

NESG2021M05

Data Sheet

NPN SiGe RF Transistor for Low Noise, High-Gain Amplification
 Flat-Lead 4-Pin Thin-Type Super Minimold (M05)

R09DS0034EJ0300
 Rev. 3.00
 Jun 20, 2012

FEATURES

- This 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. @ $V_{CE} = 2$ V, $I_C = 3$ mA, $f = 2$ GHz
 NF = 1.3 dB TYP., $G_a = 10.0$ dB TYP. @ $V_{CE} = 2$ V, $I_C = 3$ mA, $f = 5.2$ GHz
- Maximum stable power gain: MSG = 22.5 dB TYP. @ $V_{CE} = 3$ V, $I_C = 10$ 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

<R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG2021M05	NESG2021M05-A	Flat-lead 4-pin thin-type super minimold (M05, 2012 PKG) (Pb-Free)	50 pcs (Non reel)	<ul style="list-style-type: none"> 8 mm wide embossed taping Pin 3 (Collector), Pin 4 (Emitter) face the perforation side of the tape
NESG2021M05-T1	NESG2021M05-T1-A		3 kpcs/reel	

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

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

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	13.0	V
Collector to Emitter Voltage	V_{CEO}	5.0	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot} ^{Note}	175	mW
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

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 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.

<R> **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} = 1 V, I _C = 0	–	–	100	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 2 V, I _C = 5 mA	130	190	260	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 3 V, I _C = 10 mA, f = 2 GHz	20	25	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 3 V, I _C = 10 mA, f = 2 GHz	17.0	19.0	–	dB
Noise Figure (1)	NF	V _{CE} = 2 V, I _C = 3 mA, f = 2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	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)	G _a	V _{CE} = 2 V, I _C = 3 mA, f = 2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	15.0	18.0	–	dB
Associated Gain (2)	G _a	V _{CE} = 2 V, I _C = 3 mA, f = 5.2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	10.0	–	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 2 V, I _E = 0, f = 1 MHz	–	0.1	0.2	pF
Maximum Stable Power 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 Power	P _O (1 dB)	V _{CE} = 3 V, I _C = 12 mA, f = 2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	9.0	–	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP ₃	V _{CE} = 3 V, I _C = 12 mA, f = 2 GHz, Z _S = Z _{Sopt} , Z _L = Z _{Lopt}	–	17.0	–	dBm

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

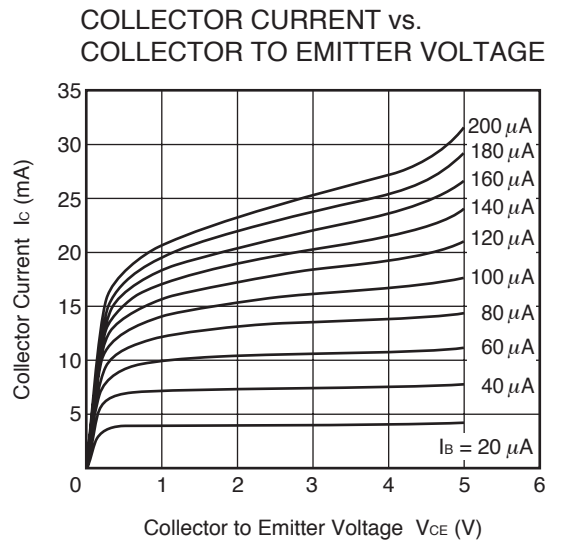
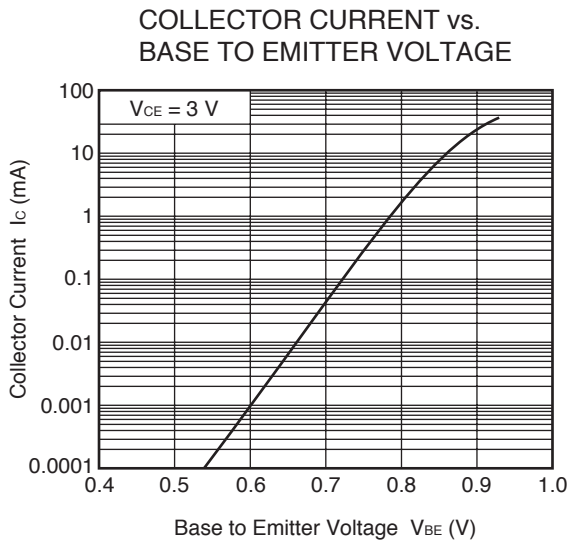
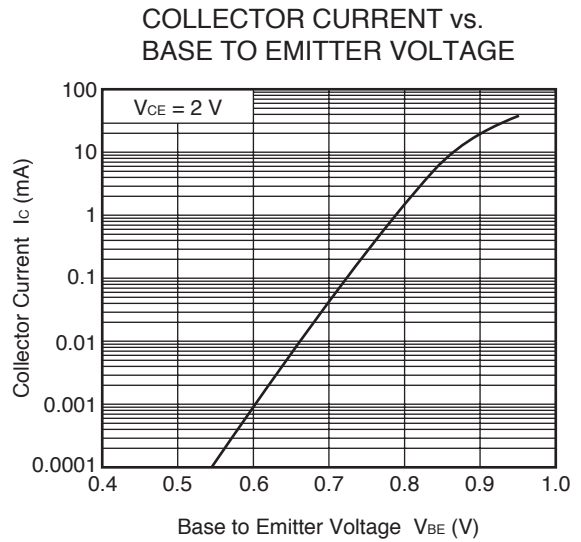
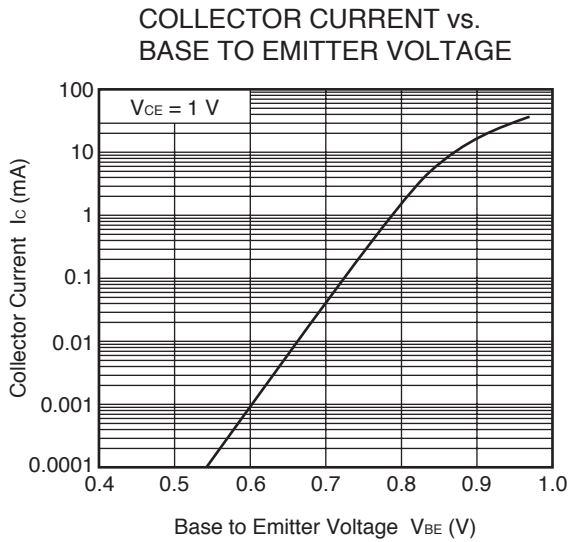
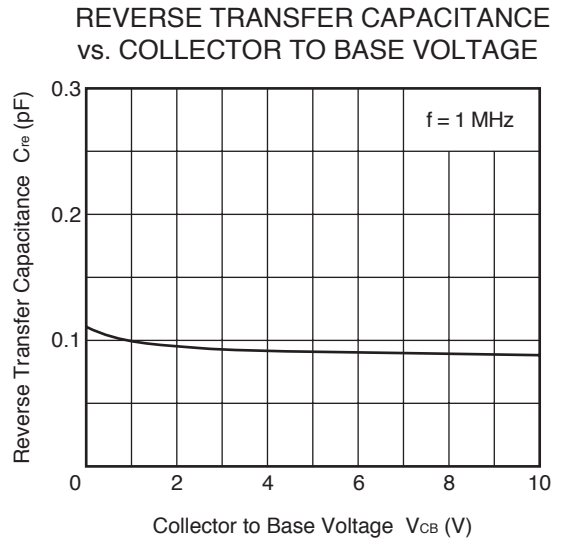
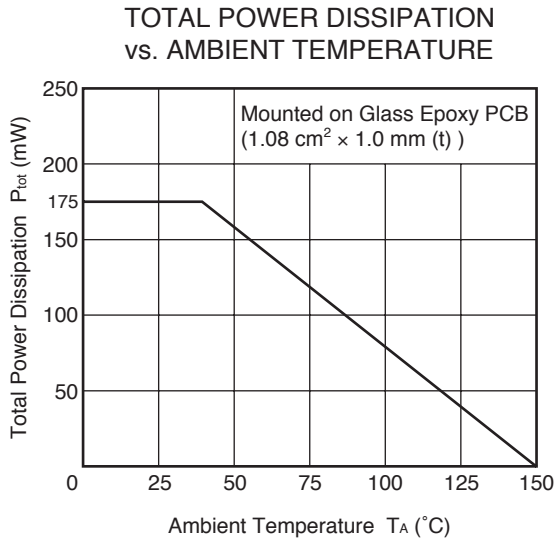
2. Collector to base capacitance when the emitter grounded

