

DATA SHEET

NEC

NPN SILICON GERMANIUM RF TRANSISTOR NESG2101M05

NPN SiGe RF TRANSISTOR FOR MEDIUM OUTPUT POWER AMPLIFICATION (125 mW) FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05)

FEATURES

- The device is an ideal choice for medium output power, high-gain amplification and low distortion, low noise, high-gain amplification
 $P_{O(1\text{ dB})} = 21\text{ dBm TYP. @ } V_{CE} = 3.6\text{ V, } I_{CQ} = 10\text{ mA, } f = 2\text{ GHz}$
 $NF = 0.6\text{ dB TYP.}, G_a = 19.0\text{ dB TYP. @ } V_{CE} = 2\text{ V, } I_c = 7\text{ mA, } f = 1\text{ GHz}$
- Maximum stable power gain: $MSG = 17.0\text{ dB TYP. @ } V_{CE} = 3\text{ V, } I_c = 50\text{ mA, } f = 2\text{ GHz}$
- High breakdown voltage technology for SiGe Tr. adopted: V_{CEO} (absolute maximum ratings) = 5.0 V
- Flat-lead 4-pin thin-type super minimold (M05) package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
NESG2101M05	50 pcs (Non reel)	• 8 mm wide embossed taping
NESG2101M05-T1	3 kpcs/reel	• Pin 3 (Collector), Pin 4 (Emitter) face the perforation side of the tape

Remark To order evaluation samples, contact your nearby sales office.
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}	13.0	V
Collector to Emitter Voltage	V_{CEO}	5.0	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_c	100	mA
Total Power Dissipation	P_{tot}^{Note}	500	mW
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

Note Mounted on $38 \times 38\text{ mm}$, $t = 0.4\text{ mm}$ polyimide PCB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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 Compound Semiconductor Devices 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	–	–	100	nA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1 V, I _C = 0 mA	–	–	100	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 2 V, I _C = 15 mA	130	190	260	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 3 V, I _C = 50 mA, f = 2 GHz	14	17	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 3 V, I _C = 50 mA, f = 2 GHz	11.5	13.5	–	dB
Noise Figure (1)	NF	V _{CE} = 2 V, I _C = 10 mA, f = 2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	0.9	1.2	dB
Noise Figure (2)	NF	V _{CE} = 2 V, I _C = 7 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	0.6	–	dB
Associated Gain (1)	G _a	V _{CE} = 2 V, I _C = 10 mA, f = 2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	11.0	13.0	–	dB
Associated Gain (2)	G _a	V _{CE} = 2 V, I _C = 7 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	19.0	–	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 2 V, I _E = 0 mA, f = 1 MHz	–	0.4	0.5	pF
Maximum Stable Power Gain	MSG ^{Note 3}	V _{CE} = 3 V, I _C = 50 mA, f = 2 GHz	14.5	17.0	–	dB
Gain 1 dB Compression Output Power	P _O (1 dB)	V _{CE} = 3.6 V, I _{Cq} = 10 mA, f = 2 GHz	–	21	–	dBm
Linear Gain	G _L	V _{CE} = 3.6 V, I _{Cq} = 10 mA, f = 2 GHz	–	15	–	dB

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

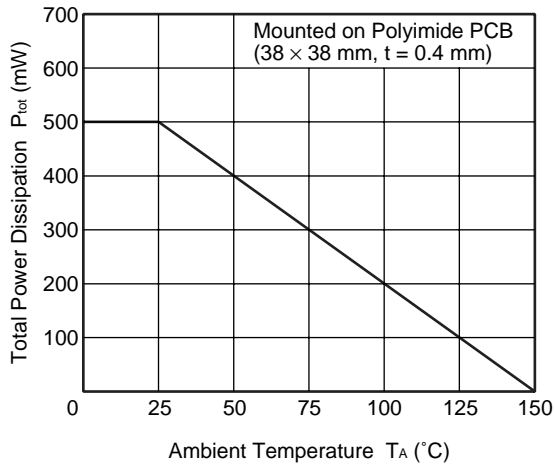
$$3. MSG = \left| \frac{S_{21}}{S_{12}} \right|$$

h_{FE} CLASSIFICATION

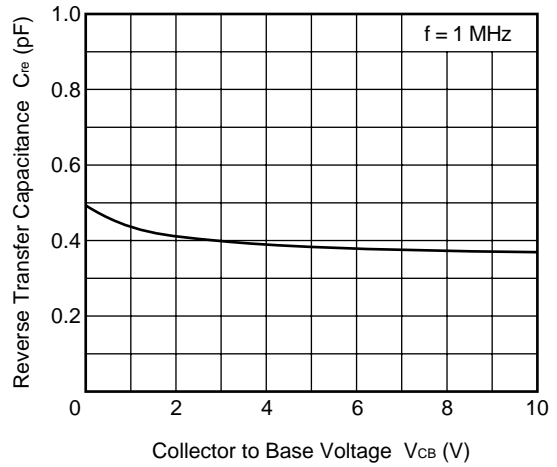
Rank	FB
Marking	T1J
h _{FE} Value	130 to 260

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

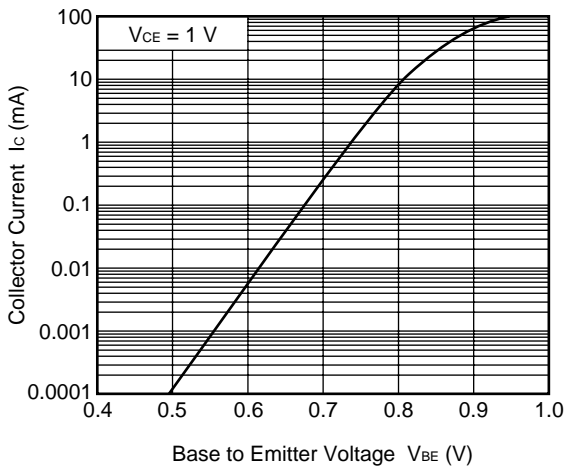
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



