NESG340033

NPN Silicon Germanium RF Transistor

R09DS0016EJ0100
Rev.1.00
Mar 29, 2011

DESCRIPTION

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

FEATURES

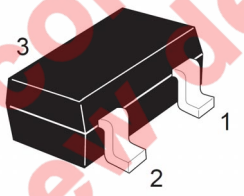
- NF = 0.65 dB TYP. @ V_{CE} = 3.3 V, I_C = 15 mA, f = 1 GHz
- $P_{o\ (1\ dB)}$ = 21 dBm TYP. @ V_{CE} = 3.3 V, $I_{C\ (set)}$ = 40 mA, f = 1 GHz
- OIP_3 = 35.5 dBm TYP. @ V_{CE} = 3.3 V, $I_{C\ (set)}$ = 50 mA, f = 1 GHz
- Maximum stable power gain: MSG =13.0 dB TYP. @ V_{CE} = 3.3 V, I_C = 40 mA, f = 1 GHz
- SiGe HBT technology (UHS3) : f_T = 10 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) (Pb-Free)	50 pcs (Non reel)	• Embossed tape 8 mm wide • Pin 3 face the perforation side of the tape
NESG340033-T1B	NESG340033-T1B-A		3 kpcs/reel	• 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
Termal Resistance from Junction to Ambient Note	Rth_{j-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	$\lvert S_{21e} \rvert^2$	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.

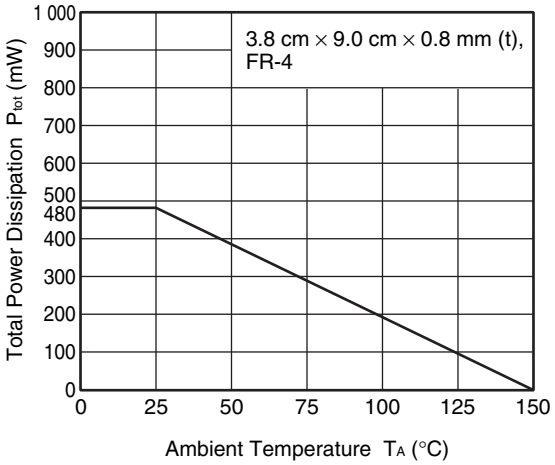
3. MSG = $\left| \frac{S_{21}}{S_{12}} \right|$

h_{FE} CLASSIFICATION

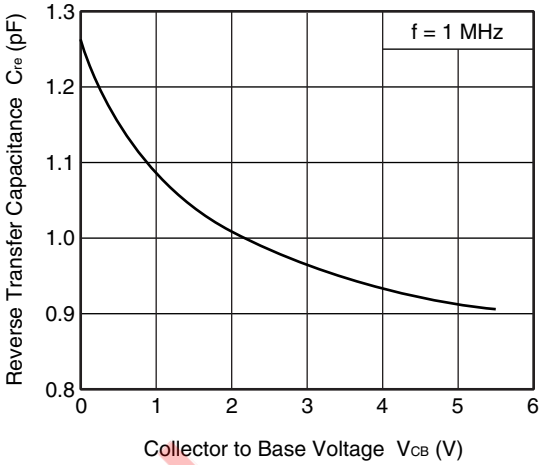
Rank	YFB
Marking	R7E
h_{FE} Value	200 to 400

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

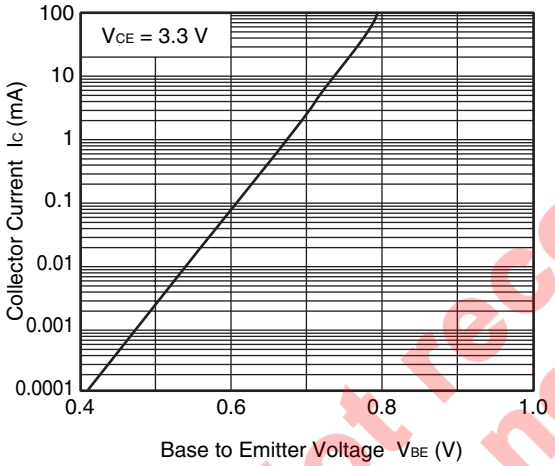
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



