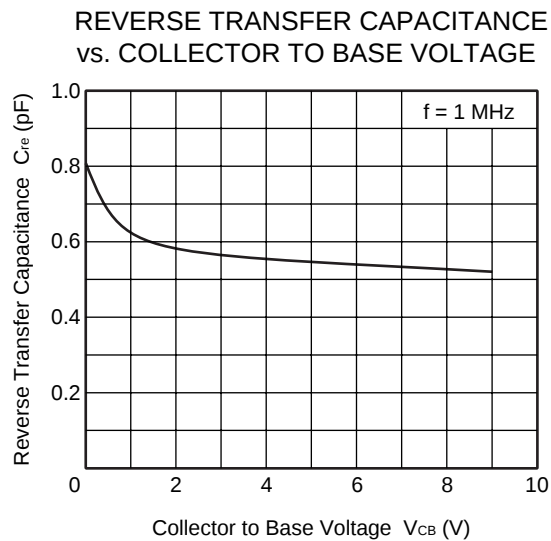
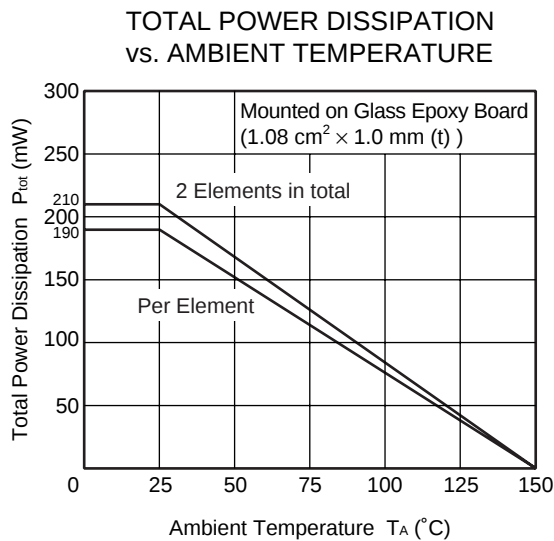
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I _{CBO}	V _{CB} = 5 V, I _E = 0 mA	–	–	600	nA
Emitter Cut-off Current	I _{EBO}	V _{BE} = 1 V, I _C = 0 mA	–	–	600	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 1 V, I _C = 5 mA	100	–	160	–
Gain Bandwidth Product (1)	f _T	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

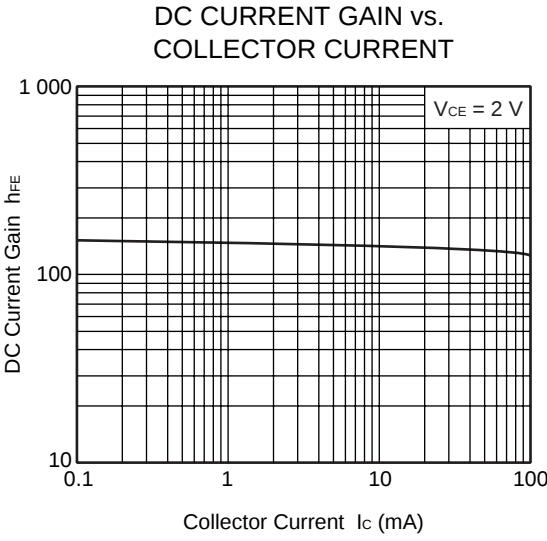
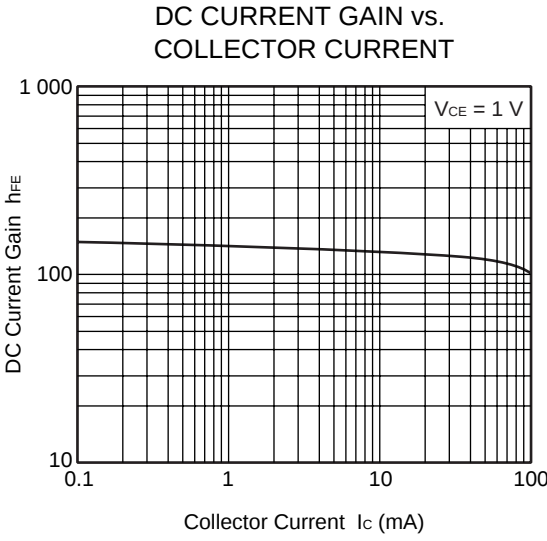
- Notes** **1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

