

# NPN SILICON GERMANIUM RF TRANSISTOR **NESG2021M05**

# NPN SIGE RF TRANSISTOR FOR LOW NOISE, HIGH-GAIN AMPLIFICATION FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05)

### FEATURES

- The device is an ideal choice for low noise, high-gain at low current amplifications NF = 0.9 dB TYP., Ga = 18.0 dB TYP. @ VCE = 2 V, Ic = 3 mA, f = 2 GHz NF = 1.3 dB TYP., Ga = 10.0 dB TYP. @ VCE = 2 V, Ic = 3 mA, f = 5.2 GHz
- NF = 1.3 dB 1 YP.,  $G_a = 10.0 \text{ dB}$  1 YP.  $(U \ VCE = 2 \ V, IC = 3 \text{ mA}, I = 5.2 \text{ GHz}$
- Maximum stable power gain: MSG = 22.5 dB TYP. @ VcE = 3 V, lc = 10 mA, f = 2 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

### ORDERING INFORMATION

Part Number	Quantity	Supplying Form	
NESG2021M05-A	50 pcs (Non reel)	• 8 mm w ide embossed taping	
NESG2021M05-T1-A	3 kpcs/reel	• Pin 3 (Collector), Pin 4 (Emitter) face the perforation side of the tape	

**Remark** To order evaluation samples, 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	Vево	1.5	V
Collector Current	k	35	mA
Total Pow er Dissipation	Ptot Note	175	mW
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	-65 to +150	°C

▶ Note Mounted on 1.08 cm<sup>2</sup> × 1.0 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.

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics			-			
Collector Cut-off Current	сво	$V_{CB} = 5 V$ , $I_E = 0 mA$	-	-	100	nA
Emitter Cut-off Current	Ево	Vев = 1 V, lc = 0 mA	-	-	100	nA
DC Current Gain	hfe Note 1	Vce = 2 V, lc = 5 mA	130	190	260	_
RF Characteristics						
Gain Bandwidth Product	f⊤	Vce = 3 V, lc = 10 mA, f = 2 GHz	20	25	-	GHz
Insertion Pow er Gain	S <sub>21e</sub>   <sup>2</sup>	Vce = 3 V, lc = 10 mA, f = 2 GHz	17.0	19.0	-	dB
Noise Figure (1)	NF	$ V_{CE} = 2 V, \ k = 3 \text{ mA}, \ f = 2 \text{ GHz}, \\ Z_S = Z_{Sopt}, \ Z_L = Z_{Lopt} $	_	0.9	1.2	dB
Noise Figure (2)	NF	$\label{eq:Vce} \begin{array}{l} V_{CE} = 2 \ V, \ k = 3 \ mA, \ f = 5.2 \ GHz, \\ Z_S = Z_{Sopt}, \ Z_L = Z_{Lopt} \end{array}$	_	1.3	-	dB
Associated Gain (1)	Ga	$    V_{CE} = 2 V, \ k = 3 \text{ mA}, \ f = 2 \text{ GHz}, \\    Z_S = Z_{Sopt}, \ Z_L = Z_{Lopt} $	15.0	18.0	-	dB
Associated Gain (2)	Ga	$\label{eq:Vce} \begin{array}{l} V_{CE} = 2 \ V, \ k = 3 \ \text{mA}, \ f = 5.2 \ \text{GHz}, \\ Z_S = Z_{Sopt}, \ Z_L = Z_{Lopt} \end{array}$	_	10.0	_	dB
Reverse Transfer Capacitance	Cre Note 2	Vсв = 2 V, I∈ = 0 mA, f = 1 MHz	-	0.1	0.2	pF
Maximum Stable Pow er Gain	MSG Note 3	$V_{CE} = 3 V$ , $I_C = 10 mA$ , $f = 2 GHz$	20.0	22.5	-	dB
Gain 1 dB Compression Output Pow er	Po (1 dB)	$\label{eq:Vce} \begin{array}{l} V_{CE} = 3 \ V, \ lc = 12 \ mA, \ f = 2 \ GHz, \\ Z_{S} = Z_{Sopt}, \ Z_{L} = Z_{Lopt} \end{array}$	_	9.0	_	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP₃	$\label{eq:Vce} \begin{array}{l} V_{CE} = 3 \ V, \ lc = 12 \ mA, \ f = 2 \ GHz, \\ Z_{S} = Z_{Sopt}, \ Z_{L} = Z_{Lopt} \end{array}$	_	17.0	-	dBm

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

<u>#</u>

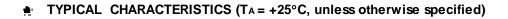
Notes 1. Pulse measurement: PW  $\leq 350~\mu s$  , Duty Cycle  $\leq 2\%$ 