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

h_{FE} CLASSIFICATION

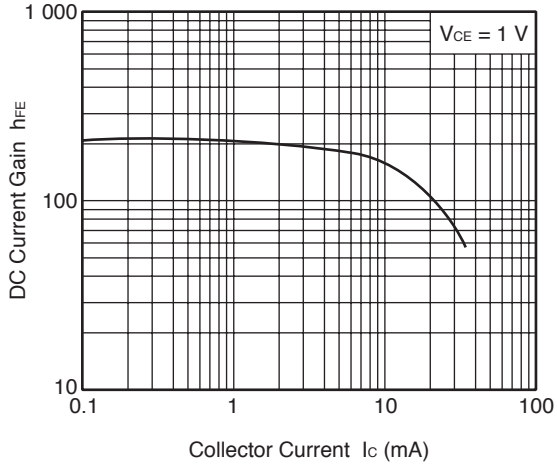
Rank	FB/YFB
Marking	T1G
h _{FE} Value	130 to 260

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

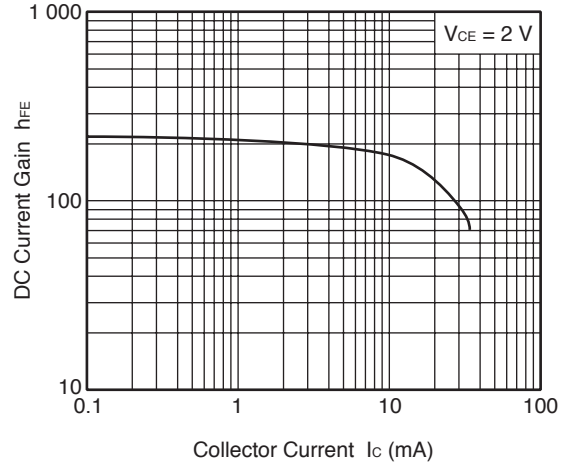


Remark The graph indicates nominal characteristics.

