DATA SHEET

NEC

NPN SILICON GERMANIUM C RF TRANSISTOR
NESG4030M14

NPN SiGe:C RF TRANSISTOR FOR LOW NOISE, HIGH-GAIN AMPLIFICATION 4-PIN LEAD-LESS MINIMOLD (M14, 1208 PKG)

FEATURES

- The device is an ideal choice for low noise, high-gain amplification
  NF = 1.1 dB TYP., G_a = 11.5 dB TYP. @ V_{CE} = 2 V, I_C = 6 mA, f = 5.8 GHz
- Maximum stable power gain: MSG = 15 dB TYP. @ V_{CE} = 2 V, I_C = 20 mA, f = 5.8 GHz
- SiGe:C HBT technology (UHS4) adopted
- Improvement of ESD protection
- 4-pin lead-less minimold (M14, 1208 PKG)

ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG4030M14	NESG4030M14-A	4-pin lead-less minimold (M14, 1208 PKG) (Pb-Free)	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 1 (Collector), Pin 4 (Emitter) face the perforation side of the tape
NESG4030M14-T3	NESG4030M14-T3-A		10 kpcs/reel	

Remark To order evaluation samples, please contact your nearby sales office.
Unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO} Note 1	5.0	V
Collector to Emitter Voltage	V_{CEO}	3.0	V
Base Current	I_B Note 1	12	mA
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot} Note 2	105	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Notes 1. V_{CBO} and I_B are limited by the permissible current of the protection element.
2. Mounted on 1.08 $cm^2 \times 1.0$ mm (t) glass epoxy PWB

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

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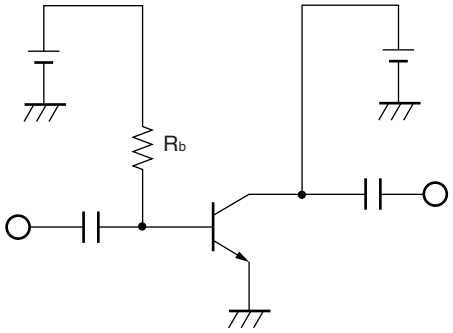
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

RECOMMENDED OPERATING RANGE (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Input Power	P_{in}	–	–	3	dBm
Base Feedback Resister	R_b	–	–	150	kΩ

Remark When the voltage return bias circuit like the figure below is used, a current increase is seen because the ESD protection element is turned on when recommended range of motion in the above table is exceeded. However, there is no influence of reliability, including deterioration.



ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I_{CBO}	V_{CB} = 4.3 V, I_E = 0 mA	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 0.4 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 2 V, I_C = 6 mA	270	400	540	–
RF Characteristics						
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 2 V, I_C = 20 mA, f = 5.8 GHz	8.5	10.5	–	dB
Noise Figure	NF	V_{CE} = 2 V, I_C = 6 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	1.1	1.5	dB
Associated Gain	G_a	V_{CE} = 2 V, I_C = 6 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	9.5	11.5	–	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 2 V, I_E = 0 mA, f = 1 MHz	–	0.12	0.25	pF
Maximum Stable Power Gain	MSG Note 3	V_{CE} = 2 V, I_C = 20 mA, f = 5.8 GHz	13	15	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	V_{CE} = 2 V, $I_{C\ (set)}$ = 6 mA, f = 5.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	9	–	dBm