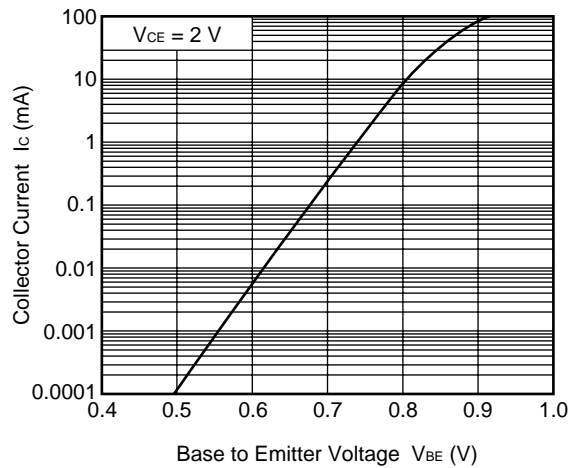
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



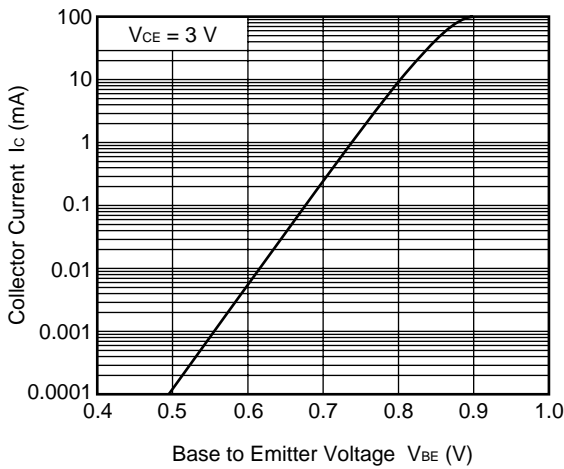
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



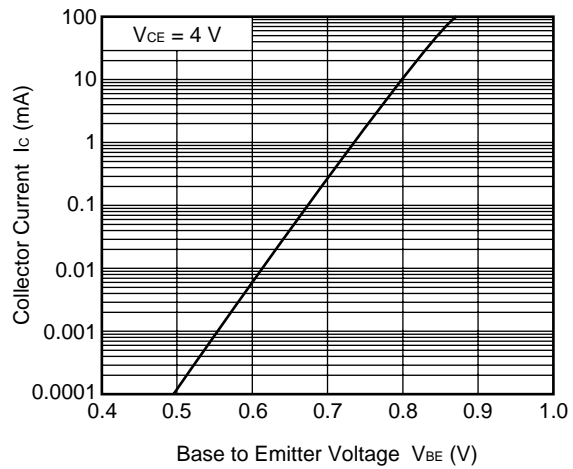
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



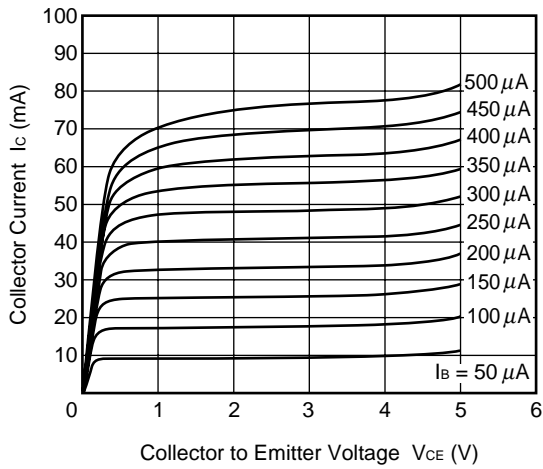
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



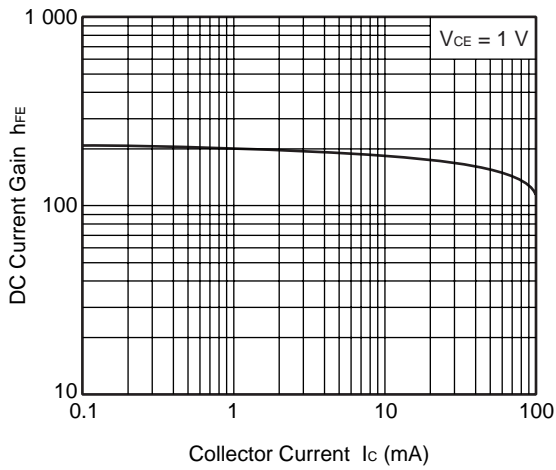
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



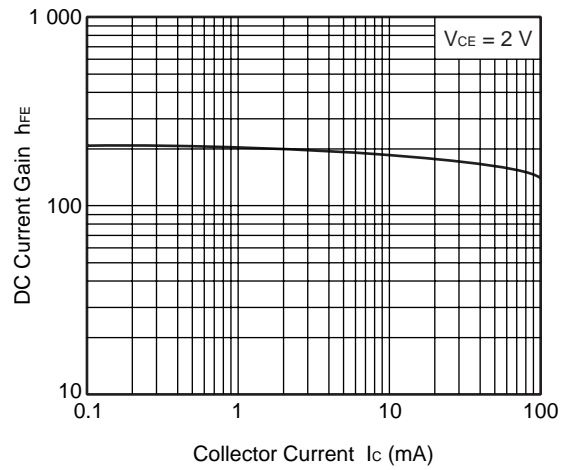
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



