

# NESG340034

R09DS0023EJ0200

## NPN Silicon Germanium RF Transistor

Rev.2.00

Aug 18, 2011

### DESCRIPTION

The NESG340034 is an ideal choice for low noise, low distortion amplification.

### FEATURES

- NF = 0.65 dB TYP. @  $V_{CE} = 5\text{ V}$ ,  $I_C = 15\text{ mA}$ ,  $f = 1\text{ GHz}$
- $P_{o(1\text{ dB})} = 24\text{ dBm}$  TYP. @  $V_{CE} = 5\text{ V}$ ,  $I_{C(\text{set})} = 40\text{ mA}$ ,  $f = 1\text{ GHz}$
- $OIP_3 = 35.5\text{ dBm}$  TYP. @  $V_{CE} = 5\text{ V}$ ,  $I_{C(\text{set})} = 40\text{ mA}$ ,  $f = 1\text{ GHz}$
- Maximum stable power gain: MSG = 12.0 dB TYP. @  $V_{CE} = 5\text{ V}$ ,  $I_C = 40\text{ mA}$ ,  $f = 1\text{ GHz}$
- SiGe HBT technology (UHS3) :  $f_T = 10\text{ GHz}$
- This product is improvement of ESD
- 3-pin power minimold (34 PKG)

### APPLICATIONS

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

### OUTLINE

RENESAS Package code: 34  
(Package name: 3-pin power minimold (34 PKG))



1. Emitter
2. Collector
3. Base

Note: Marking is "ST"

### ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG340034	NESG340034-A	3-pin power minimold (34 PKG) (Pb-Free)	25 pcs (Non reel)	• Magazine case
NESG340034-T1	NESG340034-T1-A		1 kpcs/reel	• Embossed tape 12 mm wide • Pin 2 face the perforation side of the tape

**Remark** To order evaluation samples, please contact your nearby sales office.  
Unit sample quantity is 25 pcs.

### 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.

**ABSOLUTE MAXIMUM RATINGS ( $T_A = +25^\circ\text{C}$ )**

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 <sup>Note1</sup>	$I_B$	36	mA
Collector Current	$I_C$	400	mA
Total Power Dissipation <sup>Note2</sup>	$P_{tot}$	886	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

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 ( $T_A = +25^\circ\text{C}$ )**

Parameter	Symbol	Ratings	Unit
Thermal Resistance from Junction to Ambient <sup>Note</sup>	$R_{thj-a}$	141	$^\circ\text{C/W}$

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

**RECOMMENDED OPERATING RANGE ( $T_A = +25^\circ\text{C}$ )**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Collector Current	$I_C$	-	40	-	mA

Not recommended  
for new design

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C)

&lt;R&gt;

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0	–	–	100	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 0.4 V, I <sub>C</sub> = 0	–	–	100	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 15 mA	200	320	500	–
RF Characteristics						
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 40 mA, f = 1 GHz	–	10.0	–	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 40 mA, f = 1 GHz	8.5	10.5	–	dB
Noise Figure (1)	NF1	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 15 mA, f = 1 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = 50 Ω	–	0.65	1.05	dB
Noise Figure (2)	NF2	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 40 mA, f = 1 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	0.7	–	dB
Associated Gain (1)	G <sub>a1</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 15 mA, f = 1 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = 50 Ω	8.0	10.0	–	dB
Associated Gain (2)	G <sub>a2</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 40 mA, f = 1 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	11.0	–	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0, f = 1 MHz	–	1.1	1.3	pF
Maximum Stable Power Gain	MSG <sup>Note 3</sup>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 40 mA, f = 1 GHz	10.0	12.0	–	dB
Gain 1 dB Compression Output Power	P <sub>O(1 dB)</sub>	V <sub>CE</sub> = 5 V, I <sub>C(set)</sub> = 40 mA, f = 1 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	24.0	–	dBm
Output 3rd Order Intercept Point	OIP <sub>3</sub>	V <sub>CE</sub> = 5 V, I <sub>C(set)</sub> = 40 mA, f = 1 GHz, Δf = 1 MHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	35.5	–	dBm

