

NESG340033

R09DS0016EJ0100

Rev.1.00

Mar 29, 2011

NPN Silicon Germanium RF Transistor

DESCRIPTION

The NESG340033 is an ideal choice for low noise, low distortion amplification.

FEATURES

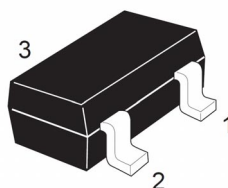
- $NF = 0.65 \text{ dB TYP. @ } V_{CE} = 3.3 \text{ V, } I_C = 15 \text{ mA, } f = 1 \text{ GHz}$
- $P_{o(1 \text{ dB})} = 21 \text{ dBm TYP. @ } V_{CE} = 3.3 \text{ V, } I_{C(\text{set})} = 40 \text{ mA, } f = 1 \text{ GHz}$
- $OIP_3 = 35.5 \text{ dBm TYP. @ } V_{CE} = 3.3 \text{ V, } I_{C(\text{set})} = 50 \text{ mA, } f = 1 \text{ GHz}$
- Maximum stable power gain: $MSG = 13.0 \text{ dB TYP. @ } V_{CE} = 3.3 \text{ V, } I_C = 40 \text{ mA, } f = 1 \text{ GHz}$
- SiGe HBT technology (UHS3) : $f_T = 10 \text{ GHz}$
- This product is improvement of ESD
- 3-pin minimold (33 PKG)

APPLICATIONS

- Suitable for up to 1GHz applications.
e.g. LNA (Low Noise Amplifier) or Power splitter for Digital-TV.

OUTLINE

RENESAS Package code: 33
(Package name: 3-pin minimold (33 PKG))



1. Emitter
2. Base
3. Collector

Note: Marking is "R7E"

ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG340033	NESG340033-A	3-pin minimold (33 PKG)	50 pcs (Non reel)	<ul style="list-style-type: none"> • Embossed tape 8 mm wide • Pin 3 face the perforation side of the tape
NESG340033-T1B	NESG340033-T1B-A	(Pb-Free)	3 kpcs/reel	<ul style="list-style-type: none"> • Qty 3 kpcs/reel

Remark To order evaluation samples, please contact your nearby sales office.

Unit sample quantity is 50 pcs.

CAUTION

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

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V _{CBO}	5.5	V
Collector to Emitter Voltage (Base Short)	V _{CES}	13	V
Collector to Emitter Voltage (Base Open)	V _{CEO}	5.5	V
Base Current ^{Note1}	I _B	36	mA
Collector Current	I _C	400	mA
Total Power Dissipation ^{Note2}	P _{tot}	480	mW
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

Notes: 1. Depend on the ESD protect device.

2. Mounted on 3.8 cm × 9.0 cm × 0.8 mm (t) glass epoxy PWB

THERMAL RESISTANCE (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Thermal Resistance from Junction to Ambient ^{Note}	R _{thj-a}	260	°C/W

Note: Mounted on 3.8 cm × 9.0 cm × 0.8 mm (t) glass epoxy PWB

RECOMMENDED OPERATING RANGE (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Collector Current	I _C	–	50	–	mA

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} = 0.4 V, I _C = 0	–	–	100	nA
DC Current Gain	h _{FE} ^{Note1}	V _{CE} = 3.3 V, I _C = 15 mA	200	300	400	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 3.3 V, I _C = 40 mA, f = 1 GHz	–	10.0	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 3.3 V, I _C = 40 mA, f = 1 GHz	9.5	11.5	–	dB
Noise Figure (1)	NF1	V _{CE} = 3.3 V, I _C = 15 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = 50 Ω	–	0.65	1.05	dB
Noise Figure (2)	NF2	V _{CE} = 3.3 V, I _C = 40 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	0.7	–	dB
Associated Gain (1)	G _{a1}	V _{CE} = 3.3 V, I _C = 15 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = 50 Ω	9.5	11.5	–	dB
Associated Gain (2)	G _{a2}	V _{CE} = 3.3 V, I _C = 40 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	12.0	–	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 3.3 V, I _E = 0, f = 1 MHz	–	0.95	1.15	pF
Maximum Stable Power Gain	MSG ^{Note 3}	V _{CE} = 3.3 V, I _C = 40 mA, f = 1 GHz	11.0	13.0	–	dB
Gain 1 dB Compression Output Power	P _O (1 dB)	V _{CE} = 3.3 V, I _C (set) = 40 mA, f = 1 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	21.0	–	dBm
Output 3rd Order Intercept Point 1	OIP ₃ 1	V _{CE} = 3.3 V, I _C (set) = 40 mA, f = 1 GHz, Δf = 1 MHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	35.0	–	dBm
Output 3rd Order Intercept Point 2	OIP ₃ 2	V _{CE} = 3.3 V, I _C (set) = 50 mA, f = 1 GHz, Δf = 1 MHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	35.5	–	dBm

