NESG2031M05

Data Sheet

NPN SiGe RF Transistor for Low Noise, High-Gain Amplification
Flat-Lead 4-Pin Thin-Type Super Minimold (M05)

R09DS0035EJ0400
Rev. 4.00
Jun 20, 2012

FEATURES

- The device is an ideal choice for low noise, high-gain at low current amplifications.
  NF = 0.8 dB TYP., Ga = 17.0 dB TYP. @ V_{CE} = 2 V, I_C = 5 mA, f = 2 GHz
  NF = 1.3 dB TYP., G_a = 10.0 dB TYP. @ V_{CE} = 2 V, I_C = 5 mA, f = 5.2 GHz
- Maximum stable power gain: MSG = 21.5 dB TYP. @ V_{CE} = 3 V, I_C = 20 mA, f = 2 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

<R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG2031M05	NESG2031M05-A	Flat-lead 4-pin thin-type supper minimold (M05, 2012 PKG) (Pb-Free)	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 3 (Collector), Pin 4 (Emitter) face the perforation side of the tape
NESG2031M05-T1	NESG2031M05-T1-A		3 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}	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	35	mA
Total Power Dissipation	P_{tot} Note	175	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 PCB

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 = 5 mA	130	190	260	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz	20	25	–	GHz
Insertion Power Gain	S_{21e} 2	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz	16.0	18.0	–	dB
Noise Figure (1)	NF	V_{CE} = 2 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	0.8	1.1	dB
Noise Figure (2)	NF	V_{CE} = 2 V, I_C = 5 mA, f = 5.2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	1.3	–	dB
Associated Gain (1)	G_a	V_{CE} = 2 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	15.0	17.0	–	dB
Associated Gain (2)	G_a	V_{CE} = 2 V, I_C = 5 mA, f = 5.2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	10.0	–	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} = 3 V, I_C = 20 mA, f = 2 GHz	19.0	21.5	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	13	–	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP_3	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	–	23	–	dBm

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

2. Collector to base capacitance when the emitter grounded

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

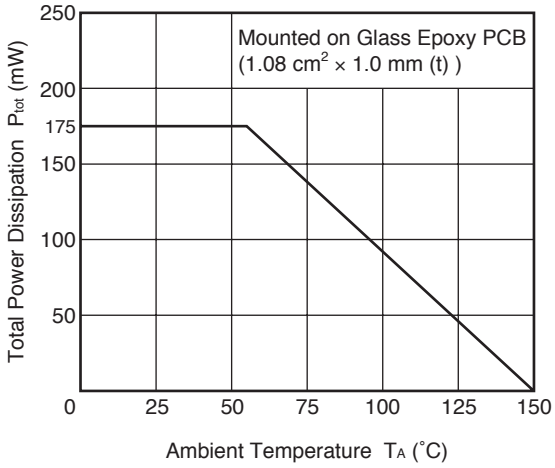
h_{FE} CLASSIFICATION

<R>

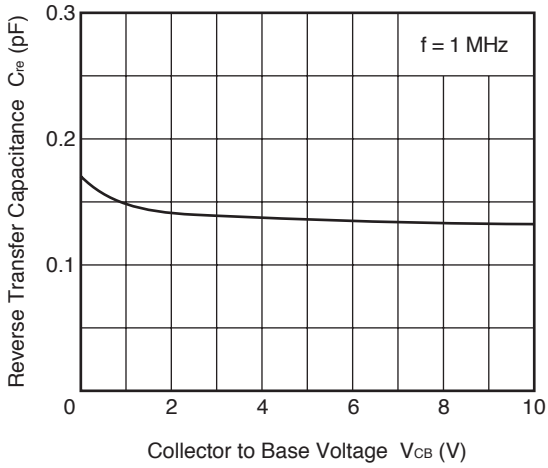
Rank	FB/YFB
Marking	T1H
h_{FE} Value	130 to 260

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

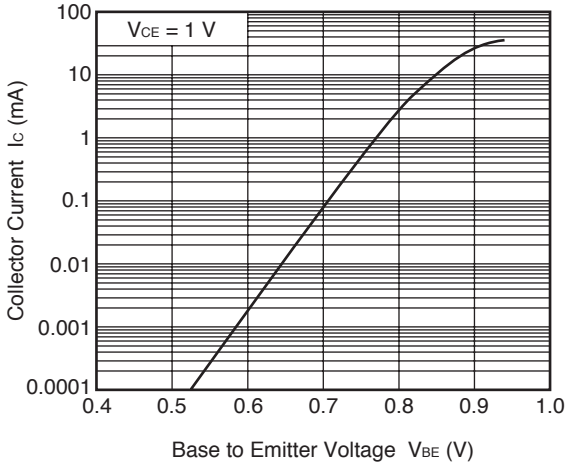
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



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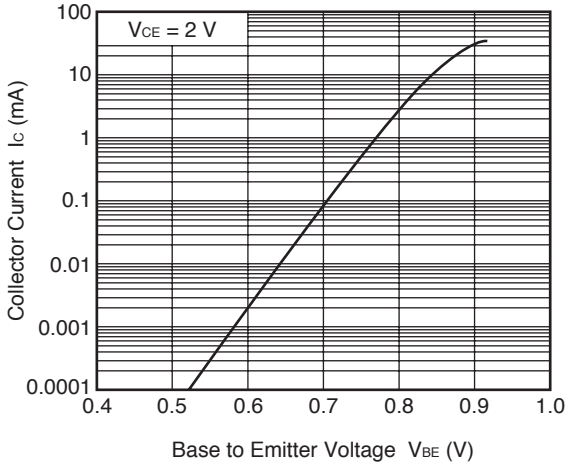