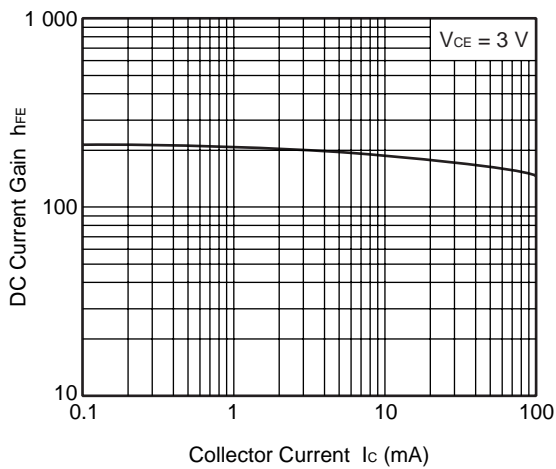
DC CURRENT GAIN vs.
COLLECTOR CURRENT



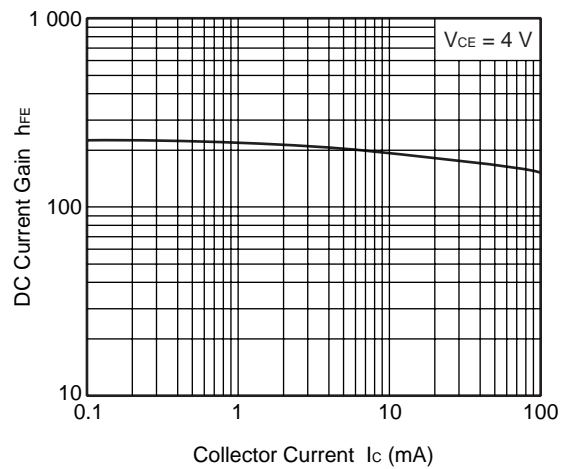
DC CURRENT GAIN vs.
COLLECTOR CURRENT



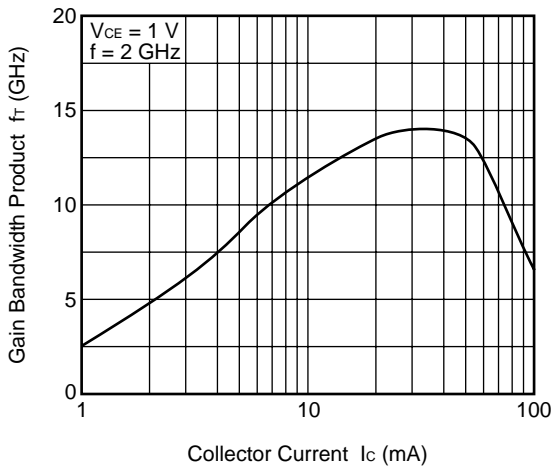
DC CURRENT GAIN vs.
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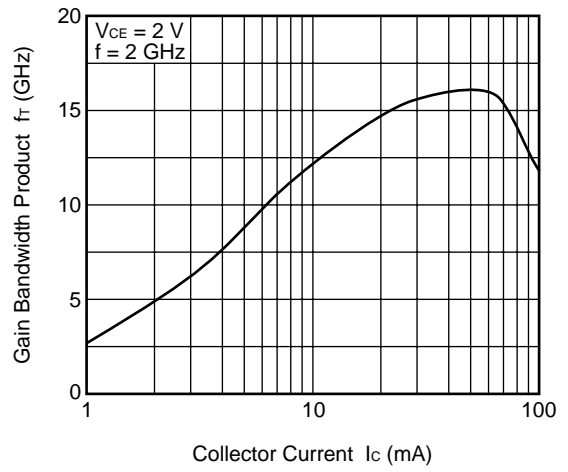
DC CURRENT GAIN vs.
COLLECTOR CURRENT



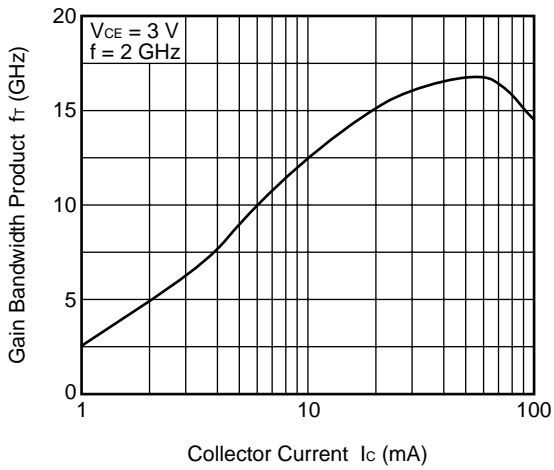
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



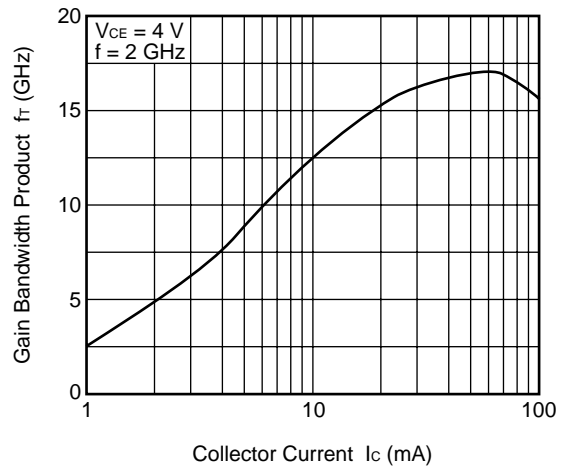
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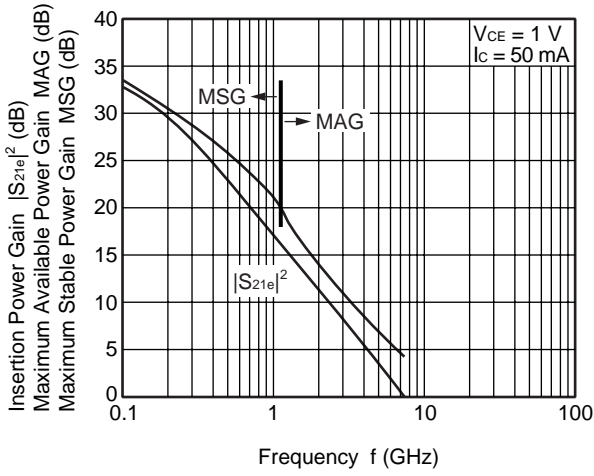
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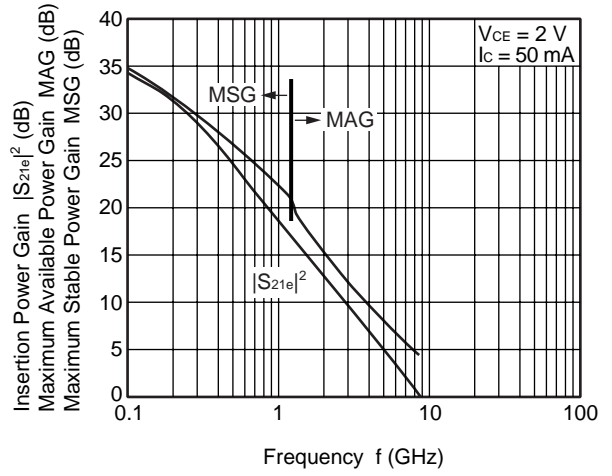
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