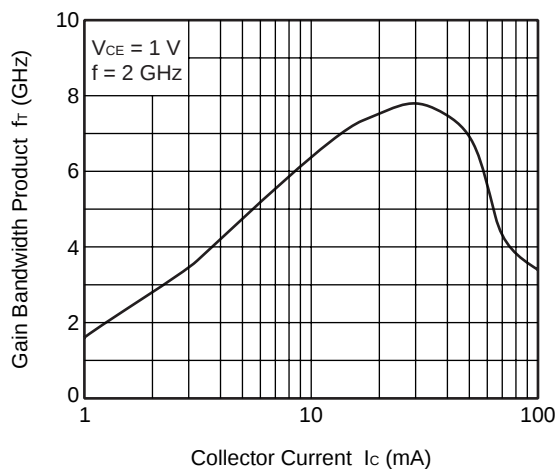
Rank	FB
Marking	kH
h _{FE} Value	100 to 160

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

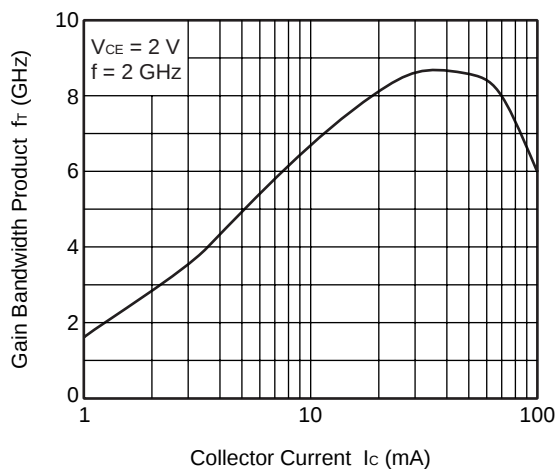




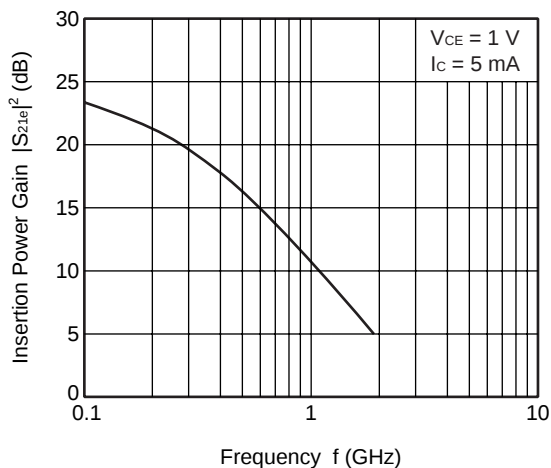
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



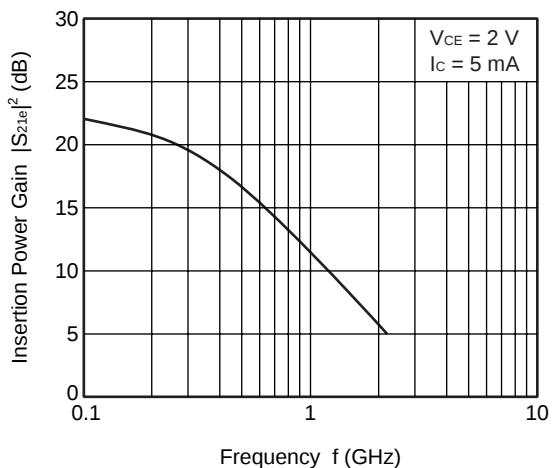
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