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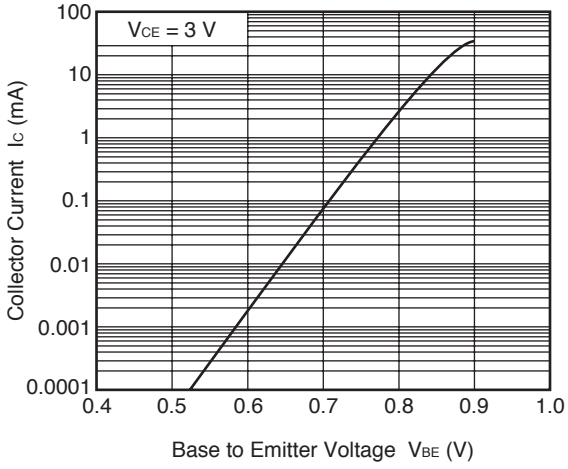
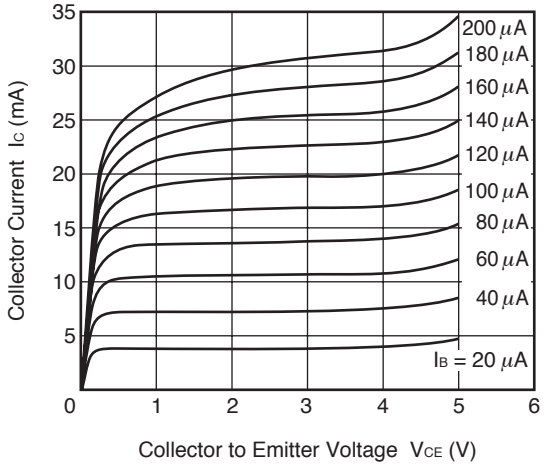
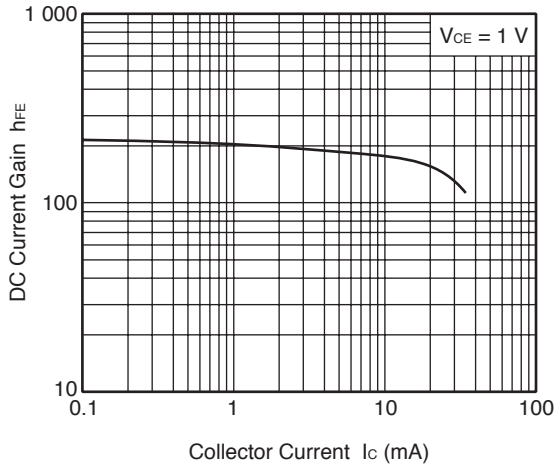


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

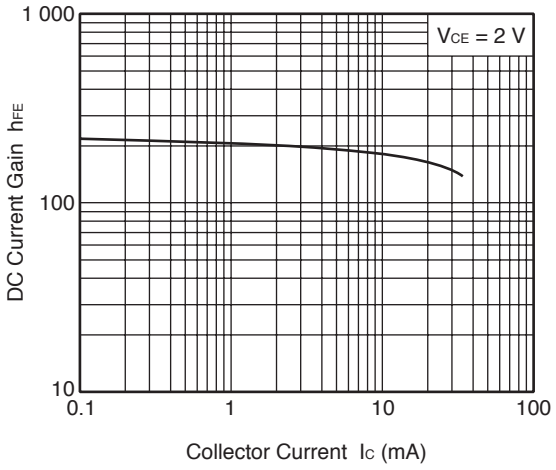


Remark The graph indicates nominal characteristics.

DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT



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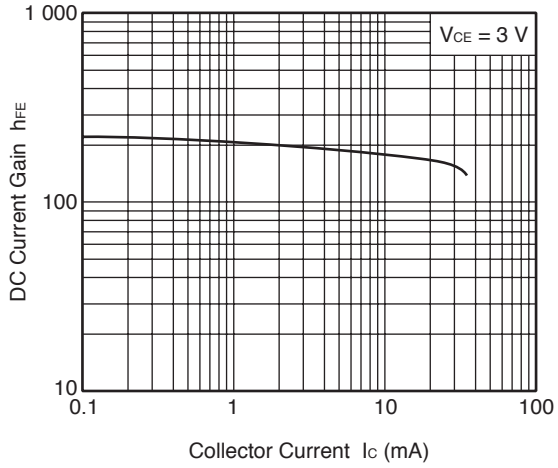
COLLECTOR CURRENT