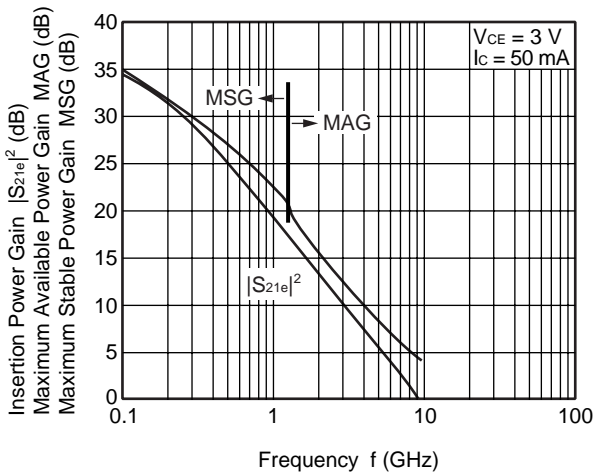
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



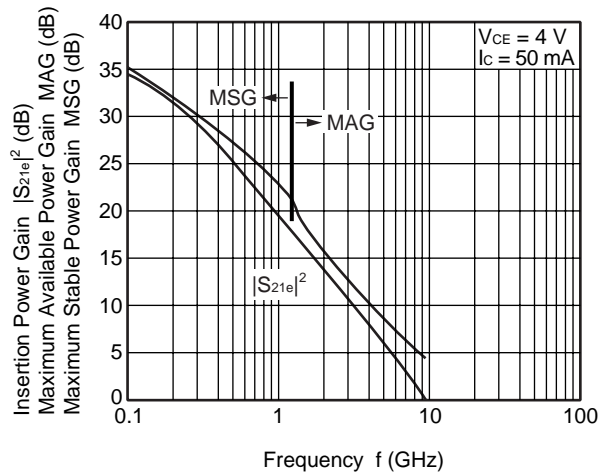
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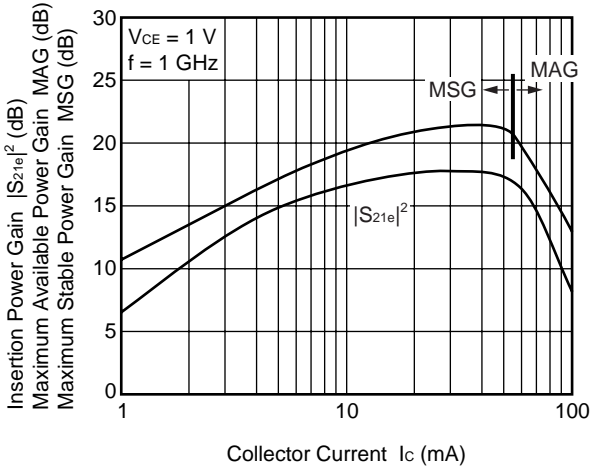
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MAG, MSG vs. FREQUENCY



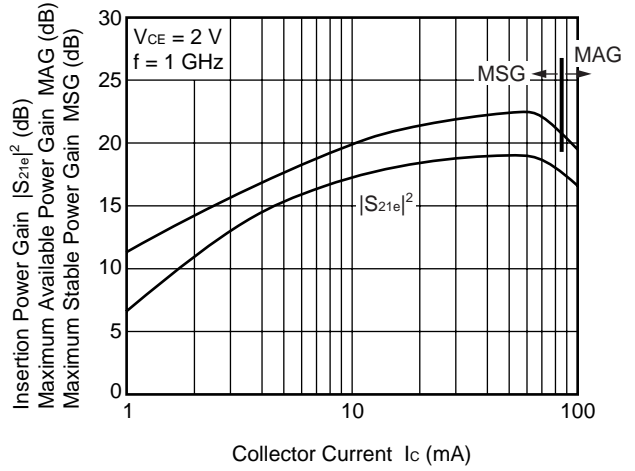
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MAG, MSG vs. FREQUENCY



