



# 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)	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	(Pb-Free)	10 kpcs/reel	

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

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

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$ <sup>Note 1</sup>	5.0	V
Collector to Emitter Voltage	$V_{CEO}$	3.0	V
Base Current	$I_B$ <sup>Note 1</sup>	12	mA
Collector Current	$I_c$	35	mA
Total Power Dissipation	$P_{tot}$ <sup>Note 2</sup>	105	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

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

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

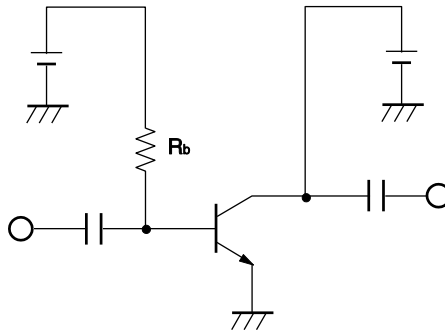
The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

**RECOMMENDED OPERATING RANGE (T<sub>A</sub> = +25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Input Power	P <sub>in</sub>	–	–	3	dBm
Base Feedback Resister	R <sub>b</sub>	–	–	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<sub>A</sub> = +25°C)**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
<b>DC Characteristics</b>						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 4.3 V, I <sub>E</sub> = 0 mA	–	–	100	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 0.4 V, I <sub>C</sub> = 0 mA	–	–	100	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA	270	400	540	–
<b>RF Characteristics</b>						
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, f = 5.8 GHz	8.5	10.5	–	dB
Noise Figure	NF	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	1.1	1.5	dB
Associated Gain	G <sub>a</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	9.5	11.5	–	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 2 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.12	0.25	pF
Maximum Stable Power Gain	MSG <sup>Note 3</sup>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 20 mA, f = 5.8 GHz	13	15	–	dB
Gain 1 dB Compression Output Power	P <sub>O(1dB)</sub>	V <sub>CE</sub> = 2 V, I <sub>C(set)</sub> = 6 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	9	–	dBm

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

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

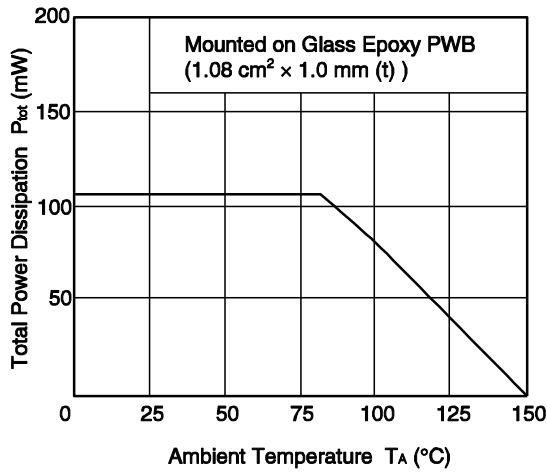
**h<sub>FE</sub> CLASSIFICATION**

<R>

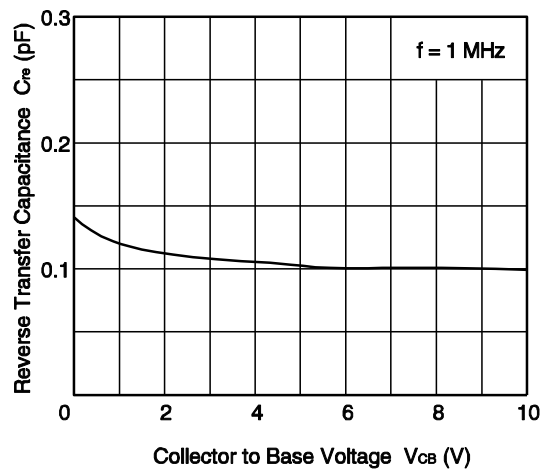
Rank	FB/YFB
Marking	zK
h <sub>FE</sub> Value	270 to 540

<R> TYPICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise specified)

