

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
2SC4093

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

DESCRIPTION

The 2SC4093 is an NPN silicon epitaxial transistor designed for low noise amplifier at VHF, UHF and CATV band. It has large dynamic range and good current characteristics, and is contained in a 4-pin minimold package which enables high-isolation gain.

FEATURES

- Low Noise
NF = 1.1 dB TYP. @ $V_{CE} = 10\text{ V}$, $I_C = 7\text{ mA}$, $f = 1\text{ GHz}$
- High Power gain
 $|S_{21e}|^2 = 13\text{ dB TYP. @ } V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$, $f = 1\text{ GHz}$
- Maximum available power gain: MAG = 14.2 dB TYP. @ $V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$, $f = 1\text{ GHz}$
- 4-pin minimold Package

★ **ORDERING INFORMATION**

Part Number	Quantity	Supplying Form
2SC4093	50 pcs (Non reel)	<ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 3 (Base), Pin 4 (Emitter) face to perforation side of the tape
2SC4093-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}	12	V
Emitter to Base Voltage	V_{EBO}	3.0	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot}^{Note}	200	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} = 10 V, I _C = 20 mA	50	120	250	–
RF Characteristics						
Gain Bandwidth Product	f _T	V _{CE} = 10 V, I _C = 20 mA	–	7.0	–	GHz
Insertion Power Gain	S _{21e} ²	V _{CE} = 10 V, I _C = 20 mA, f = 1.0 GHz	11	13	–	dB
Noise Figure	NF	V _{CE} = 10 V, I _C = 7 mA, f = 1.0 GHz	–	1.1	2.0	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 10 V, I _E = 0 mA, f = 1.0 MHz	–	0.6	0.95	pF

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

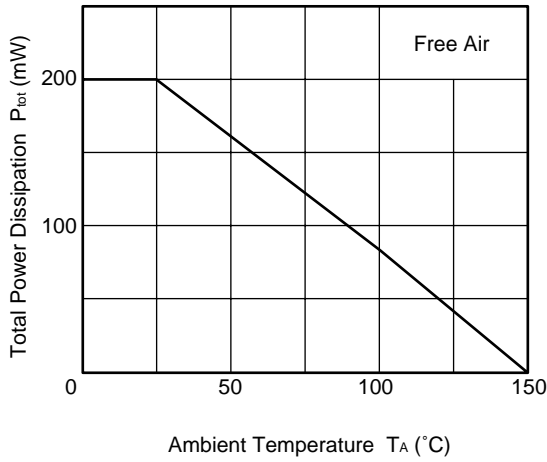
h_{FE} CLASSIFICATION

Rank	R26/RBF ^{Note}	R27/RBG ^{Note}	R28/RBH ^{Note}
Marking	R26	R27	R28
Range	50 to 100	80 to 160	125 to 250

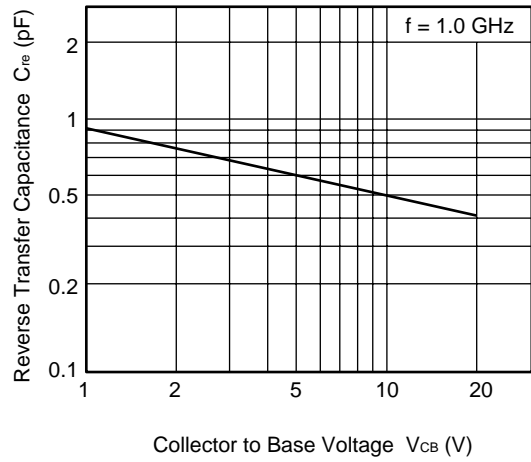
Note Old Specification / New Specification

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

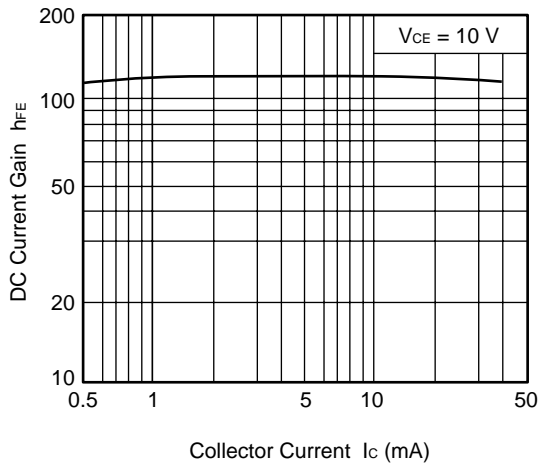
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