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

2. Collector to base capacitance when the emitter grounded.

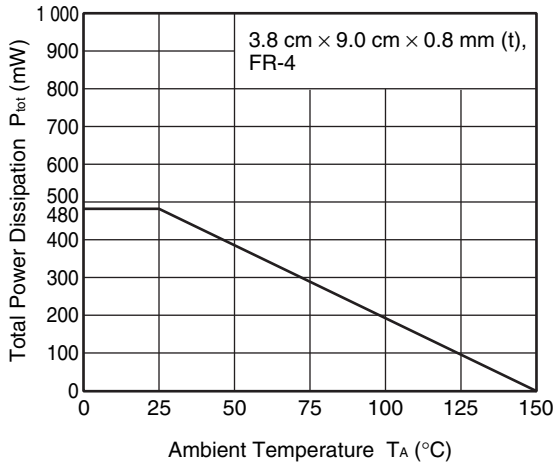
$$3. \text{MSG} = \left| \frac{S_{21}}{S_{12}} \right|$$

h_{FE} CLASSIFICATION

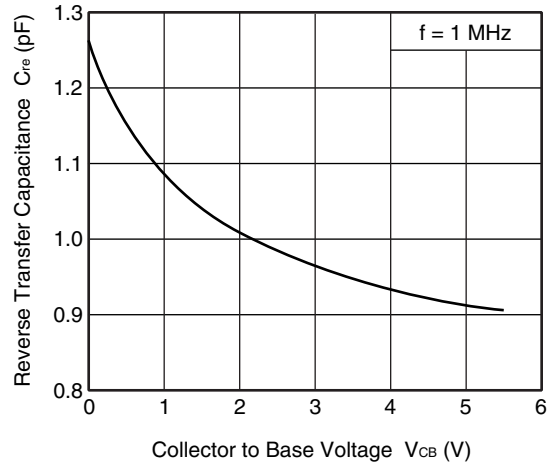
Rank	YFB
Marking	R7E
h _{FE} Value	200 to 400

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

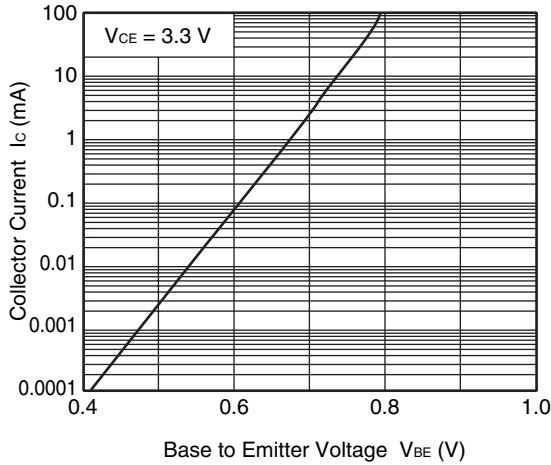
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