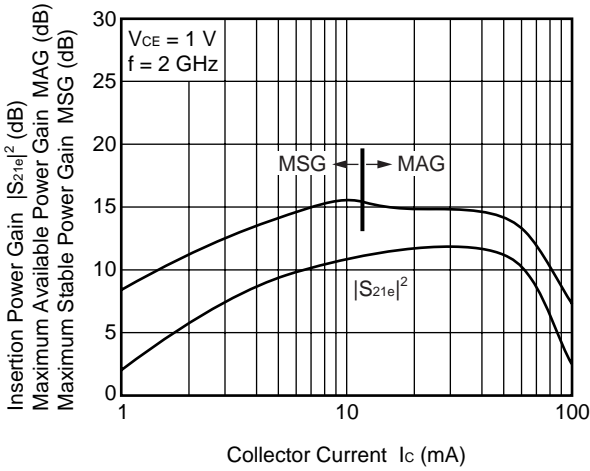
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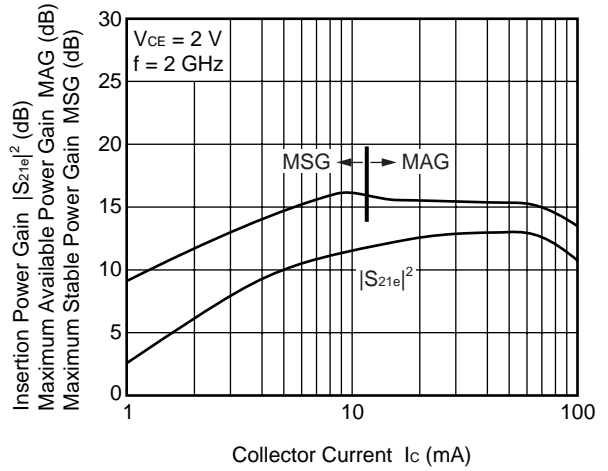
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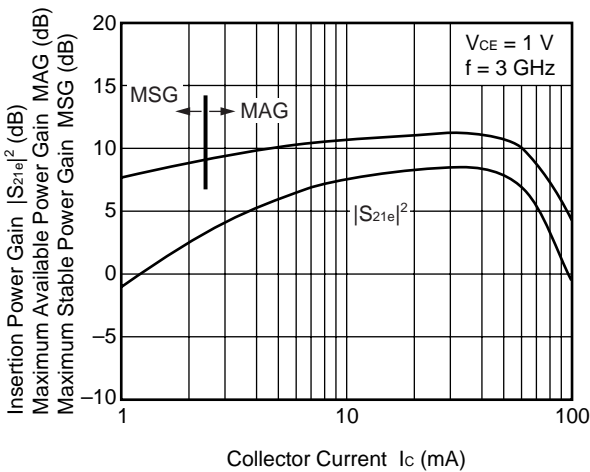
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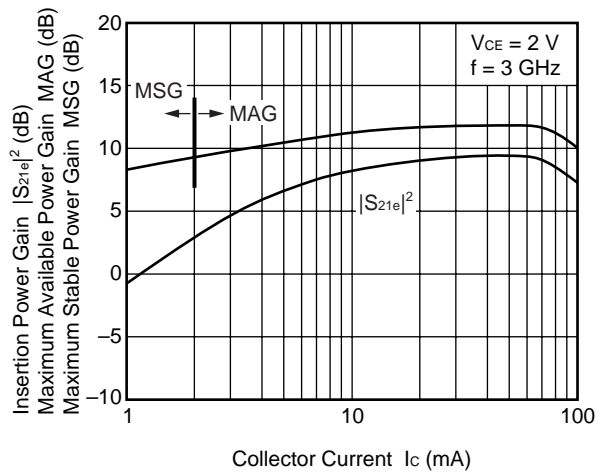
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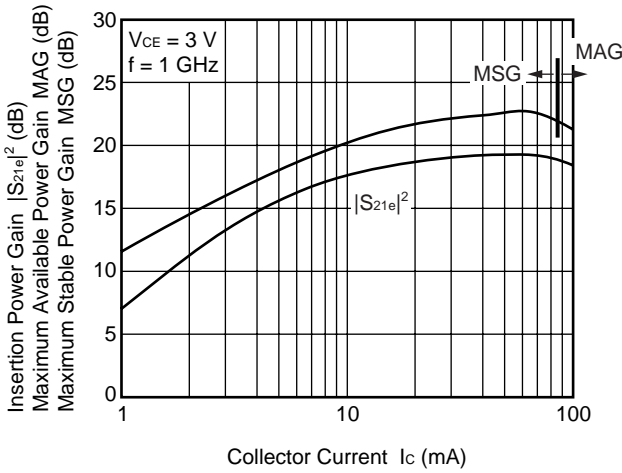
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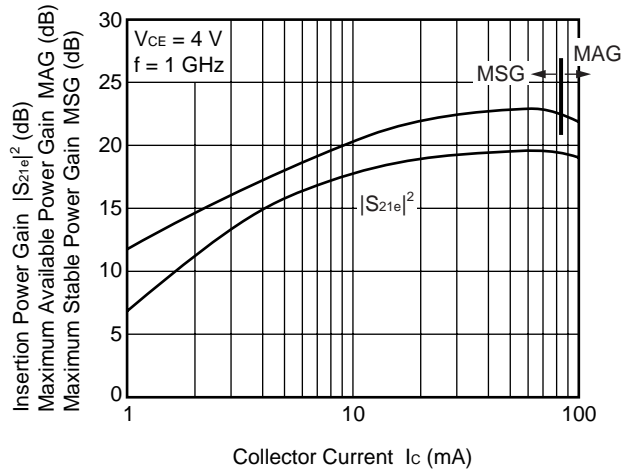
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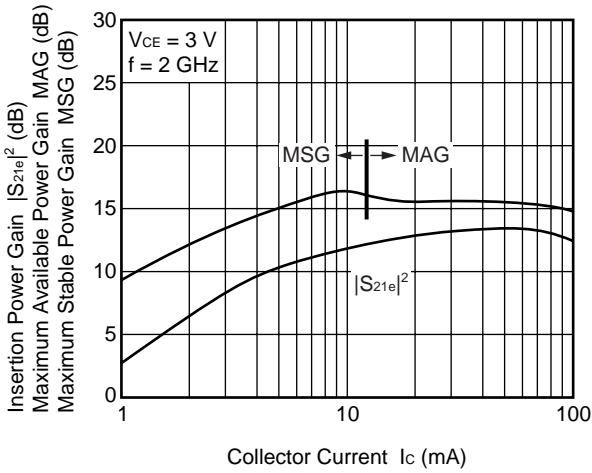
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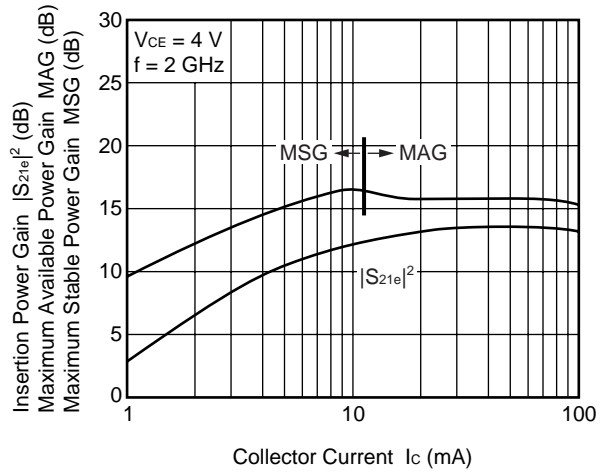
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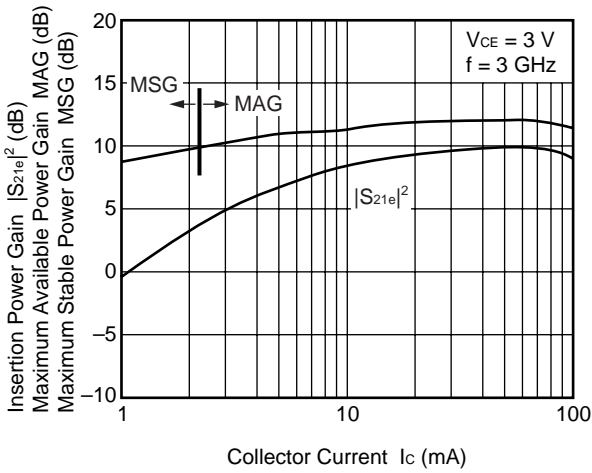
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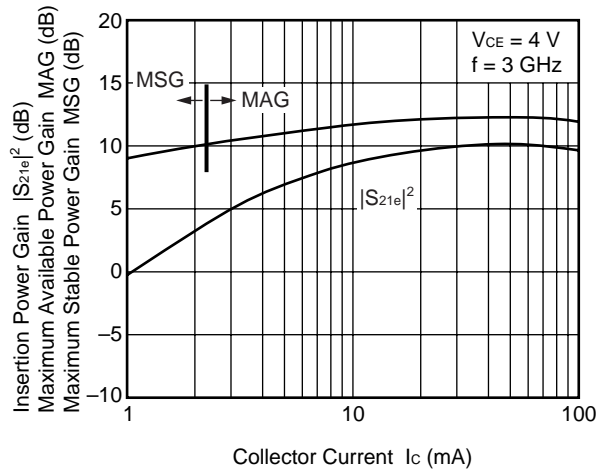
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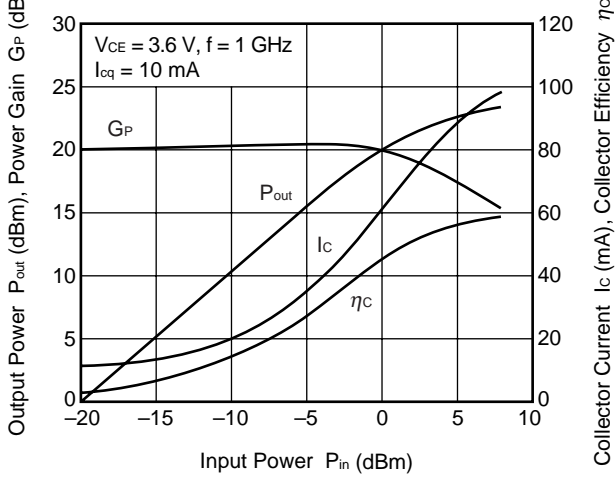
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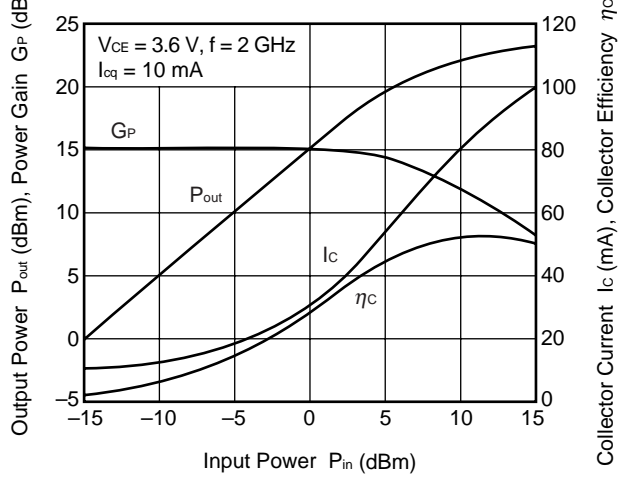
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vs. COLLECTOR CURRENT



