

# NE461M02 / 2SC5337 JEITA Part No.

## Data Sheet

### NPN Silicon RF Transistor for High-Frequency Low Distortion Amplifier 4-Pin Power Minimold

R09DS0047EJ0300  
 Rev.3.00  
 Sep 14, 2012

#### FEATURES

- Low distortion:  $IM_2 = 59.0$  dB TYP.,  $IM_3 = 82.0$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 50$  mA
- Low noise  
 $NF = 1.5$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 50$  mA,  $f = 500$  MHz  
 $NF = 2.0$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 50$  mA,  $f = 1$  GHz
- 4-pin power minimold package with improved gain from the NE46134 / 2SC4536

#### <R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NE461M02 2SC5337	NE461M02-AZ 2SC5337-AZ	4-pin power minimold (Pb-Free) <sup>Note</sup>	25 pcs (Non reel)	• Magazine case
NE461M02-T1 2SC5337-T1	NE461M02-T1-AZ 2SC5337-T1-AZ		1 kpcs/reel	• 12 mm wide embossed taping • Collector face the perforation side of the tape

**Note** Contains Lead in the part except the electrode terminals.

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

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

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$	30	V
Collector to Emitter Voltage	$V_{CEO}$	15	V
Emitter to Base Voltage	$V_{EBO}$	3.0	V
Collector Current	$I_C$	250	mA
Total Power Dissipation	$P_{tot}$ <sup>Note</sup>	2.0	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

**Note** Mounted on  $16\text{ cm}^2 \times 0.7$  mm (t) ceramic substrate (Copper plating)

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

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 20\text{ V}, I_E = 0$	–	0.01	5.0	$\mu\text{A}$
Emitter Cut-off Current	$I_{EBO}$	$V_{BE} = 2\text{ V}, I_C = 0$	–	0.03	5.0	$\mu\text{A}$
DC Current Gain	$h_{FE}$ <sup>Note 1</sup>	$V_{CE} = 10\text{ V}, I_C = 50\text{ mA}$	60	120	200	–
RF Characteristics						
Insertion Power Gain	$S_{21e}$ <sup>2</sup>	$V_{CE} = 10\text{ V}, I_C = 50\text{ mA}, f = 1\text{ GHz}$	7.0	8.3	–	dB
Noise Figure (1)	NF <sup>Note 2</sup>	$V_{CE} = 10\text{ V}, I_C = 50\text{ mA}, f = 500\text{ MHz}$	–	1.5	3.5	dB
Noise Figure (2)	NF <sup>Note 2</sup>	$V_{CE} = 10\text{ V}, I_C = 50\text{ mA}, f = 1\text{ GHz}$	–	2.0	3.5	dB
2nd Order Intermodulation Distortion	IM <sub>2</sub>	$V_{CE} = 10\text{ V}, I_C = 50\text{ mA}, R_S = R_L = 75\ \Omega,$ $V_{in} = 105\text{ dB}\mu\text{V}/75\ \Omega, f_1 = 190\text{ MHz},$ $f_2 = 90\text{ MHz}, f = f_1 - f_2$	–	59.0	–	dB
3rd Order Intermodulation Distortion	IM <sub>3</sub>	$V_{CE} = 10\text{ V}, I_C = 50\text{ mA}, R_S = R_L = 75\ \Omega,$ $V_{in} = 105\text{ dB}\mu\text{V}/75\ \Omega, f_1 = 190\text{ MHz},$ $f_2 = 200\text{ MHz}, f = 2 \times f_1 - f_2$	–	82.0	–	dB

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

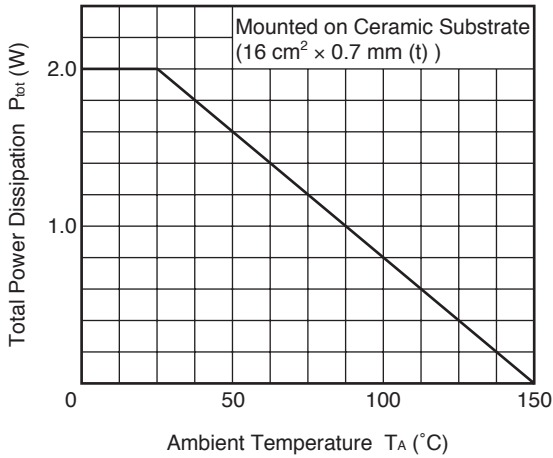
**2.**  $R_S = R_L = 50\ \Omega$ , tuned

