NESG3032M14

Data Sheet

NPN SiGe RF Transistor for Low Noise, High-Gain Amplification 4-Pin Lead-Less Minimold (M14, 1208 PKG)

R09DS0048EJ0300
Rev.3.00
Sep 18, 2012

<R> **FEATURES**

- The NESG3032M14 is an ideal choice for low noise, high-gain amplification
  NF = 0.6 dB TYP. @ V_{CE} = 2 V, I_C = 6 mA, f = 2.0 GHz
- Maximum stable power gain: MSG = 20.5 dB TYP. @ V_{CE} = 2 V, I_C = 15 mA, f = 2.0 GHz
- SiGe HBT technology (UHS3) adopted: f_{max} = 110 GHz
- 4-pin lead-less minimold (M14, 1208 PKG)

<R> **ORDERING INFORMATION**

Part Number	Order Number	Package	Quantity	Supplying Form
NESG3032M14	NESG3032M14-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 (NC) face the perforation side of the tape
NESG3032M14-T3	NESG3032M14-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}	12.0	V
Collector to Emitter Voltage	V_{CEO}	4.3	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot} Note	150	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–65 to +150	°C

Note Mounted on 1.08 cm^2 × 1.0 mm (t) glass epoxy PWB

CAUTION

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

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.

<R> 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	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V, I_C = 0	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 2 V, I_C = 6 mA	220	300	380	–
RF Characteristics						
Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 2 V, I_C = 15 mA, f = 2.0 GHz	15.0	17.5	–	dB
Noise Figure	NF	V_{CE} = 2 V, I_C = 6 mA, f = 2.0 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	0.60	0.85	dB
Associated Gain	G_a	V_{CE} = 2 V, I_C = 6 mA, f = 2.0 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	17.5	–	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 2 V, I_E = 0, f = 1 MHz	–	0.15	0.25	pF
Maximum Stable Power Gain	MSG Note 3	V_{CE} = 2 V, I_C = 15 mA, f = 2.0 GHz	17.5	20.5	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	V_{CE} = 3 V, $I_{C\ (set)}$ = 20 mA, f = 2.0 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	12.5	–	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP_3	V_{CE} = 3 V, $I_{C\ (set)}$ = 20 mA, f = 2.0 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	24.0	–	dBm

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

2. Collector to base capacitance when the emitter grounded

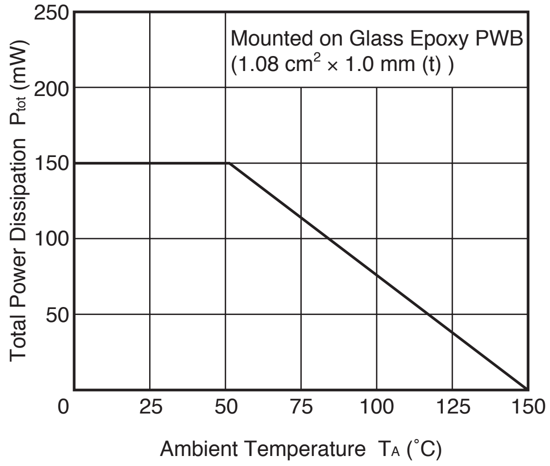
3. $MSG = \left|\frac{S_{21}}{S_{12}}\right|$

<R> h_{FE} CLASSIFICATION

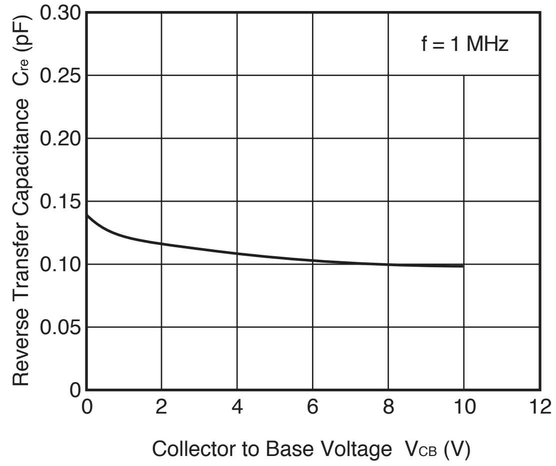
Rank	FB/YFB
Marking	zN
h_{FE} Value	220 to 380

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

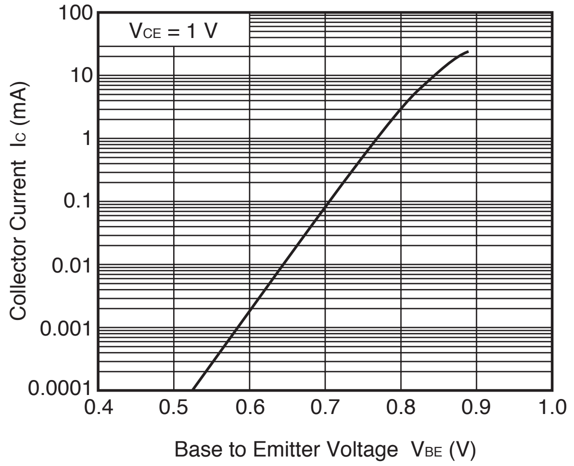
TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



