

NESG2101M05

NPN SiGe RF Transistor for Medium Output Power Amplification (125 mW)
 Flat-Lead 4-Pin Thin-Type Super Minimold (M05)

R09DS0036EJ0300
 Rev. 3.00
 Jun 20, 2012

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

<R>

ORDERING INFORMATION

| Part Number | Order Number | Package | Quantity | Supplying Form |
|----------------|------------------|--|-------------------|---|
| NESG2101M05 | NESG2101M05-A | Flat-lead 4-pin thin-type super minimold (M05, 2012 PKG) (Pb-Free) | 50 pcs (Non reel) | <ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 3 (Collector), Pin 4 (Emitter) face the perforation side of the tape |
| NESG2101M05-T1 | NESG2101M05-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 ($T_A = +25^\circ\text{C}$)

| 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 $38\text{ cm}^2 \times 0.4\text{ mm}$ (t) polyimide 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 = 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, 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 |

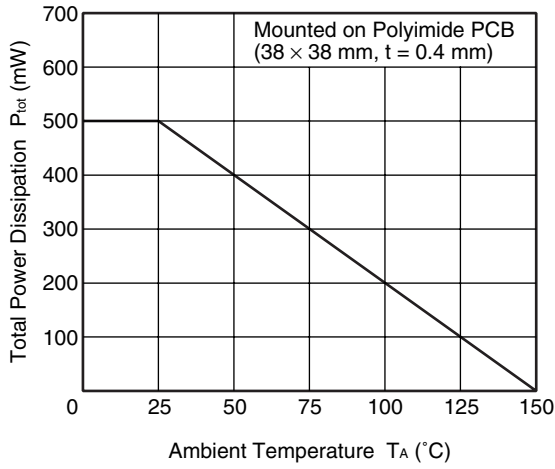
- Notes
1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%
 2. Collector to base capacitance when the emitter grounded
 3. $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

h_{FE} CLASSIFICATION

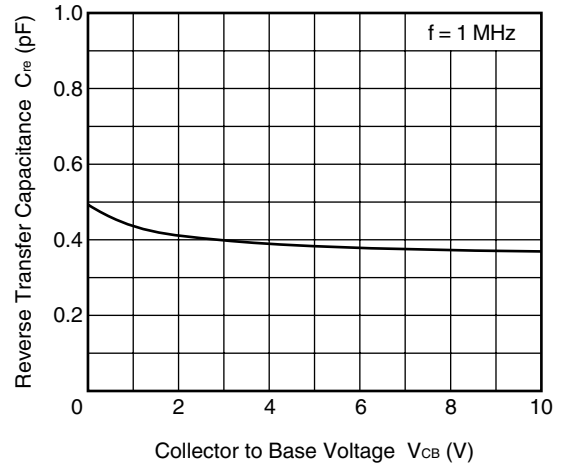
| | |
|-----------------------|------------|
| Rank | FB/YFB |
| Marking | T1J |
| h _{FE} Value | 130 to 260 |

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

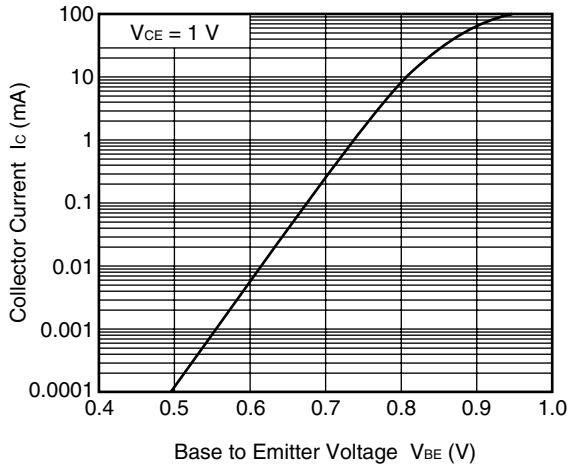
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



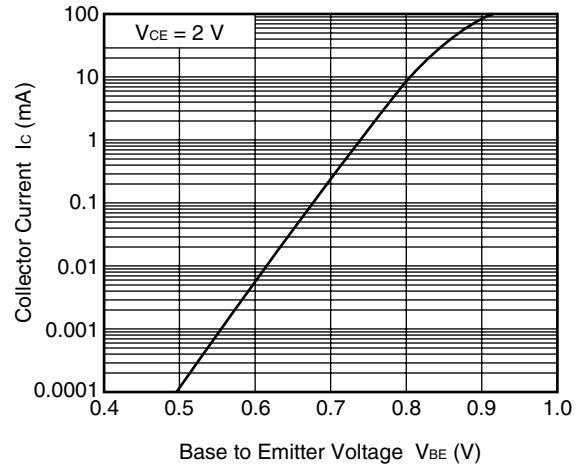
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



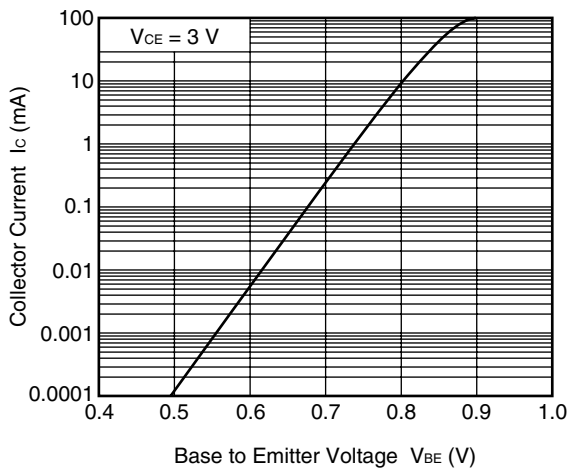
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