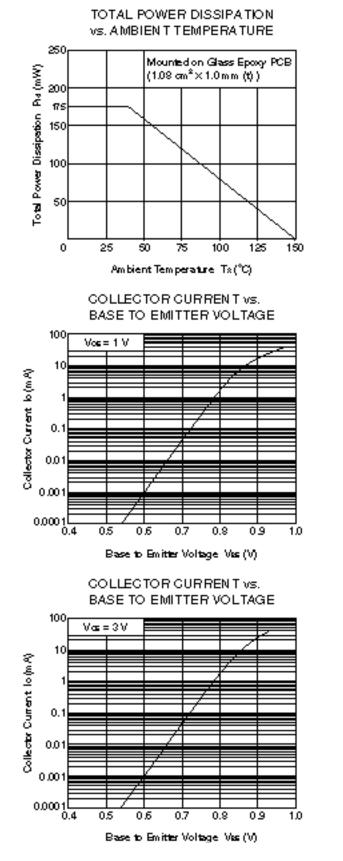
2. Collector to base capacitance when the emitter grounded

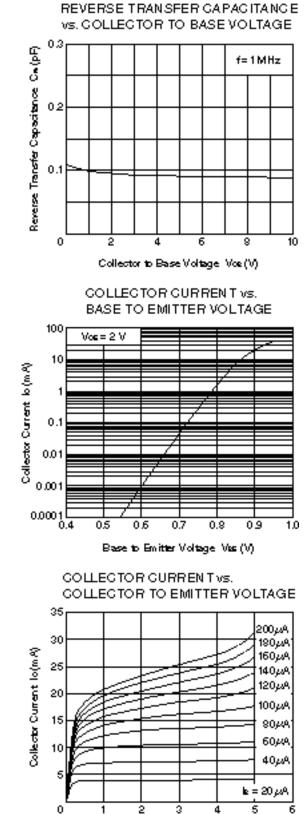
**3.** MSG = 
$$\frac{S_{21}}{S_{12}}$$

# **hfe CLASSIFICATION**

Rank	FB		
Marking	T1G		
hre Value	130 to 260		



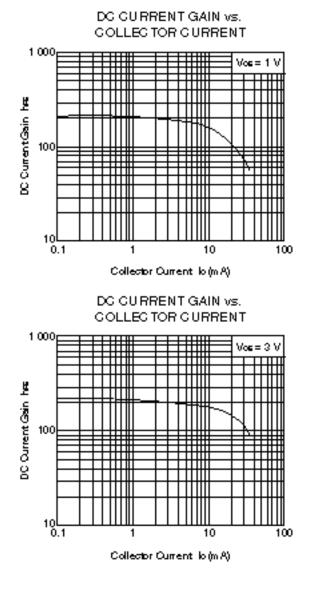




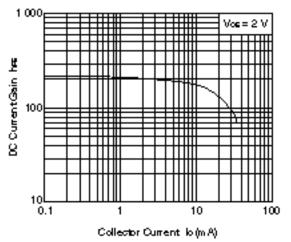
1

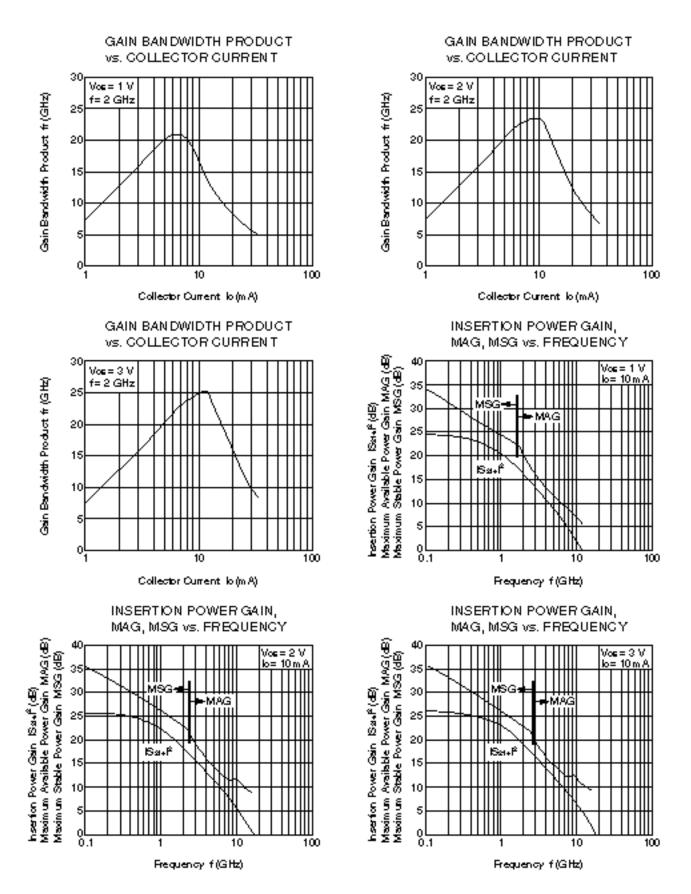
Collector to Emitter Voltage Vos (V)