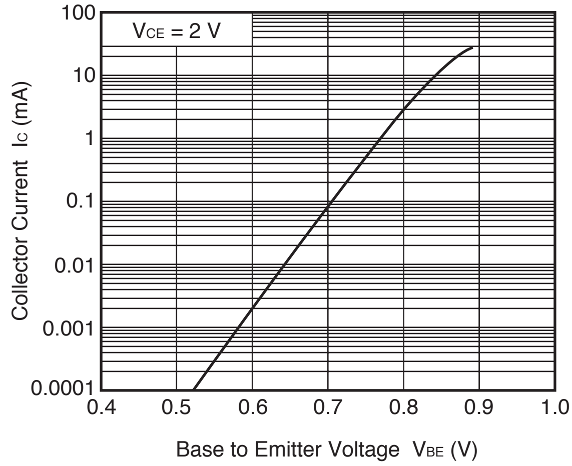
REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



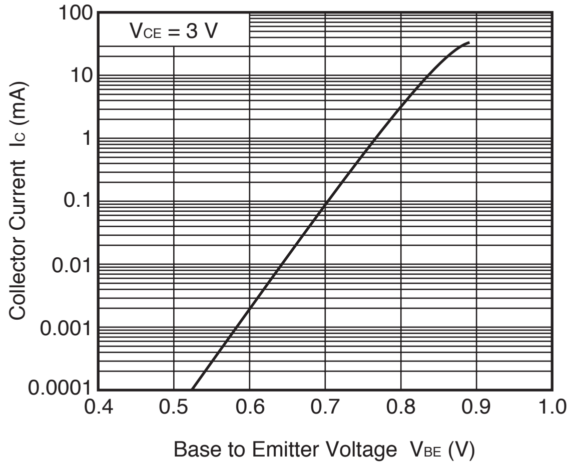
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



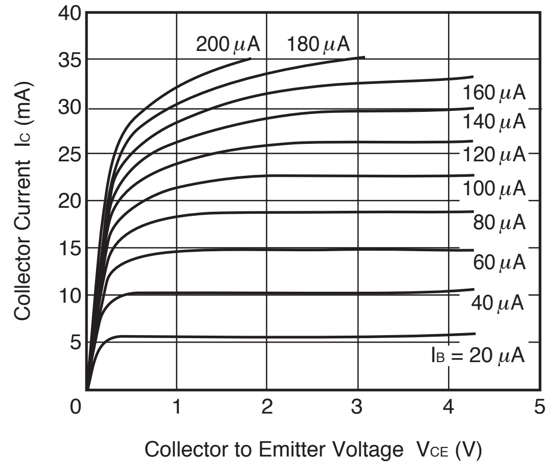
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

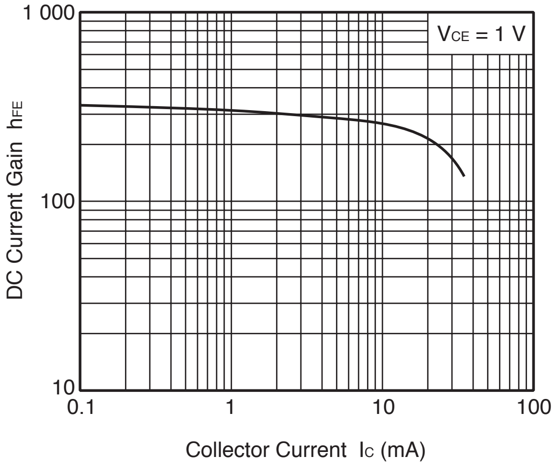


COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE

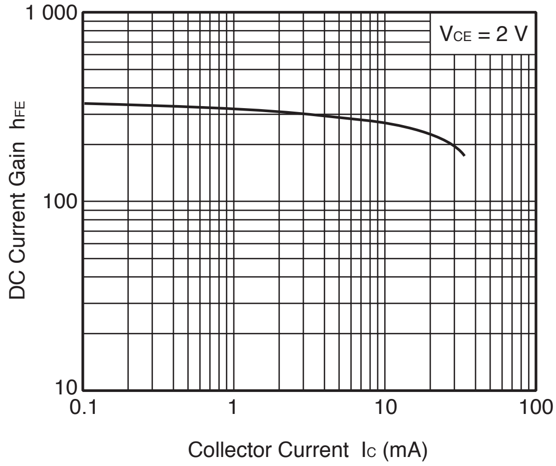


Remark The graphs indicate nominal characteristics.

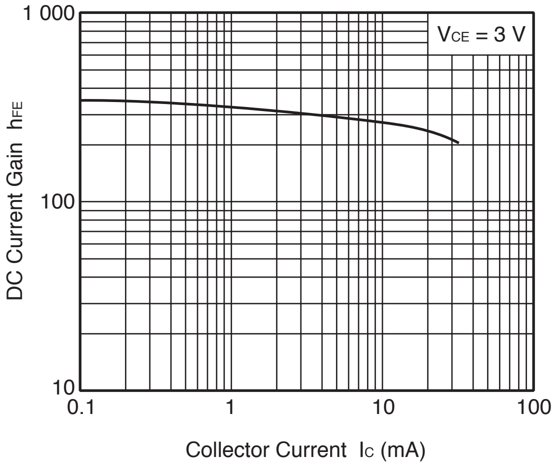
DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT