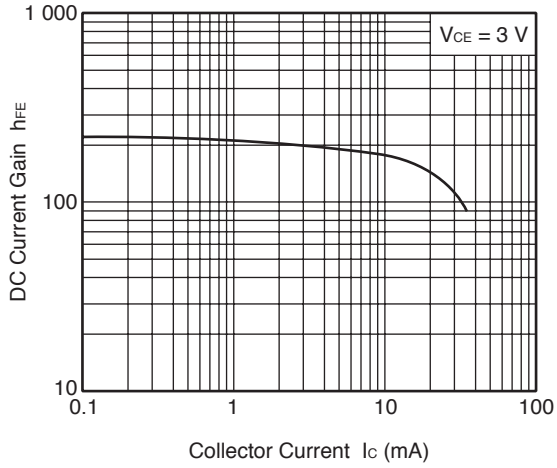
DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT

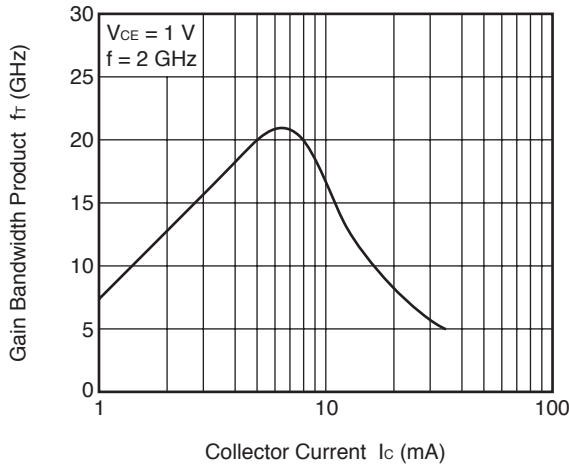


DC CURRENT GAIN vs.
COLLECTOR CURRENT

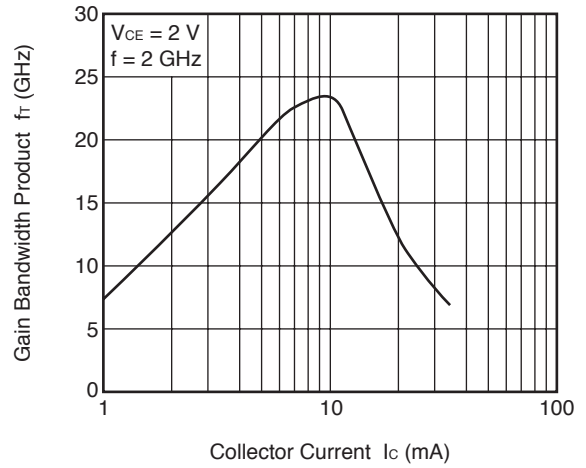


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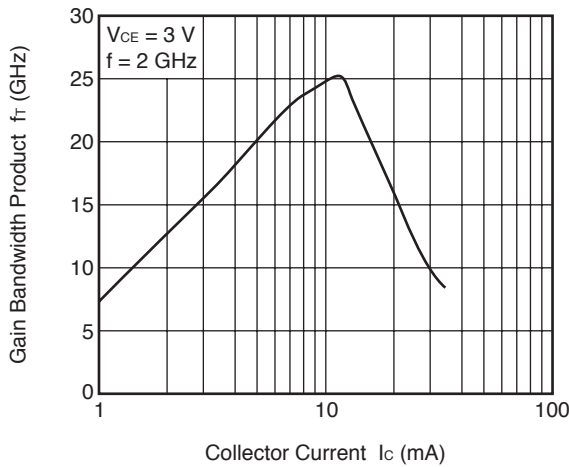
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



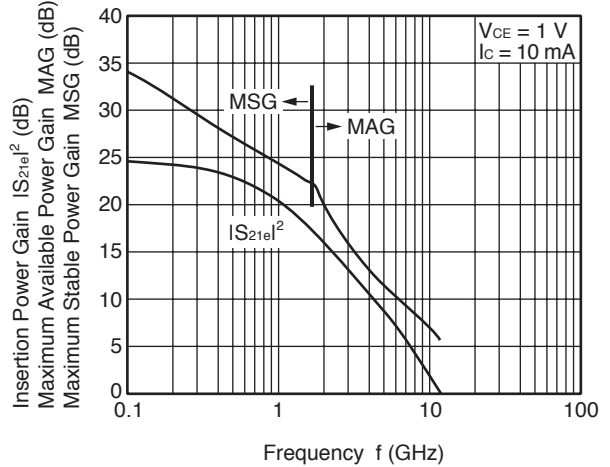
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



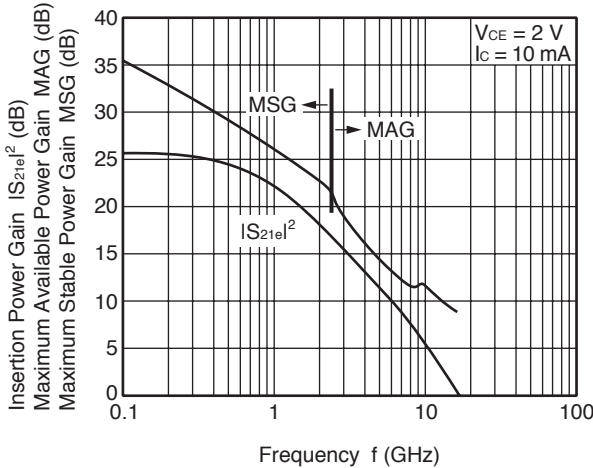
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