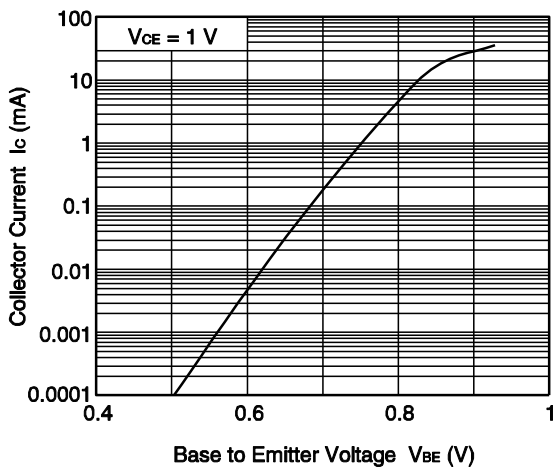
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



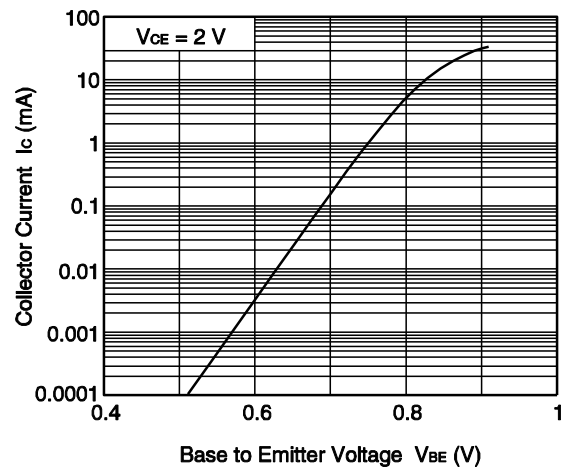
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



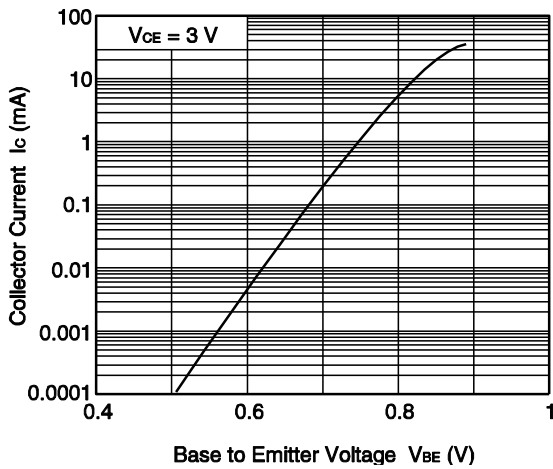
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



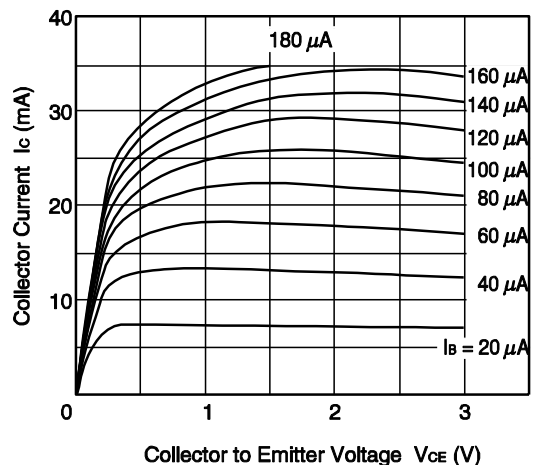
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

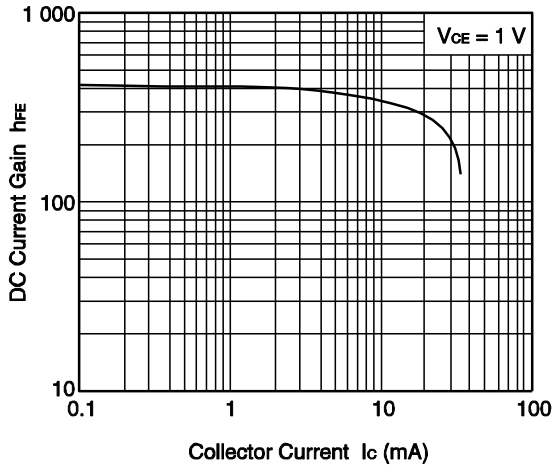


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

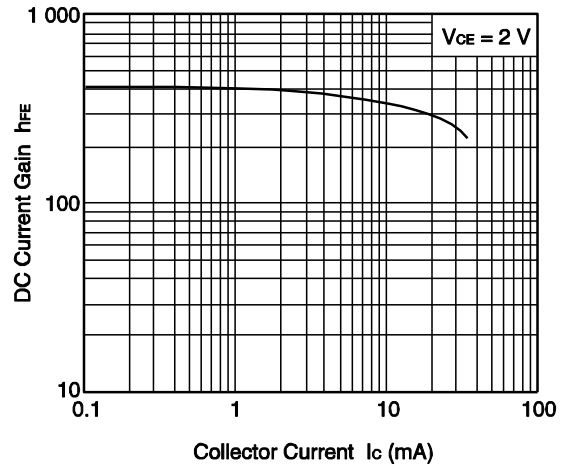


Remark The graphs indicate nominal characteristics.