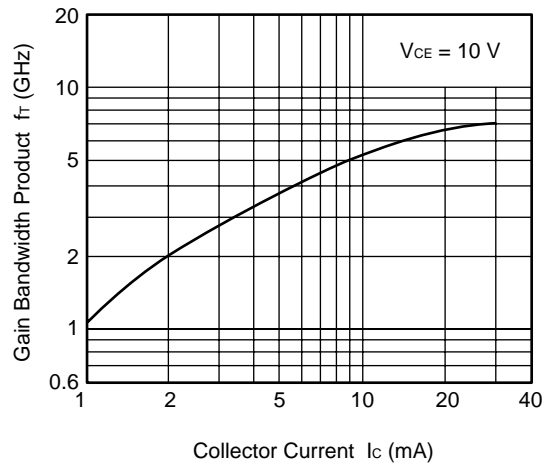
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



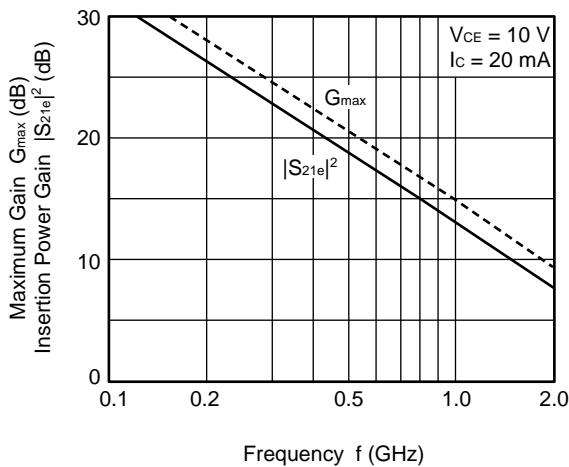
DC CURRENT GAIN vs. COLLECTOR CURRENT



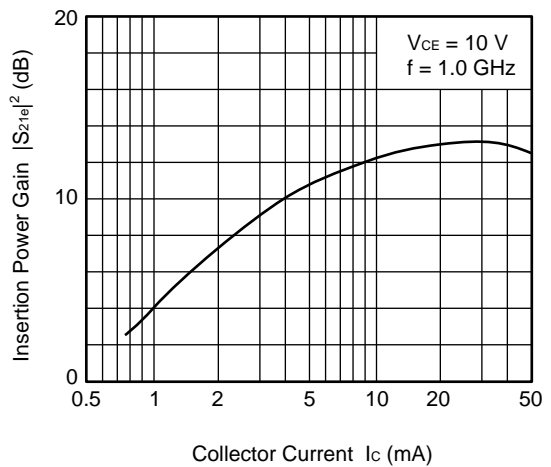
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



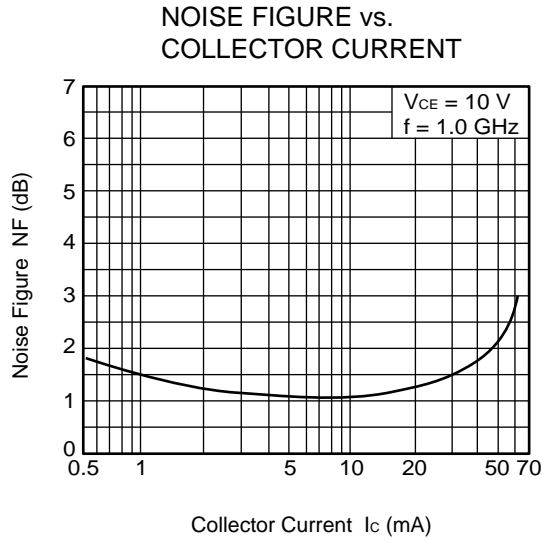
MAXIMUM GAIN/INSERTION POWER GAIN vs. FREQUENCY



INSERTION POWER GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.



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★ **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.

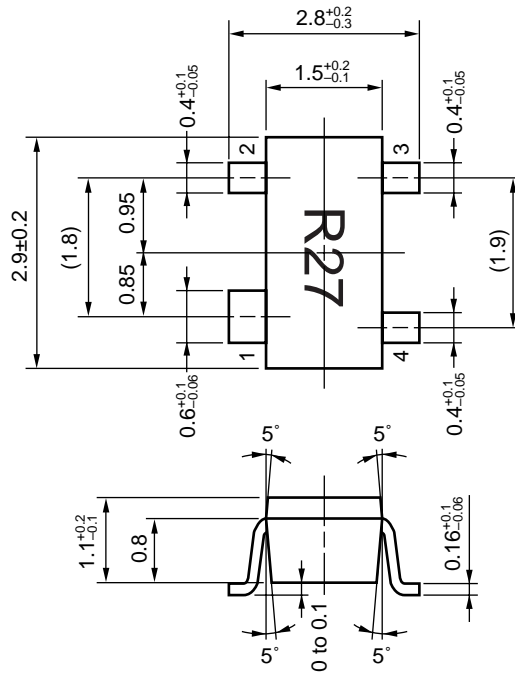
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

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

★ PACKAGE DIMENSIONS

4-PIN MINIMOLD PACKAGE (UNIT: mm)



PIN CONNECTIONS

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

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 "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
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