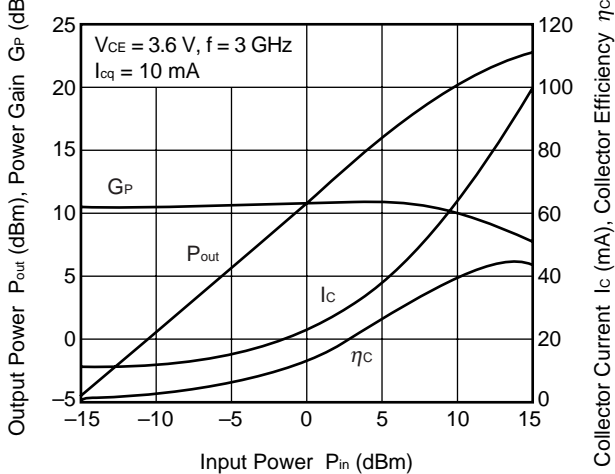
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



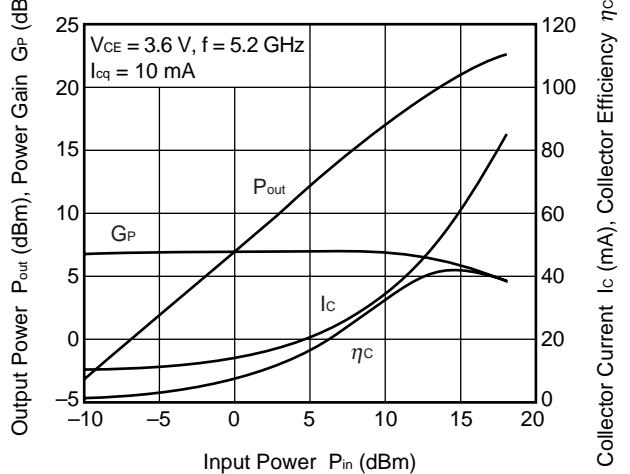
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