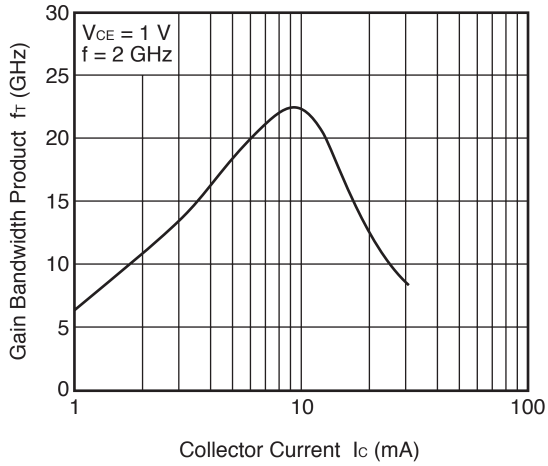


DC CURRENT GAIN vs.
COLLECTOR CURRENT

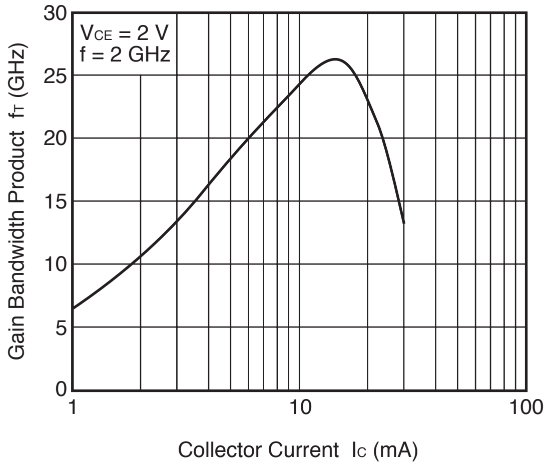


Remark The graphs indicate nominal characteristics.

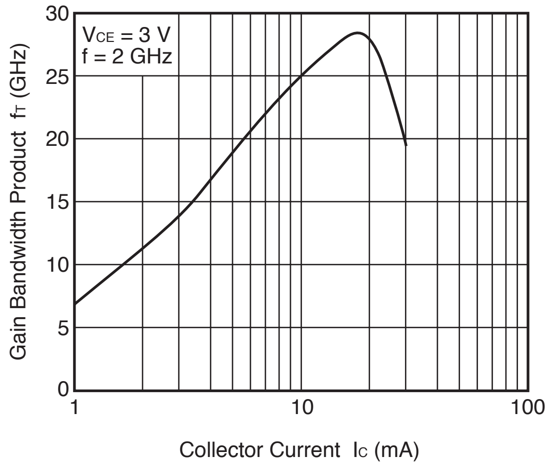
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



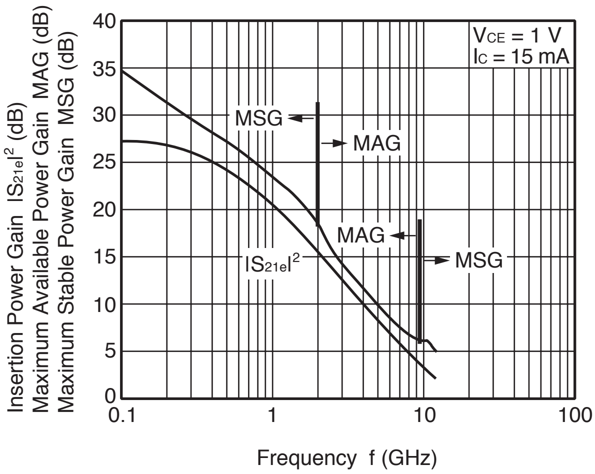
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



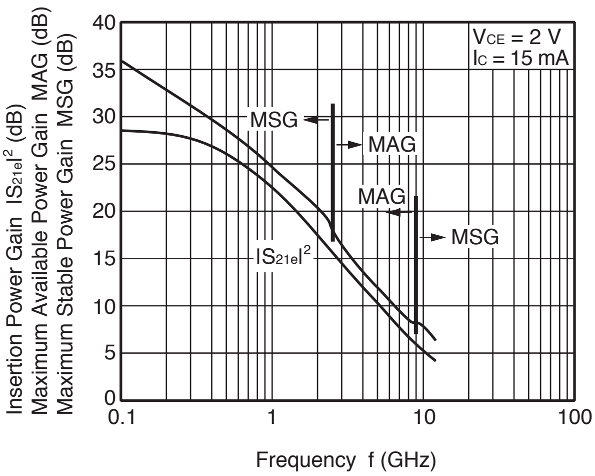
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



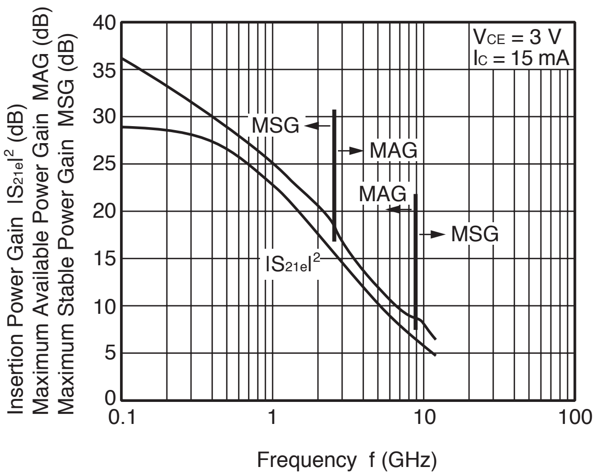
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