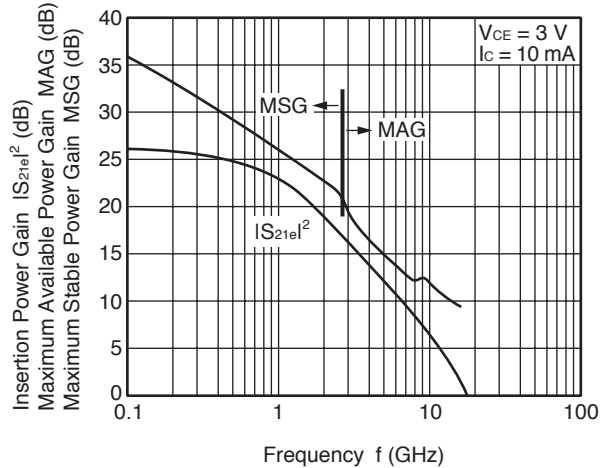
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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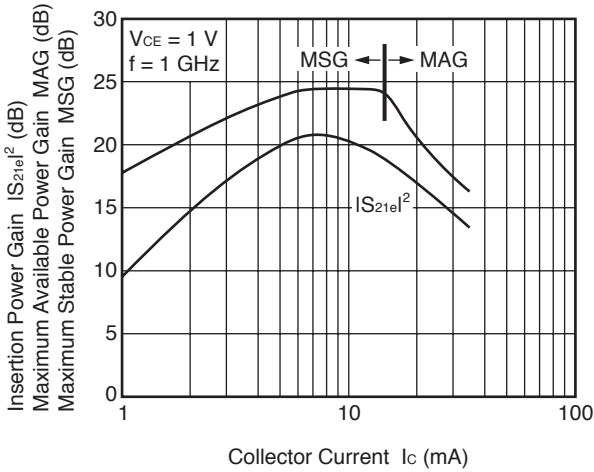


INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY

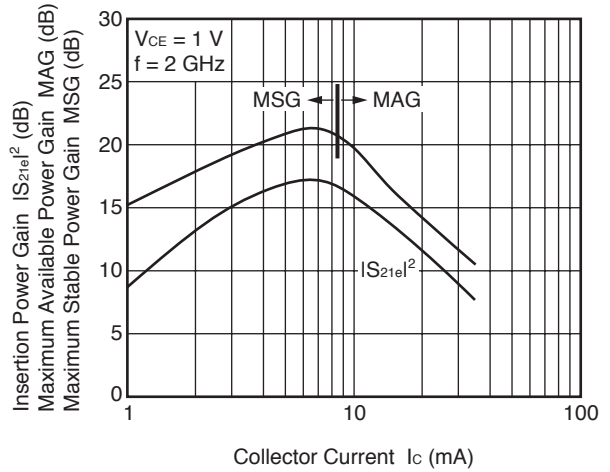


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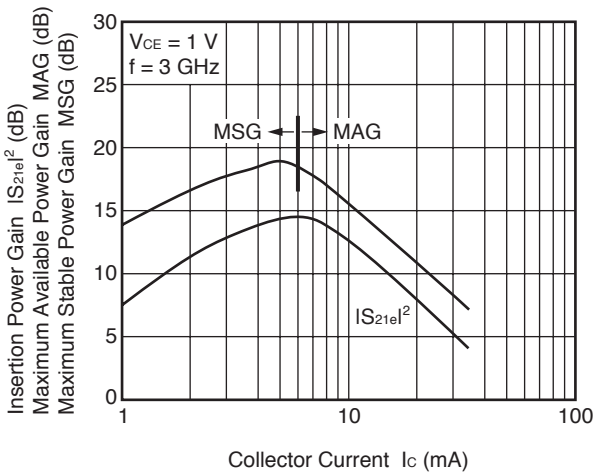
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



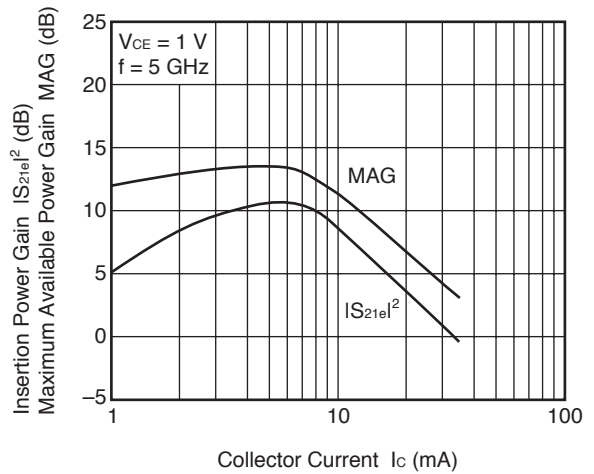
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



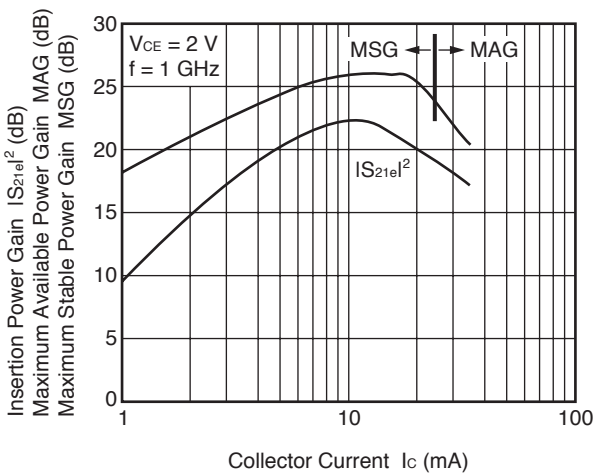
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