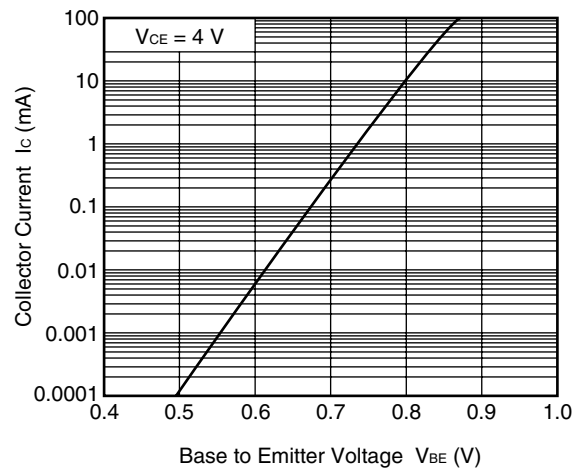
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

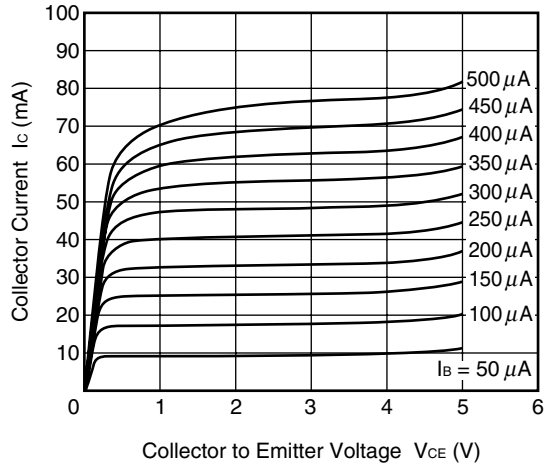


COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

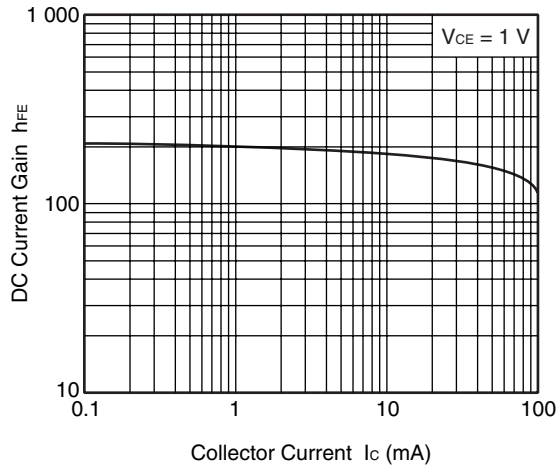


Remark The graph indicates nominal characteristics.

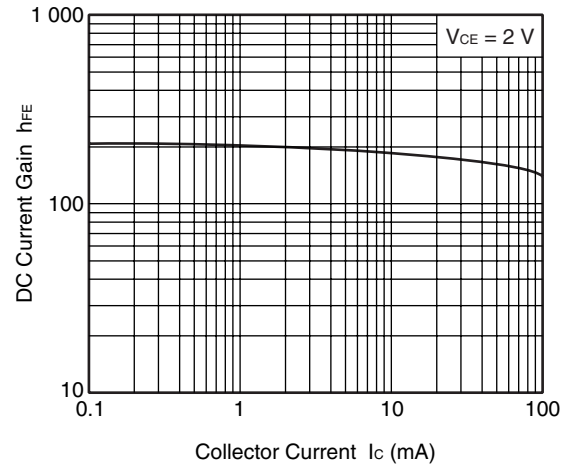
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