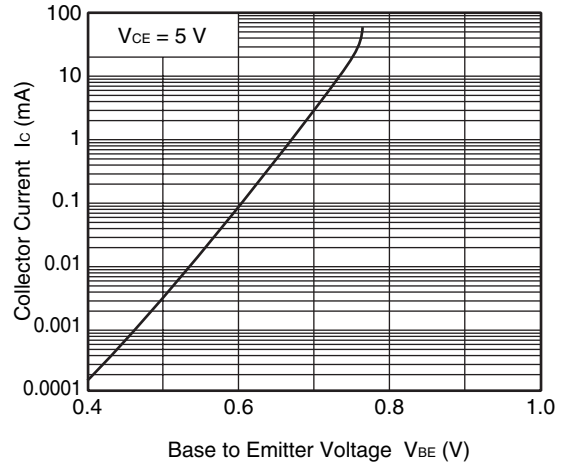
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



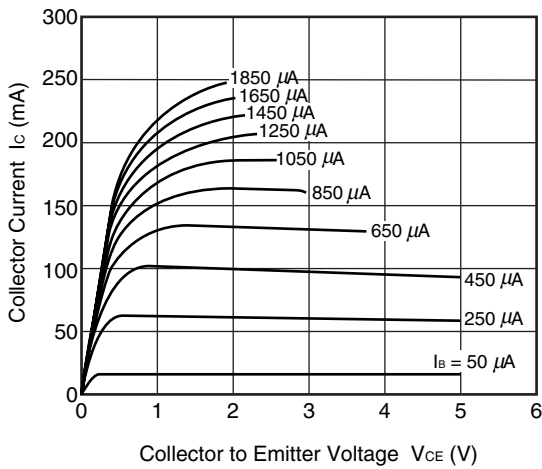
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

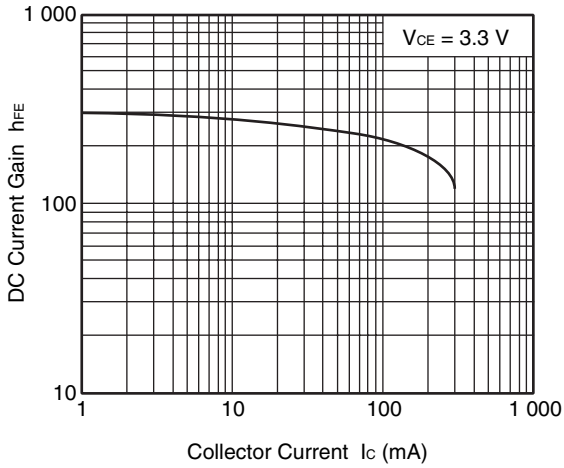


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

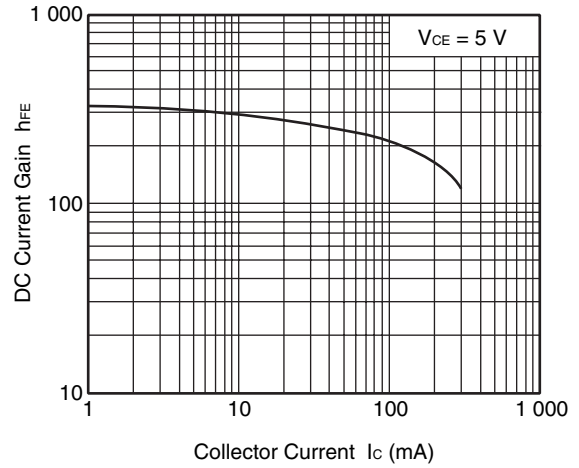


Remark The graphs indicate nominal characteristics.