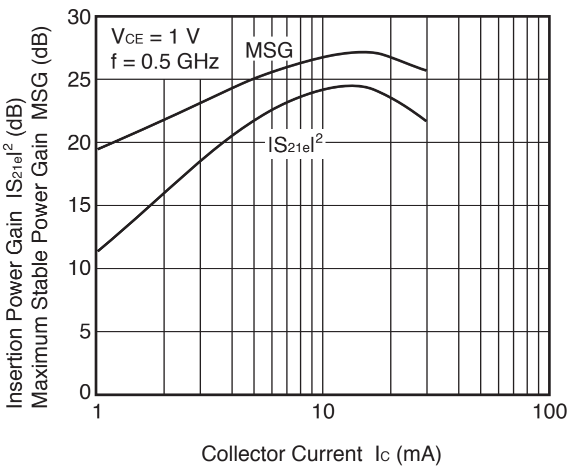


INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

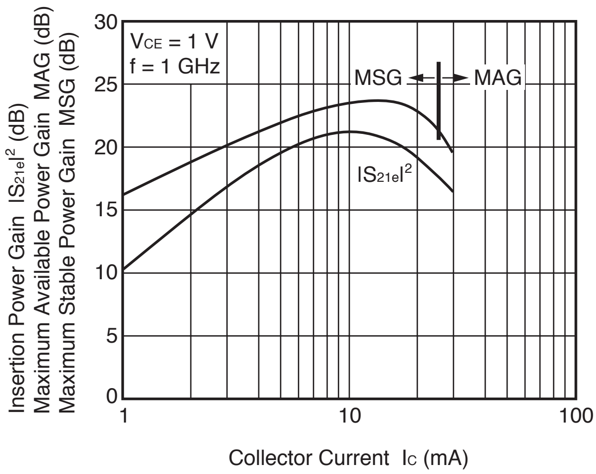


Remark The graphs indicate nominal characteristics.

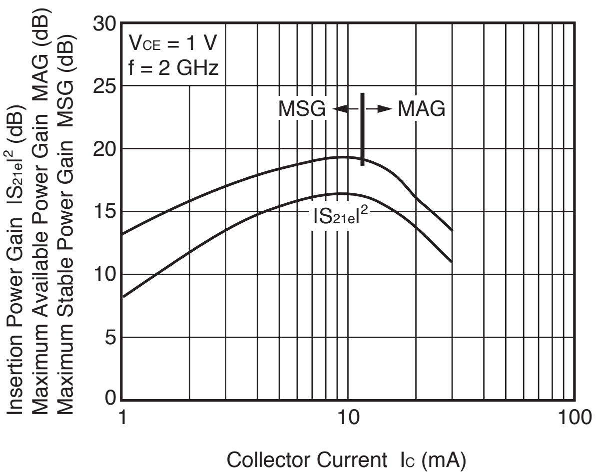
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



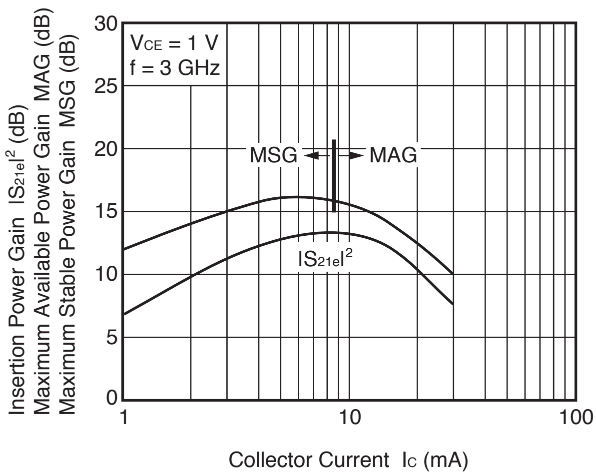
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



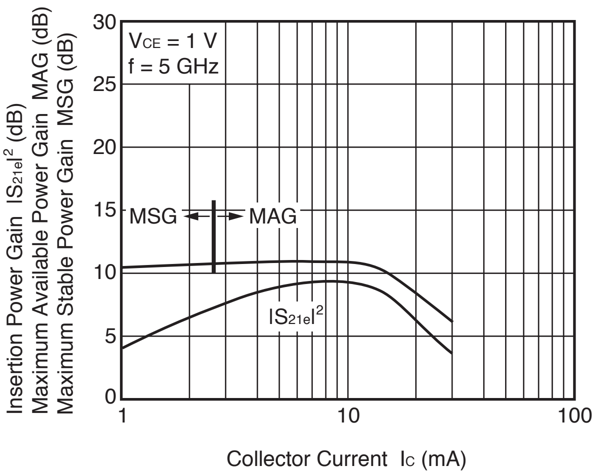
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



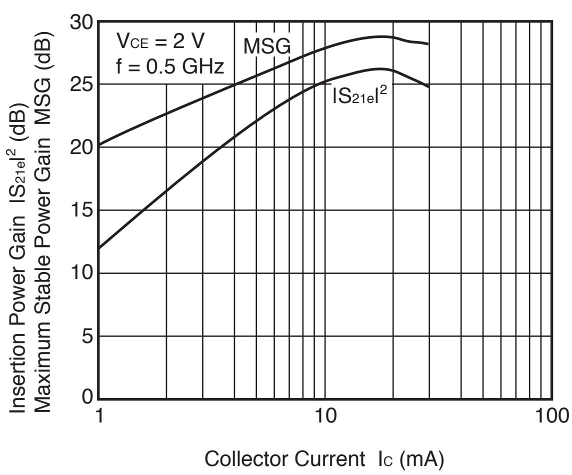
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