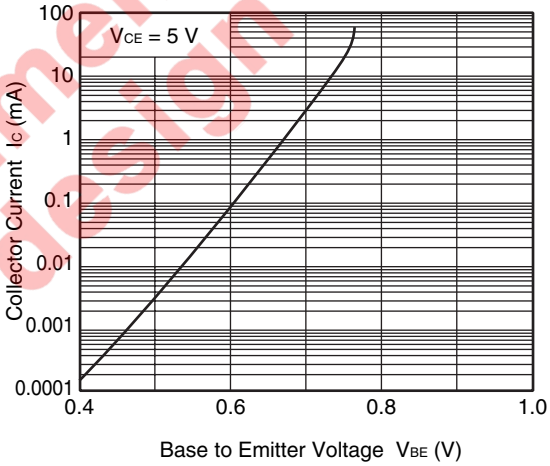
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



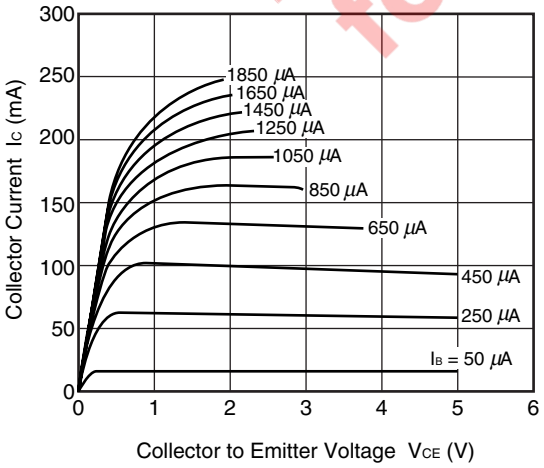
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

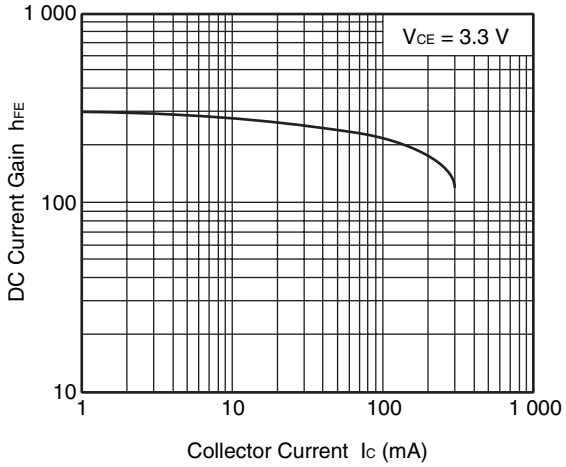


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

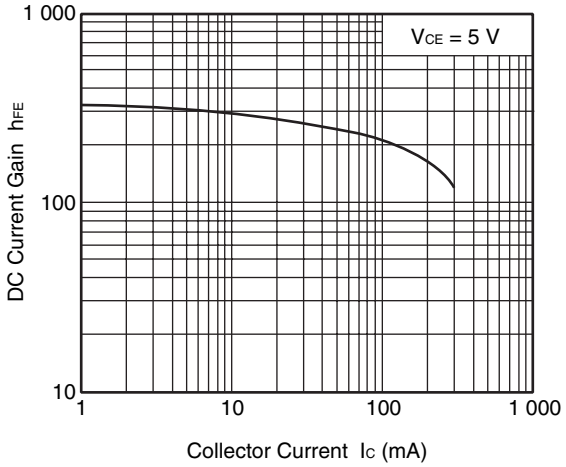


Remark The graphs indicate nominal characteristics.