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

2. Collector to base capacitance when the emitter grounded

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

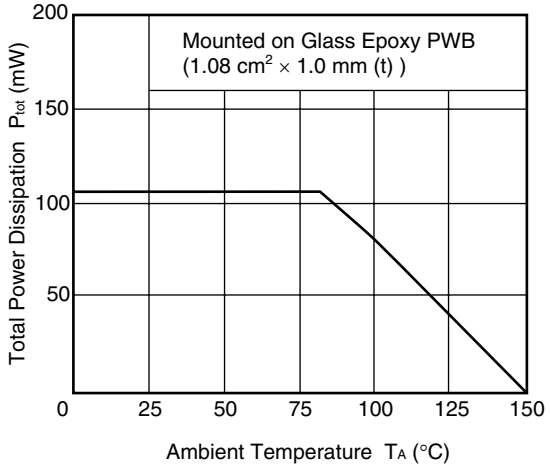
h_{FE} CLASSIFICATION

<R>

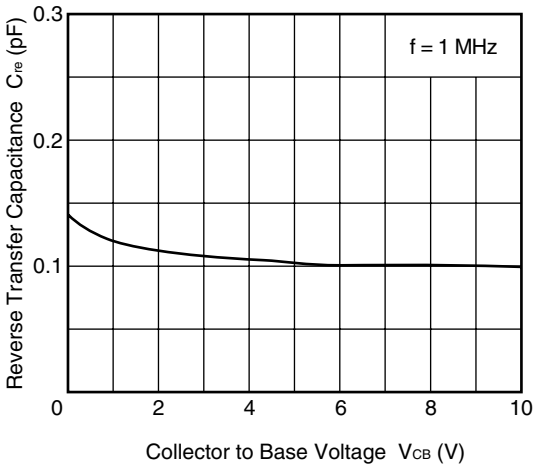
Rank	FB/YFB
Marking	zK
h_{FE} Value	270 to 540

<R> **TYPICAL CHARACTERISTICS (T_A = +25°C, unless otherwise specified)**

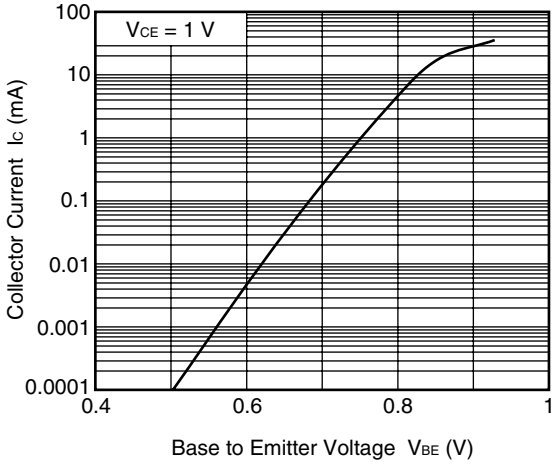
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



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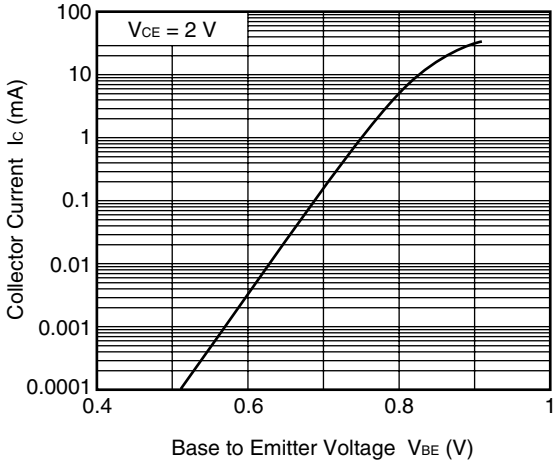
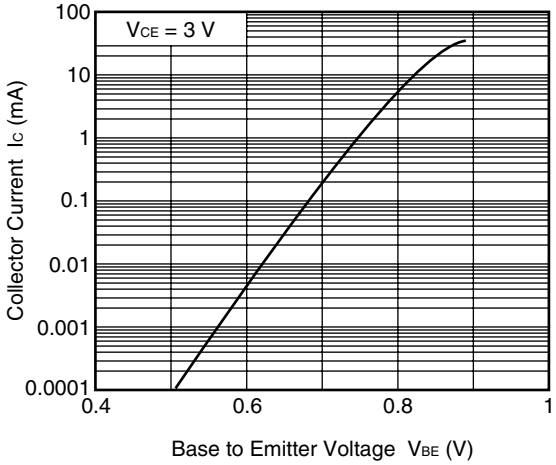
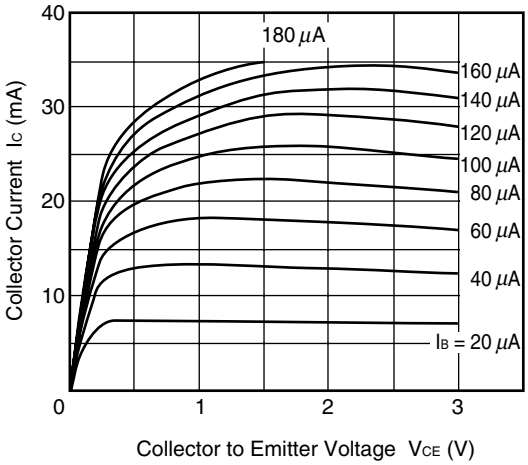


COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

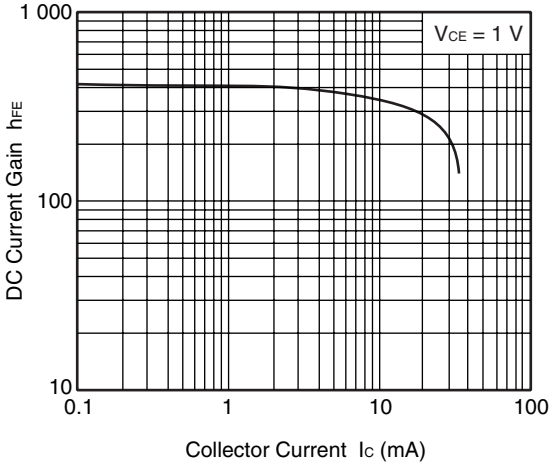


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

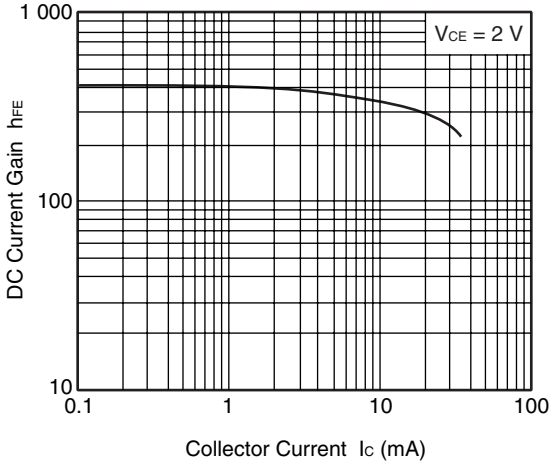


Remark The graphs indicate nominal characteristics.

DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
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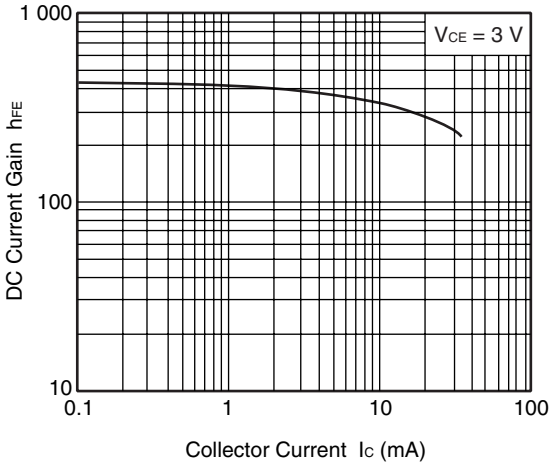
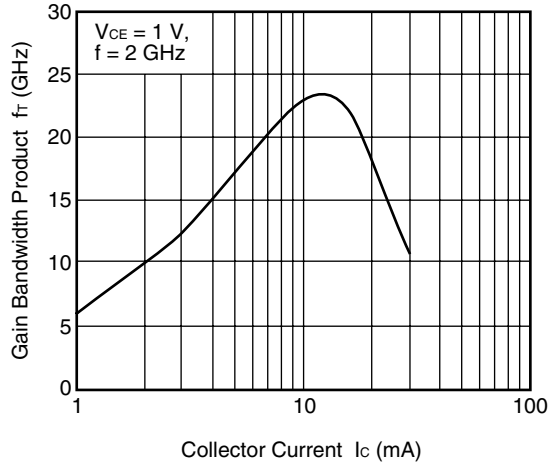


GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
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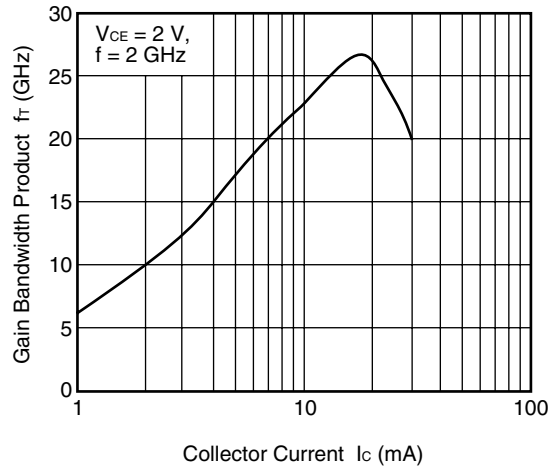

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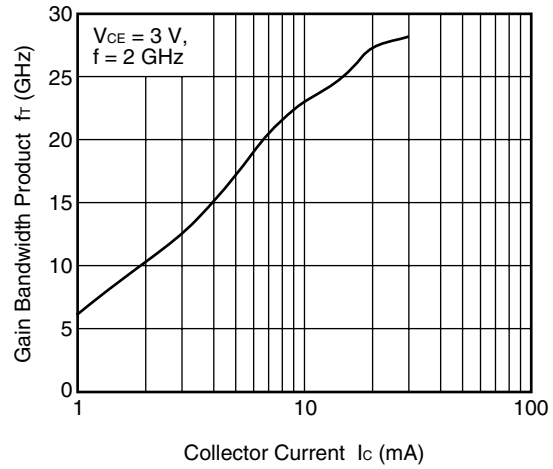

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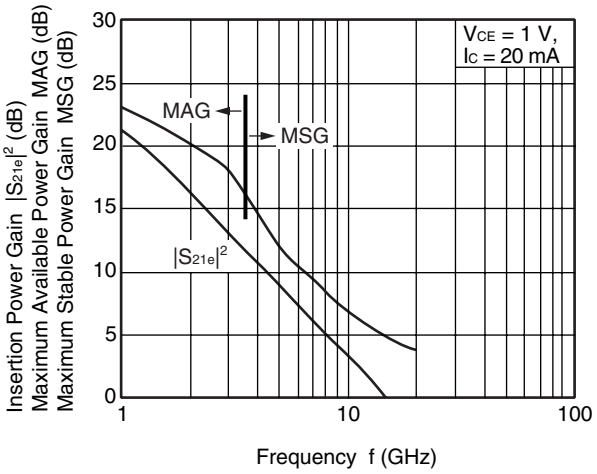
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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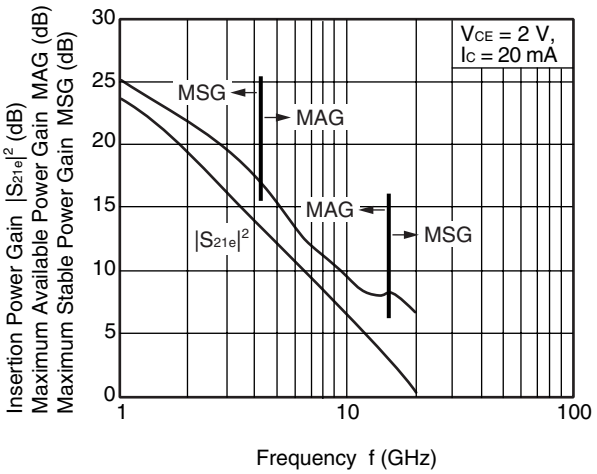