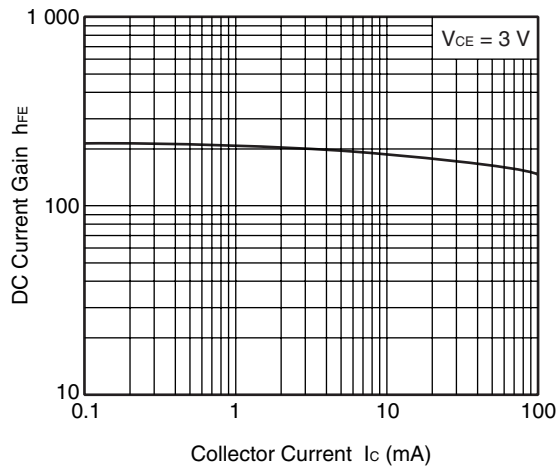
DC CURRENT GAIN vs. COLLECTOR CURRENT



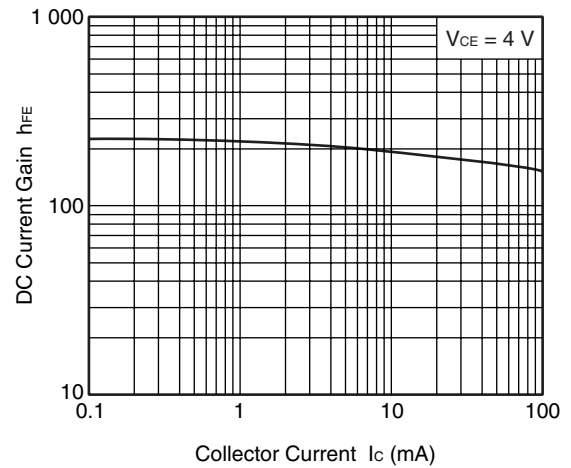
DC CURRENT GAIN vs. COLLECTOR CURRENT



DC CURRENT GAIN vs. COLLECTOR CURRENT

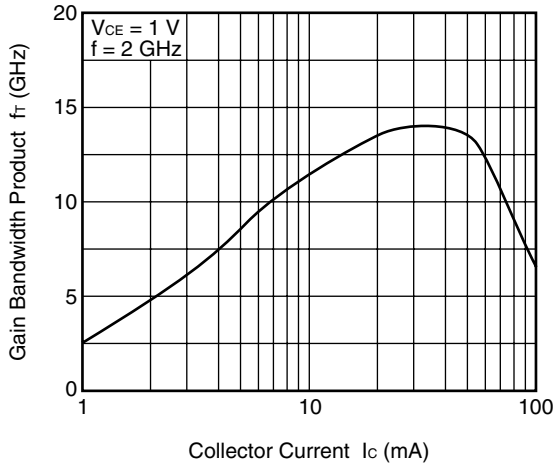


DC CURRENT GAIN vs. COLLECTOR CURRENT

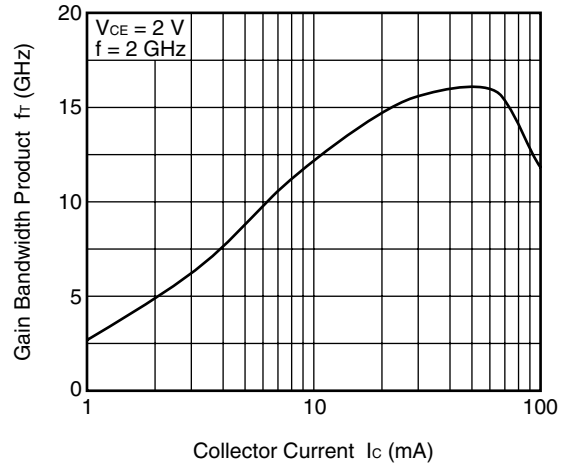


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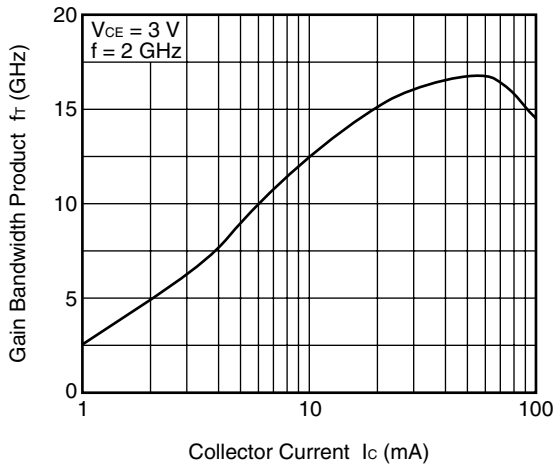
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



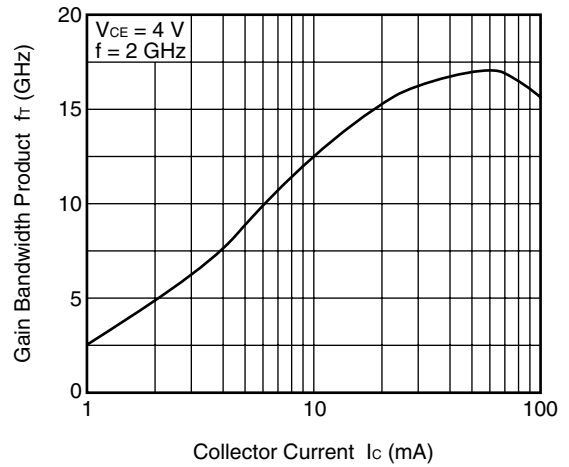
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

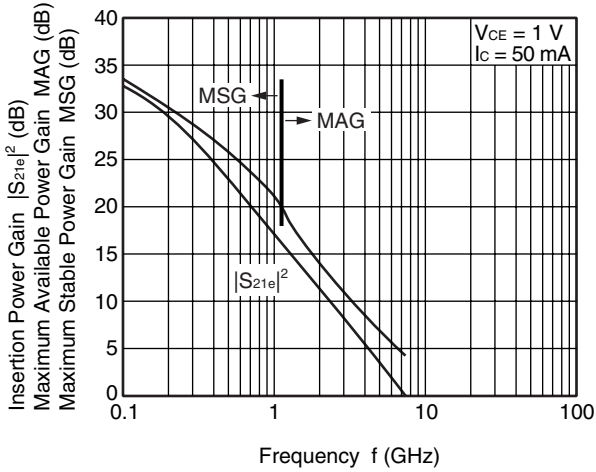


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

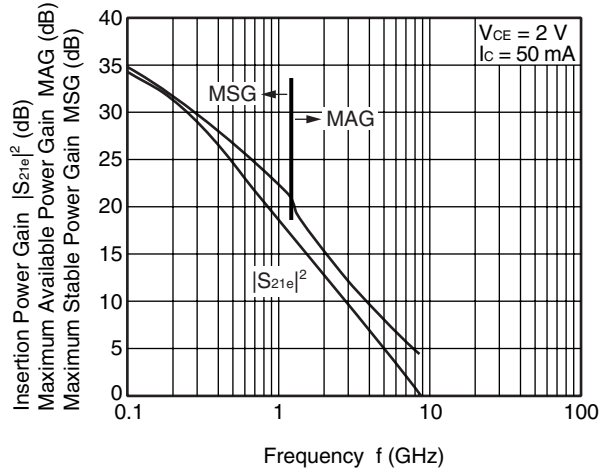


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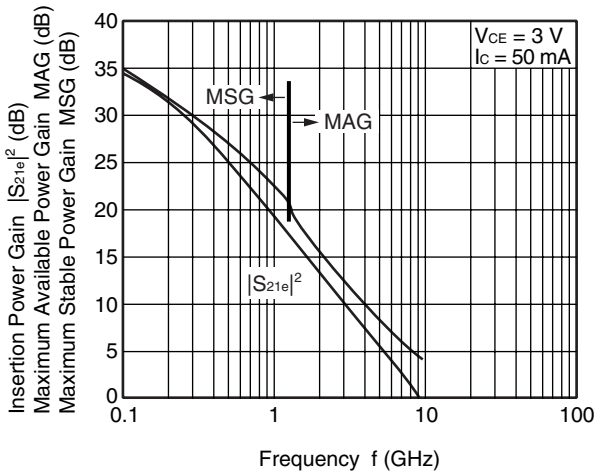
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