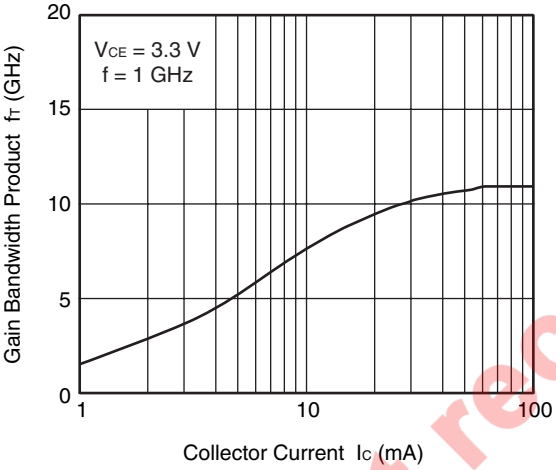
DC CURRENT GAIN vs.
COLLECTOR CURRENT



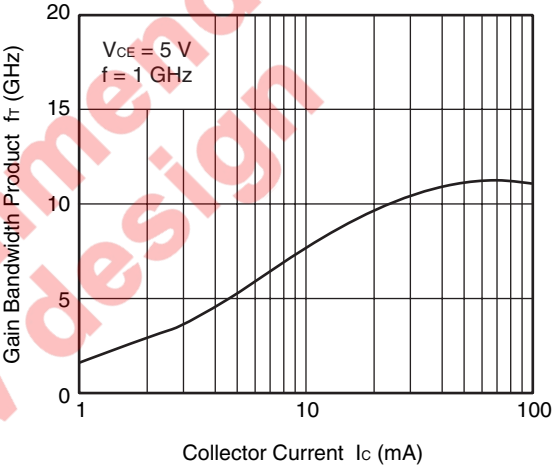
DC CURRENT GAIN vs.
COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



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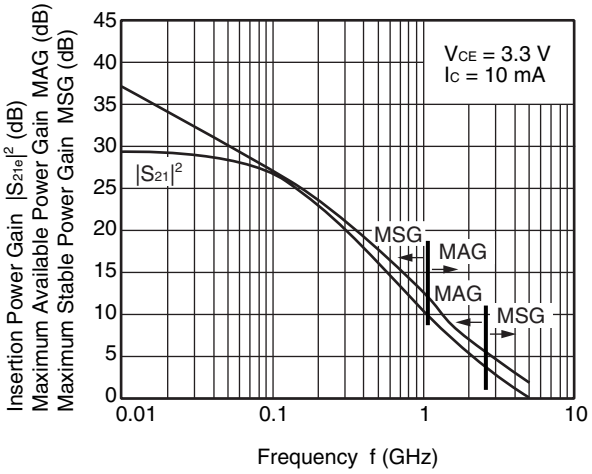
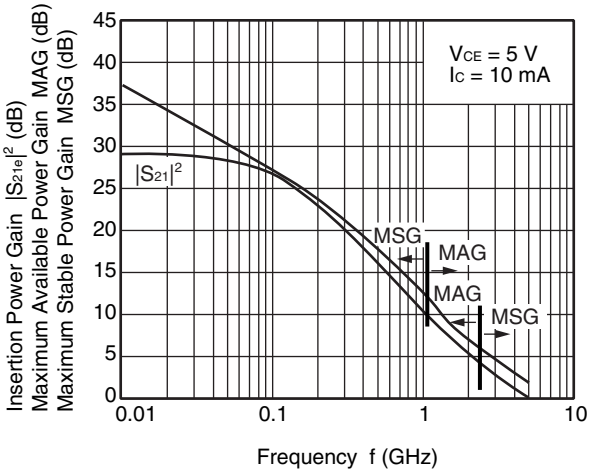
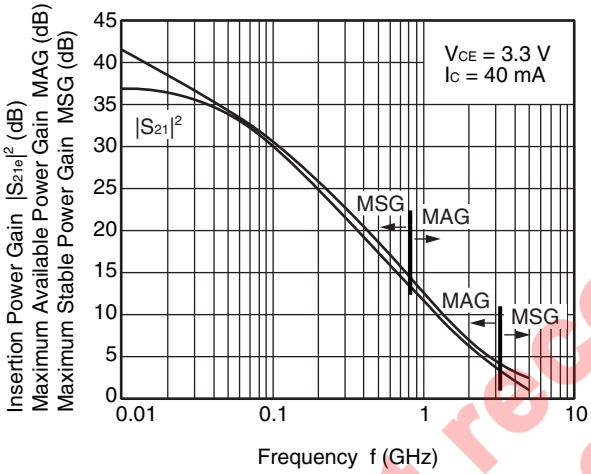
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