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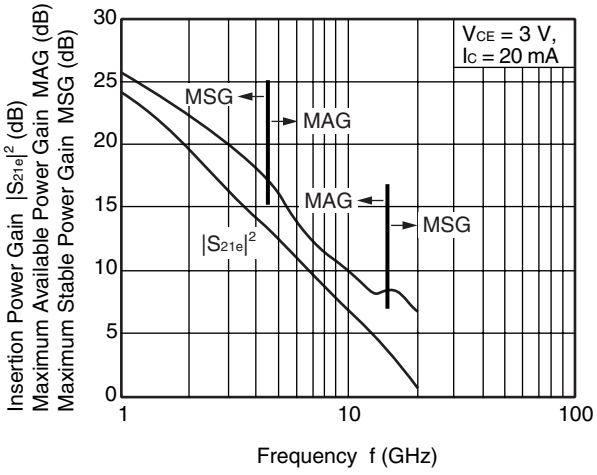

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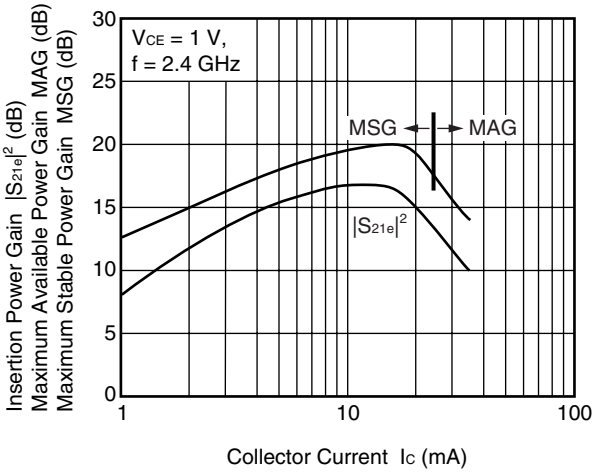

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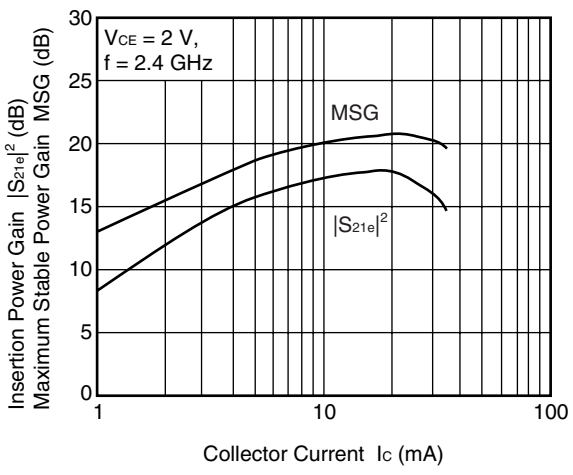

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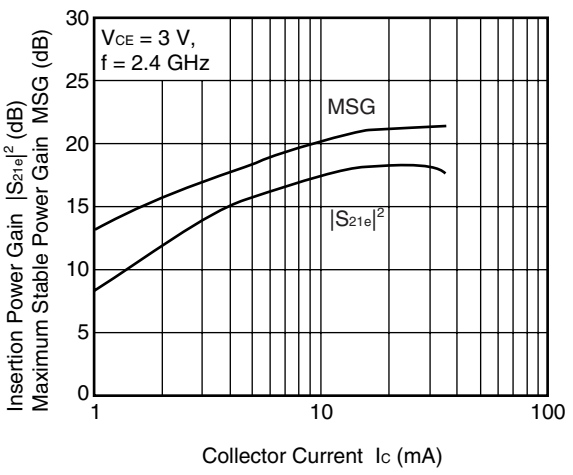