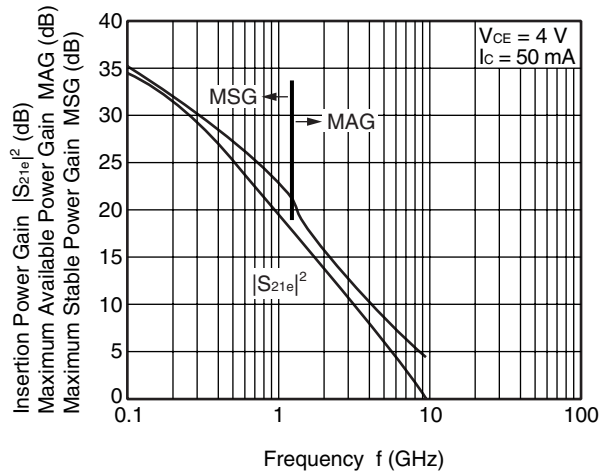
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY

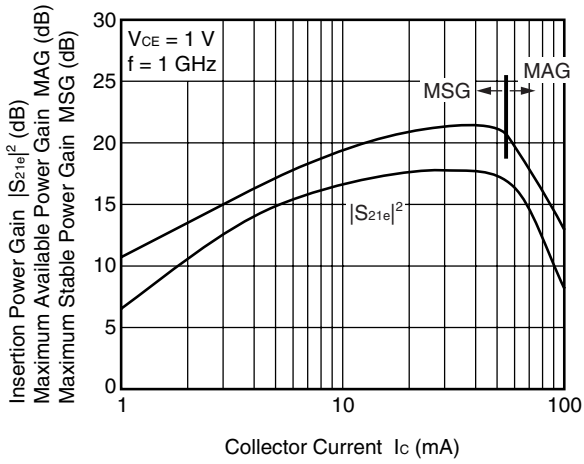


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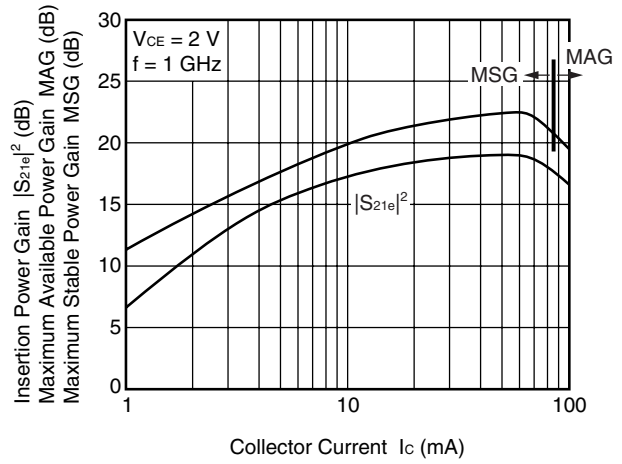


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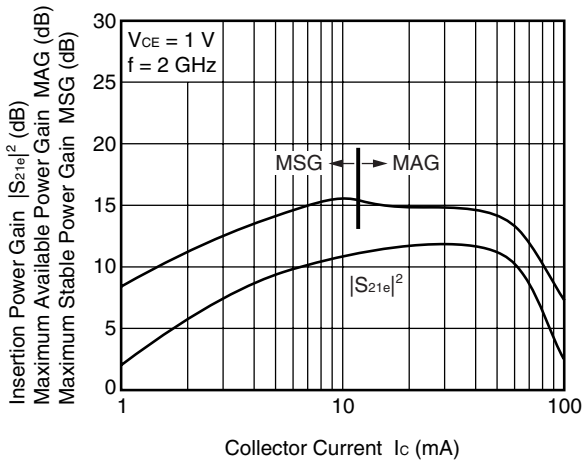
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



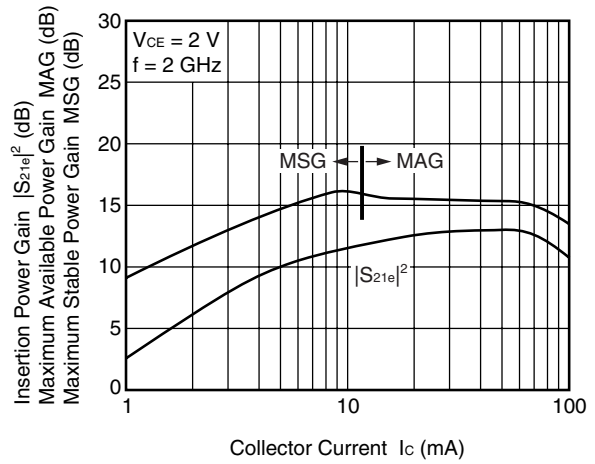
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



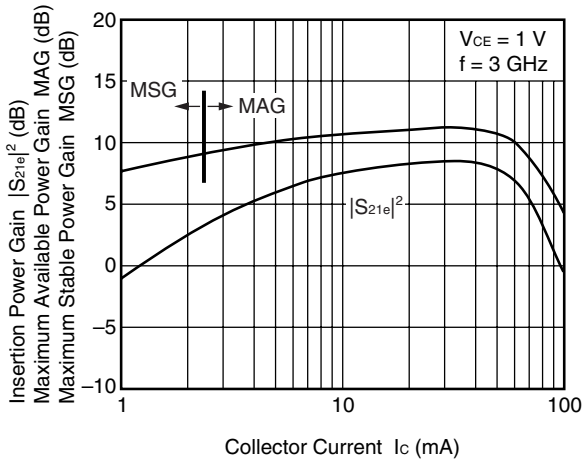
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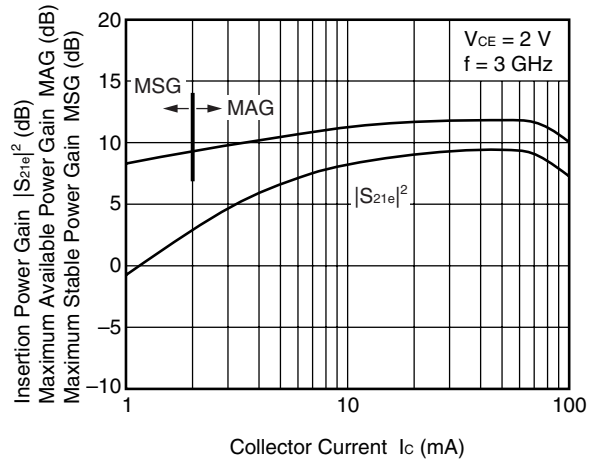
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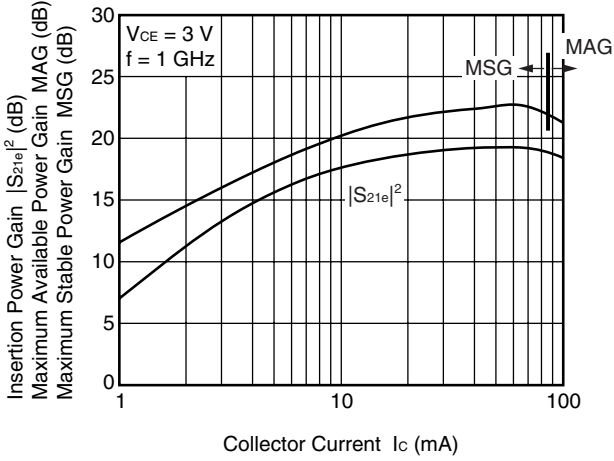