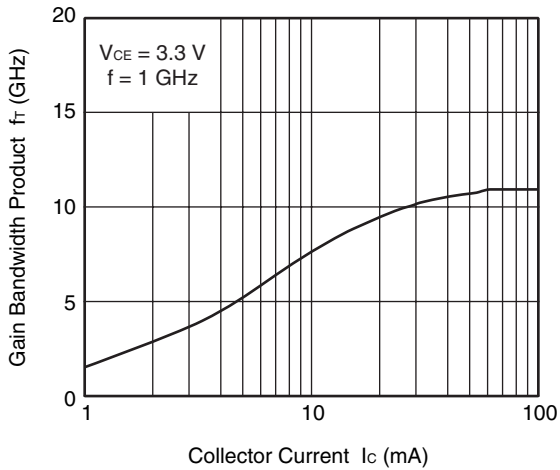
DC CURRENT GAIN vs. COLLECTOR CURRENT



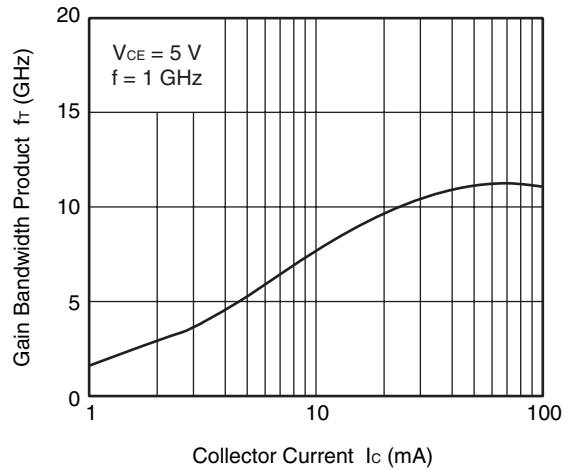
DC CURRENT GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

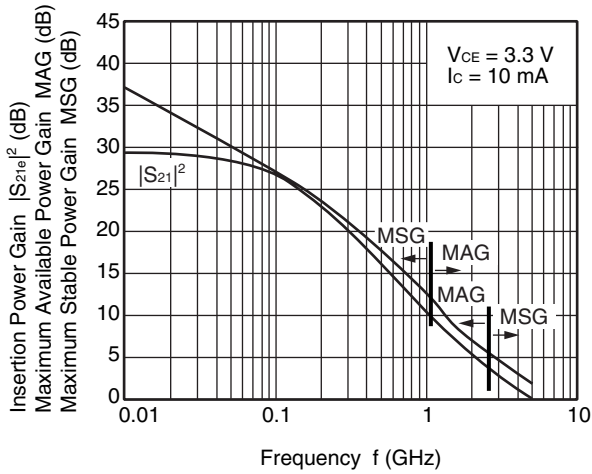


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

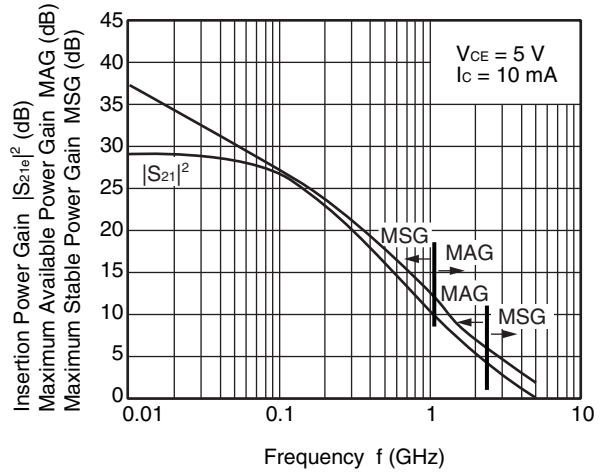


Remark The graphs indicate nominal characteristics.

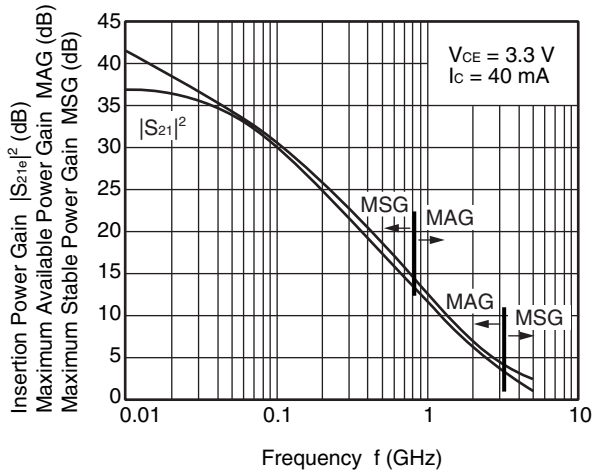
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