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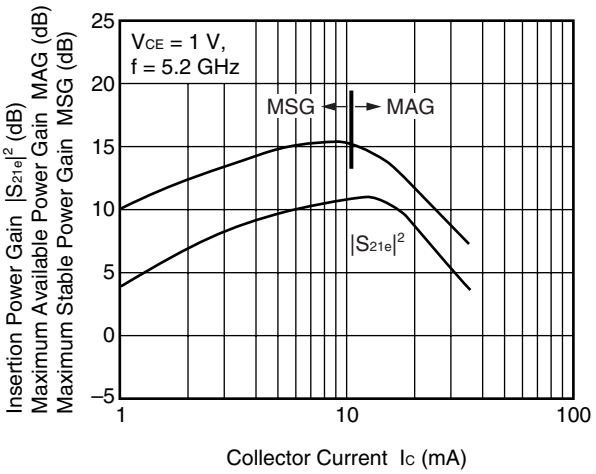

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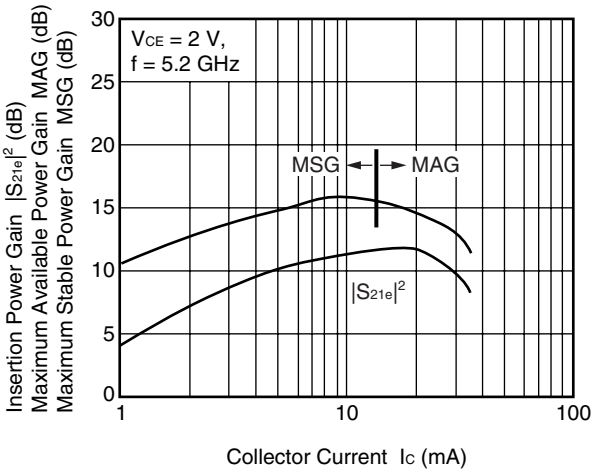

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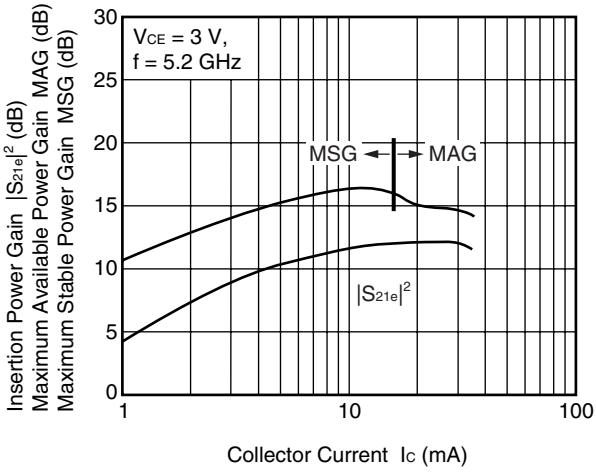

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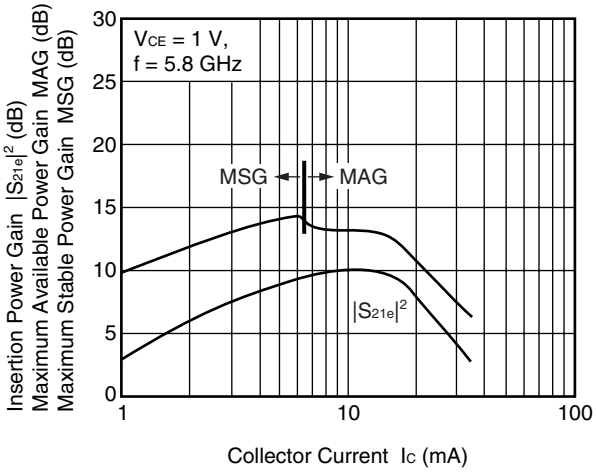