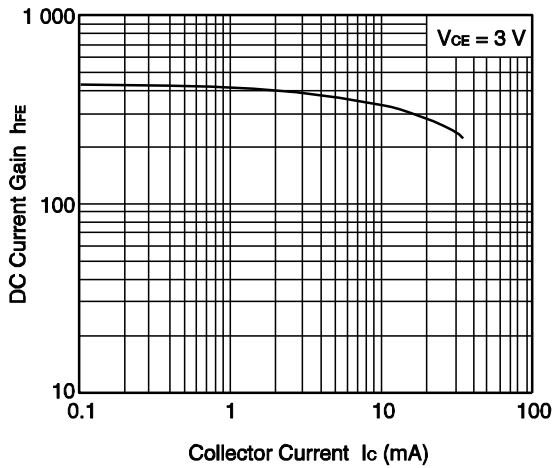
DC CURRENT GAIN vs. COLLECTOR CURRENT



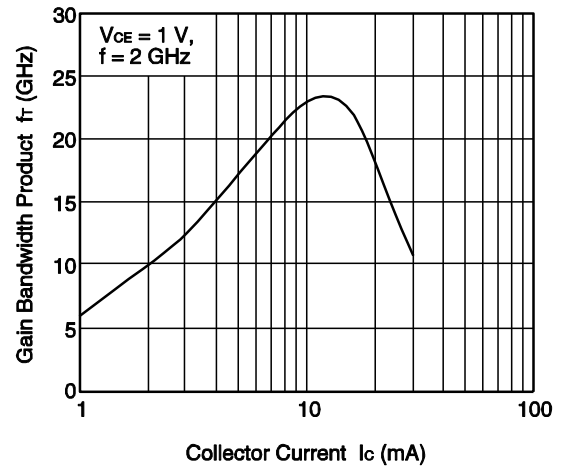
DC CURRENT GAIN vs. COLLECTOR CURRENT



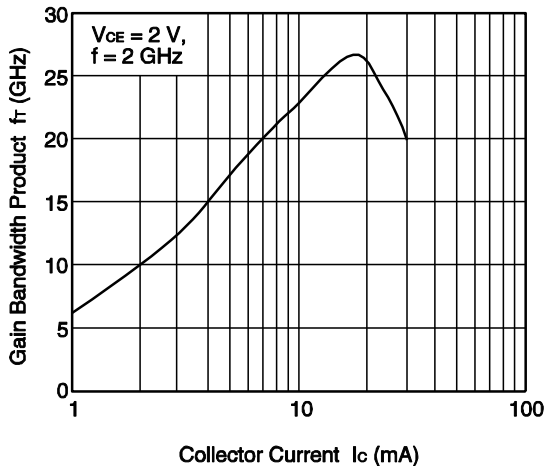
DC CURRENT GAIN vs. COLLECTOR CURRENT



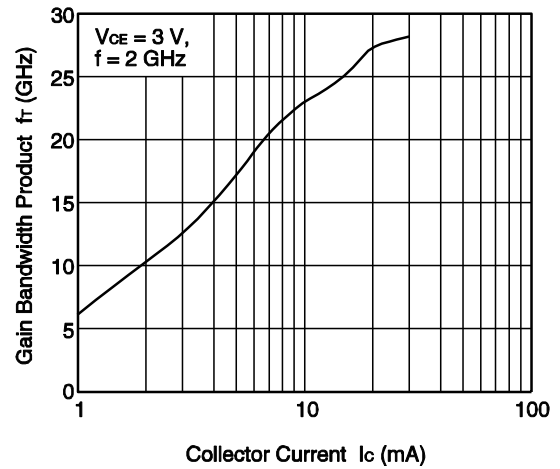
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