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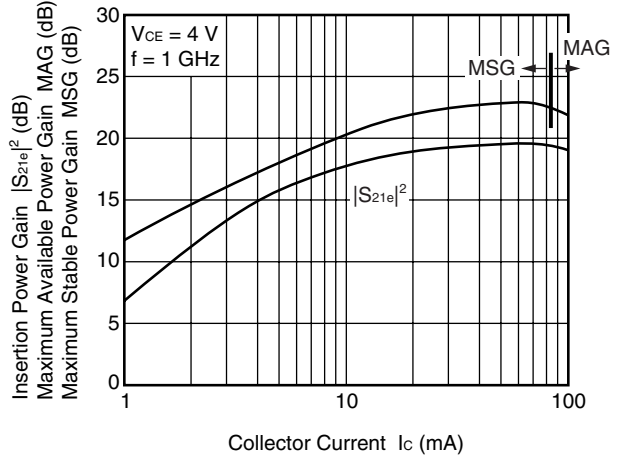


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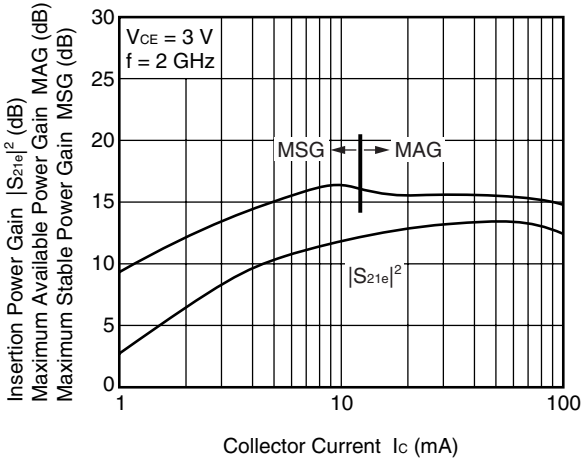
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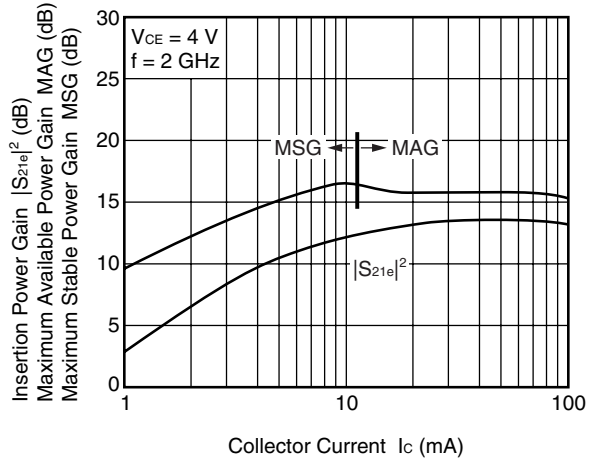
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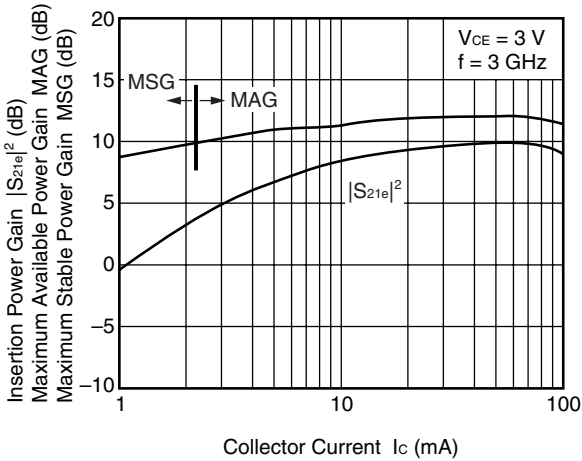
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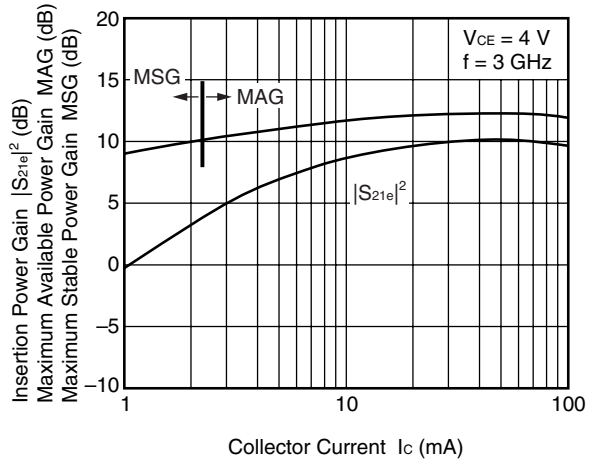
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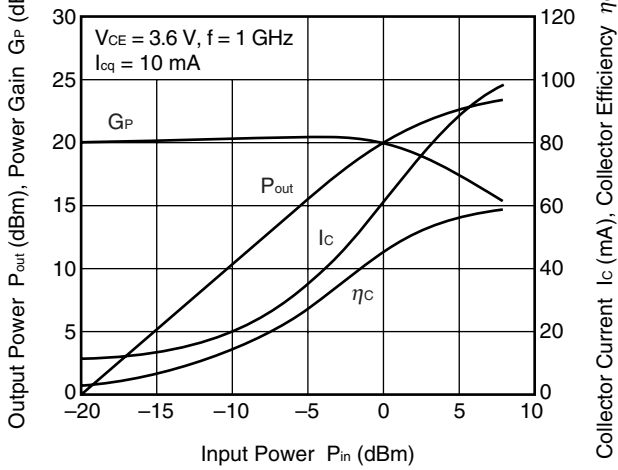