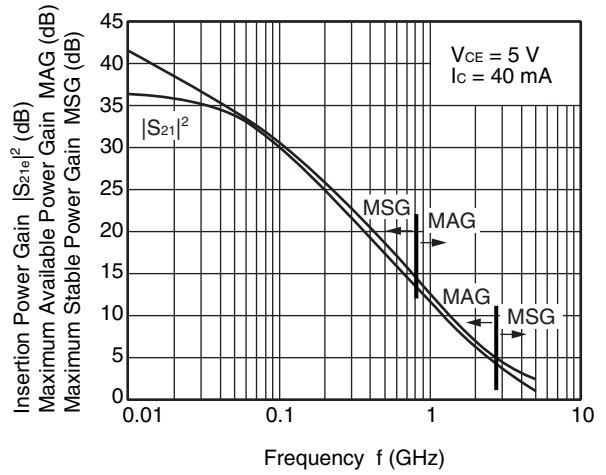
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



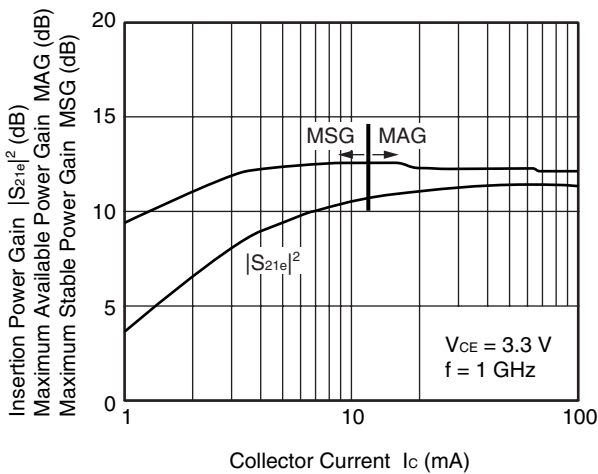
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



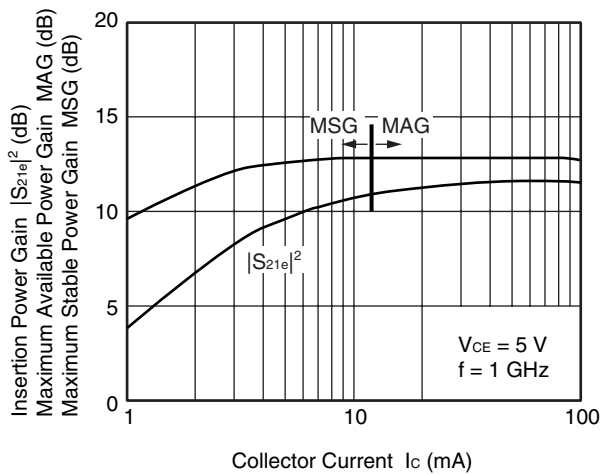
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