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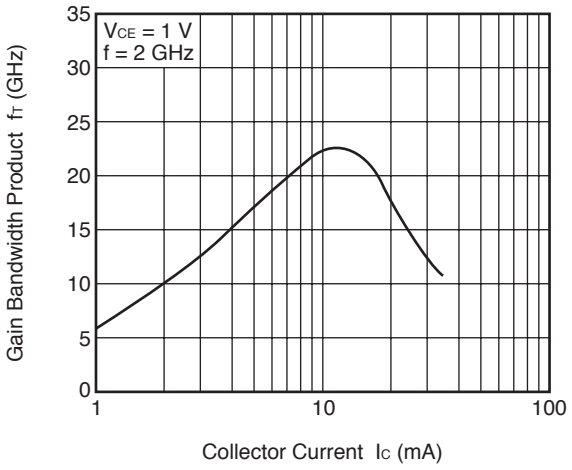
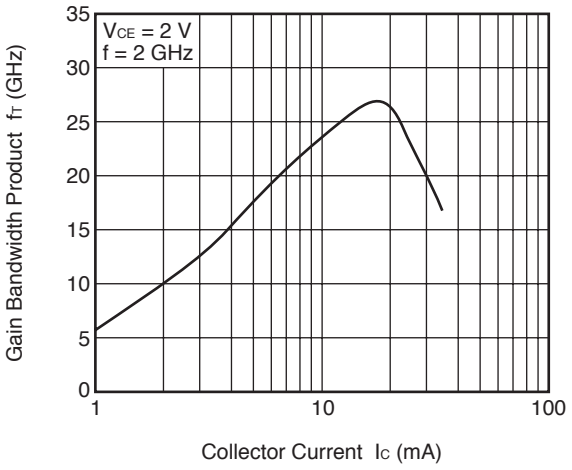
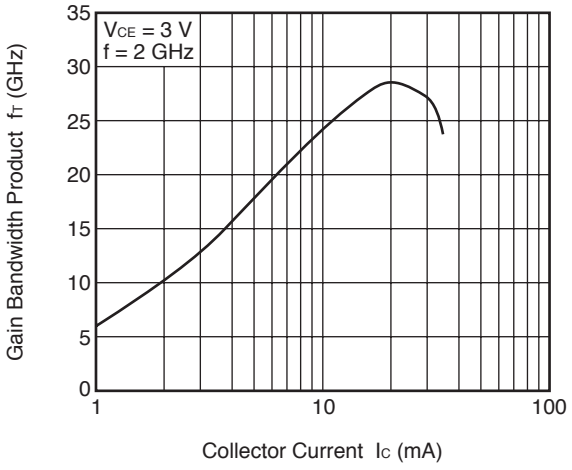
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



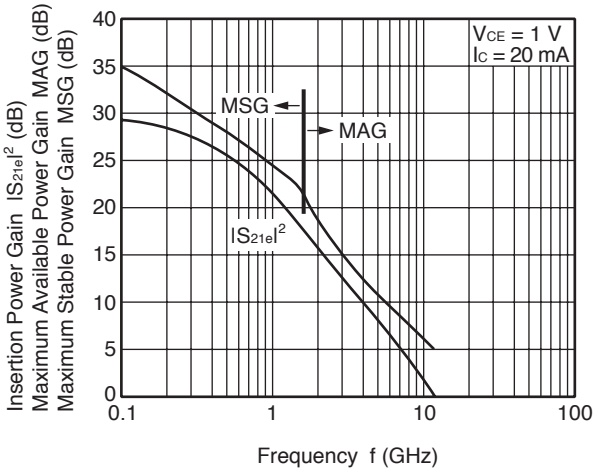
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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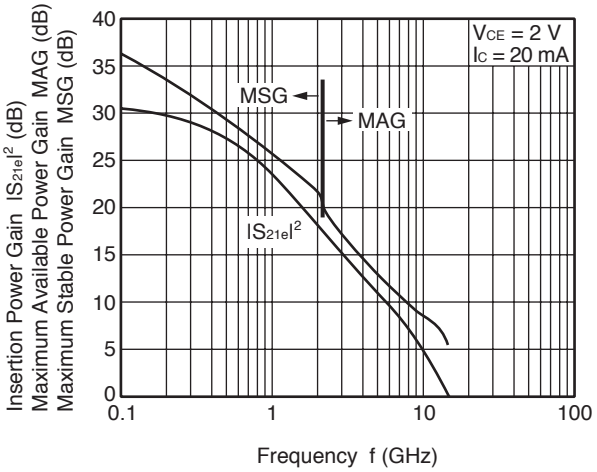

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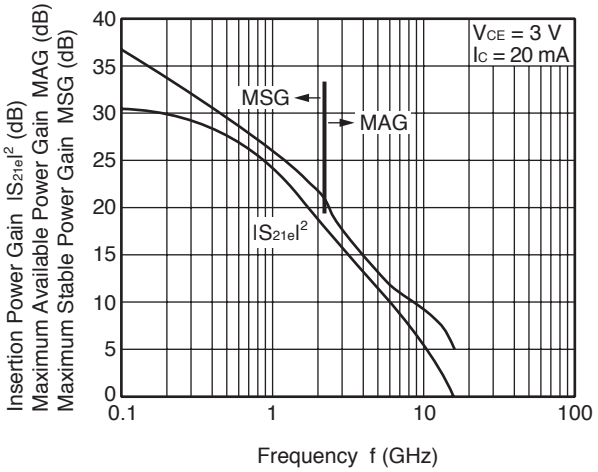