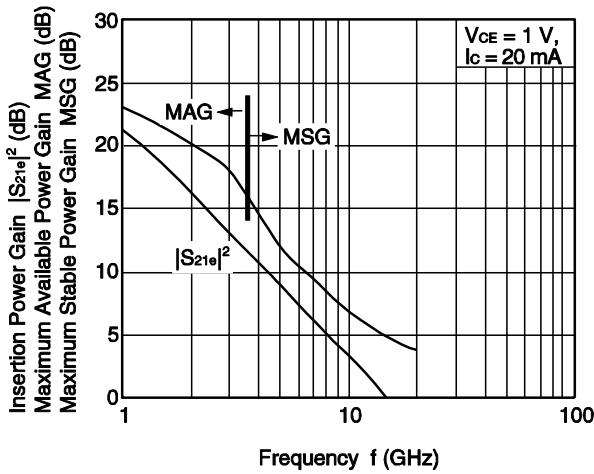


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

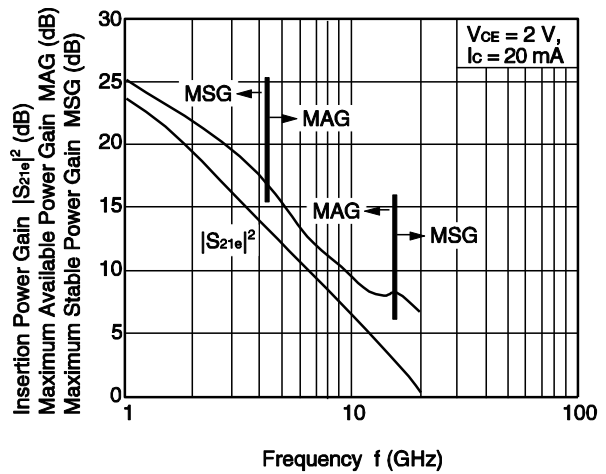


**Remark** The graphs indicate nominal characteristics.

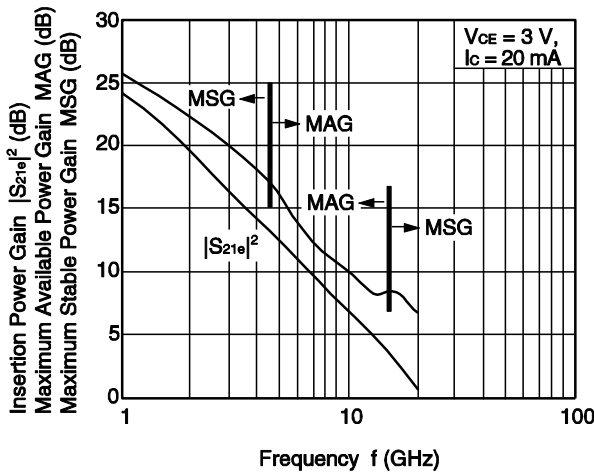
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



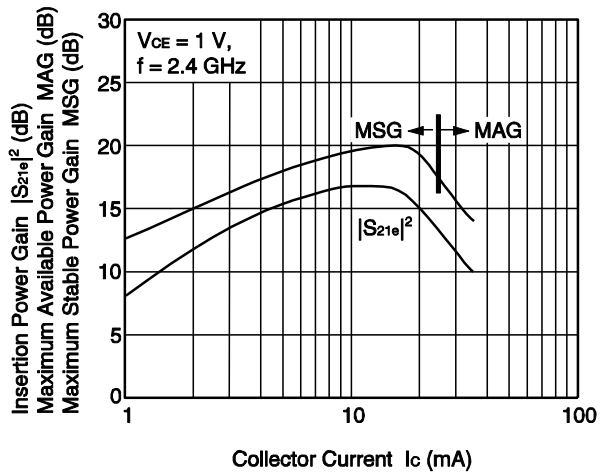
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



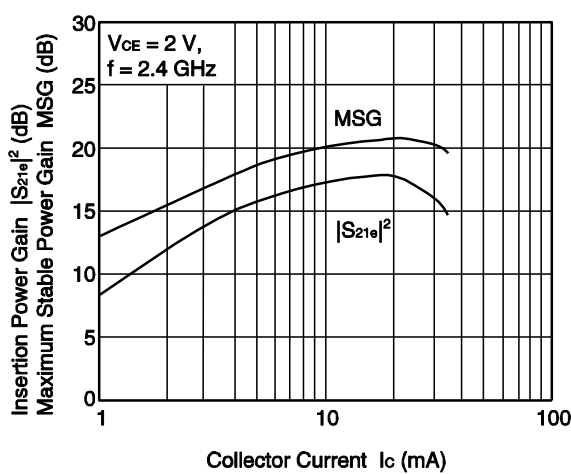
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