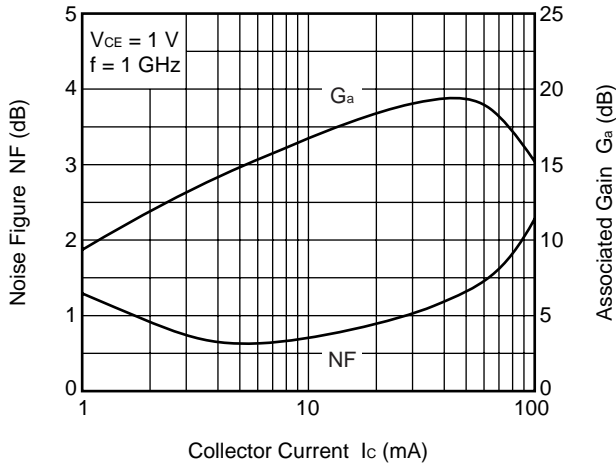
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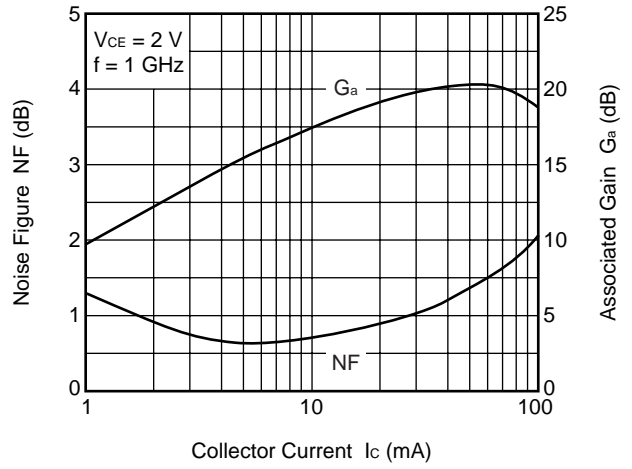
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



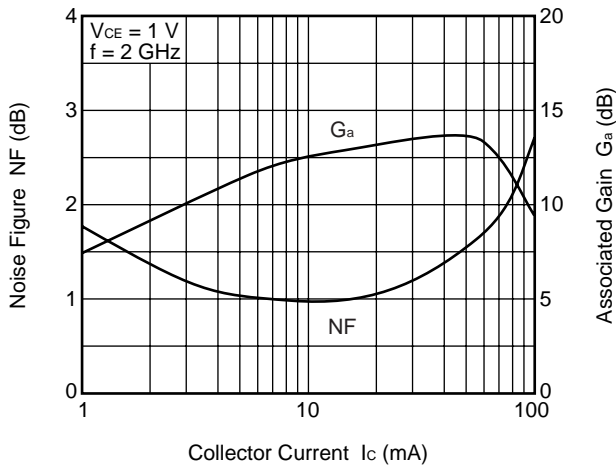
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



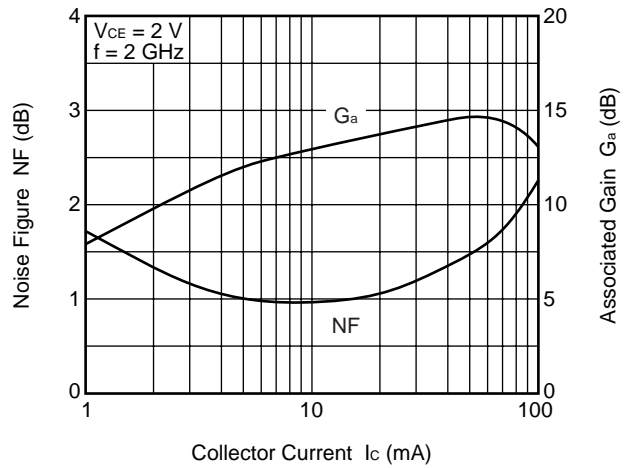
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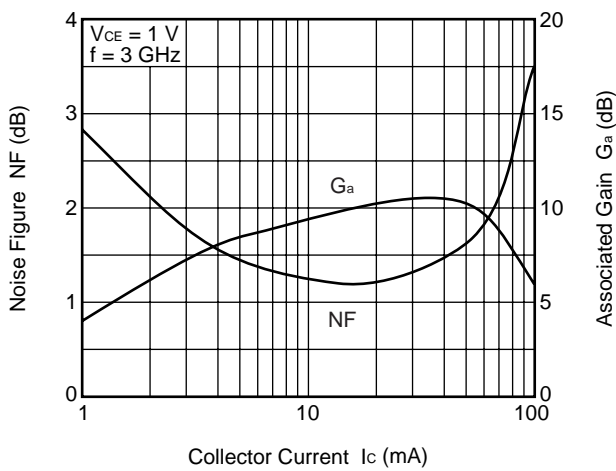
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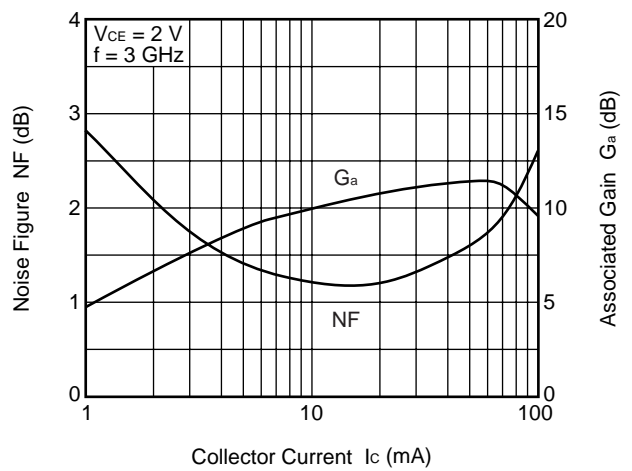
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



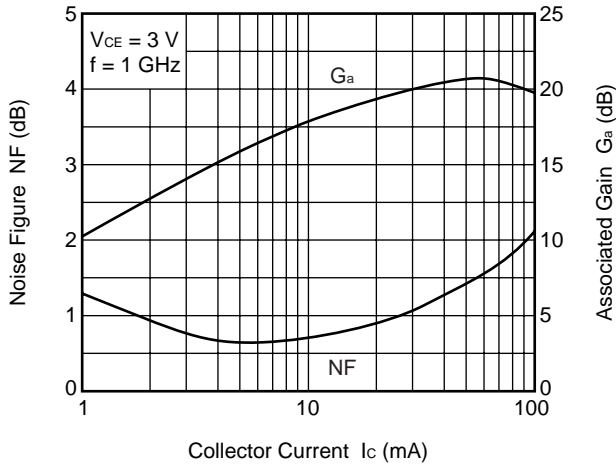
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