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

2. Collector to base capacitance when the emitter grounded.

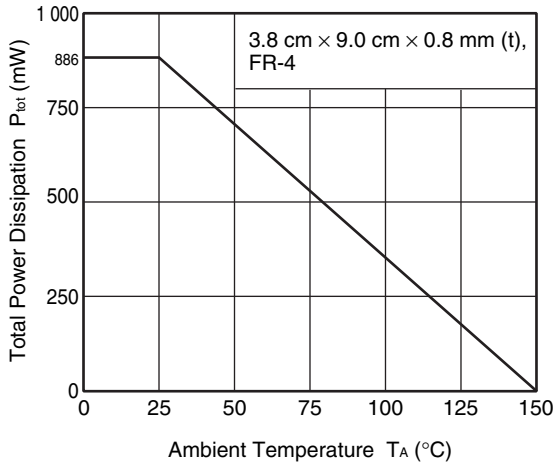
3. 
$$MSG = \left| \frac{S_{21}}{S_{12}} \right|$$

h<sub>FE</sub> CLASSIFICATION

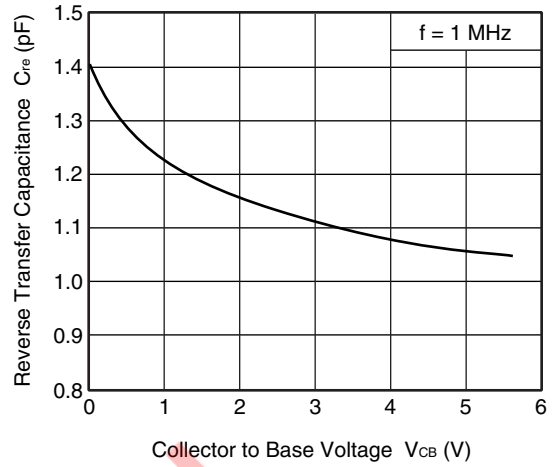
Rank	FB
Marking	ST
h <sub>FE</sub> Value	200 to 500

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)**

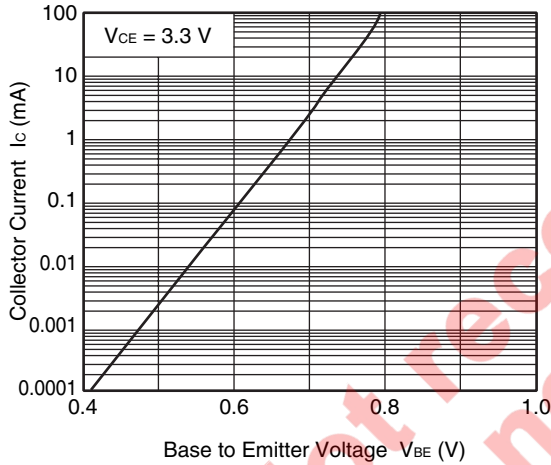
**TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE**



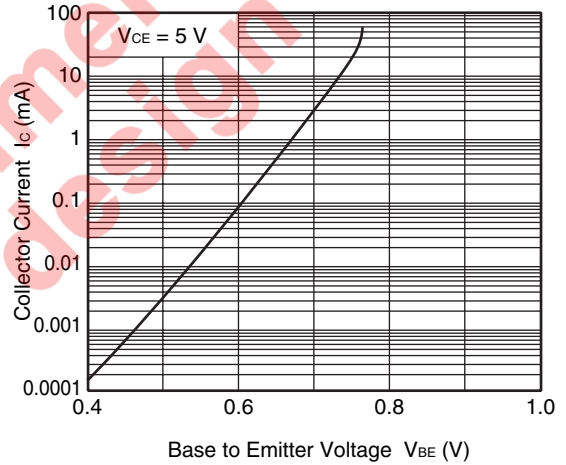
**REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE**