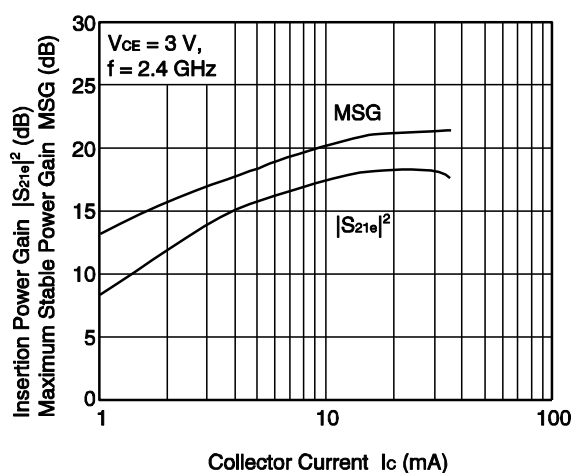
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MSG vs. COLLECTOR CURRENT

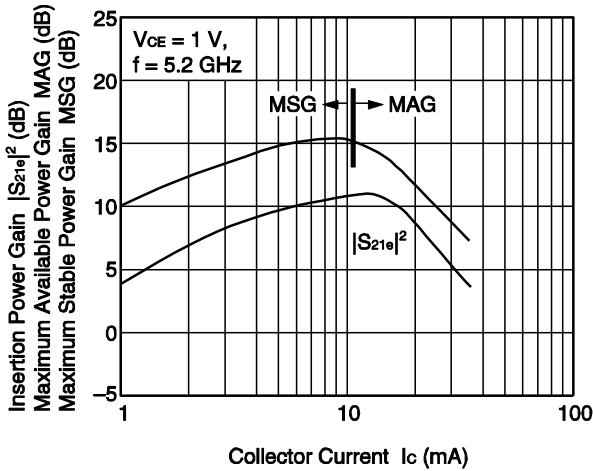


INSERTION POWER GAIN, MSG vs. COLLECTOR CURRENT

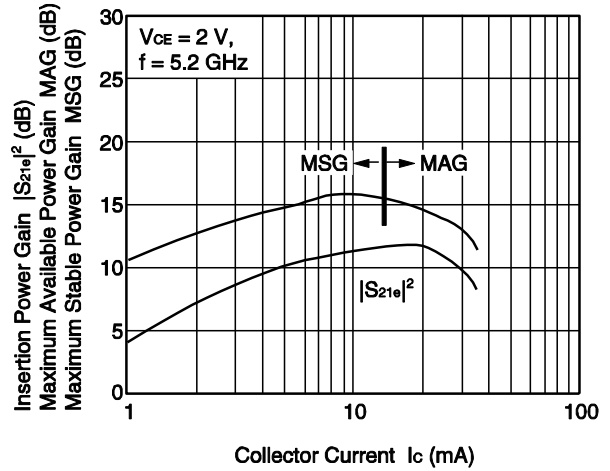


Remark The graphs indicate nominal characteristics.

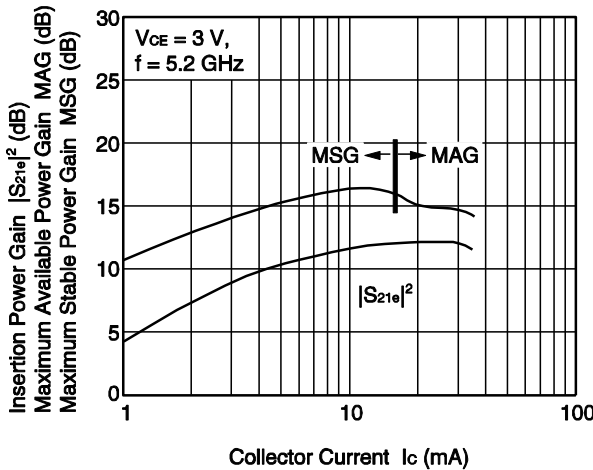
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