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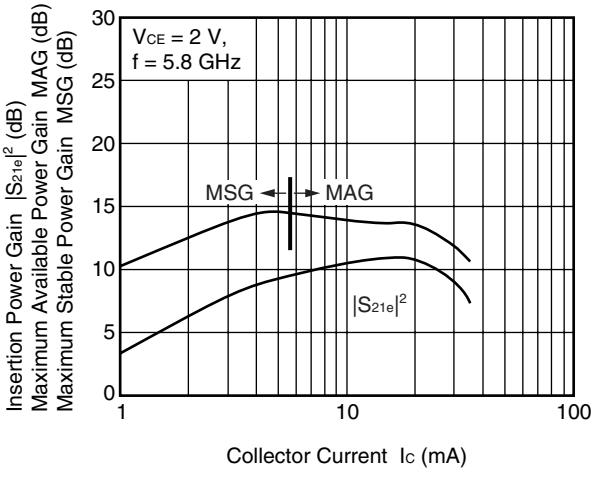

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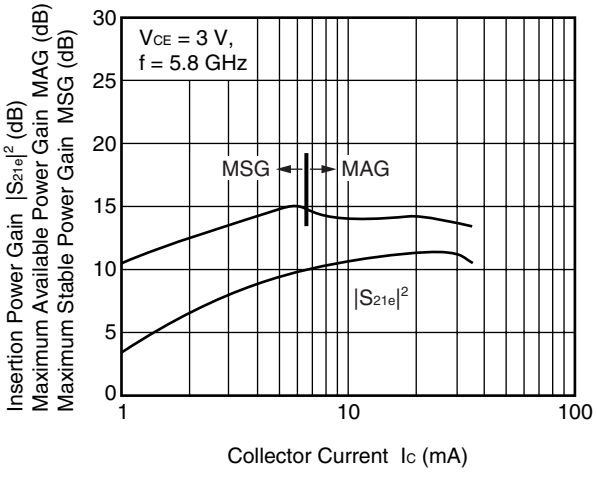

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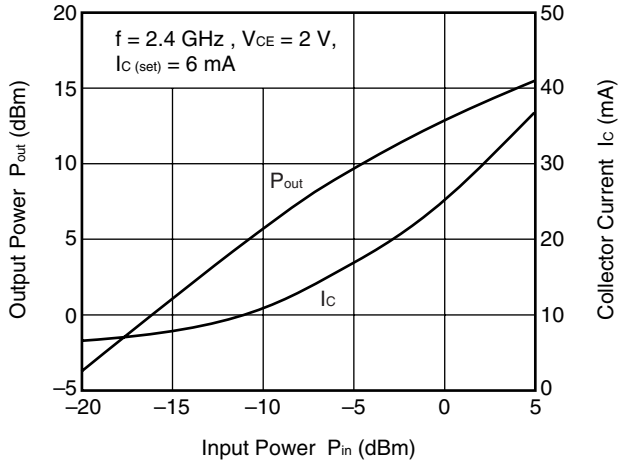
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