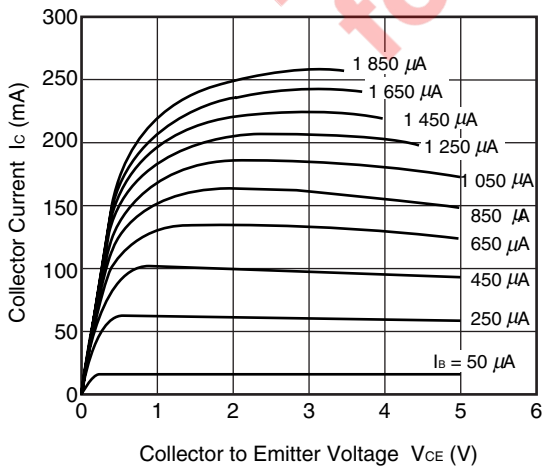
**COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE**



**COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE**

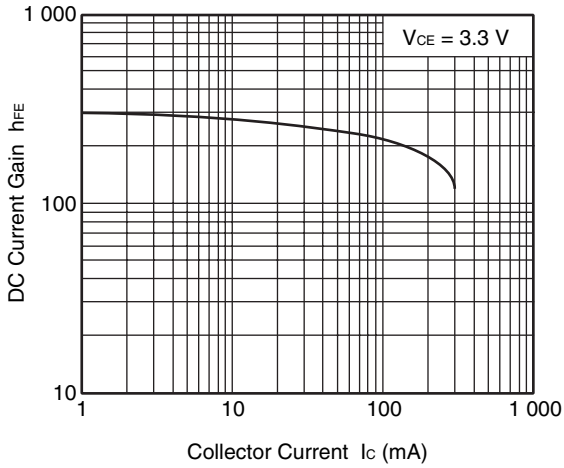


**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**

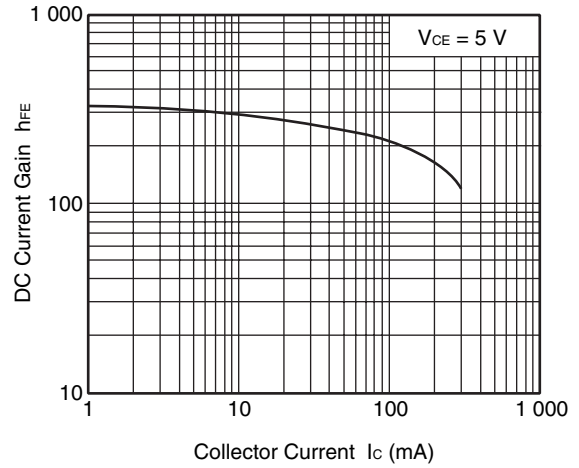


**Remark** The graphs indicate nominal characteristics.

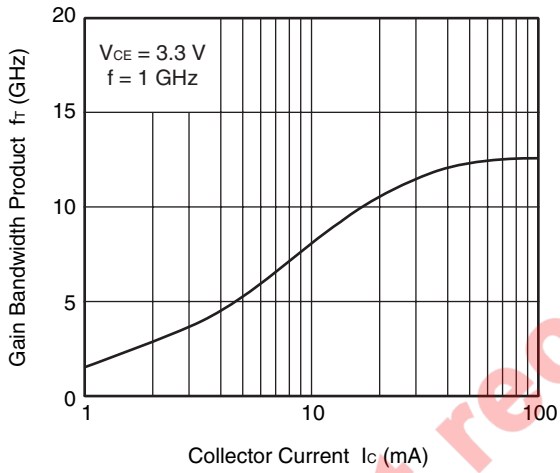
DC CURRENT GAIN vs. COLLECTOR CURRENT



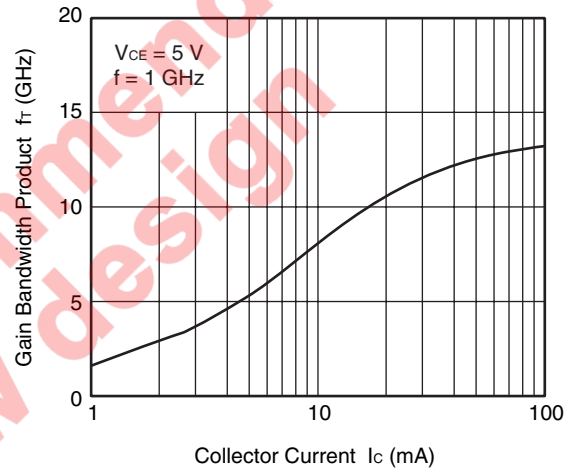
DC CURRENT GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