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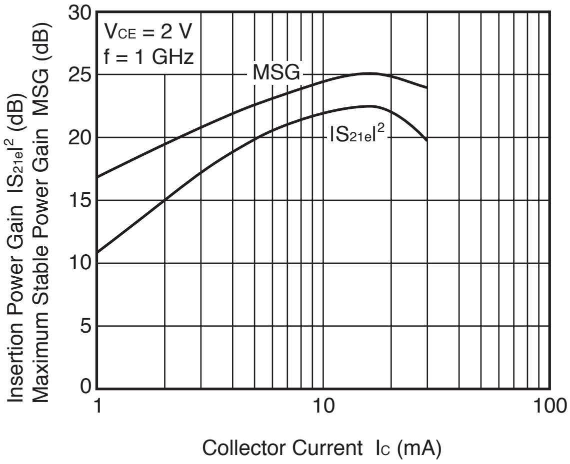
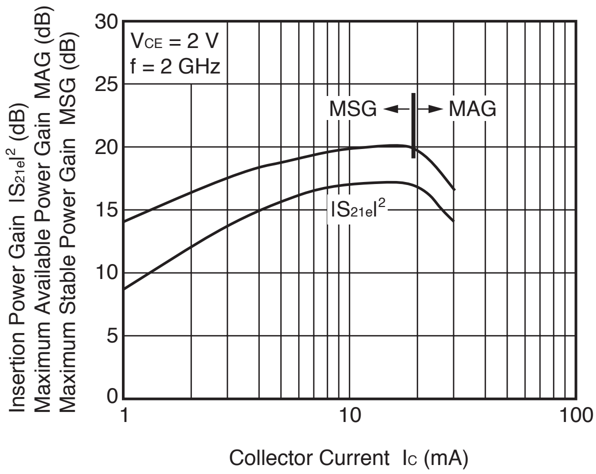
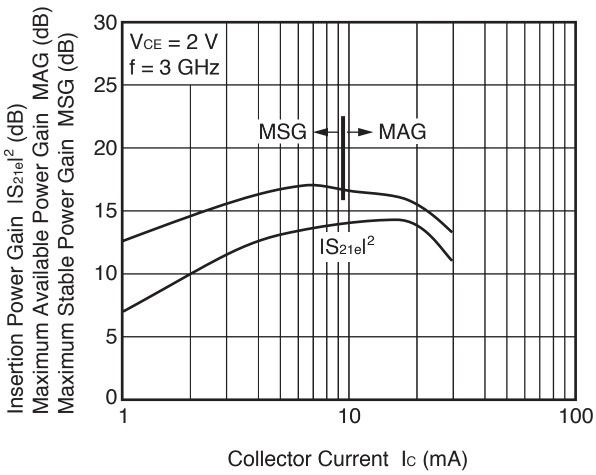
INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



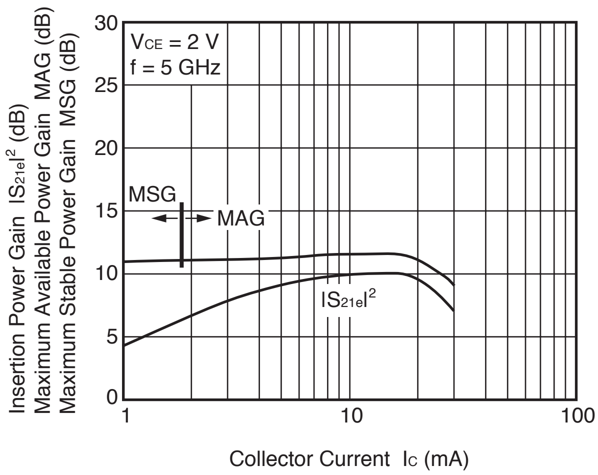
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



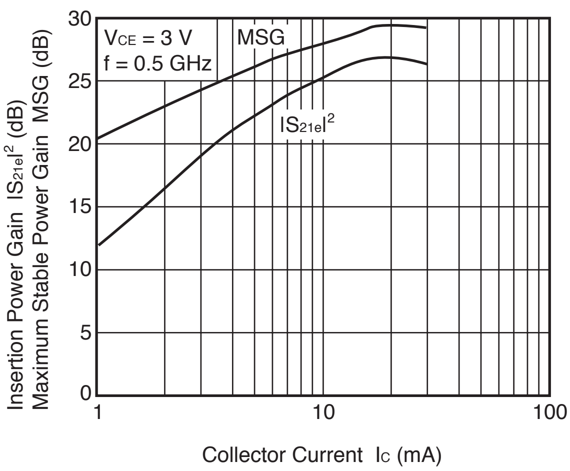
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



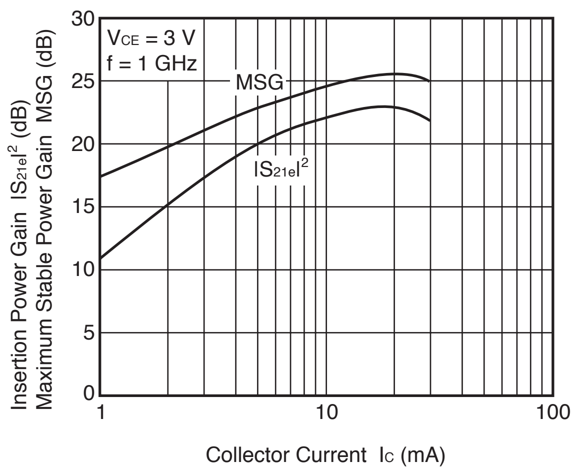
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