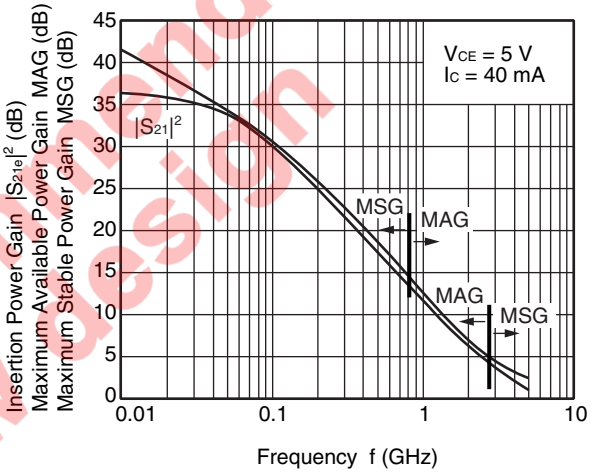
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



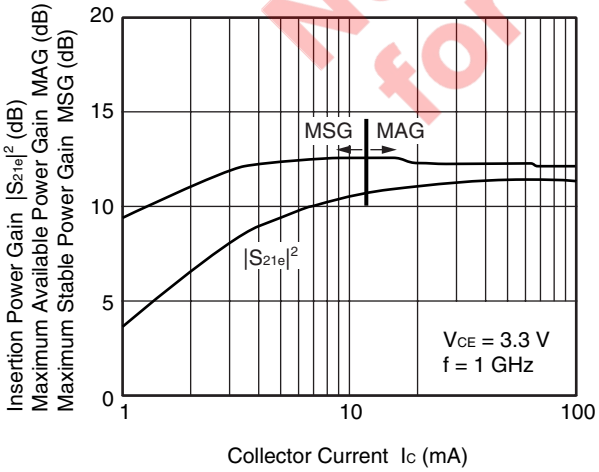
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



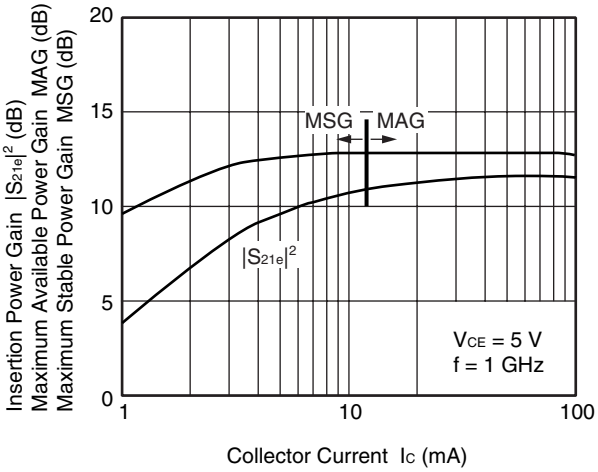
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