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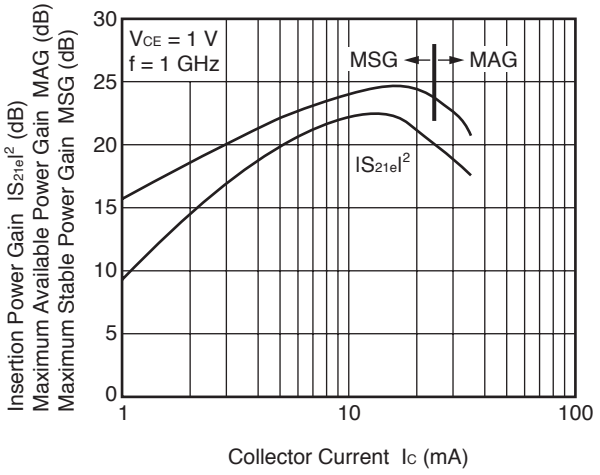
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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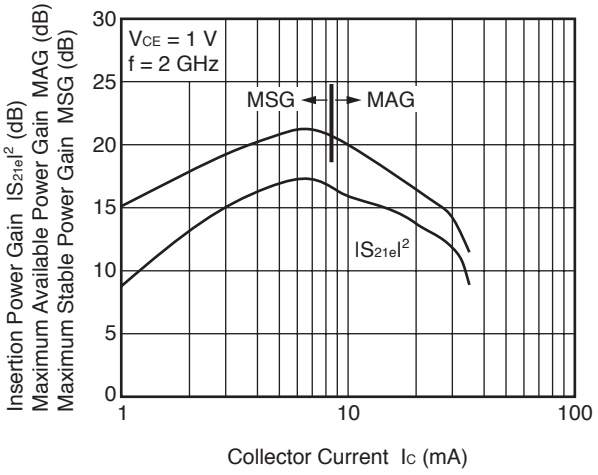

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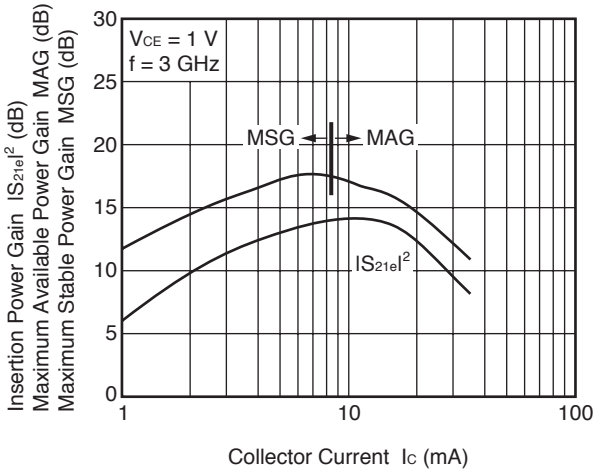
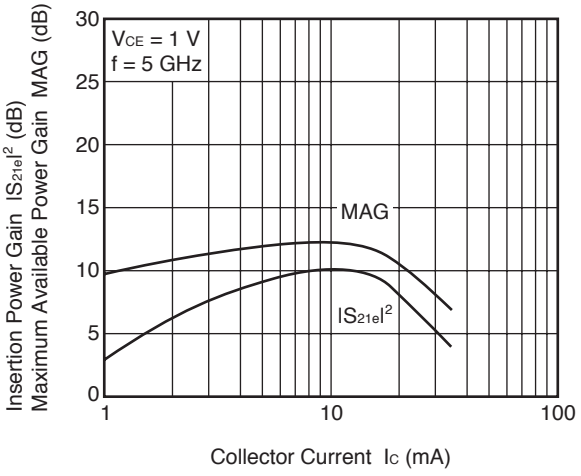
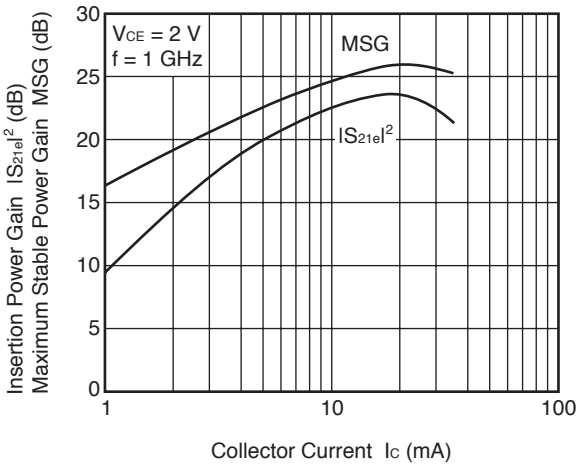


INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



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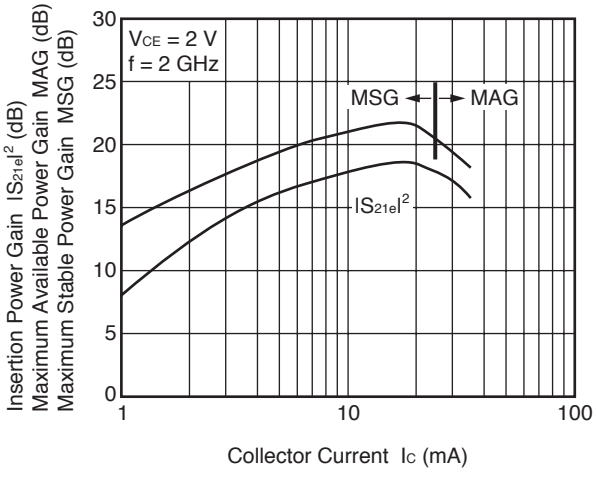

