

# NPN SILICON GERMANIUM RF TRANSISTOR NESG2021M16

## NPN SIGE RF TRANSISTOR FOR LOW NOISE, HIGH-GAIN AMPLIFICATION 6-PIN LEAD-LESS MINIMOLD (M16, 1208 PKG)

#### FEATURES

- The device is an ideal choice for low noise, high-gain at low current amplifications
  - NF = 0.9 dB TYP.,  $G_a$  = 18.0 dB TYP. @ Vce = 2 V, Ic = 3 mA, f = 2 GHz
  - NF = 1.3 dB TYP.,  $G_a$  = 10.0 dB TYP. @ Vce = 2 V, Ic = 3 mA, f = 5.2 GHz
- Maximum stable power gain: MSG = 22.5 dB TYP. @ Vce = 3 V, Ic = 10 mA, f = 2 GHz
- High breakdown voltage technology for SiGe Tr. adopted: VCEO (absolute maximum ratings) = 5.0 V
- 6-pin lead-less minimold (M16, 1208 PKG)

## <R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG2021M16	NESG2021M16-A	6-pin lead-less minimold (M16, 1208 PKG)	50 pcs (Non reel)	<ul><li>8 mm wide embossed taping</li><li>Pin 1 (Collector), Pin 6 (Emitter) face the</li></ul>
NESG2021M16-T3	NESG2021M16-T3-A	(Pb-Free)	10 kpcs/reel	perforation side of the tape

**Remark** To order evaluation samples, please contact your nearby sales office. Unit sample quantity is 50 pcs.

## ABSOLUTE MAXIMUM RATINGS (TA = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	Vсво	13.0	V
Collector to Emitter Voltage	VCEO	5.0	V
Emitter to Base Voltage	Vebo	1.5	V
Collector Current	lc	35	mA
Total Power Dissipation	Ptot Note	175	mW
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	-65 to +150	°C

Note Mounted on 1.08  $\text{cm}^2 \times 1.0 \text{ mm}$  (t) glass epoxy PCB

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

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

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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.

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	Ісво	Vсв = 5 V, IE = 0 mA	-	-	100	nA
Emitter Cut-off Current	Іево	V <sub>EB</sub> = 1 V, Ic = 0 mA	_	_	100	nA
DC Current Gain	hfe Note 1	Vce = 2 V, Ic = 5 mA	130	190	260	-
RF Characteristics						
Gain Bandwidth Product	fт	Vce = 3 V, Ic = 10 mA, f = 2 GHz	20	25	-	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	Vce = 3 V, Ic = 10 mA, f = 2 GHz	17.0	19.0	-	dB
Noise Figure (1)	NF		-	0.9	1.2	dB
Noise Figure (2)	NF	$      V_{CE} = 2 \ V, \ I_C = 3 \ mA, \ f = 5.2 \ GHz, \\      Z_S = Z_{Sopt}, \ Z_L = Z_{Lopt} $	_	1.3	-	dB
Associated Gain (1)	Ga		15.0	18.0	-	dB
Associated Gain (2)	G₃		-	10.0	-	dB
Reverse Transfer Capacitance	Cre Note 2	Vсв = 2 V, IE = 0 mA, f = 1 MHz	-	0.1	0.2	pF
Maximum Stable Power Gain	MSG Note 3	Vce = 3 V, Ic = 10 mA, f = 2 GHz	20.0	22.5	-	dB
Gain 1 dB Compression Output Power	PO (1 dB)	$ V_{CE} = 3 \text{ V}, \text{ Ic }_{(set)} = 12 \text{ mA } (\text{RF OFF}), $ f = 2 GHz, Zs = Zsopt, ZL = ZLopt	-	9	_	dBm
Output 3rd Order Intercept Point	OIP <sub>3</sub>	$  V_{CE} = 3 V, I_{C (set)} = 12 mA (RF OFF), $ f = 2 GHz, Zs = Zsopt, ZL = ZLopt	_	17	-	dBm

Notes 1. Pulse measurement: PW  $\leq 350~\mu\text{s},~\text{Duty}~\text{Cycle} \leq 2\%$ 