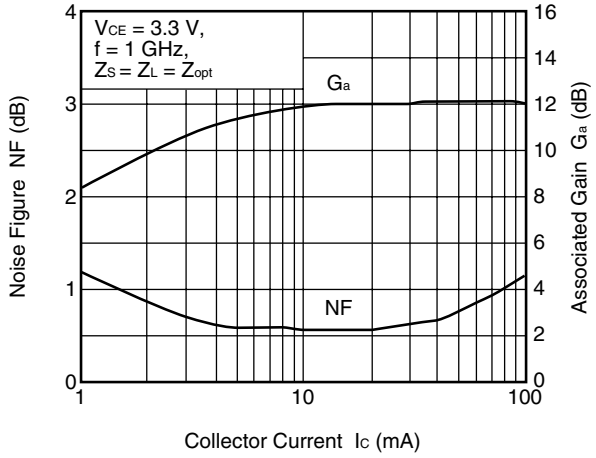


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

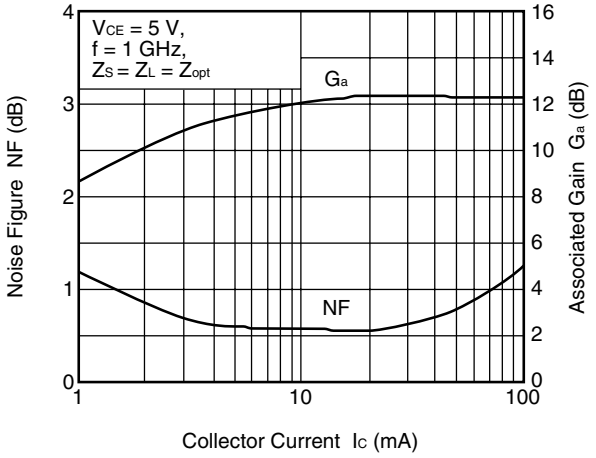


Remark The graphs indicate nominal characteristics.

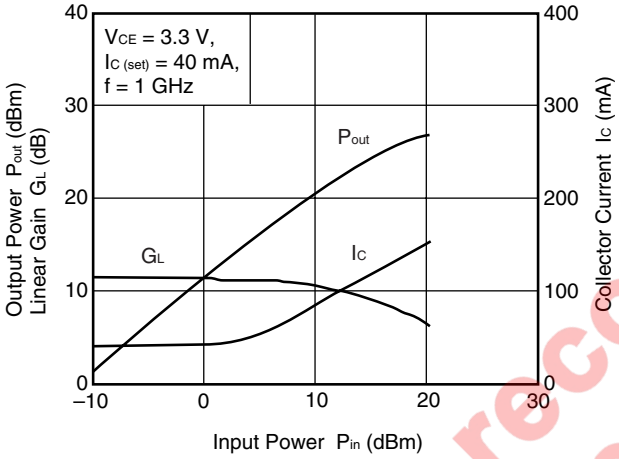
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



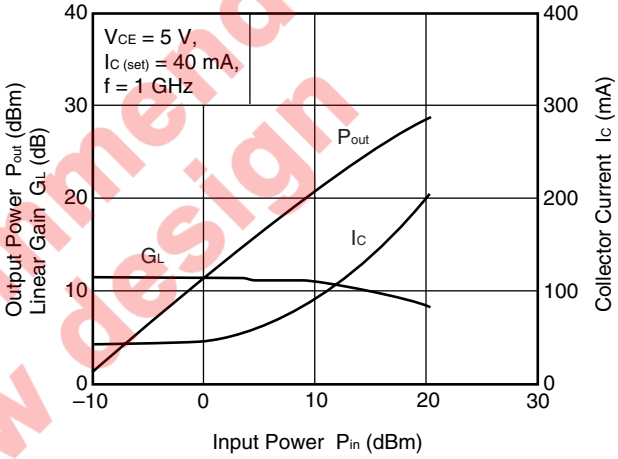
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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