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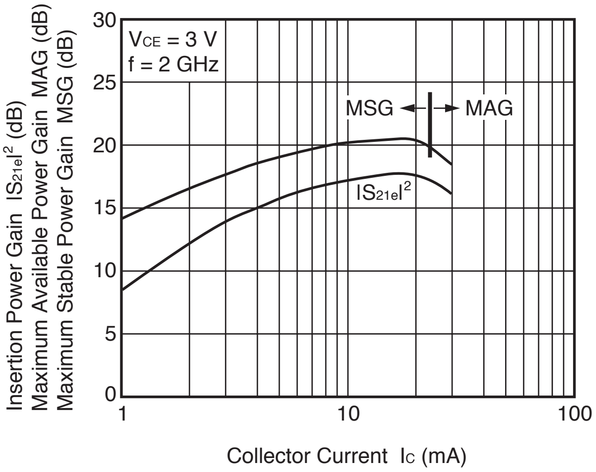
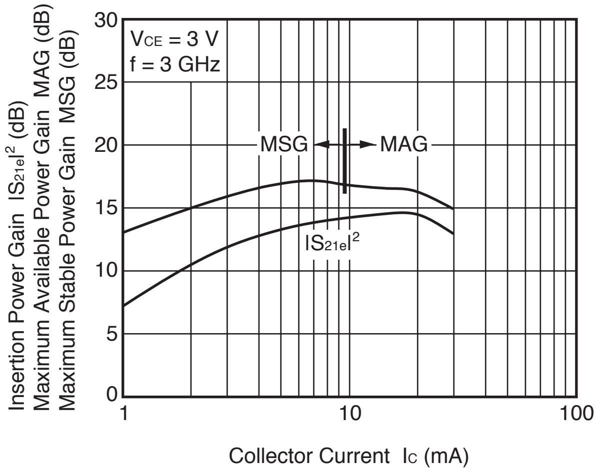
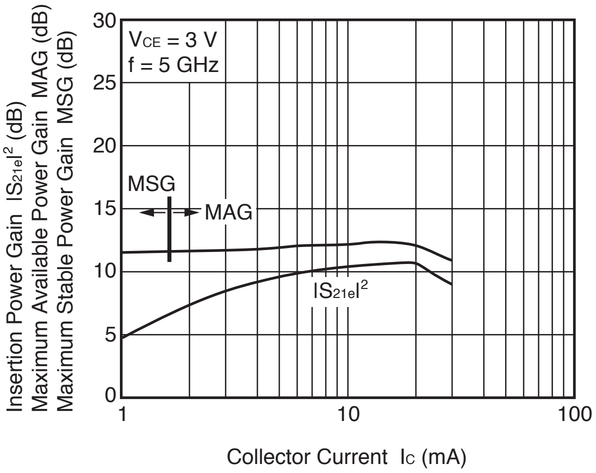
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

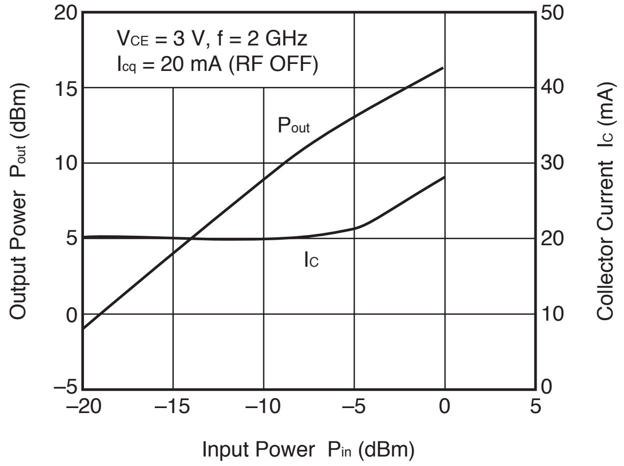


INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



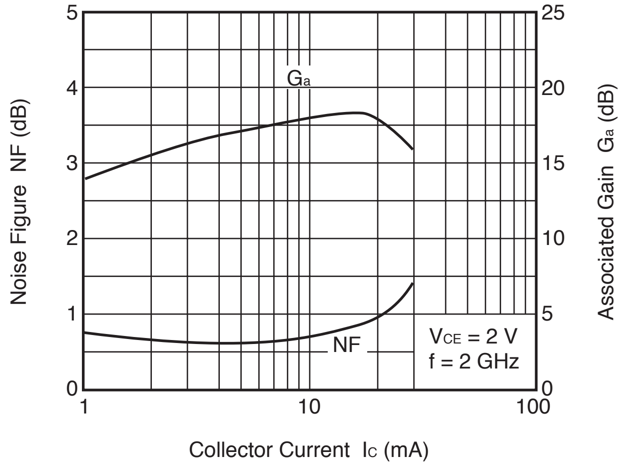
Remark The graphs indicate nominal characteristics.

OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



Measuring method : Measured at power matched with external sleeve tuner. (The load resistance is not inserted between the base DC power supply and Bias Tee.)