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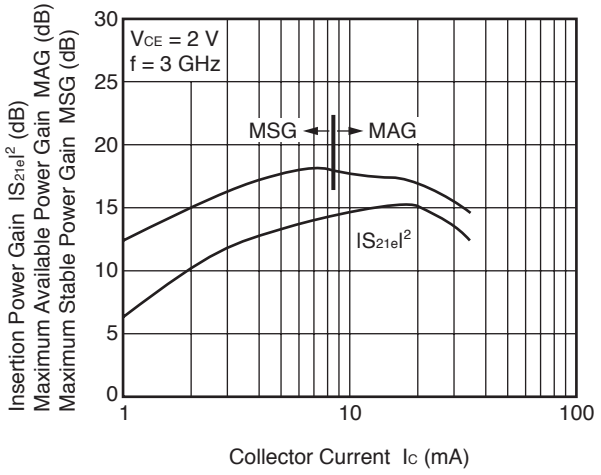

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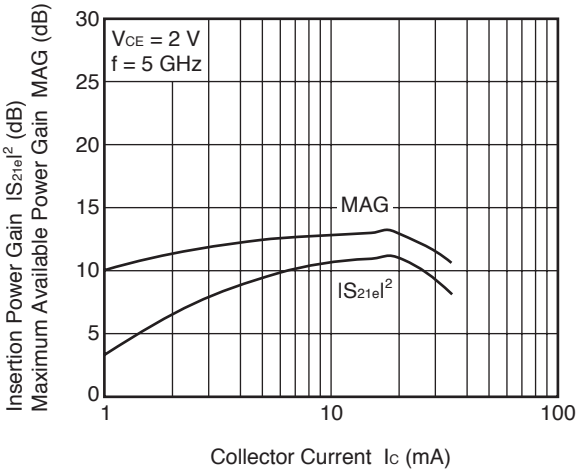

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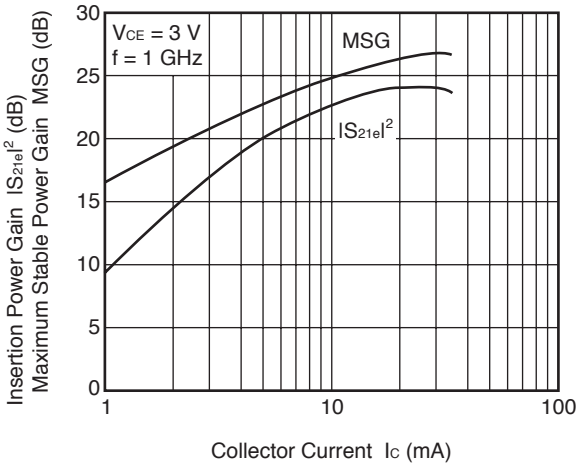

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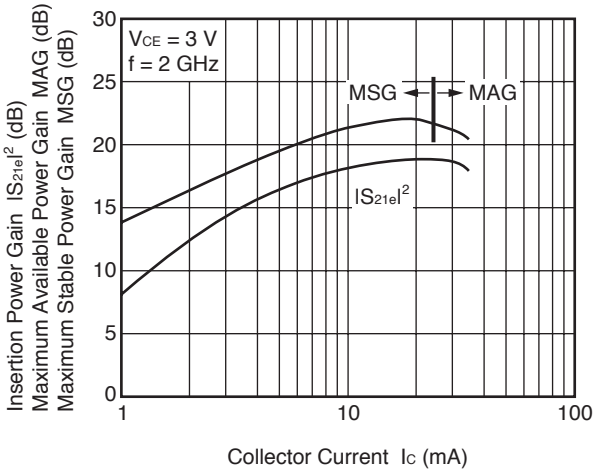

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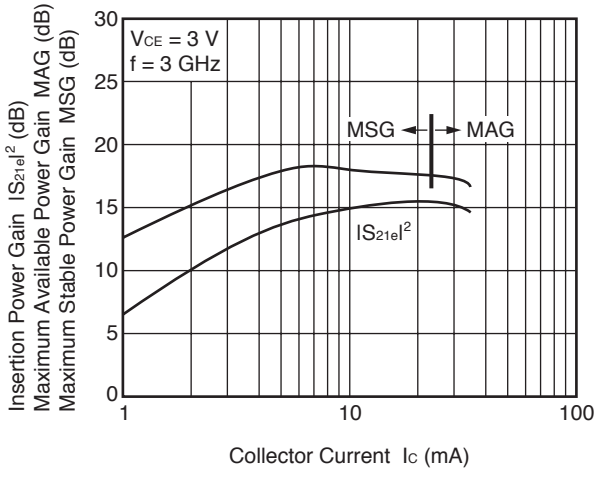