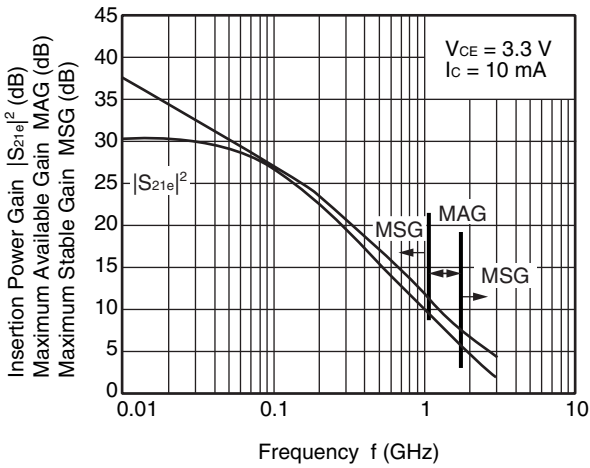


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

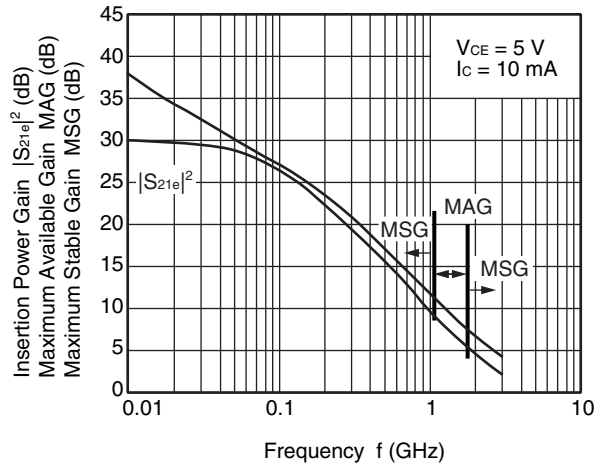


**Remark** The graphs indicate nominal characteristics.

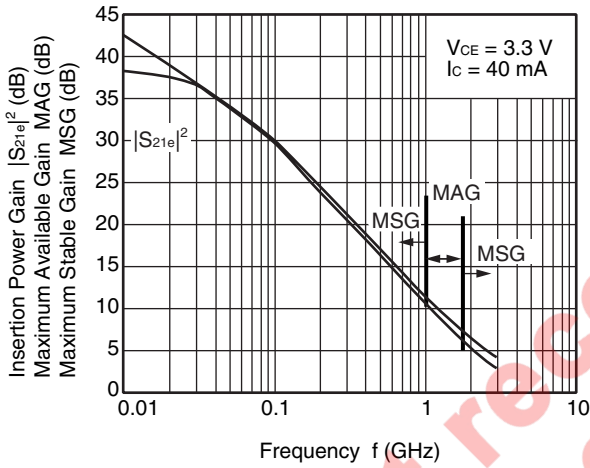
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



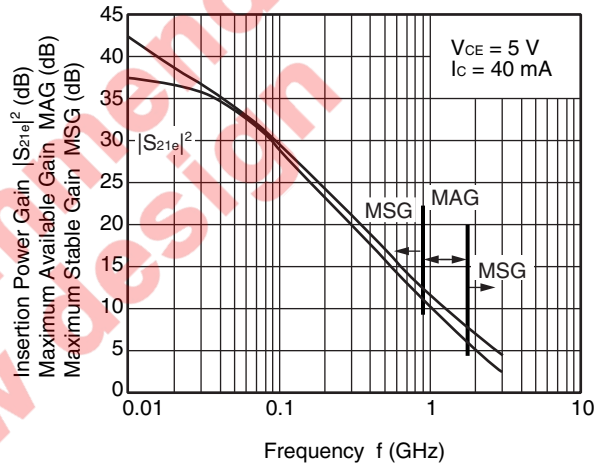
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