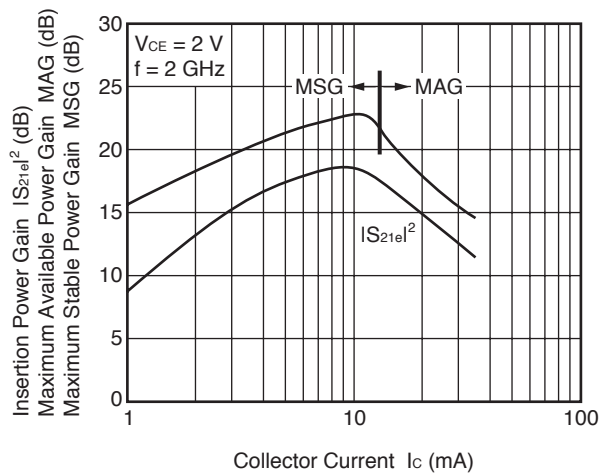
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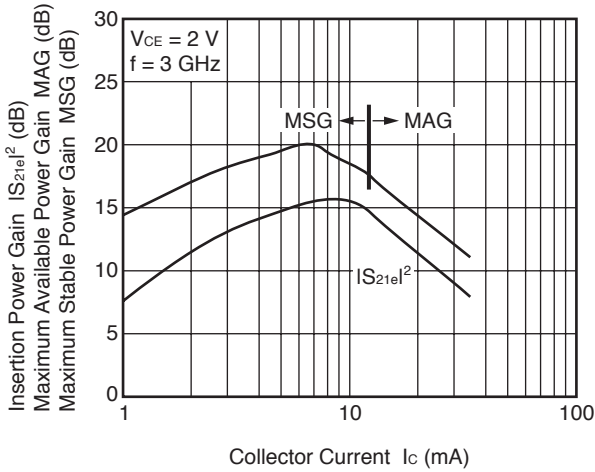


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

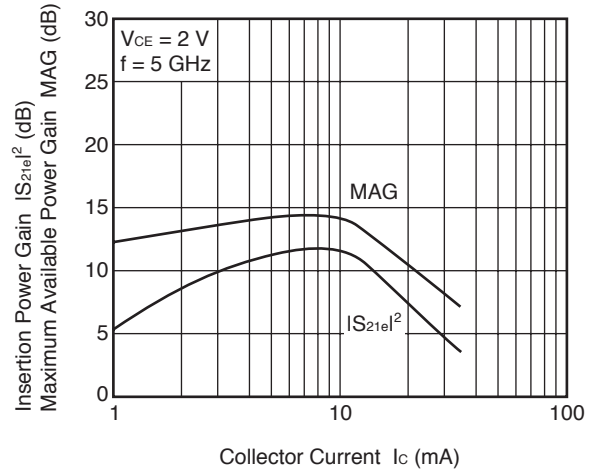


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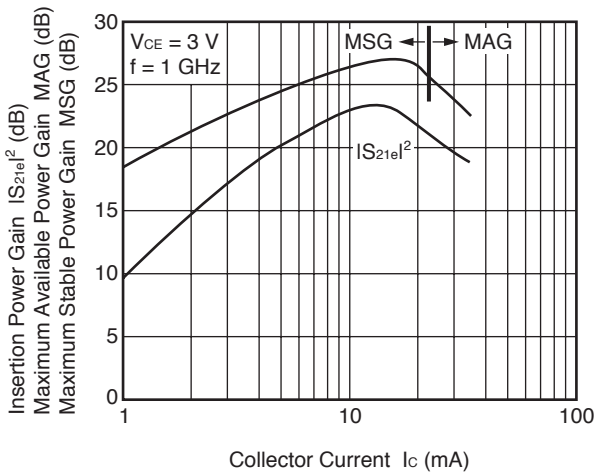
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



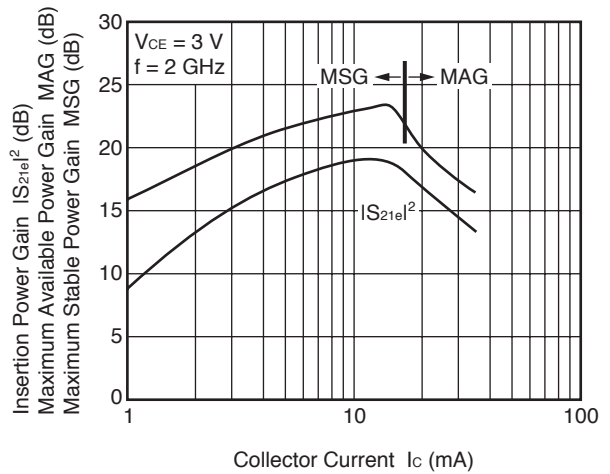
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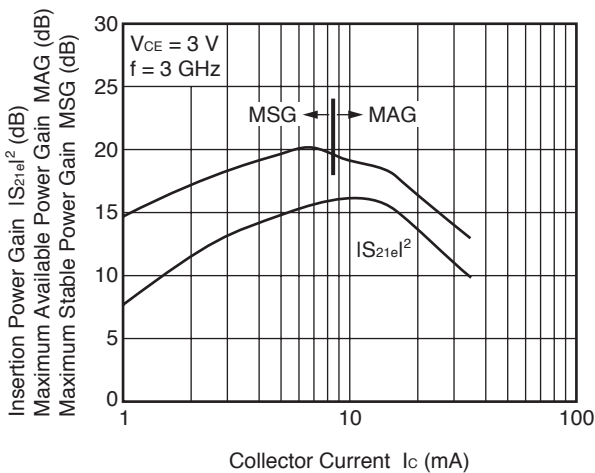
INSERTION POWER GAIN, MAG, MSG
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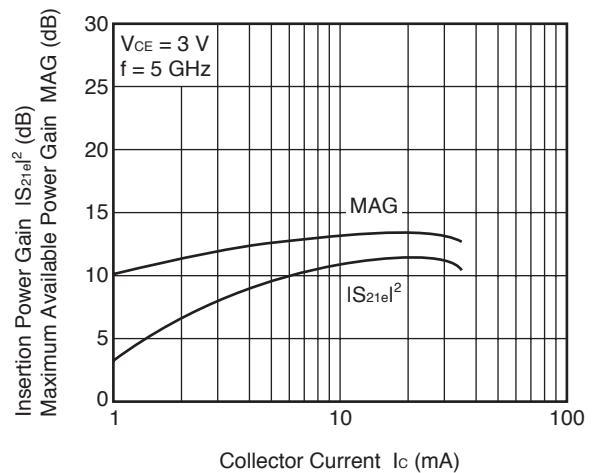
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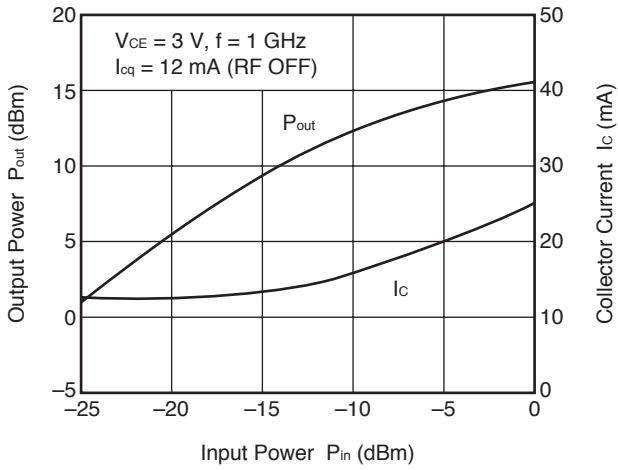


INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT

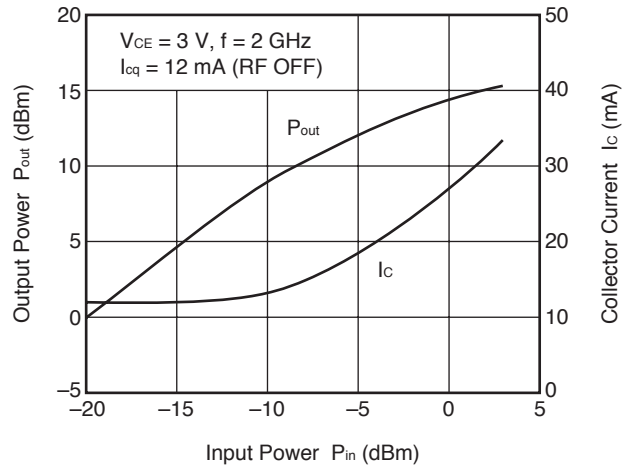


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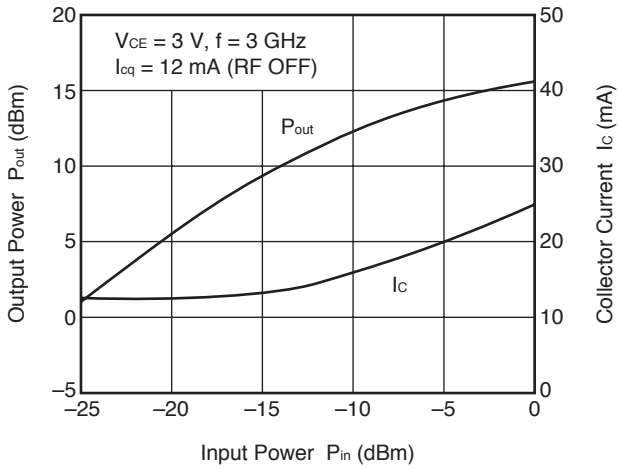
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



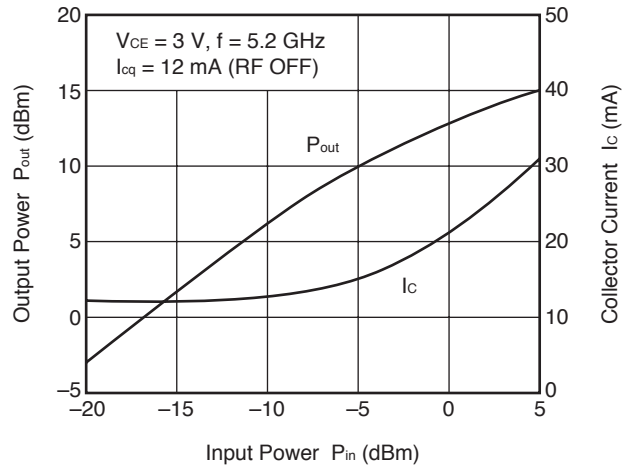
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER