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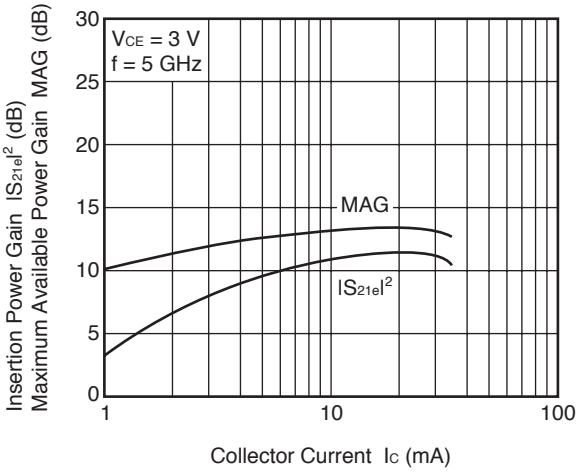
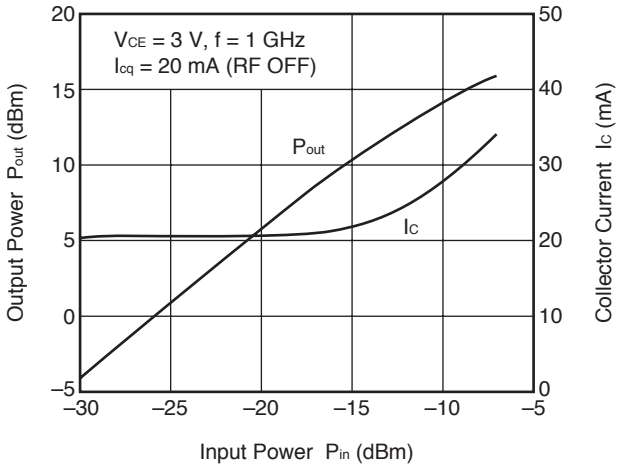
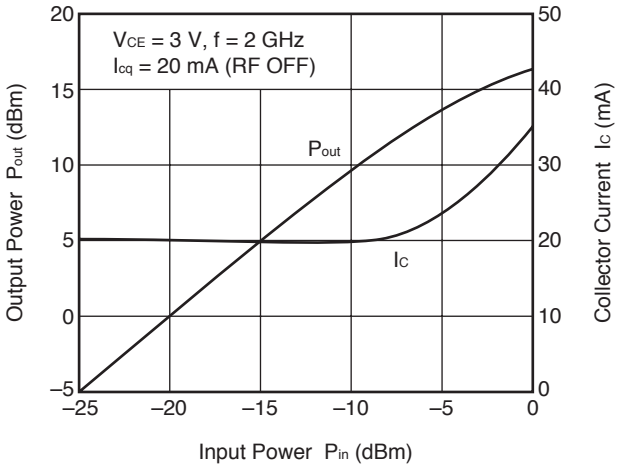


Remark The graph indicates nominal characteristics.

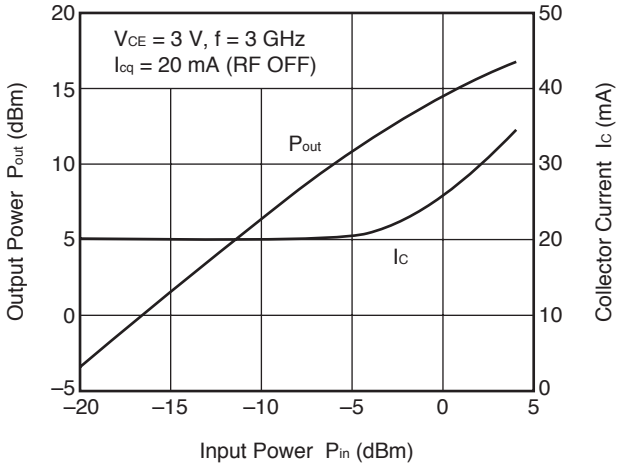
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



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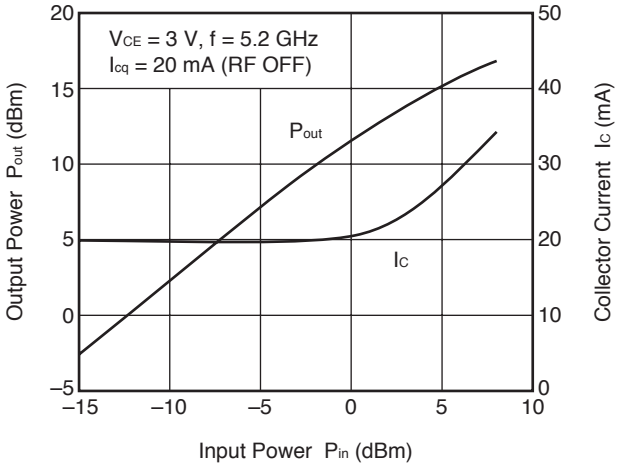
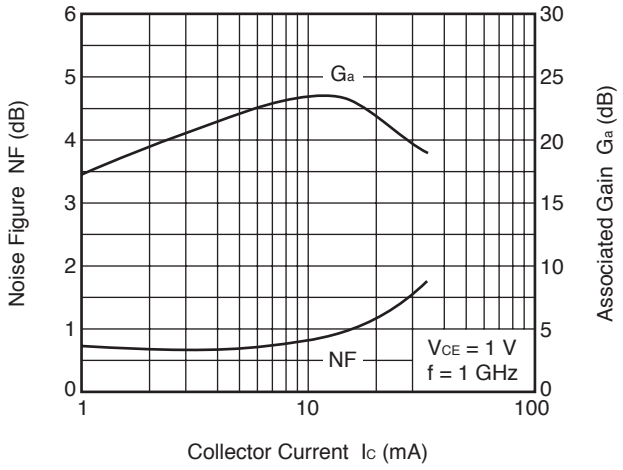


Remark The graph indicates nominal characteristics.

