

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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NPN SILICON RF TRANSISTOR
2SC5013

NPN EPITAXIAL SILICON RF TRANSISTOR
 FOR HIGH-FREQUENCY LOW-NOISE AMPLIFICATION
 4-PIN SUPER MINIMOLD

FEATURES

- High Gain Bandwidth Product (fr = 10 GHz TYP.)
- Low Noise, High Gain
- Low Voltage Operation
- 4-pin super minimold Package

★ **ORDERING INFORMATION**

Part Number	Quantity	Supplying Form
2SC5013	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 3 (Base), Pin 4 (Emitter) face to perforation side of the tape
2SC5013-T1	3 kpcs/reel	

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

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V _{CBO}	20	V
Collector to Emitter Voltage	V _{CEO}	10	V
Emitter to Base Voltage	V _{EBO}	1.5	V
Collector Current	I _C	35	mA
Total Power Dissipation	P _{tot} ^{Note}	150	mW
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

Note Free air

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

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 Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I _{CBO}	V _{CB} = 10 V, I _E = 0 mA	–	–	1.0	μA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1 V, I _C = 0 mA	–	–	1.0	μA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 6 V, I _C = 10 mA	50	100	250	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 6 V, I _C = 10 mA	–	10	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 6 V, I _C = 10 mA, f = 2.0 GHz	7.5	9.5	–	dB
Noise Figure	NF	V _{CE} = 6 V, I _C = 5 mA, f = 2.0 GHz	–	1.8	3.0	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 10 V, I _E = 0 mA, f = 1.0 MHz	–	0.25	0.8	pF

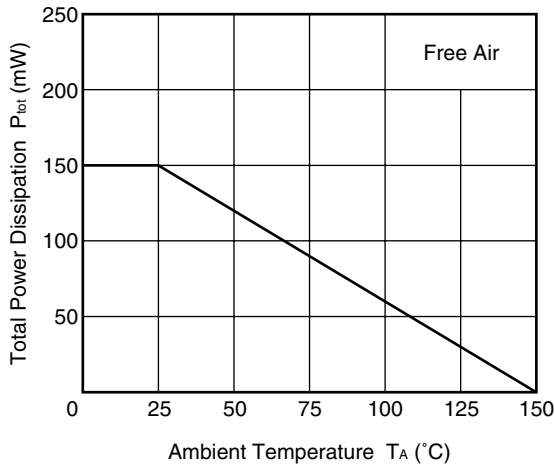
- Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%
- 2.** Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

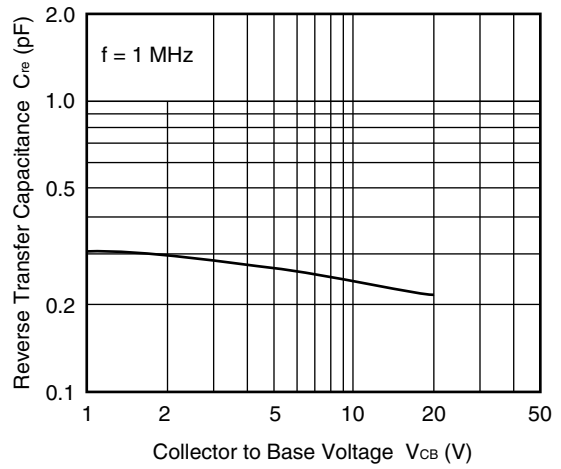
Rank	EB	FB	GB
Marking	R46	R47	R48
h _{FE} Value	50 to 100	80 to 160	125 to 250

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

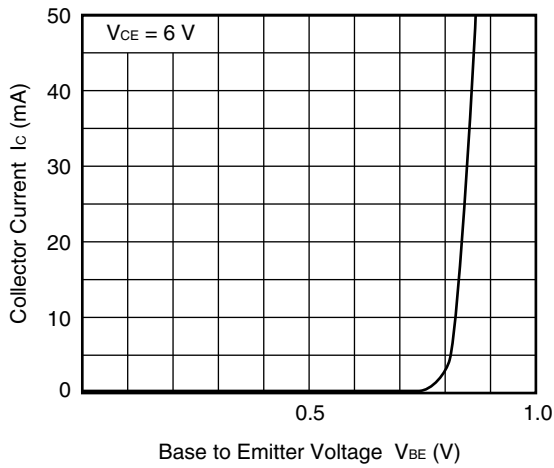
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



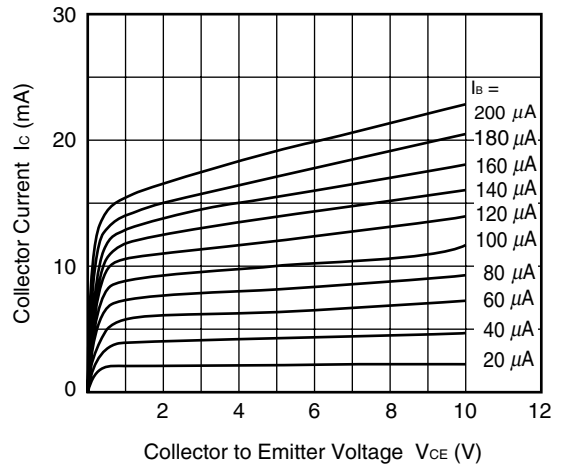
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