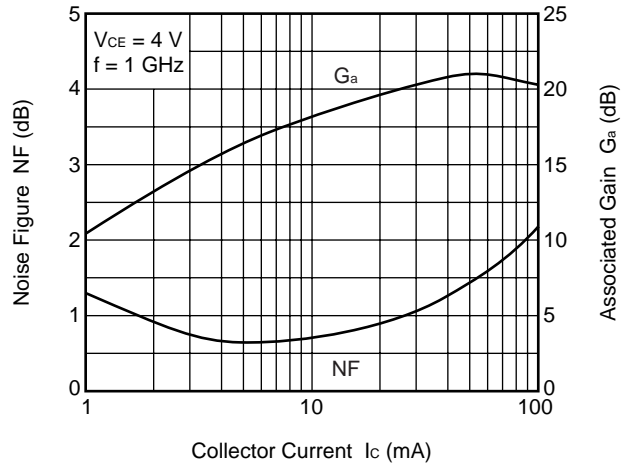
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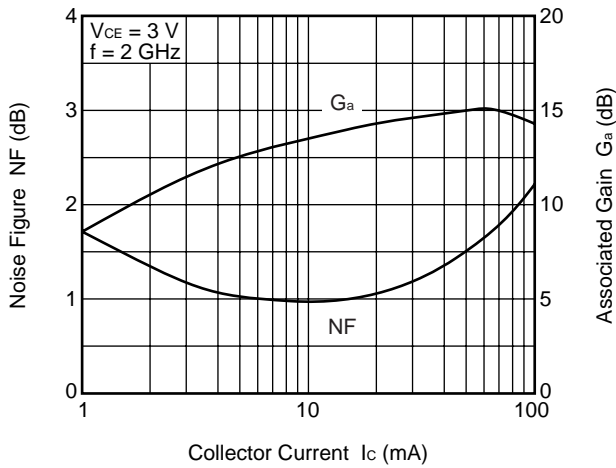
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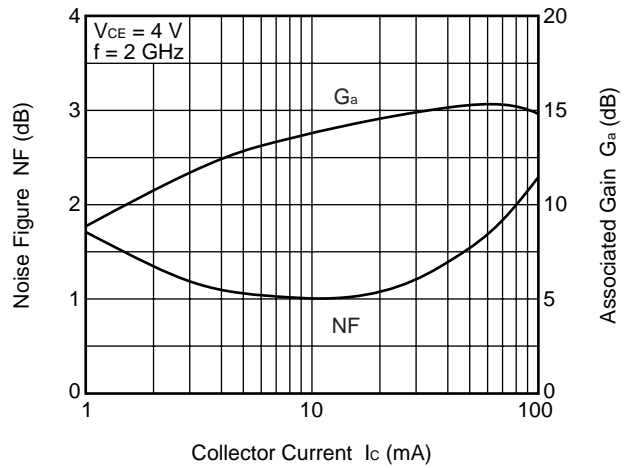
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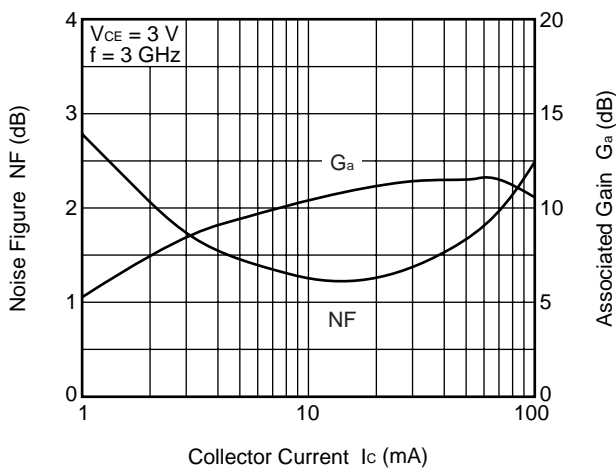
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



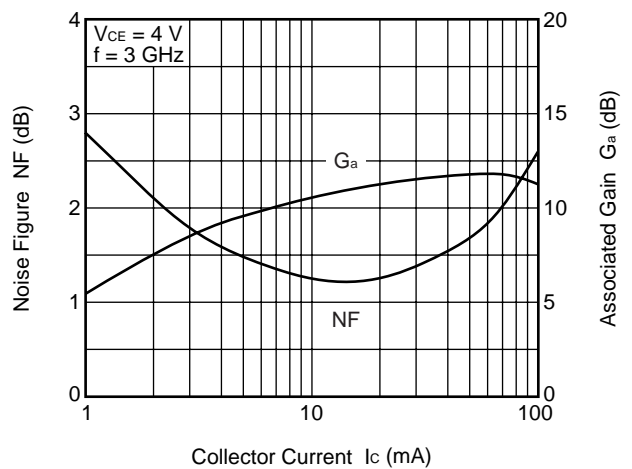
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

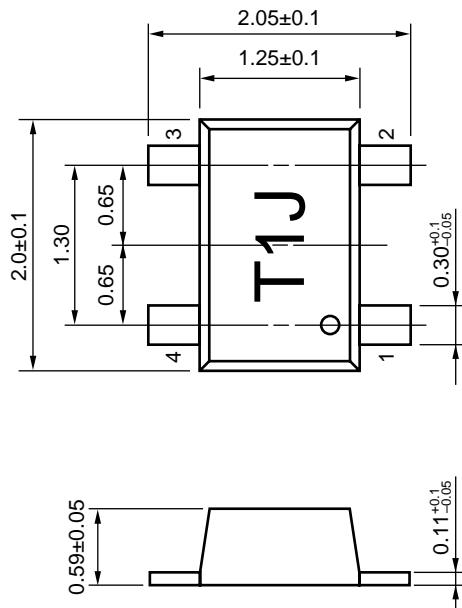
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL <http://www.csd-nec.com/>

PACKAGE DIMENSIONS

FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05) (UNIT: mm)



PIN CONNECTIONS

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

- **The information in this document is current as of March, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
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M8E 00.4-0110

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