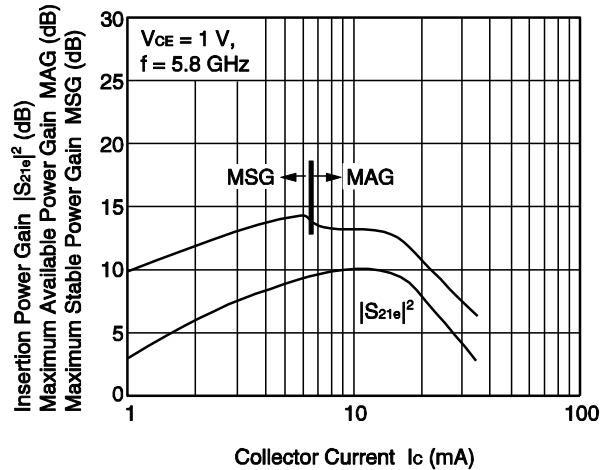
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



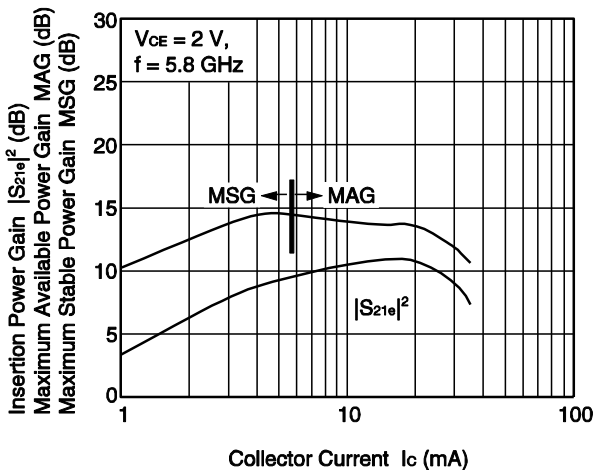
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



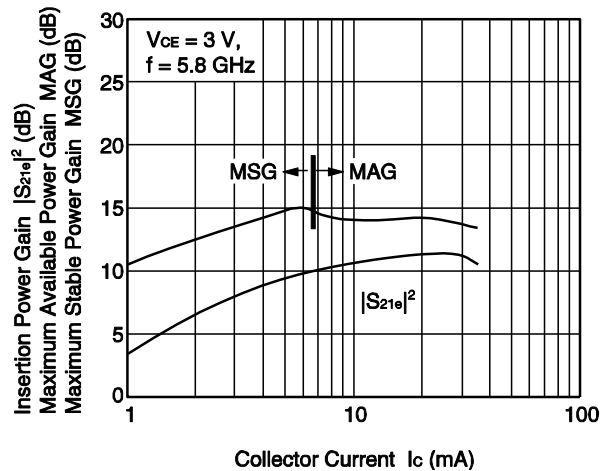
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

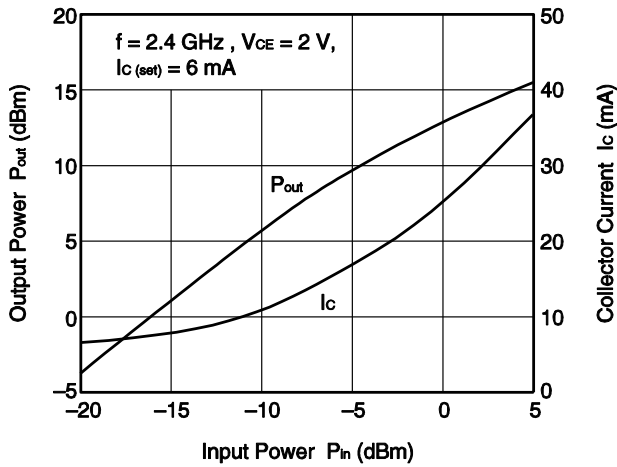


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

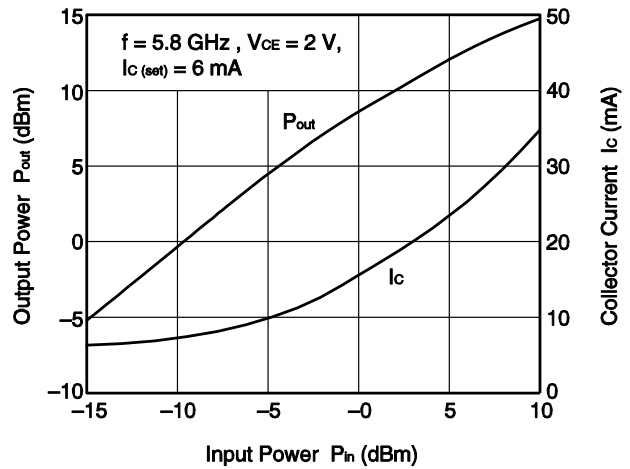


Remark The graphs indicate nominal characteristics.