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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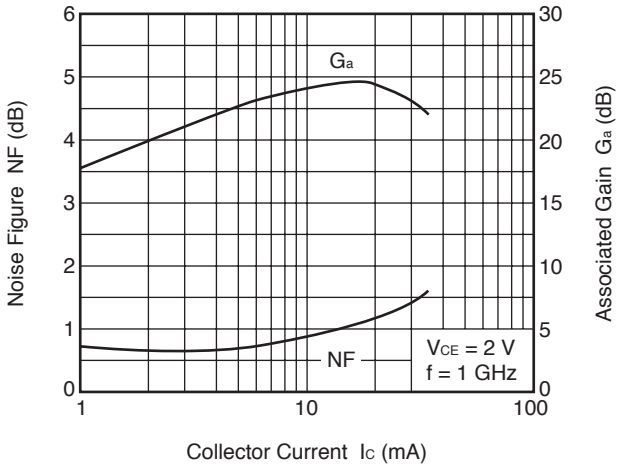

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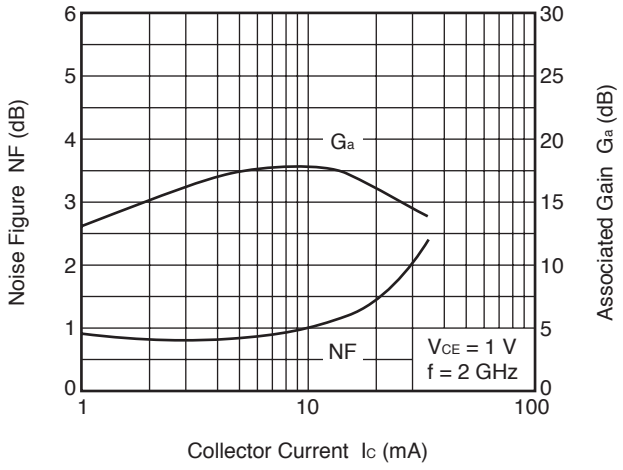

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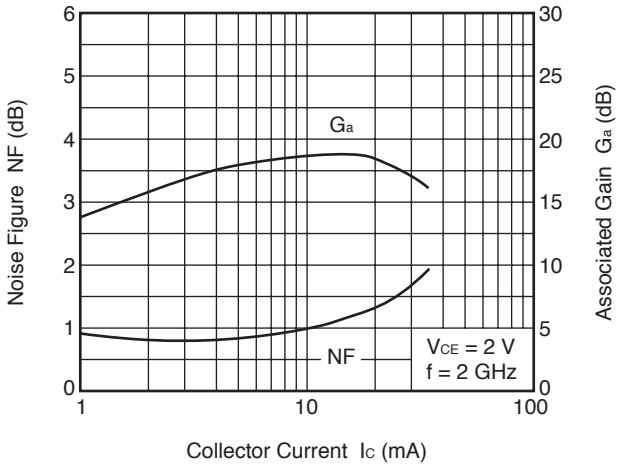

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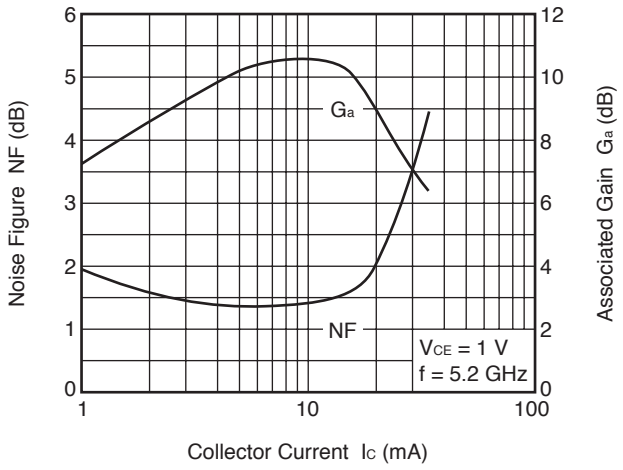

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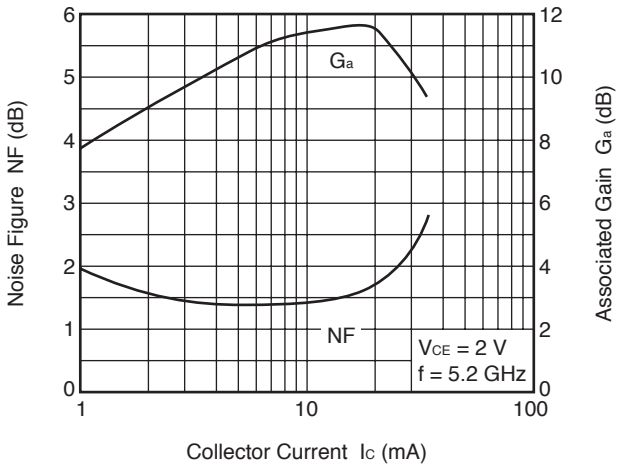