2. Collector to base capacitance when the emitter grounded

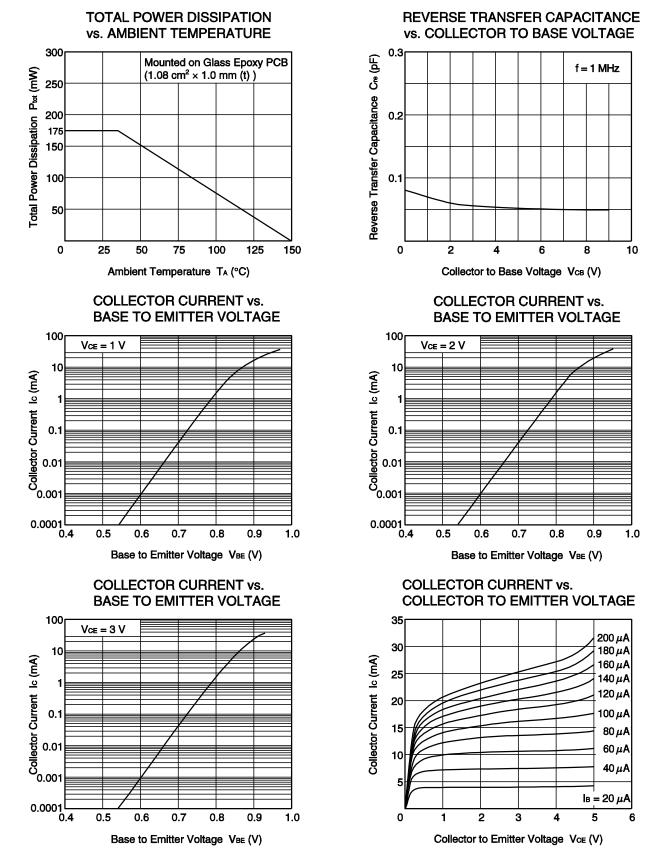
$$3. \text{ MSG} = \frac{|S_{21}|}{|S_{12}|}$$

## **hfe CLASSIFICATION**

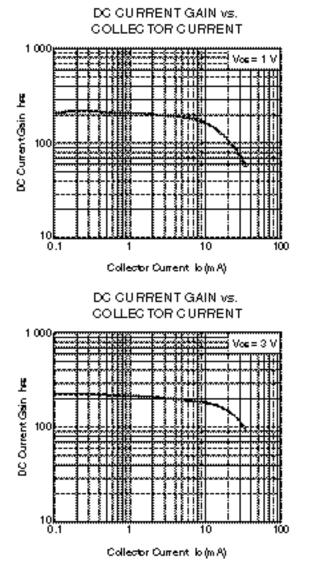
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Rank	FB/YFB		
Marking	zE		
hfe Value	130 to 260		

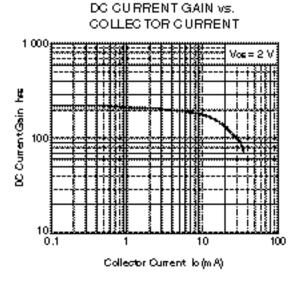
## <R> TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)