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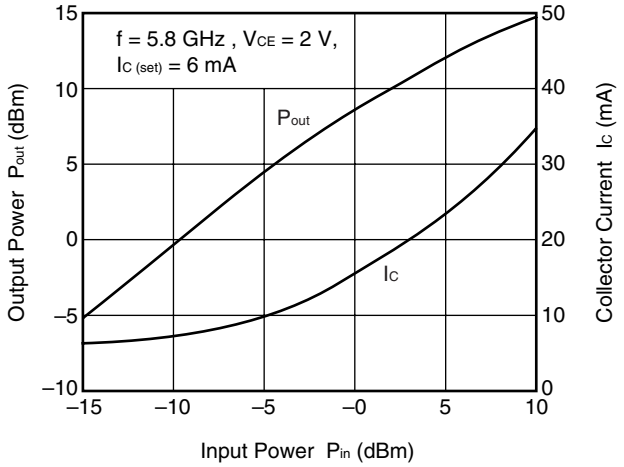
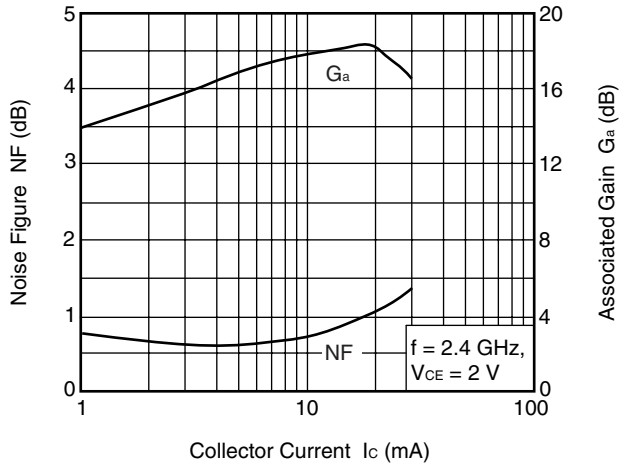
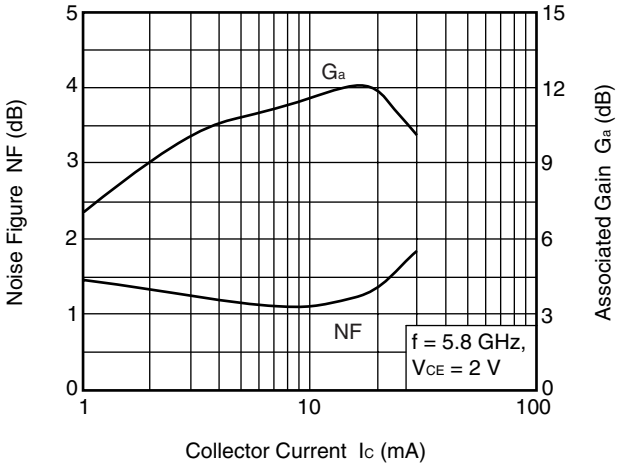


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

<R> **S-PARAMETERS**

S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

Click here to download S-parameters.

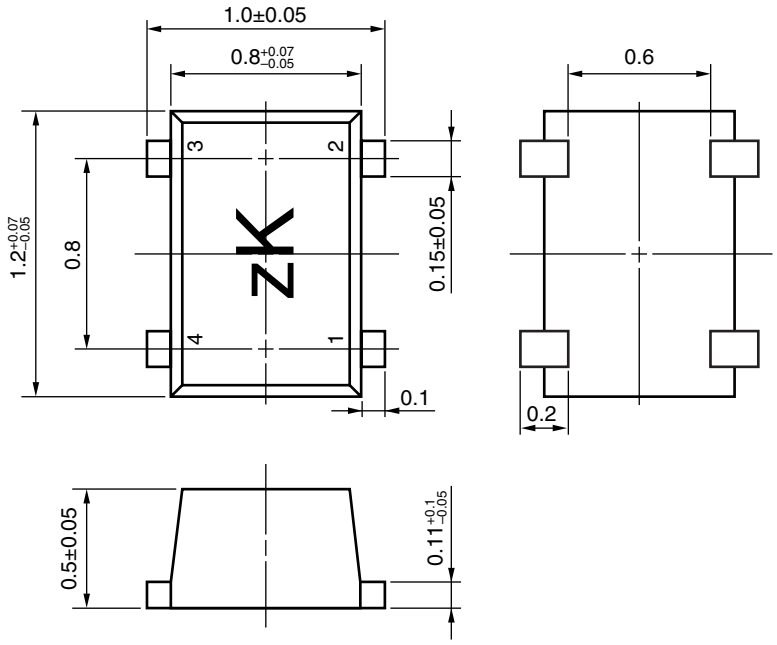
[RF and Microwave] → [Device Parameters]

URL http://www.necel.com/microwave/en/

<R> **PACKAGE DIMENSIONS**

4-PIN LEAD-LESS MINIMOLD (M14, 1208 PKG) (UNIT: mm)

(Top View) **(Bottom View)**



PIN CONNECTIONS

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

- **The information in this document is current as of August, 2009. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.**
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