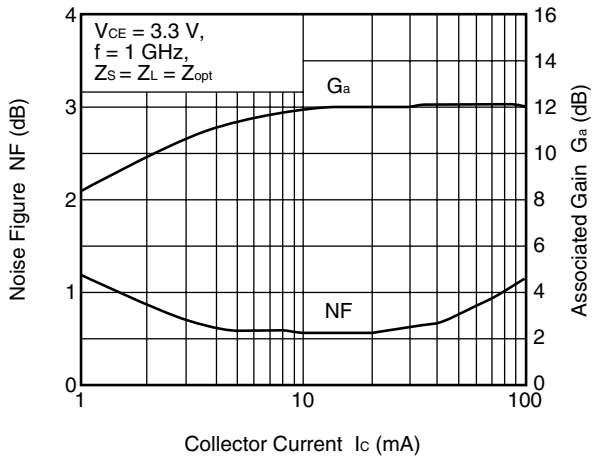


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

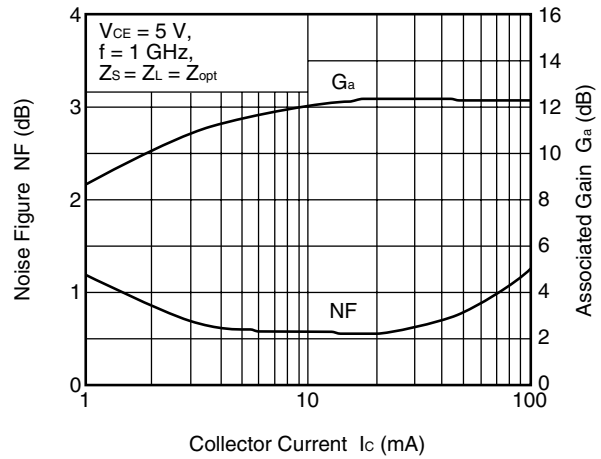


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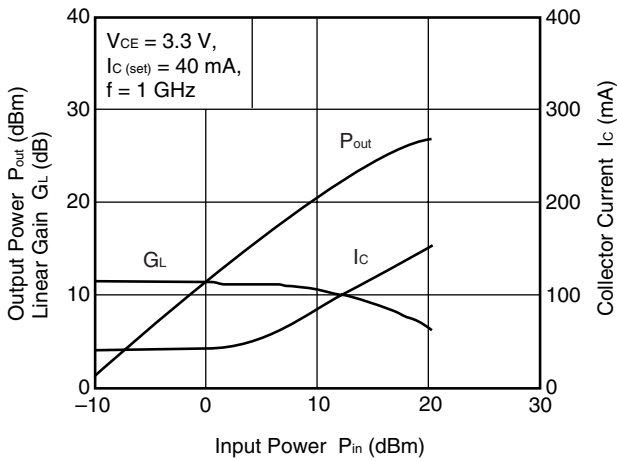
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



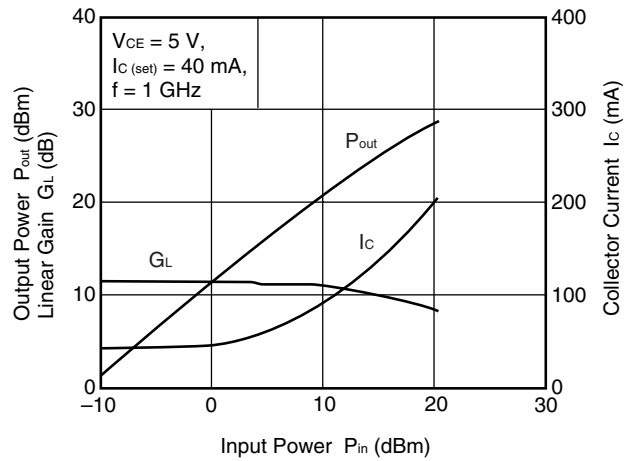
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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

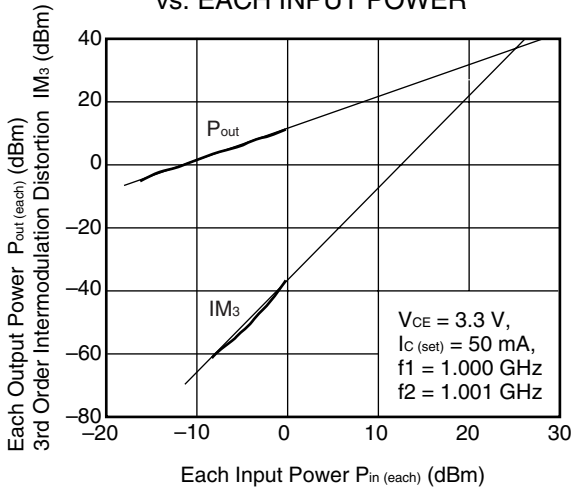


OUTPUT POWER, LINEAR GAIN, COLLECTOR CURRENT vs. INPUT POWER

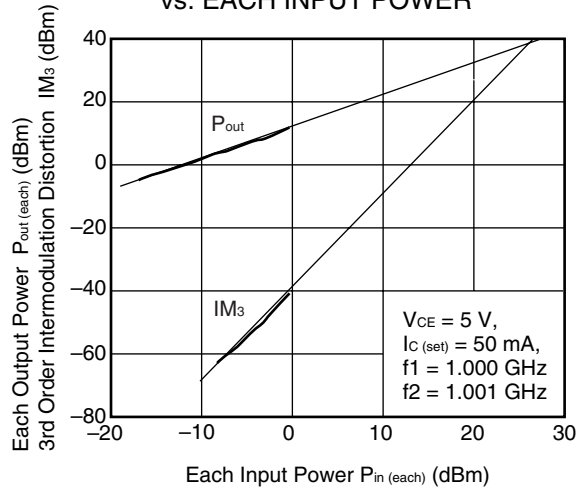


Remark The graphs indicate nominal characteristics.