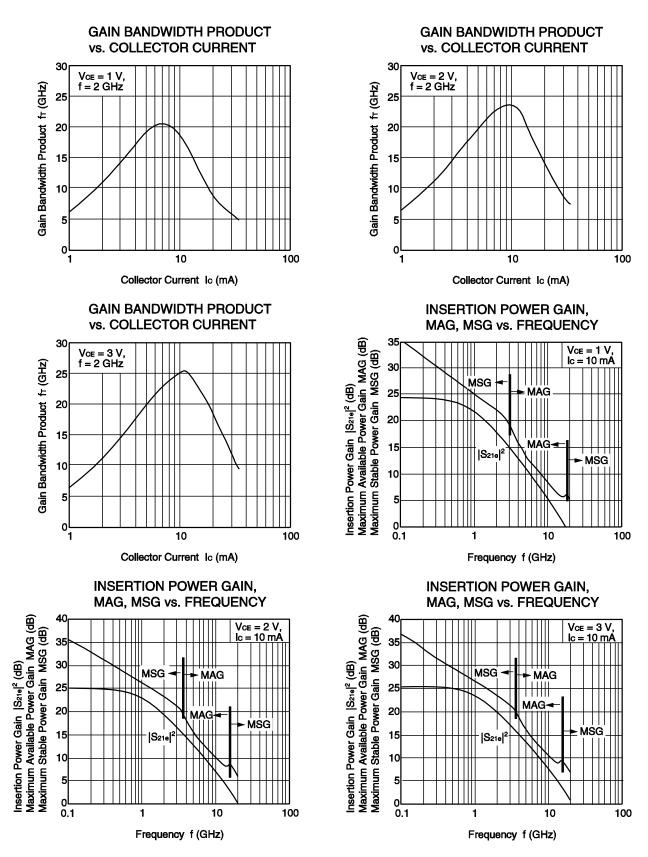


**Remark** The graphs indicate nominal characteristics.

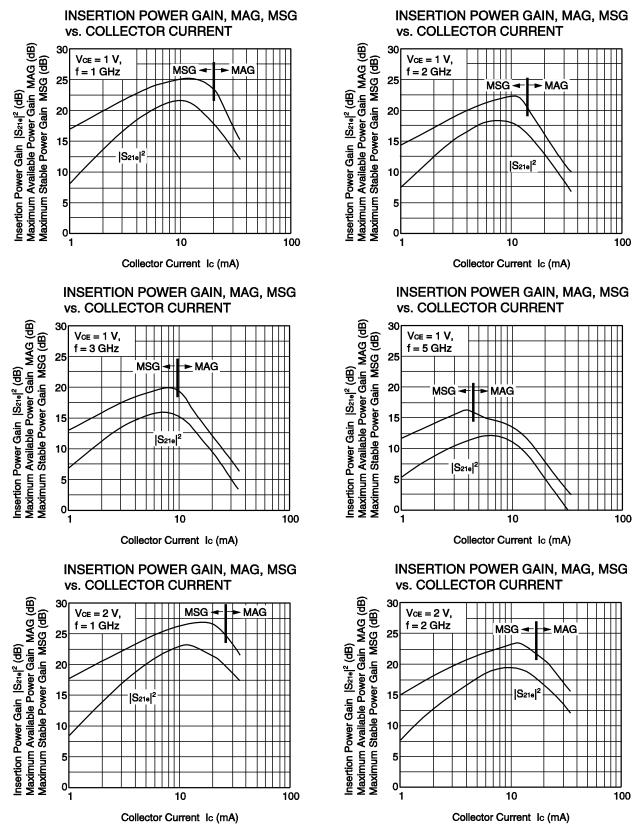


Remark The graphs indicate nominal characteristics.