<R>  $h_{FE}$  CLASSIFICATION

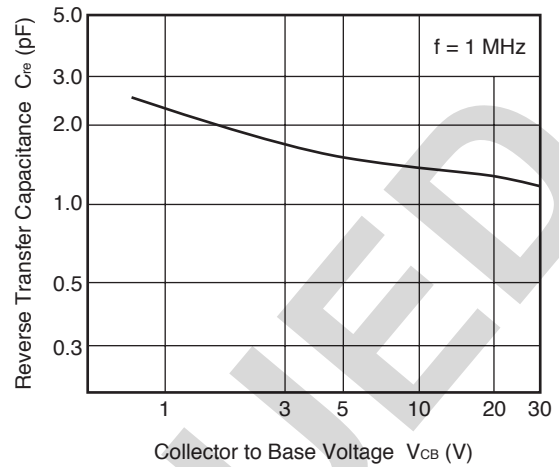
Rank	QR/YQR	QS/YQS
Marking	QR	QS
$h_{FE}$ Value	60 to 120	100 to 200

**TYPICAL CHARACTERISTICS (Unless otherwise specified,  $T_A = +25^\circ\text{C}$ )**

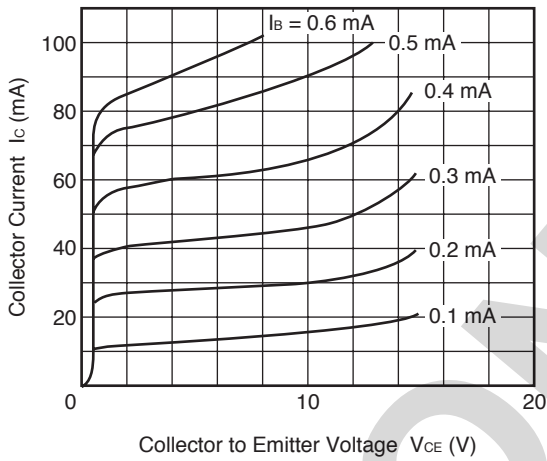
**TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE**



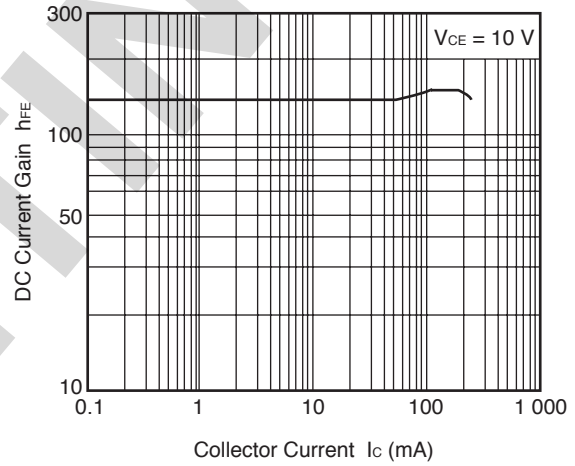
**REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE**



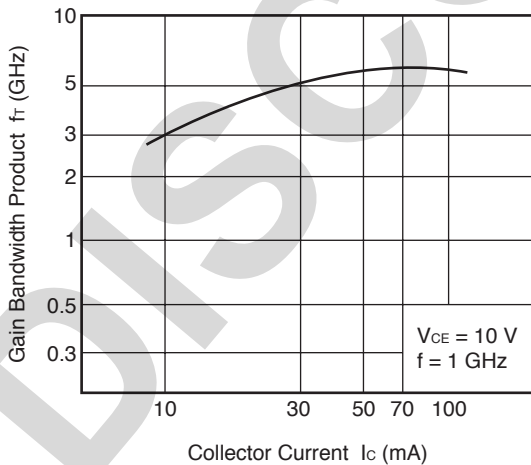
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



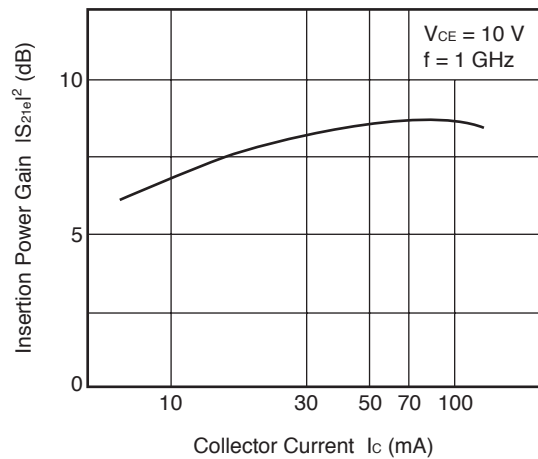
**DC CURRENT GAIN vs. COLLECTOR CURRENT**



**GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT**

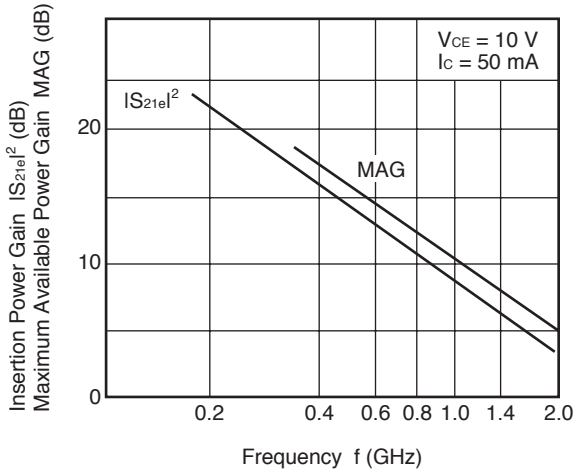


**INSERTION POWER GAIN vs. COLLECTOR CURRENT**

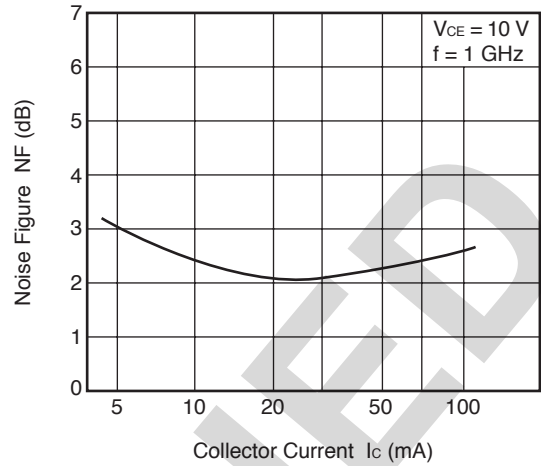


**Remark** The graphs indicate nominal characteristics.

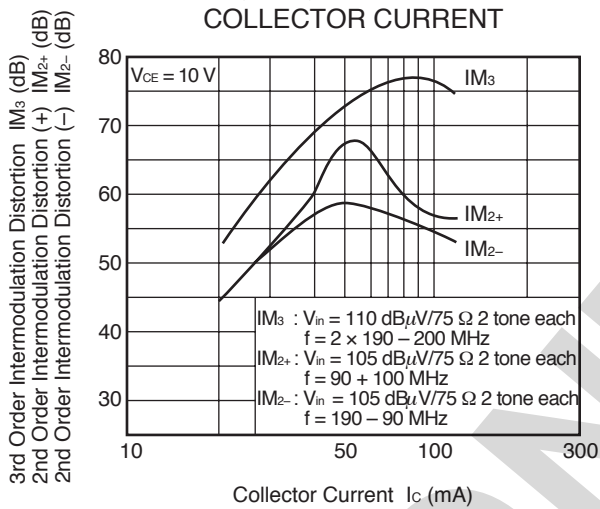
INSERTION POWER GAIN, MAG vs. FREQUENCY



NOISE FIGURE vs. COLLECTOR CURRENT



IM3, IM2+, IM2- vs. COLLECTOR CURRENT



**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.

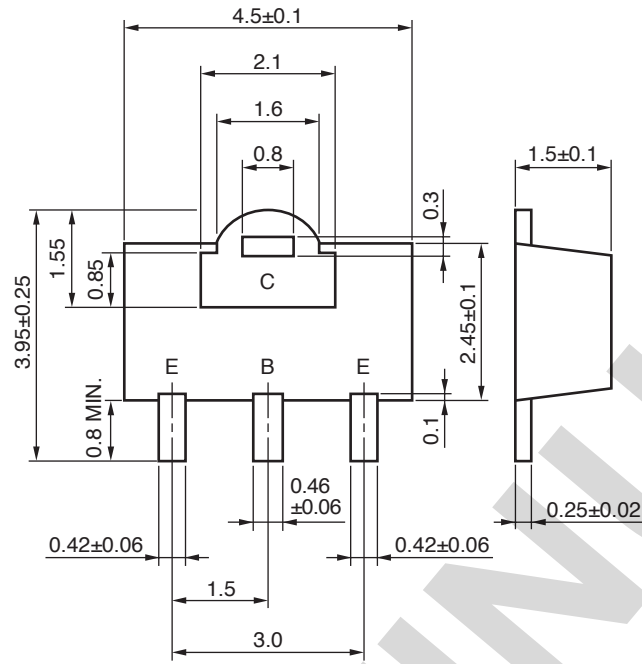
Click here to download S-parameters.

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

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

**PACKAGE DIMENSIONS**

**4-PIN POWER MINIMOLD (UNIT: mm)**



**PIN CONNECTIONS**

- E: Emitter
- C: Collector
- B: Base

DISCONTINUED

**Revision History****NE461M02 / 2SC5337 Data Sheet**

Rev.	Date	Description	
		Page	Summary
1.00	Mar 01, 1996	–	First edition issued
2.00	Aug 28, 2001	–	Second edition issued
2.10	Sep 06, 2001	–	Second V1 edition issued
3.00	Sep 14, 2012	Throughout	The company name is changed to Renesas Electronics Corporation.
		p.1	Modification of ORDERING INFORMATION
		p.2	Modification of ELECTRICAL CHARACTERISTICS
		p.2	Modification of $h_{FE}$ CLASSIFICATION
		p.4	Modification of method for obtaining S-parameters

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