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

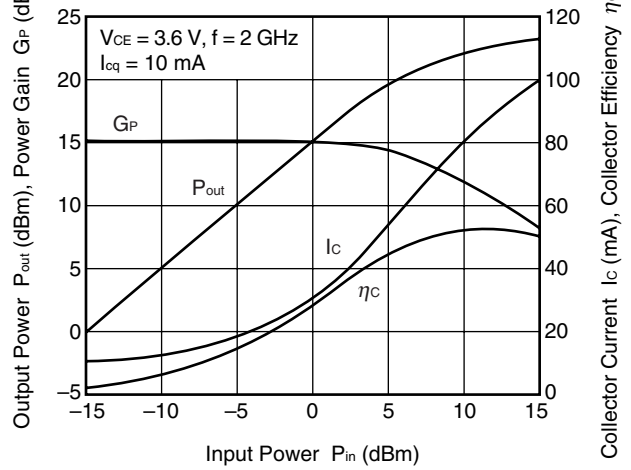


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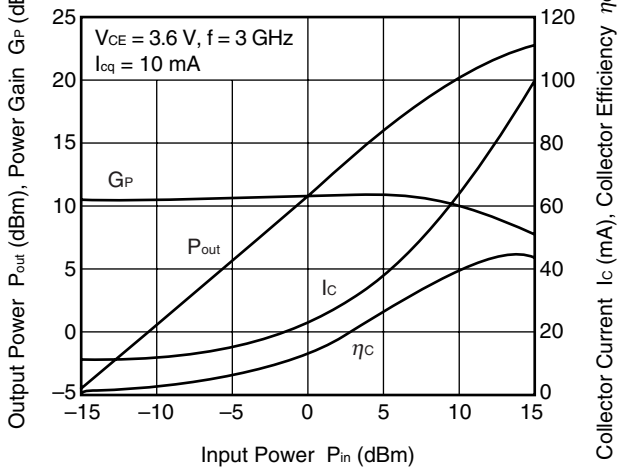
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



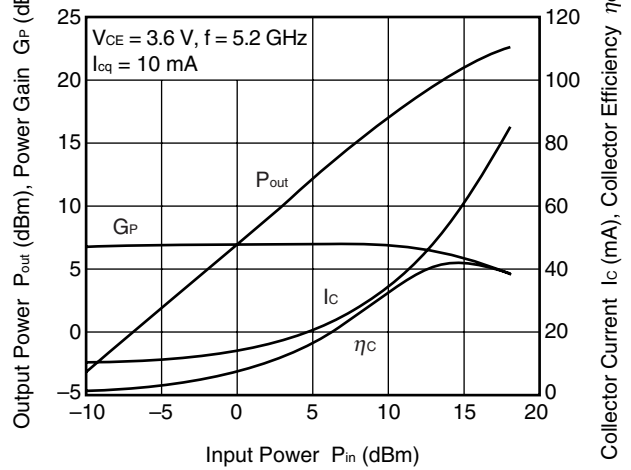
OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER



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

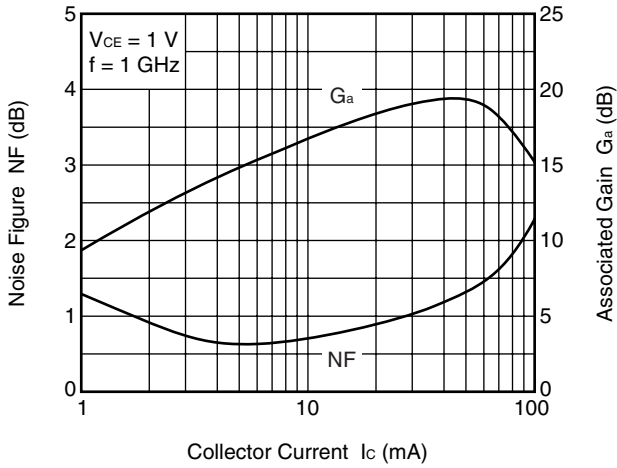


OUTPUT POWER, POWER GAIN, COLLECTOR CURRENT, COLLECTOR EFFICIENCY vs. INPUT POWER

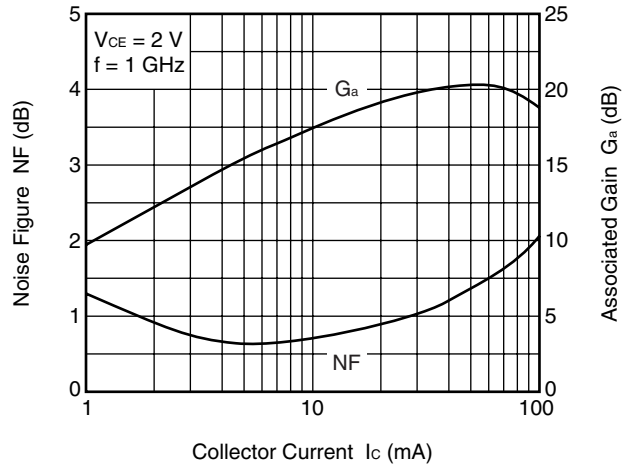


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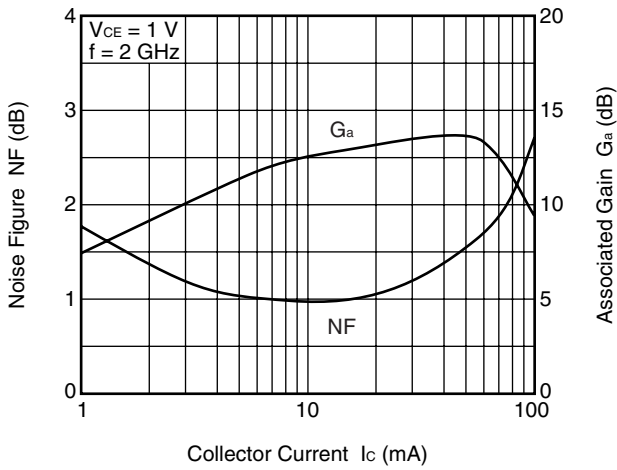
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