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

<R> **S-PARAMETERS**

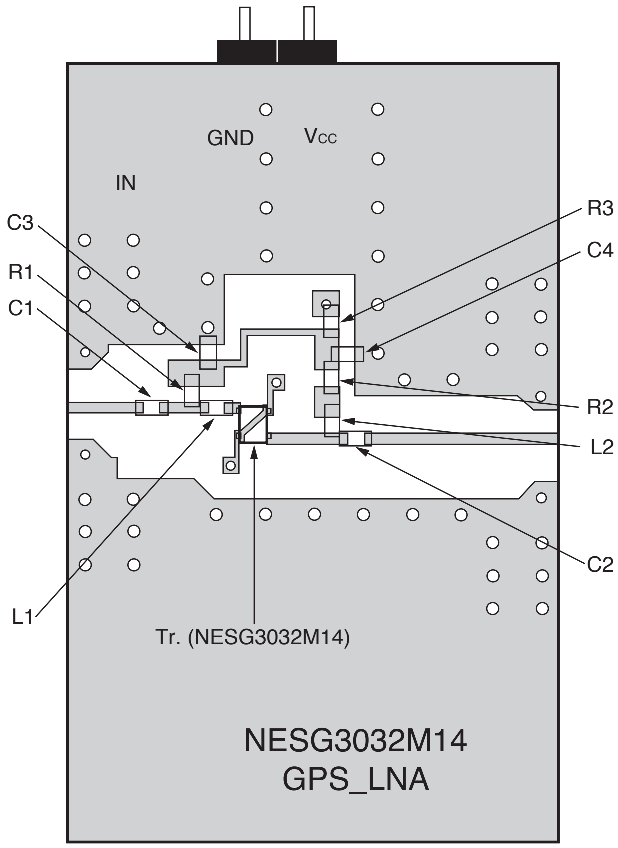
S-parameters and noise parameters are provided on our web site in a form (S2P) that enables direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

Click here to download S-parameters.

[Products] → [RF Devices] → [Device Parameters]

URL http://www.renesas.com/products/microwave/

<R> **EVALUATION CIRCUIT EXAMPLE (f = 1.575 GHz LNA)**

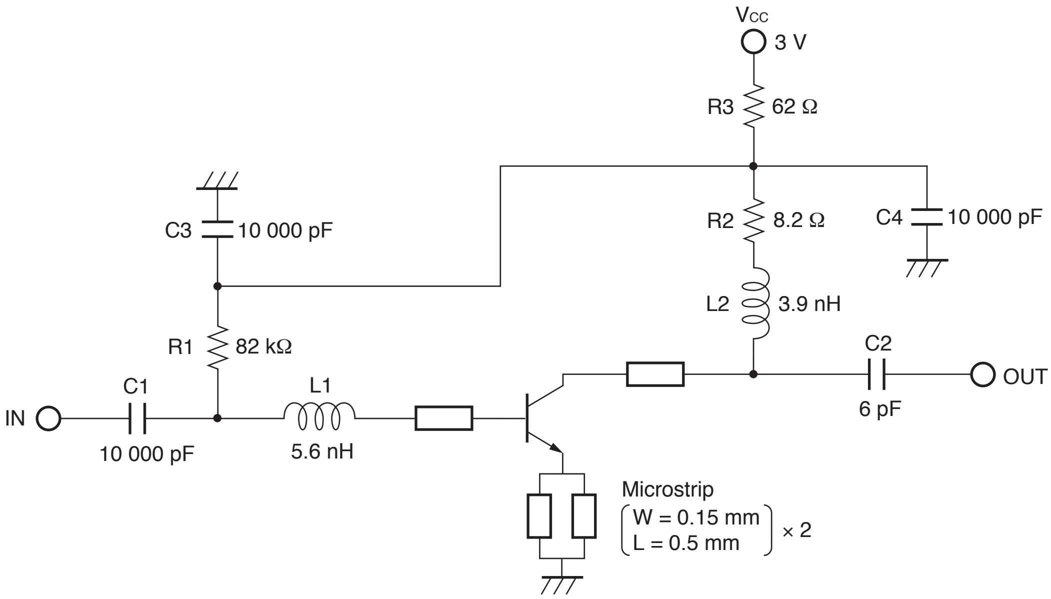


Notes 1. 15 × 24 mm, t = 0.2 mm double sided copper clad glass epoxy PWB.

2. Au plated on pattern

3. ○ : Through holes

<R> **EVALUATION CIRCUIT (f = 1.575 GHz LNA)**



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

<R> **COMPONENT LIST**

Symbol	Parts	Part Number	Maker	Value
C1, C3, C4	Chip Capacitor	GRM155B31H103KA88	Murata	10 000 pF
C2	Chip Capacitor	GRM1552C1H6R0DZ01	Murata	6 pF
L1	Chip Inductor	AML1005H5N6STS	FDK	5.6 nH
L2	Chip Inductor	AML1005H3N9STS	FDK	3.9 nH
R1	Chip Resistor	MCR01MZPJ823	ROHM	82 kΩ
R2	Chip Resistor	MCR01MZPJ8R2	ROHM	8.2 Ω
R3	Chip Resistor	MCR01MZPJ620	ROHM	62 Ω