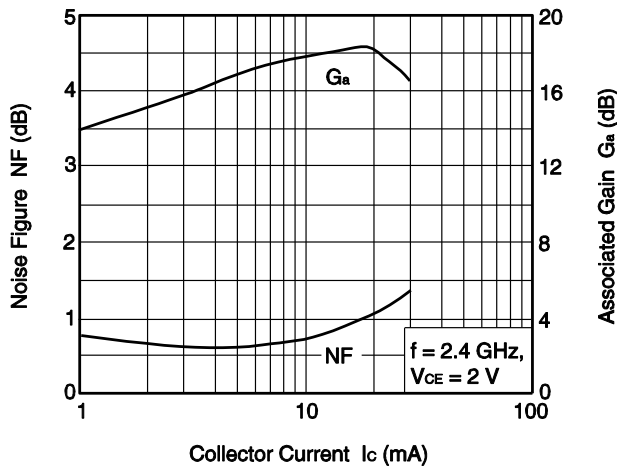
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



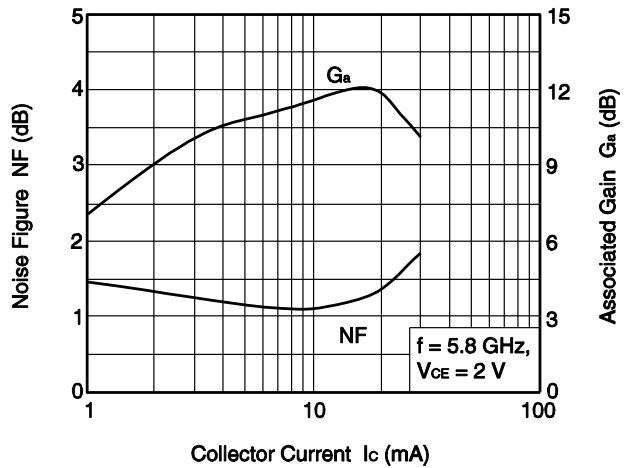
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



**Remark** The graphs indicate nominal characteristics.

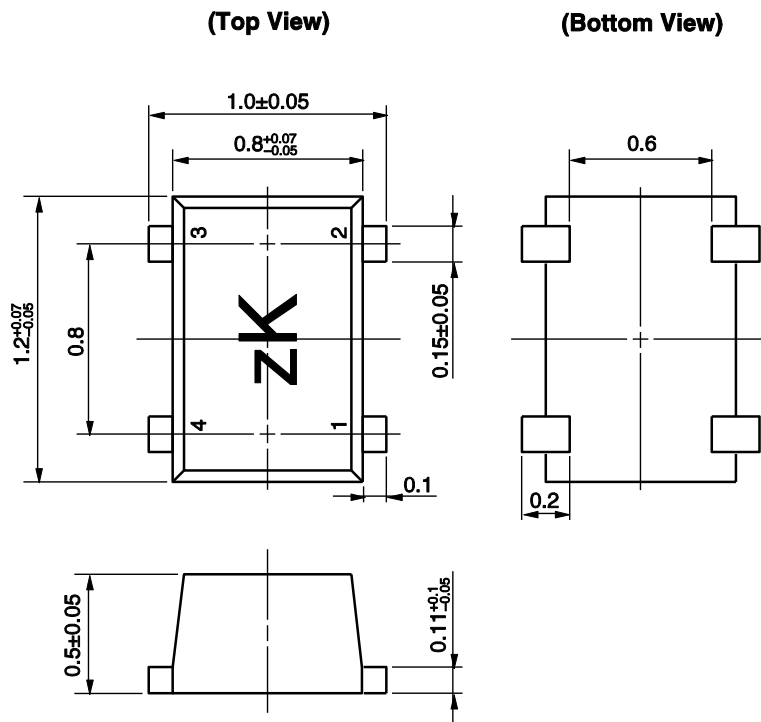
<R> **S-PARAMETERS**

- 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)**



**PIN CONNECTIONS**

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