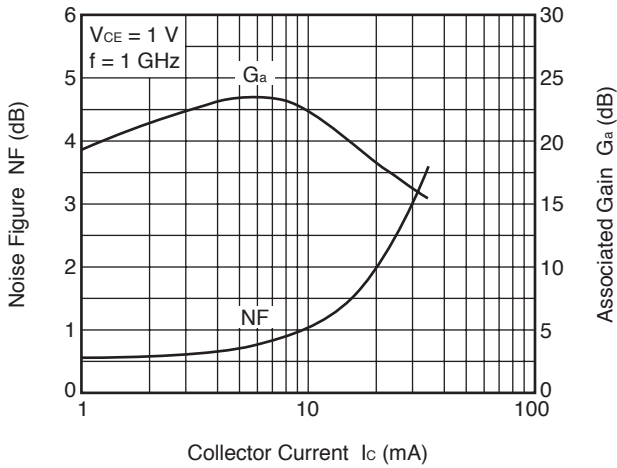


OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER

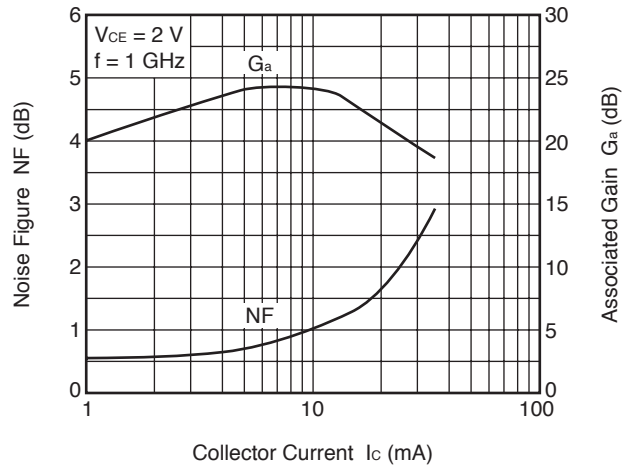


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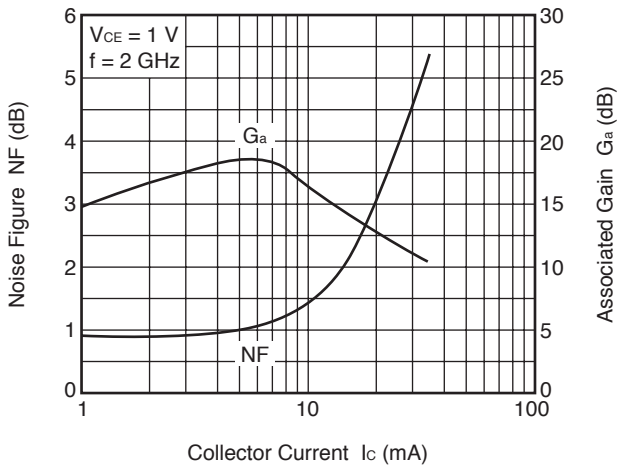
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



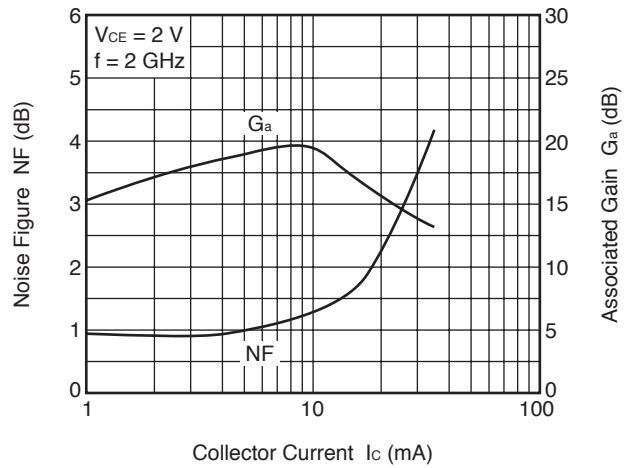
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



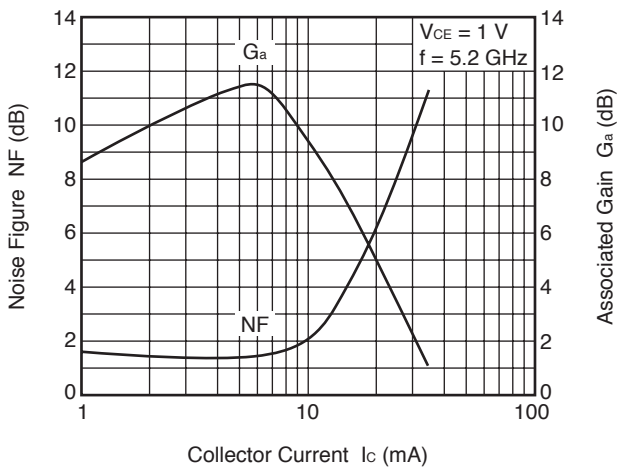
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



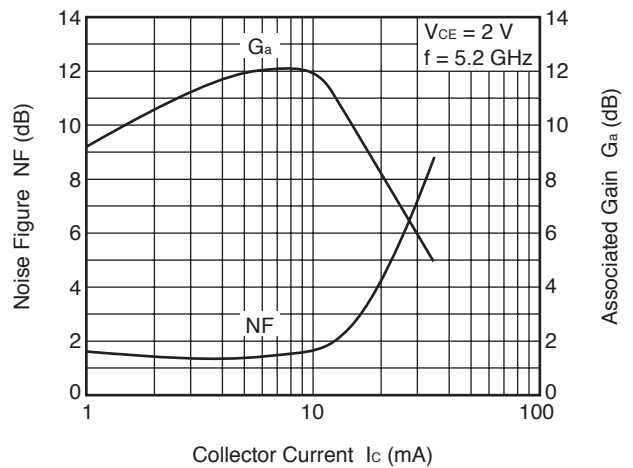
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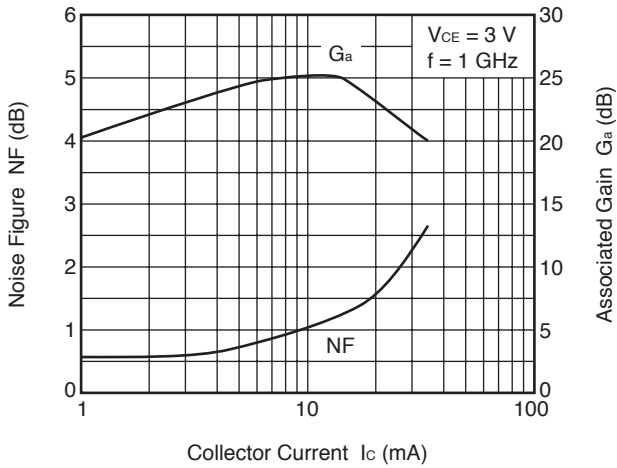