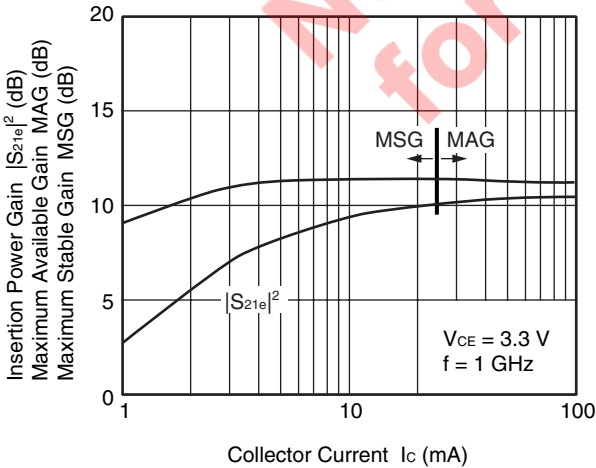
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



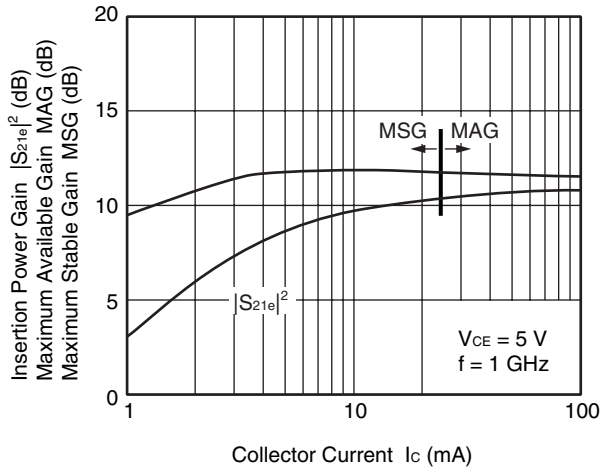
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