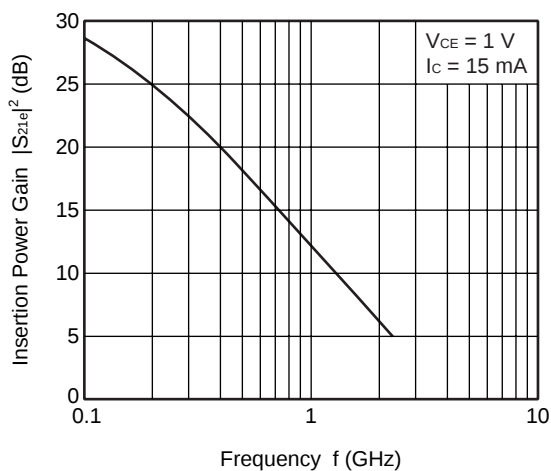
INSERTION POWER GAIN vs. FREQUENCY



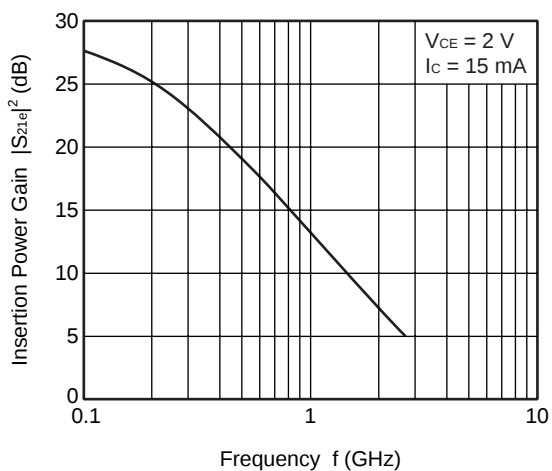
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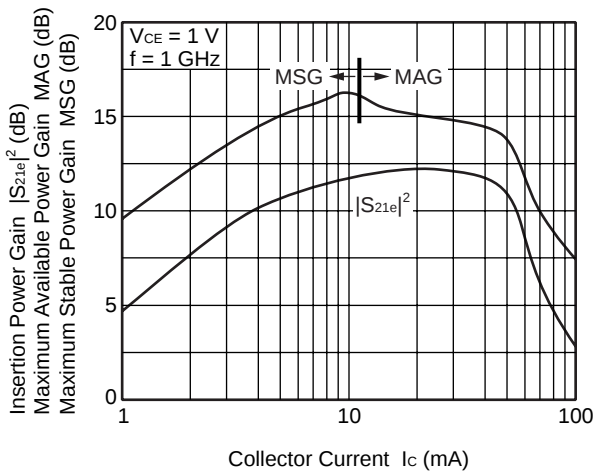
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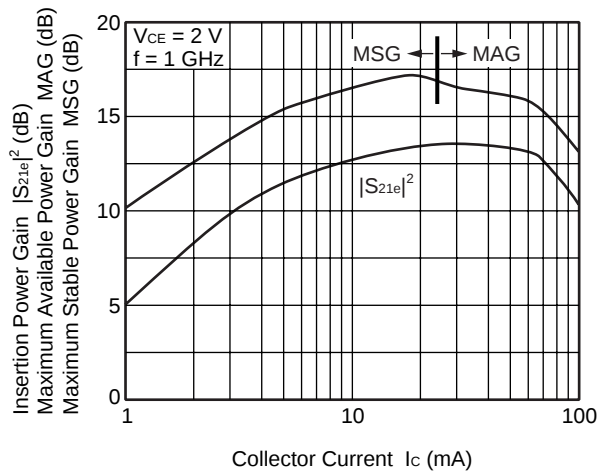
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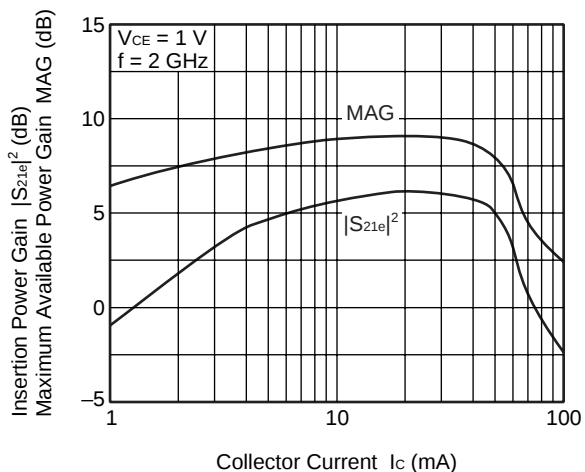
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