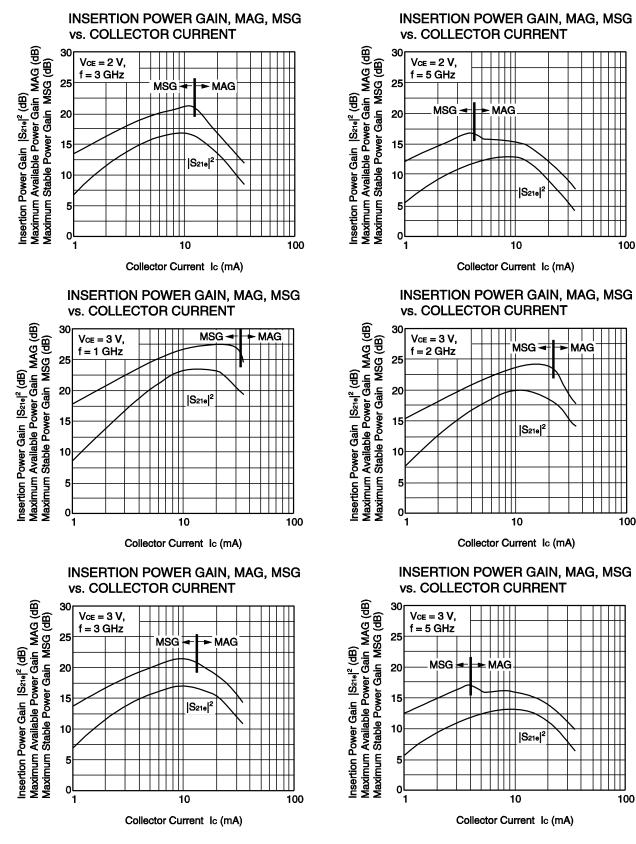




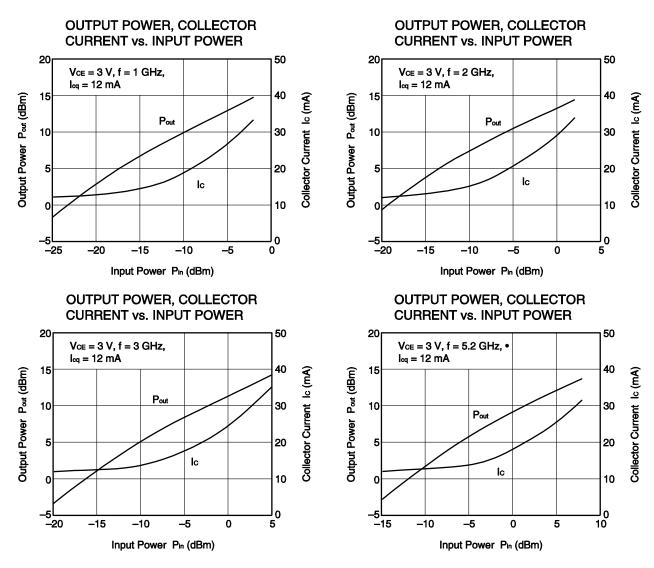
Remark The graphs indicate nominal characteristics.



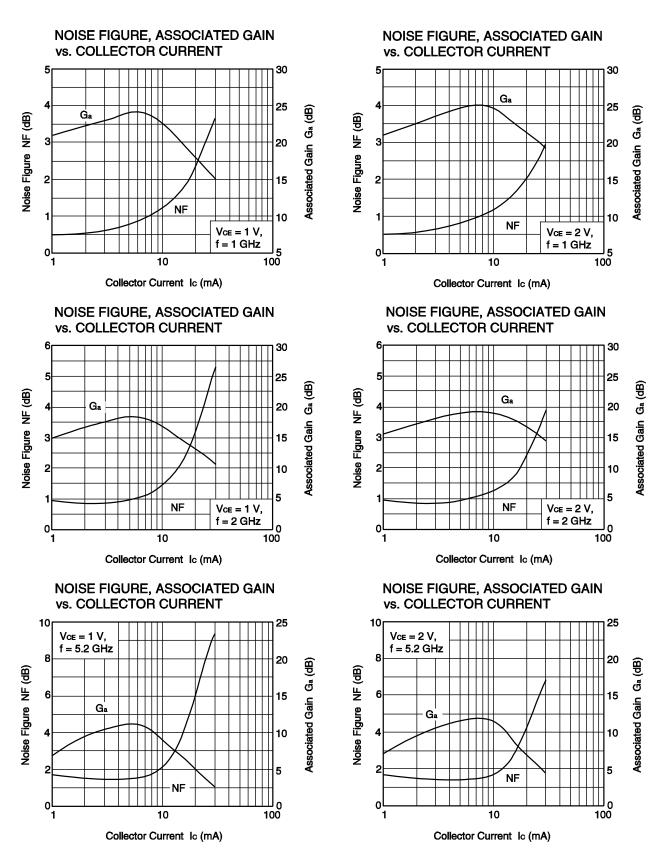
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30

25

20

15

10

5

100

 $V_{CE} = 3 V$ ,

f = 2 GHz

Associated Gain Ga (dB)

NOISE FIGURE, ASSOCIATED GAIN

NF

10

Collector Current Ic (mA)

vs. COLLECTOR CURRENT

Ga

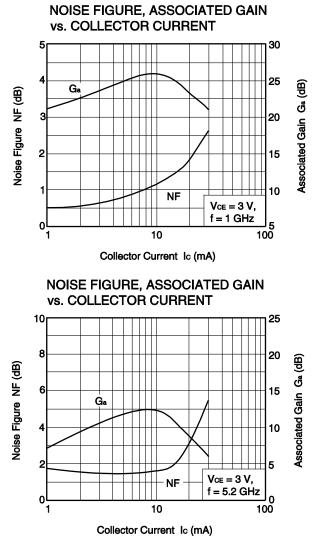
6

5

0

1

Noise Figure NF (dB)



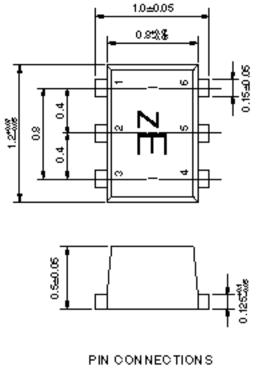
**Remark** The graphs indicate nominal characteristics.

#### <R> 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://www.necel.com/microwave/en/

## PACKAGE DIMENSIONS

## 6-PIN LEAD-LESS MINIMOLD (M16, 1208 PKG) (UNIT: mm)



- 1. Collector 2. Emitter
- 3. Emitter
- 4. Base
- 5. Emitter
- 6. Emitter
- Caution All four Emitter-pins should be connected to PWB in order to obtain better Electrical performance and heat sinking.