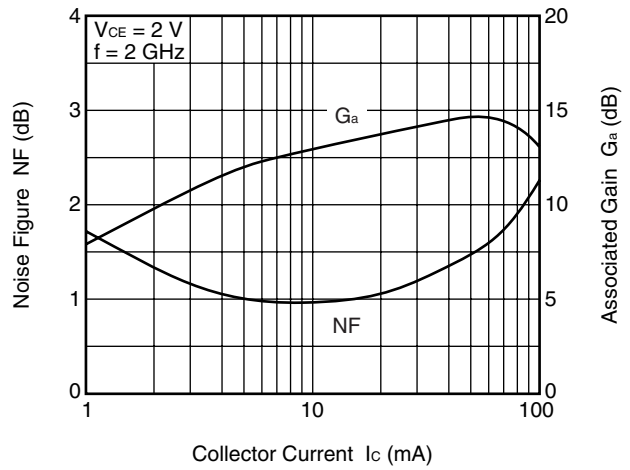
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



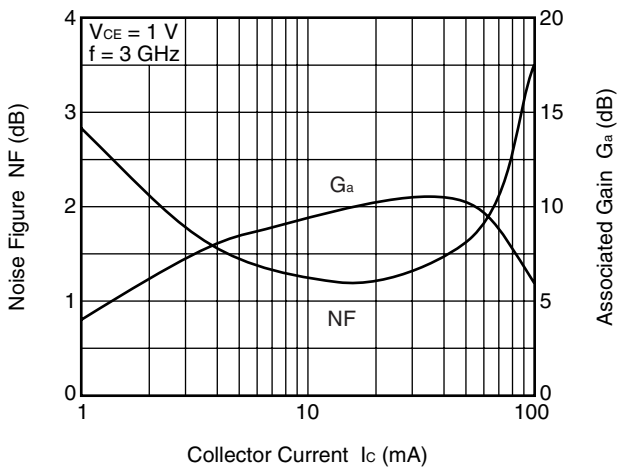
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



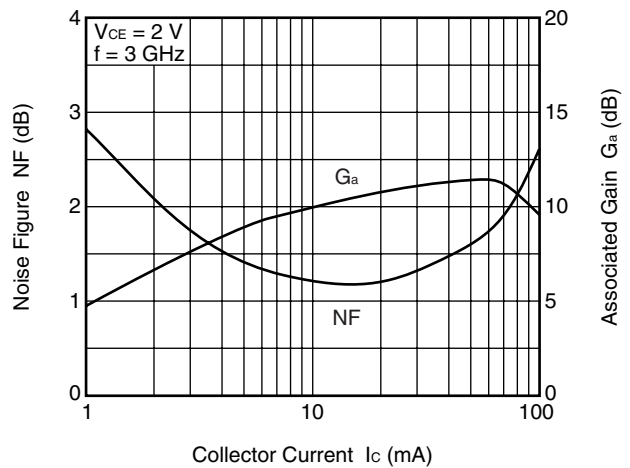
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

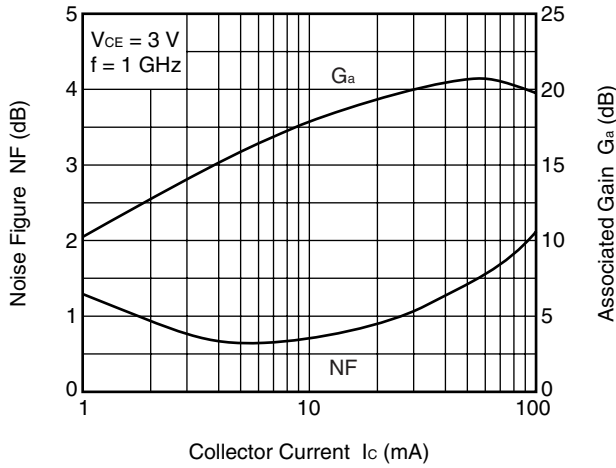


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

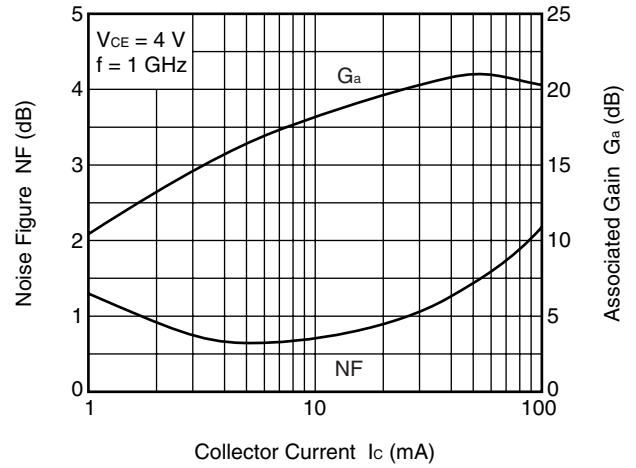


Remark The graphs indicate nominal characteristics.