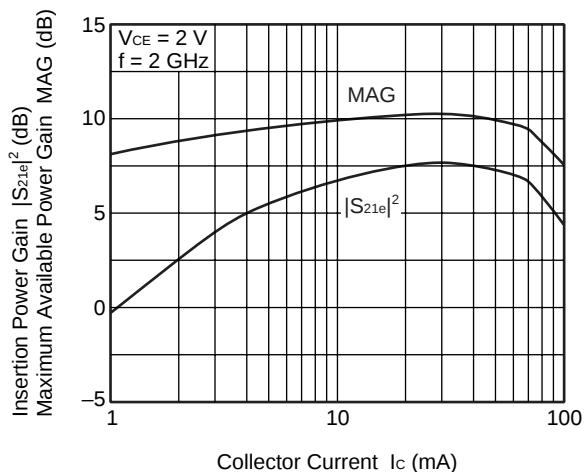
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



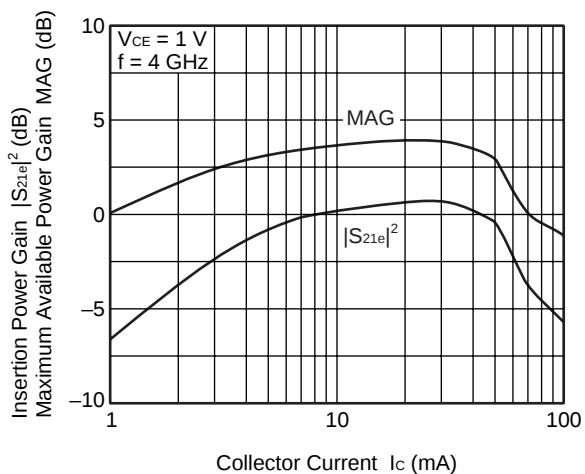
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



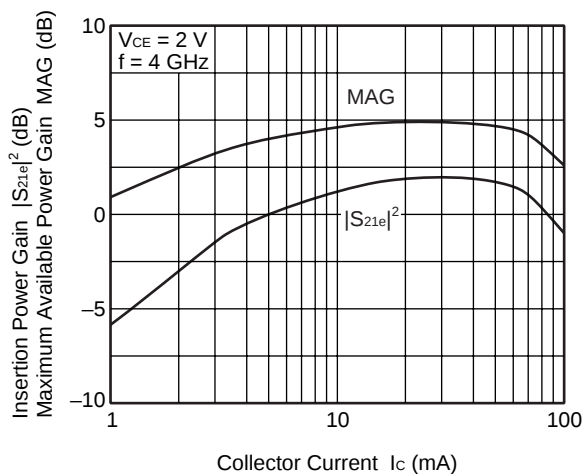
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



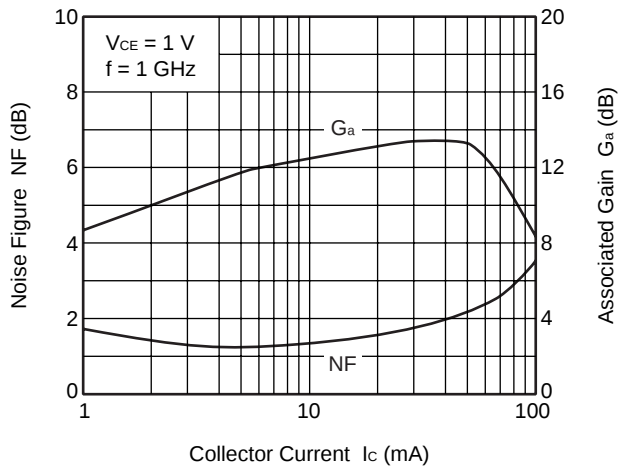
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