<R>

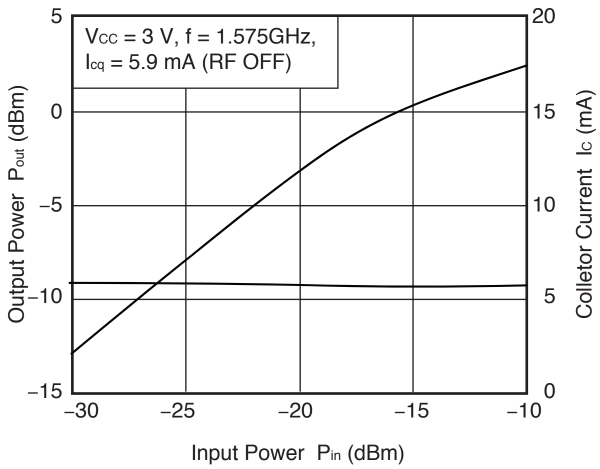
EXAMPLE OF CHARACTERISTICS FOR f = 1.575 GHz LNA EVALUATION BOARD

ELECTRICAL CHARACTERISTICS (T_A = +25°C, V_{CC} = 3 V, I_C = 5.9 mA, f = 1.575 GHz)

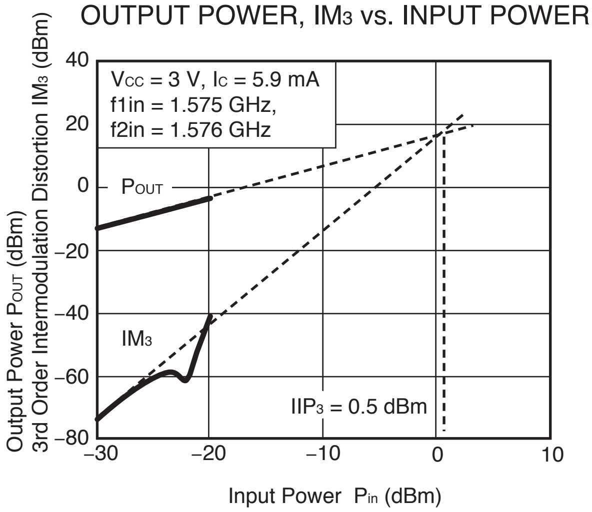
Parameter	Symbol	Value	Unit
Noise Figure	NF	0.72	dB
Gain	G_a	17.2	dB
Input Return Loss	RL_{in}	10.2	dB
Output Return Loss	RL_{out}	16.0	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	–0.9	dBm
Input 3rd Order Distortion Intercept Point	IIP_3	0.5	dBm

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

OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



OUTPUT POWER, IM3 vs. INPUT POWER

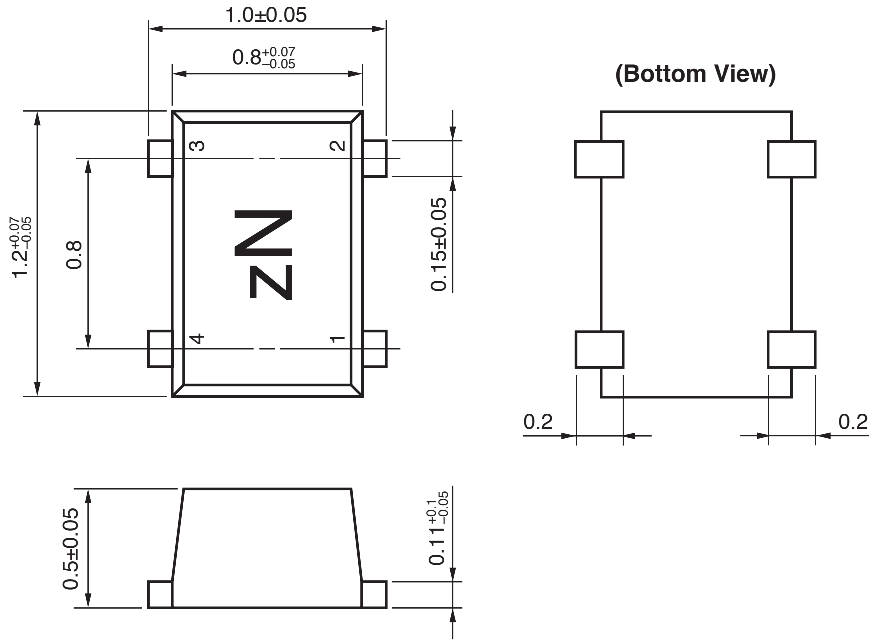


Remark The graph indicates nominal characteristics.

<R>

PACKAGE DIMENSIONS

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



PIN CONNECTIONS

1. Collector
2. Emitter
3. Base
4. NC (Connected with Pin 2) **Note**

Note A NC pin is Non-connection in the mold package (When NC-pin is open state, it will get an influences of floating capacitance. Therefore, we recommend that NC pin connect to Emitter pin).

Revision History	NESG3032M14 Data Sheet

Rev.	Date	Description	
		Page	Summary
1.00	Jul 19, 2005	–	First edition issued
2.00	Sep 11, 2007	–	Second edition issued
3.00	Sep 18, 2012	Throughout	The company name is changed to Renesas Electronics Corporation.
		p.1	Modification of FEATURES
		p.1	Modification of ORDERING INFORMATION
		p.2	Modification of ELECTRICAL CHARACTERISTICS
		p.2	Modification of h_{FE} CLASSIFICATION
		p.9	Modification of method for obtaining S-parameters
		p.10	Addition of EVALUTION CIRCUIT EXAMPLE
		p.11	Addition of EVALUTION CIRCUIT
		p.11	Addition of COMPONENT LIST
		p.12	Addition of EXAMPLE OF CHARACTERISTICS FOR f = 1.575 GHz LNA EVALUATION BOARD
		p.13	Modification of PACKAGE DIMENSIONS