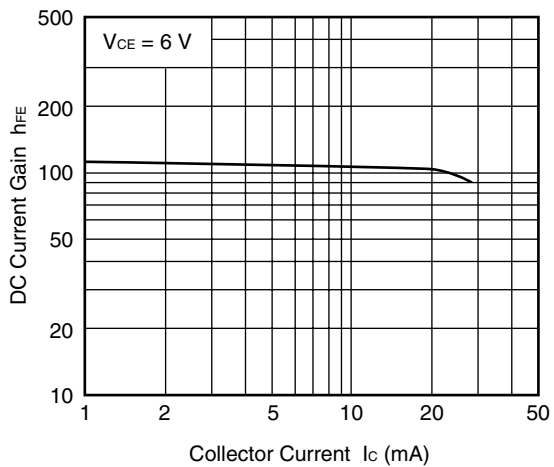
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



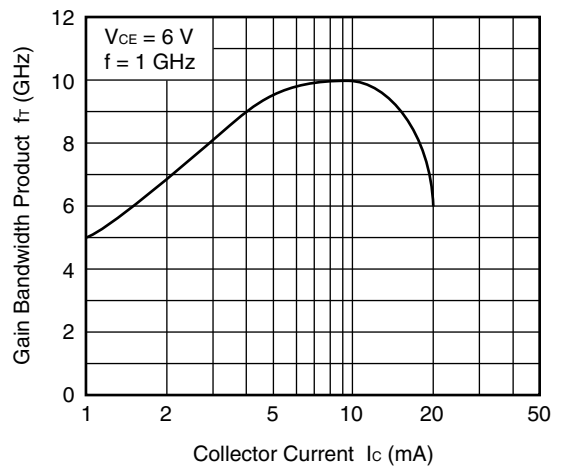
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT

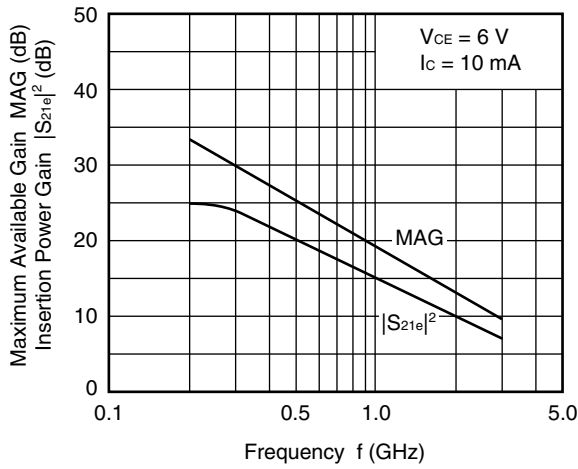


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

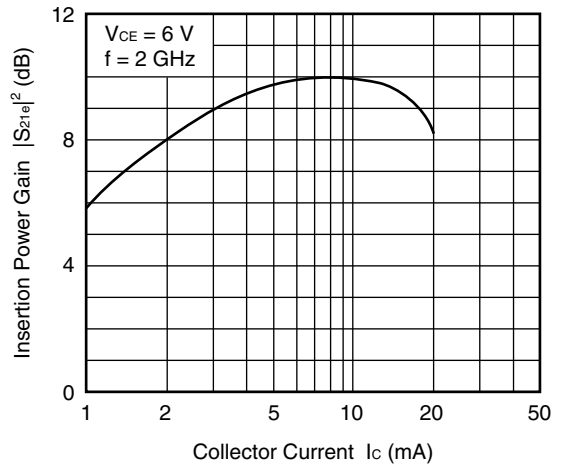


Remark The graphs indicate nominal characteristics.

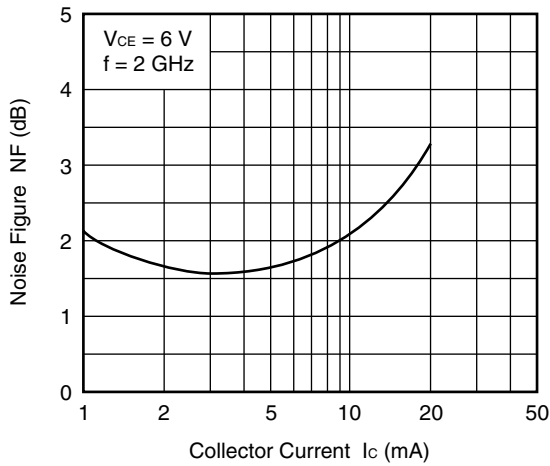
MAXIMUM AVAILABLE GAIN/INSERTION POWER GAIN vs. FREQUENCY



INSERTION POWER GAIN vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

★ **S-PARAMETERS**

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

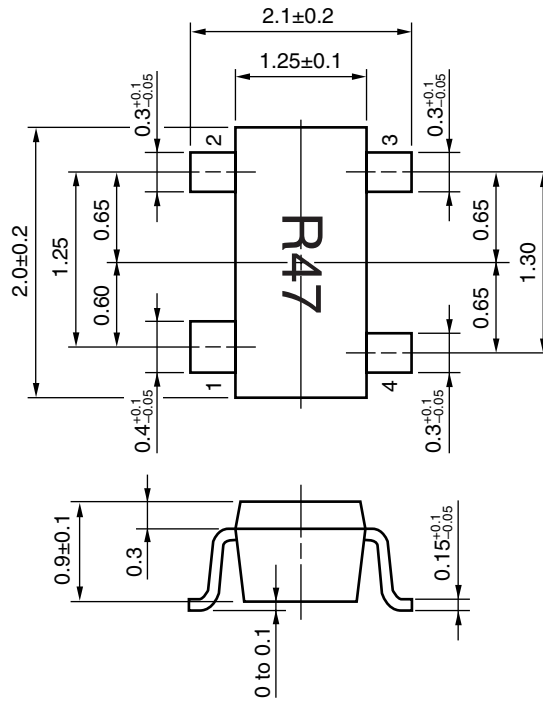
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL <http://www.ncsd.necel.com/>

★ PACKAGE DIMENSIONS

4-PIN SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

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

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