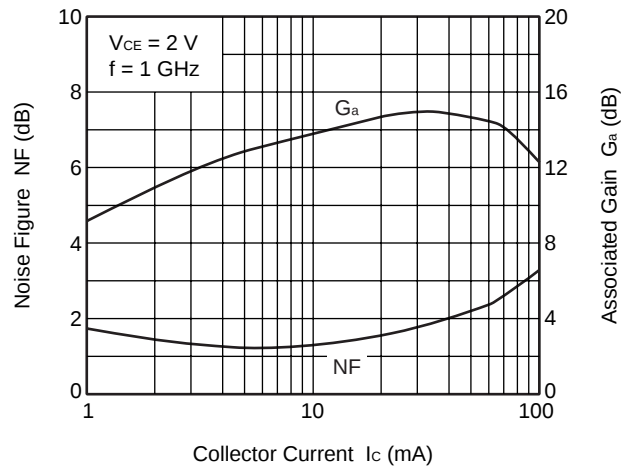
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



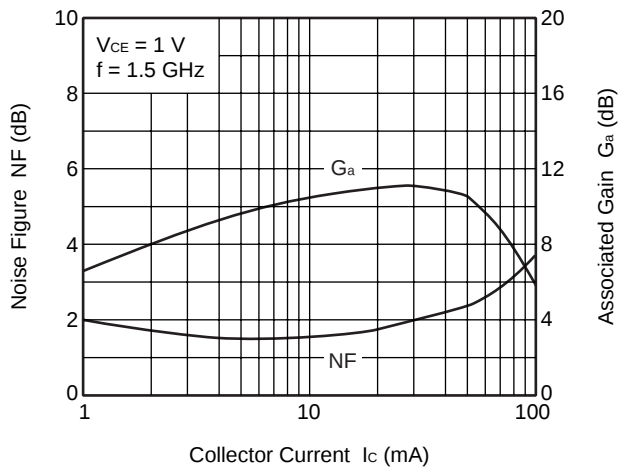
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



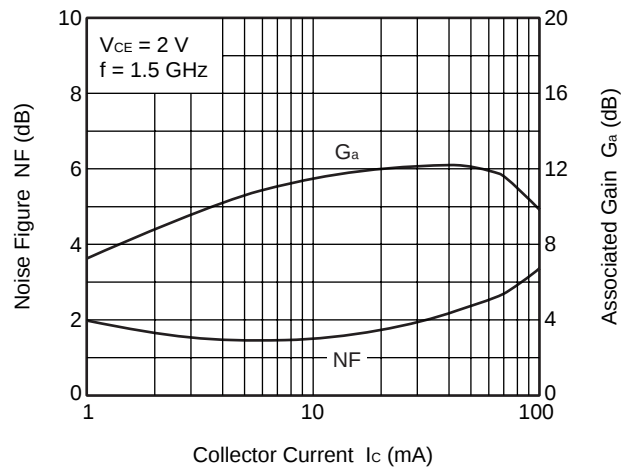
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



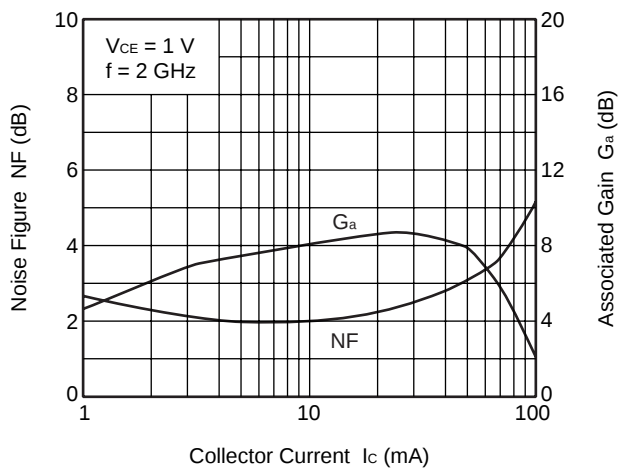
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



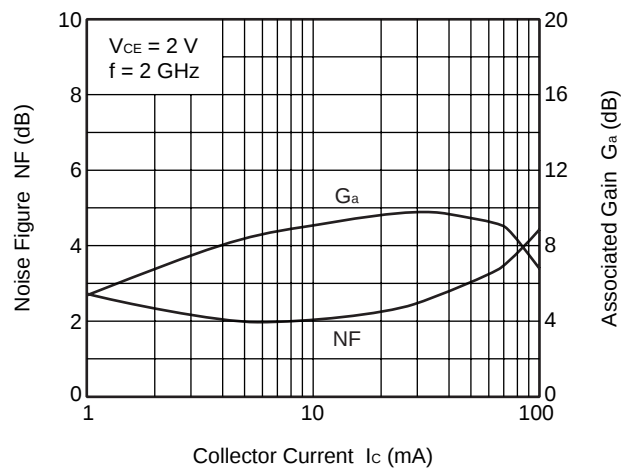
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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.
$$\text{MAG} = \left| \frac{S_{21}}{S_{12}} \right| (K - \sqrt{K^2 - 1})$$