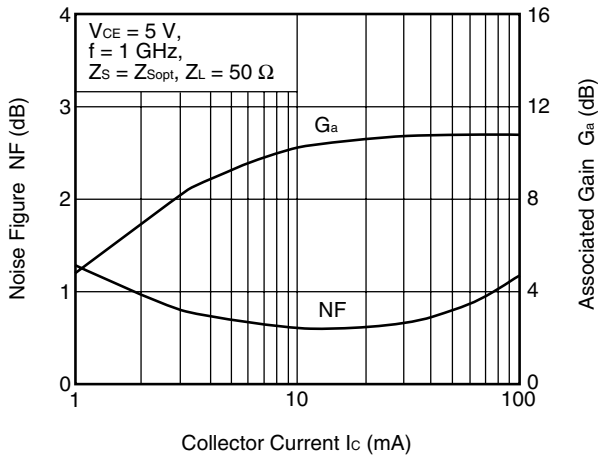


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

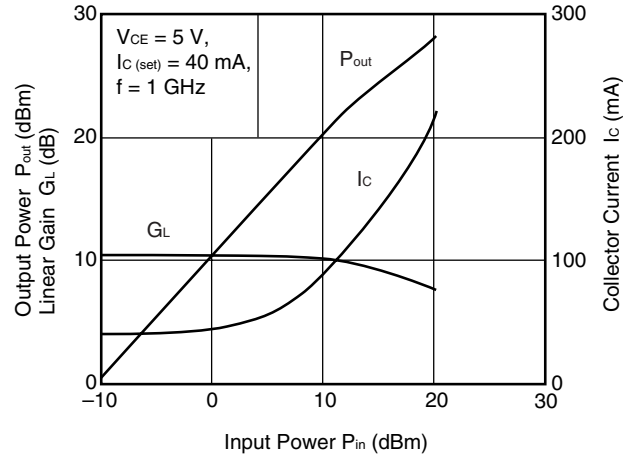


**Remark** The graphs indicate nominal characteristics.

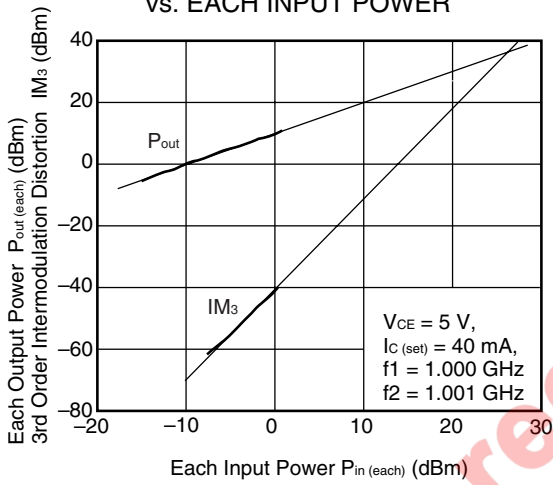
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



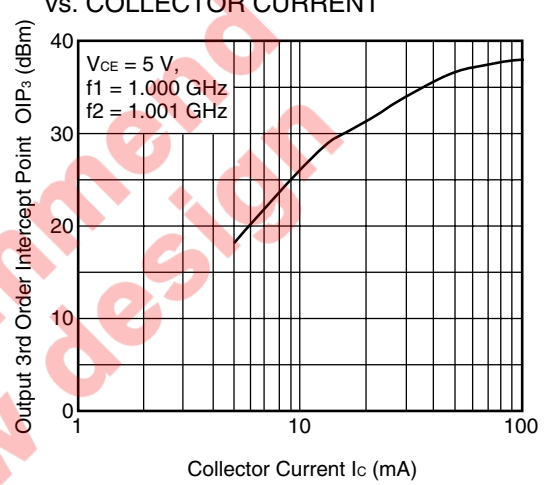
OUTPUT POWER, LINEAR GAIN, COLLECTOR CURRENT vs. INPUT POWER



EACH OUTPUT POWER,  $IM_3$  vs. EACH INPUT POWER



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]

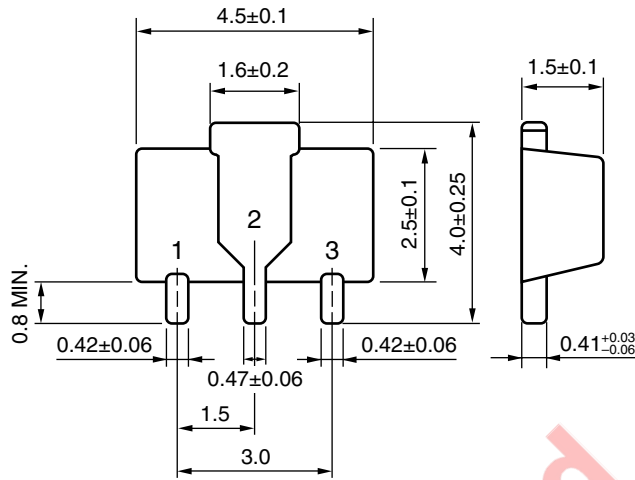
URL <http://www2.renesas.com/microwave/en/download.html>

Not recommend  
for new design



**PACKAGE DIMENSIONS**

**3-PIN POWER MINIMOLD (34 PKG) (UNIT: mm)**



**PIN CONNECTIONS**

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

Not recommend  
for new design

<b>Revision History</b>	<b>NESG340034 Data Sheet</b>
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Rev.	Date	Description	
		Page	Summary
1.00	Jun 27, 2011	–	First edition issued
2.00	Aug 18, 2011	p.3	<b>ELECTRICAL CHARACTERISTICS</b> DC Current Gain 400 → 500 (MAX.)

Not recommend  
for new design

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