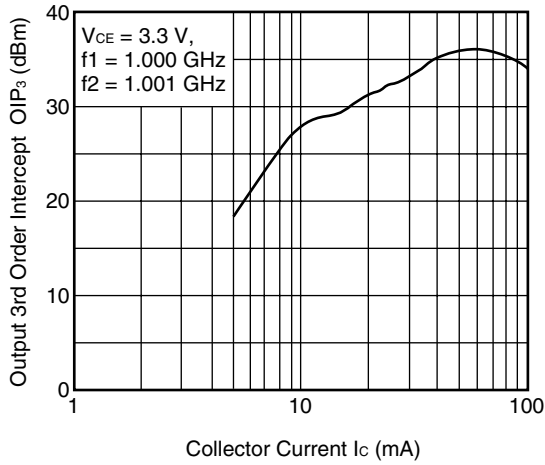
EACH OUTPUT POWER, IM_3
vs. EACH INPUT POWER



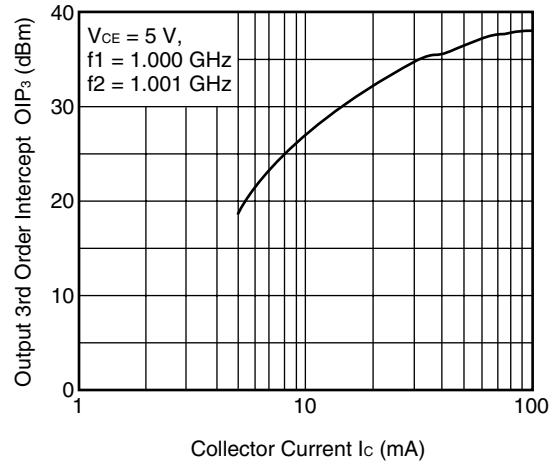
EACH OUTPUT POWER, IM_3
vs. EACH INPUT POWER



OUTPUT 3RD ORDER INTERCEPT POINT
vs. COLLECTOR CURRENT



OUTPUT 3RD ORDER INTERCEPT POINT
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

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.

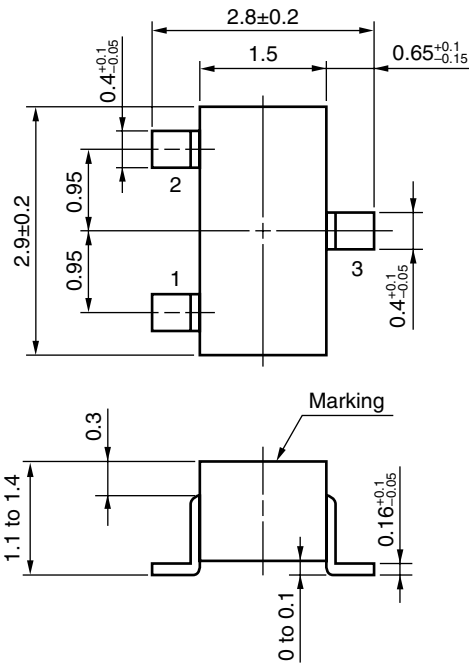
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL <http://www2.renesas.com/microwave/en/download.html>

PACKAGE DIMENSIONS

3-PIN MINIMOLD (33 PKG) (UNIT: mm)



PIN CONNECTIONS

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

Revision History	NESG340033 Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Mar 29, 2011	-	First edition issued

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-586-6000, 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.
7F, 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: +65-6276-8001

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 Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141