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

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

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	0.969	-20.0	3.596	166.2	0.045	76.0	0.989	-7.4	0.092	19.04
0.2	0.946	-39.8	3.407	153.4	0.086	67.1	0.949	-14.7	0.087	15.99
0.3	0.906	-58.9	3.167	140.9	0.119	56.7	0.898	-21.1	0.128	14.25
0.4	0.868	-75.3	2.906	129.3	0.145	47.6	0.839	-26.5	0.186	13.01
0.5	0.843	-90.0	2.676	119.9	0.164	39.8	0.783	-30.9	0.226	12.13
0.6	0.806	-103.7	2.427	110.7	0.176	33.1	0.728	-34.8	0.282	11.39
0.7	0.778	-115.5	2.212	103.1	0.184	27.3	0.686	-37.9	0.333	10.79
0.8	0.760	-125.9	2.016	96.3	0.188	22.4	0.647	-41.0	0.382	10.31
0.9	0.749	-135.1	1.840	89.9	0.190	18.1	0.618	-43.9	0.428	9.87
1.0	0.741	-143.3	1.700	84.0	0.189	14.6	0.593	-46.6	0.477	9.55
1.1	0.732	-150.5	1.571	78.9	0.187	11.4	0.576	-49.4	0.530	9.25
1.2	0.731	-157.1	1.451	74.0	0.183	8.8	0.560	-52.0	0.580	8.99
1.3	0.734	-162.8	1.356	69.6	0.179	6.5	0.551	-54.8	0.621	8.80
1.4	0.734	-167.8	1.266	65.4	0.174	4.5	0.543	-57.5	0.680	8.62
1.5	0.736	-172.3	1.190	61.5	0.168	3.1	0.540	-60.2	0.729	8.50
1.6	0.739	-176.3	1.121	57.7	0.163	1.9	0.535	-62.8	0.791	8.38
1.7	0.743	-179.9	1.054	54.5	0.156	1.1	0.537	-65.4	0.844	8.29
1.8	0.744	176.4	1.000	51.2	0.150	0.9	0.534	-68.0	0.920	8.25
1.9	0.745	172.8	0.947	48.2	0.143	0.9	0.537	-70.5	0.997	8.21
2.0	0.749	170.0	0.903	45.1	0.137	1.8	0.535	-72.9	1.076	6.52
2.1	0.751	167.1	0.871	43.0	0.130	2.9	0.539	-75.5	1.134	6.03
2.2	0.752	164.4	0.831	40.5	0.125	4.4	0.538	-78.0	1.240	5.29
2.3	0.756	161.4	0.799	38.4	0.119	6.6	0.543	-80.5	1.302	4.97
2.4	0.761	158.7	0.769	36.1	0.115	8.9	0.539	-83.0	1.386	4.56
2.5	0.762	156.0	0.738	34.0	0.111	12.2	0.542	-85.9	1.474	4.15
2.6	0.766	153.3	0.711	32.4	0.107	15.8	0.543	-88.8	1.555	3.83
2.7	0.764	150.5	0.686	30.4	0.106	20.0	0.545	-91.7	1.636	3.45
2.8	0.768	147.9	0.658	29.1	0.106	24.2	0.545	-94.4	1.691	3.09
2.9	0.755	144.8	0.625	27.0	0.109	28.0	0.542	-97.5	1.861	2.24
3.0	0.749	141.3	0.605	24.8	0.113	32.5	0.539	-101.1	1.923	1.75
4.0	0.781	123.7	0.468	14.0	0.181	51.3	0.579	-134.6	1.464	0.09
5.0	0.789	101.1	0.394	12.0	0.286	40.3	0.626	-164.0	1.283	-1.81