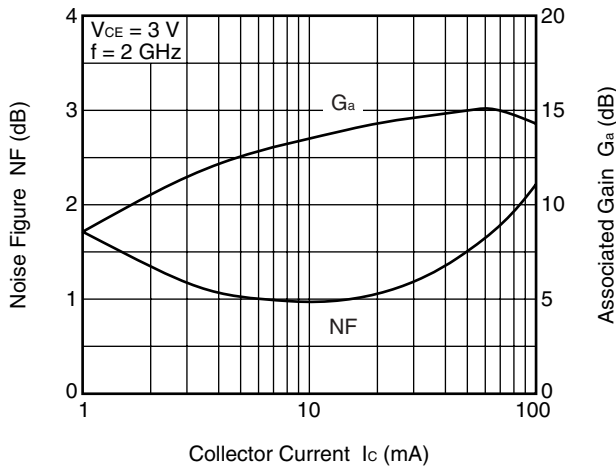
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



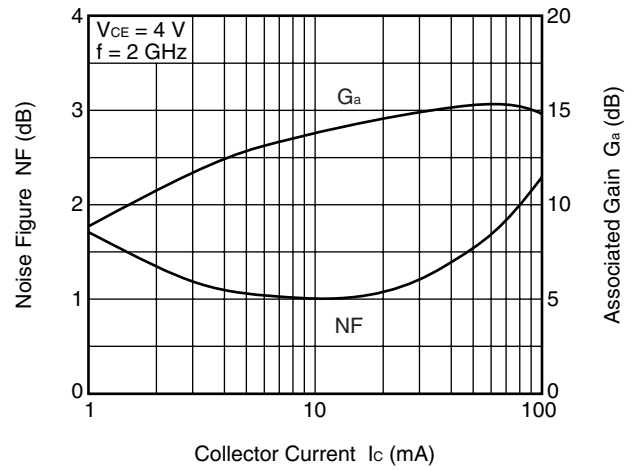
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



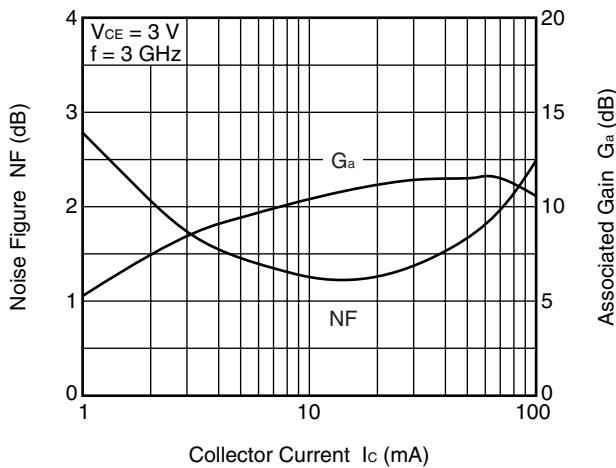
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



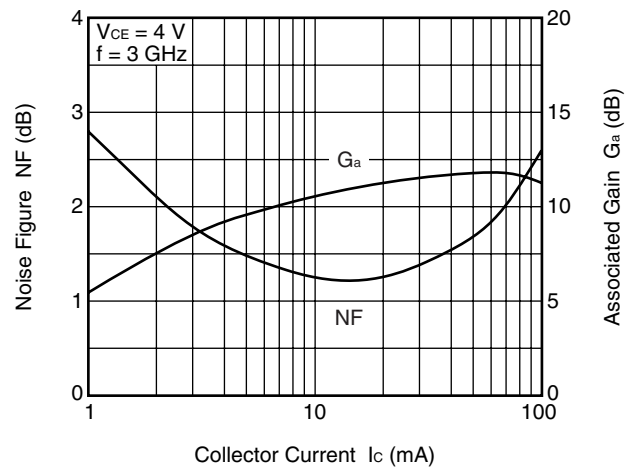
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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 form (S2P) that enables direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

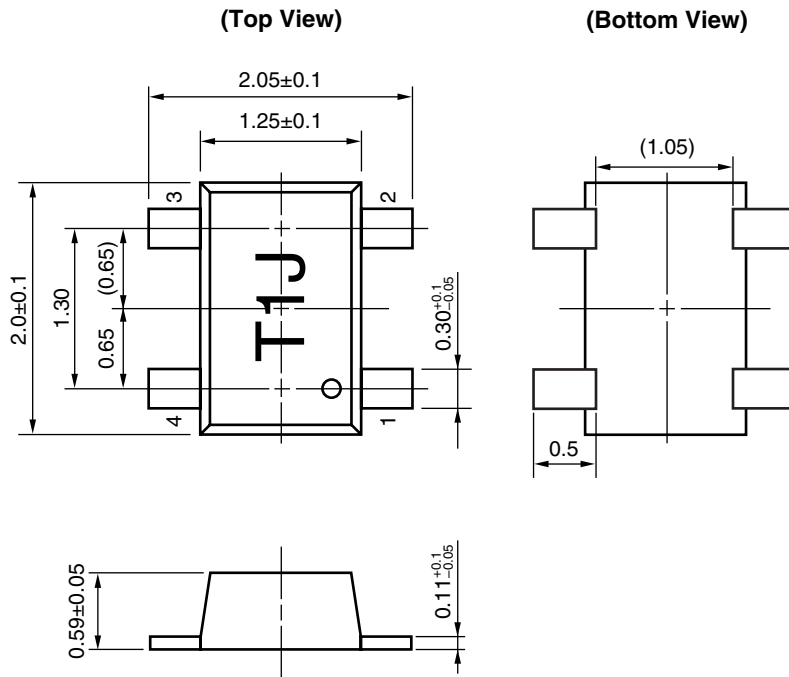
Click here to download S-parameters.

[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 | NESG2101M05 Data Sheet |
|-------------------------|-------------------------------|

| Rev. | Date | Description | |
|------|---|-------------|--|
| | | Page | Summary |
| - | Mar 2003 | - | Previous No. : PU10190EJ02V0DS |
| 3.00 | Jun 20, 2012 | p.1 | Modification of ORDERING INFORMATION |
| | | p.2 | Modification of ELECTRICAL CHARACTERISTICS |
| | | | Modification of h_{FE} CLASSIFICATION |
| | | p.12 | Modification of S-PARAMETERS |
| p.13 | Modification of PACKAGE DIMENSIONS | | |

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SALES OFFICES

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Laved or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141