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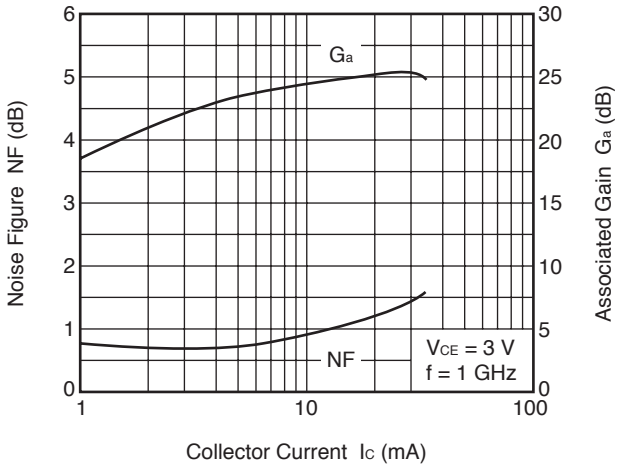
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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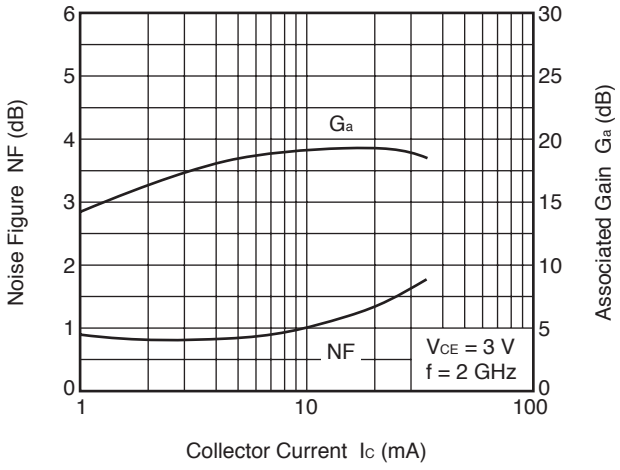

NOISE FIGURE, ASSOCIATED GAIN
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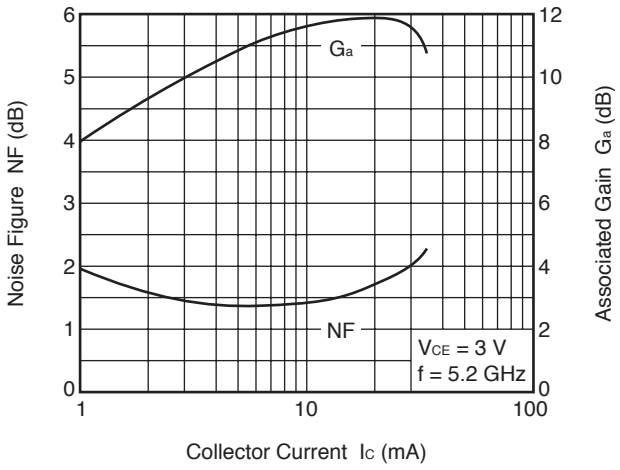


Remark The graphs indicate nominal characteristics.

S-PARAMETERS

<R> 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.

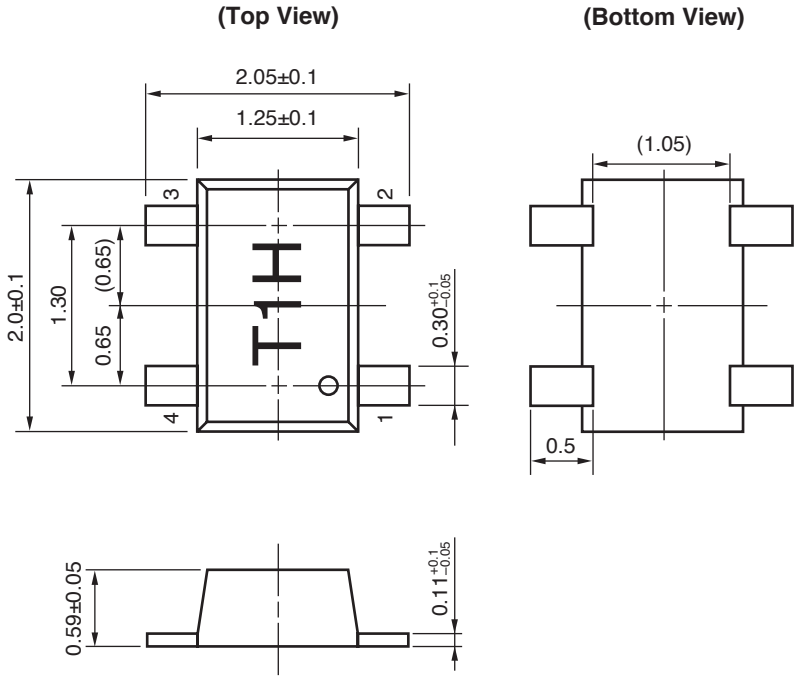
Click here to download S-parameters.

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

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

PACKAGE DIMENSIONS

<R> **FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05, 2012 PKG) (UNIT: mm)**



PIN CONNENTION

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

Remark ( ) : Reference value

Revision History	NESG2031M05 Data Sheet

Rev.	Date	Description	
		Page	Summary
–	Sep 2004	–	Previous No. : PU10189EJ03V0DS
4.00	Jun 20, 2012	p.1	Modification of **ORDERING INFORMATION**
		p.2	Modification of **ELECTRICAL CHARACTERISTICS**
			Modification of **h_{FE} CLASSIFICATION**
		p.11	Modification of **S-PARAMETERS**
		p.12	Modification of **PACKAGE DIMENSIONS**

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

CEL:

NESG2031M05-T1-A NESG2031M05-A