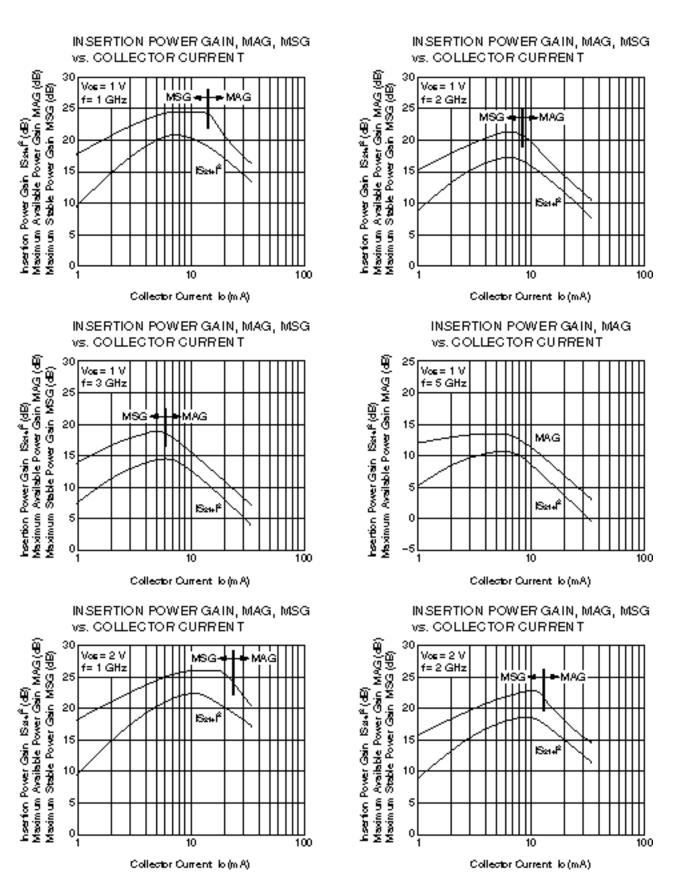
6

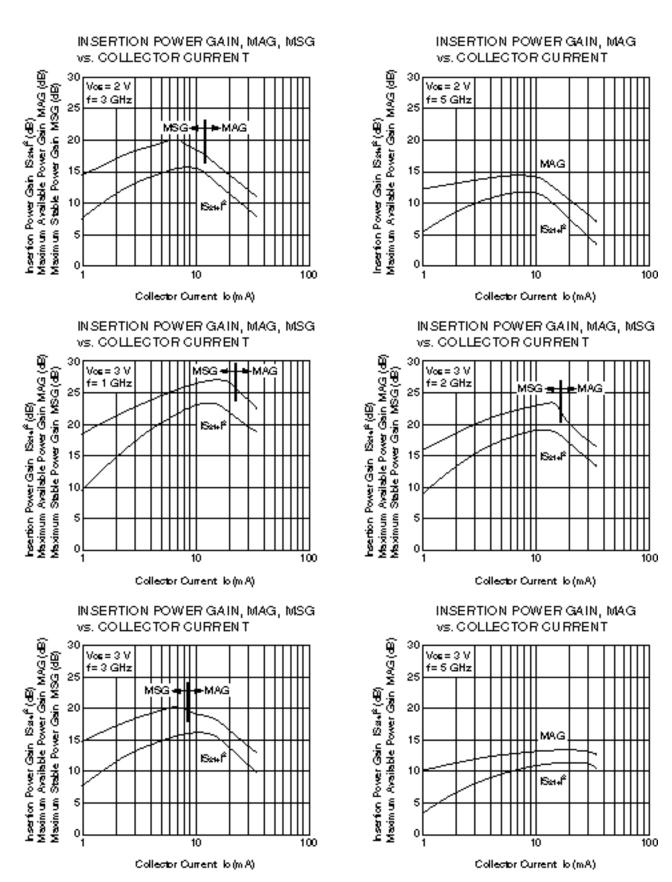


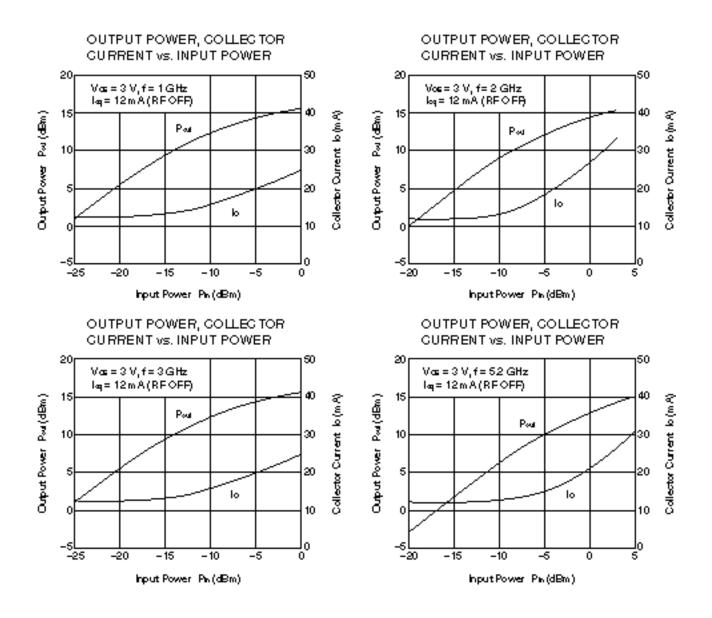
DC CURRENT GAIN vs. COLLECTOR CURRENT

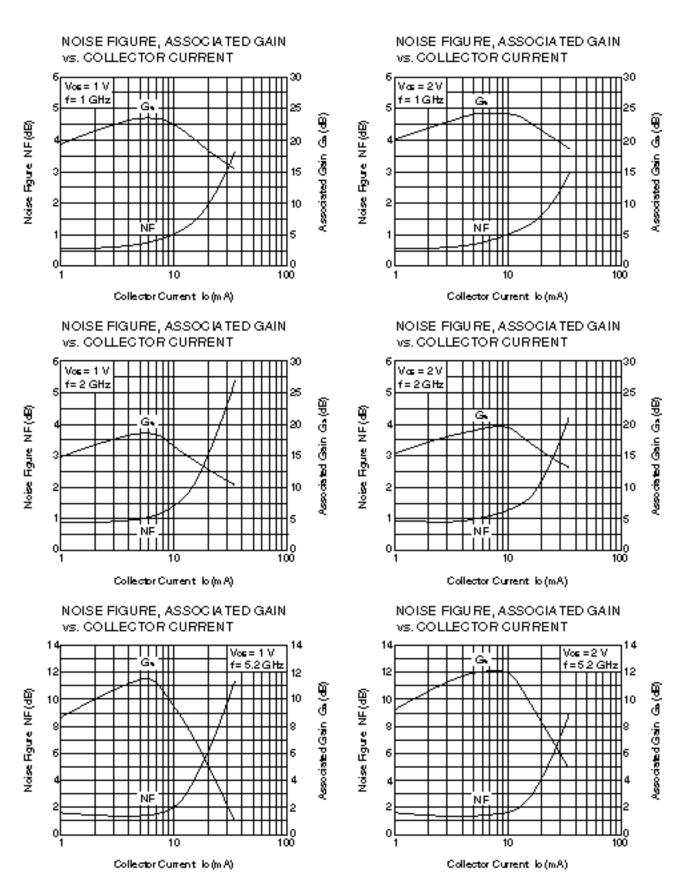


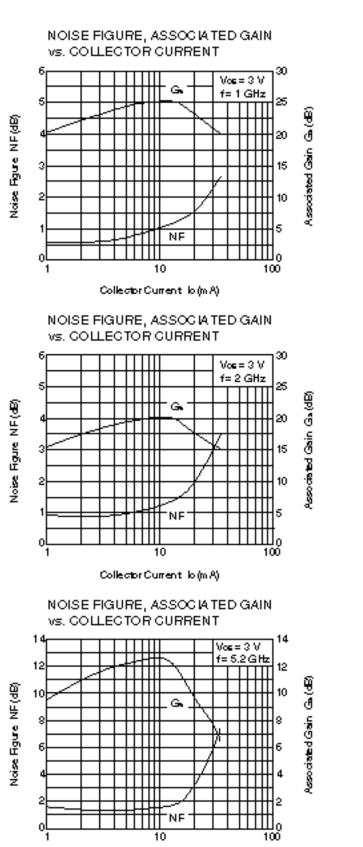














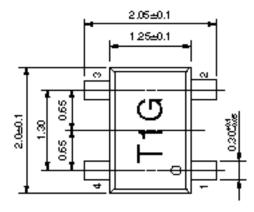
Remark The graphs indicate nominal characteristics.

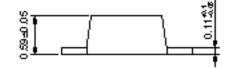
### **S-PARAMETERS**

- 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://www.necel.com/microwave/en/

# PACKAGE DIMENSIONS

# FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05) (UNIT: mm)





### PIN CONNECTIONS

- 1. Base
- 2. Emitter
- Collector
- 4. Emitter