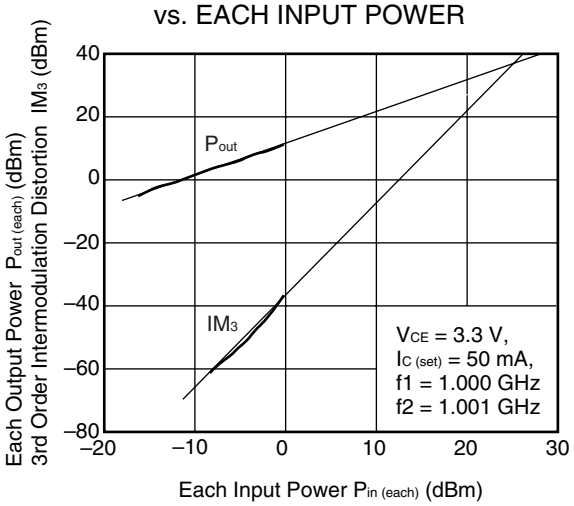


OUTPUT POWER, LINEAR GAIN,
COLLECTOR CURRENT vs. INPUT POWER

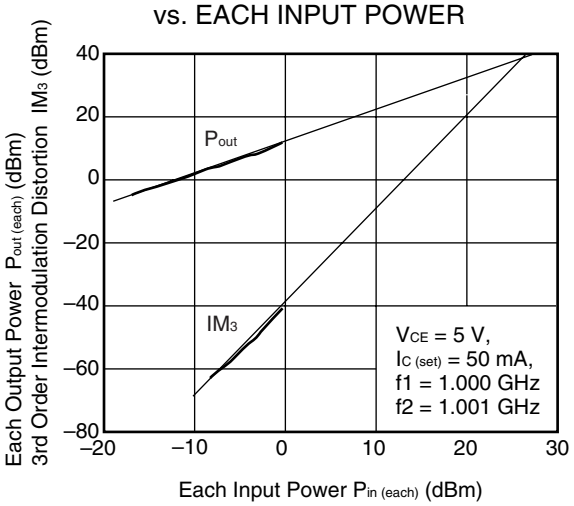


Remark The graphs indicate nominal characteristics.

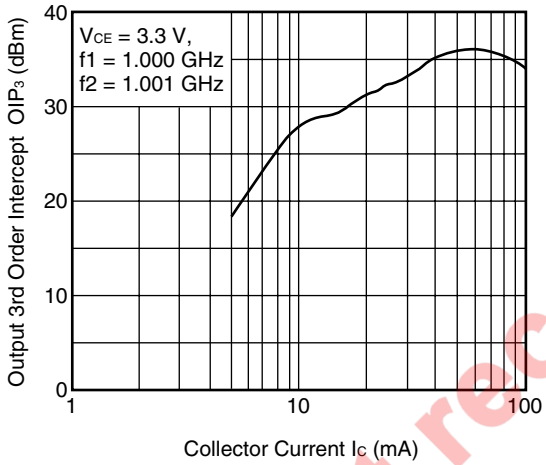
EACH OUTPUT POWER, IM_3
vs. EACH INPUT POWER



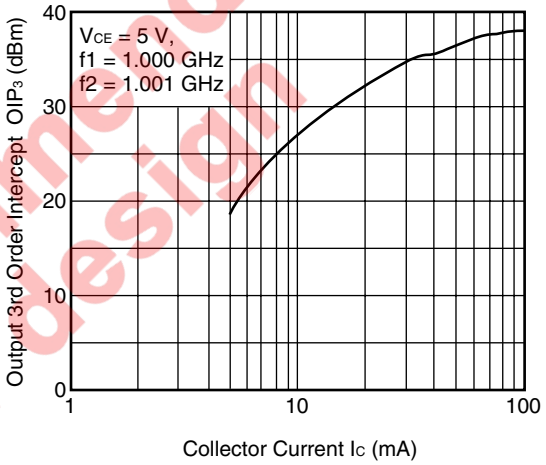
EACH OUTPUT POWER, IM_3
vs. EACH INPUT POWER



OUTPUT 3RD ORDER INTERCEPT POINT
vs. COLLECTOR CURRENT



OUTPUT 3RD ORDER INTERCEPT POINT
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

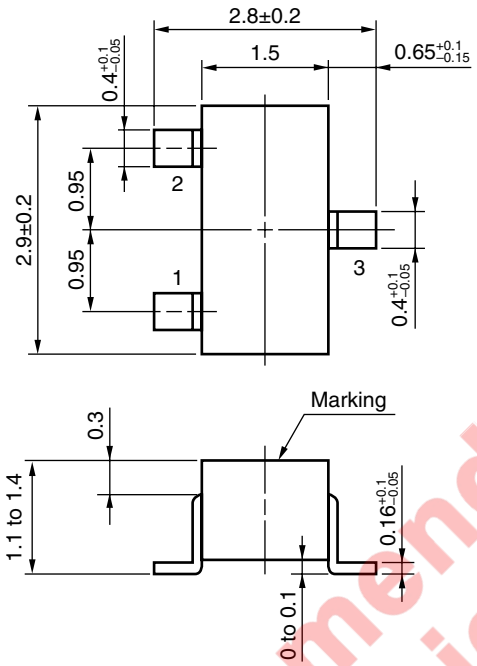
S-PARAMETERS

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

Rev.	Date	Description	
		Page	Summary
1.00	Mar 29, 2011	–	First edition issued

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RENESAS

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Colophon 1.0