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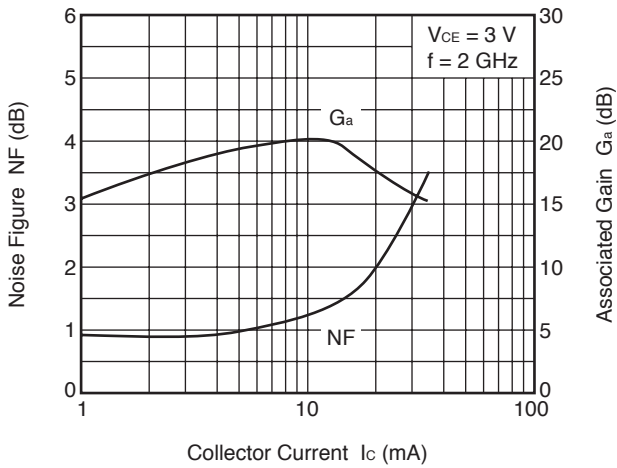


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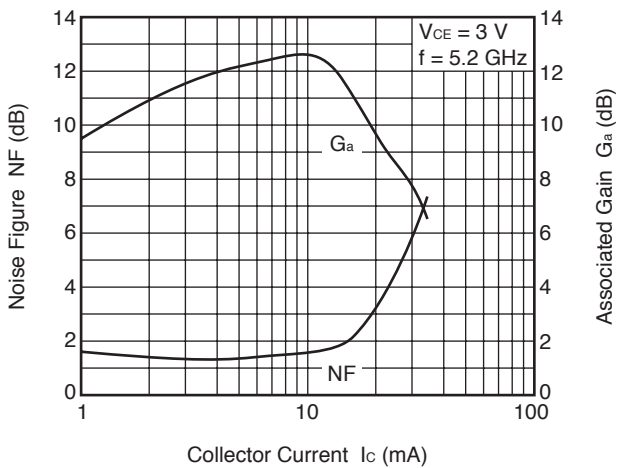
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Remark The graphs indicate nominal characteristics.

<R> S-PARAMETERS

S-parameters and noise parameters are provided on our web site in a form (S2P) that enables direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

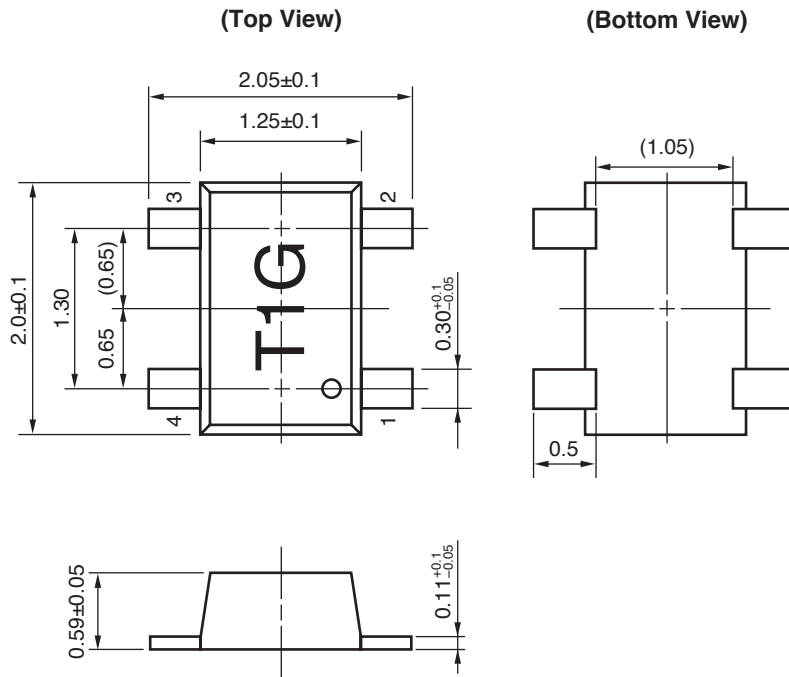
Click here to download S-parameters.

[Products] → [RF Devices] → [Device Parameters]

URL <http://www.renesas.com/products/microwave/>

<R> **PACKAGE DIMENSIONS**

FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05, 2012 PKG) (UNIT: mm)



PIN CONNENTION

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

Remark () : Reference value

Revision History	NESG2021M05 Data Sheet
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Rev.	Date	Description	
		Page	Summary
-	Mar 2003	-	Previous No. : PU10188EJ02V0DS
3.00	Jun 20, 2012	p.1	Modification of ORDERING INFORMATION
		p.2	Modification of ELECTRICAL CHARACTERISTICS
			Modification of h_{FE} CLASSIFICATION
		p.11	Modification of S-PARAMETERS
		p.12	Modification of PACKAGE DIMENSIONS

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