

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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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MICROWAVE LOW NOISE AMPLIFIER

NPN SILICON EPITAXIAL TRANSISTOR

4 PINS MINI MOLD

DESCRIPTION

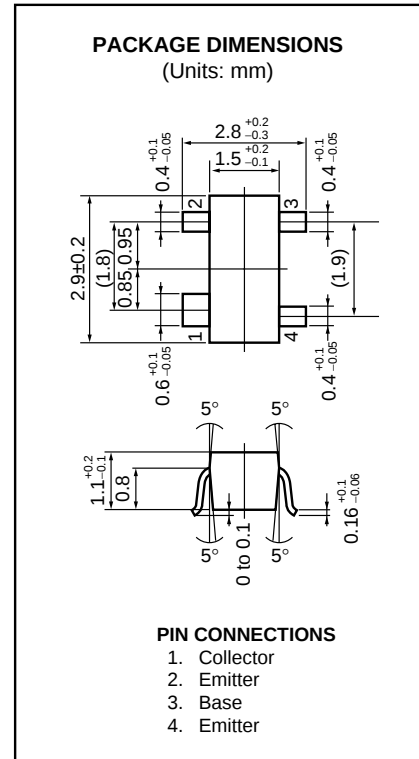
The 2SC4094 is an NPN epitaxial silicon transistor designed for use in low-noise and small signal amplifiers from VHF band to UHF band. Low-noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This achieved by direct nitride passivated base surface process (DNP process) which is an NEC proprietary new fabrication technique.

FEATURES

- NF = 1.2 dB TYP. @f = 1.0 GHz, $V_{CE} = 8$ V, $I_C = 7$ mA
- $|S_{21e}|^2 = 15$ dB TYP. @f = 1.0 GHz, $V_{CE} = 8$ V, $I_C = 20$ mA

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

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	65	mA
Total Power Dissipation	P_T	200	mW
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$



ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

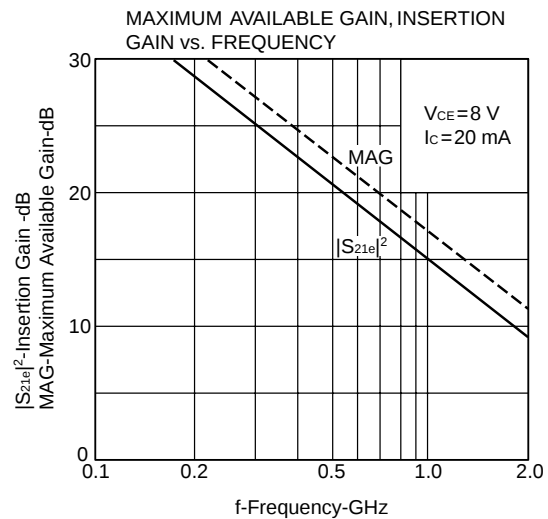
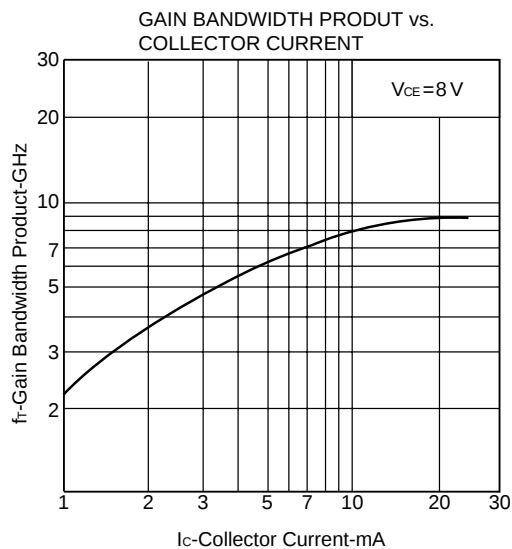
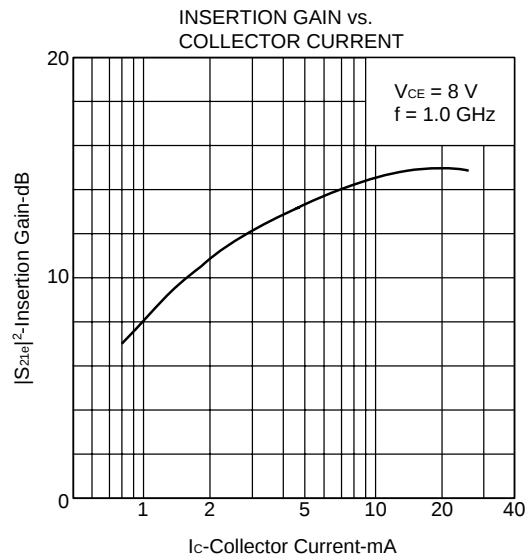
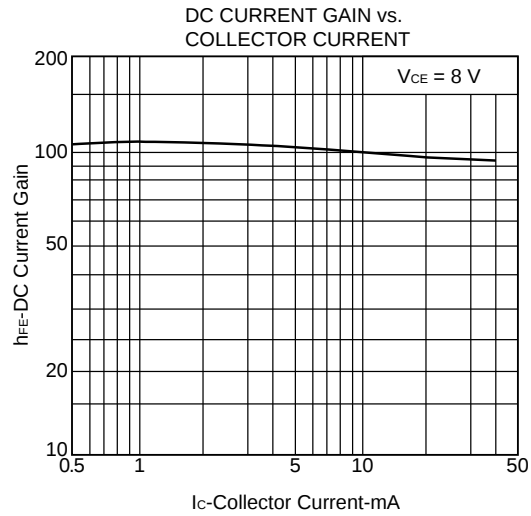
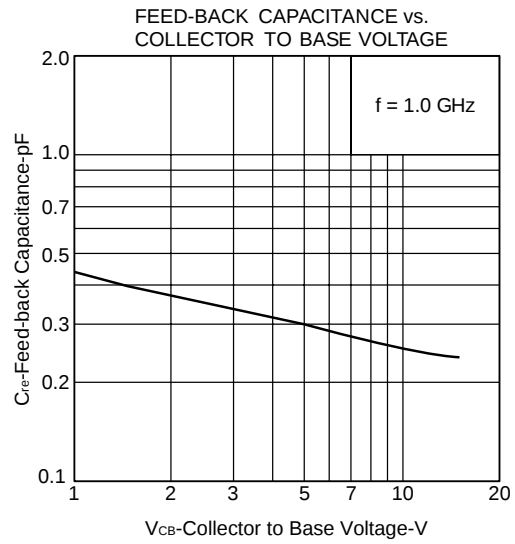
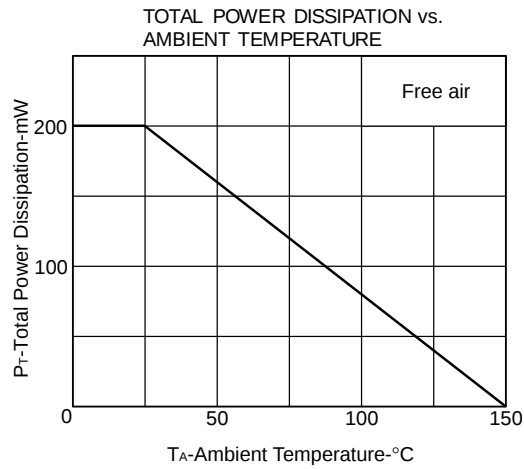
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			1.0	μA	$V_{CB} = 10$ V, $I_E = 0$
Emitter Cutoff Current	I_{EBO}			1.0	μA	$V_{EB} = 1$ V, $I_C = 0$
DC Current Gain	h_{FE}	50		250		$V_{CE} = 8$ V, $I_C = 20$ mA
Gain Bandwidth Product	f_T		9		GHz	$V_{CE} = 8$ V, $I_C = 20$ mA, $f = 1.0$ GHz
Feed-Back Capacitance	C_{re}		0.25	0.8	pF	$V_{CB} = 10$ V, $I_E = 0$, $f = 1.0$ MHz
Insertion Power Gain	$ S_{21e} ^2$	13	15		dB	$V_{CE} = 8$ V, $I_C = 20$ mA, $f = 1.0$ GHz
Maximum Available Gain	MAG		17		dB	$V_{CE} = 8$ V, $I_C = 20$ mA, $f = 1.0$ GHz
Noise Figure	NF		1.2	2.0	dB	$V_{CE} = 8$ V, $I_C = 7$ mA, $f = 1.0$ GHz

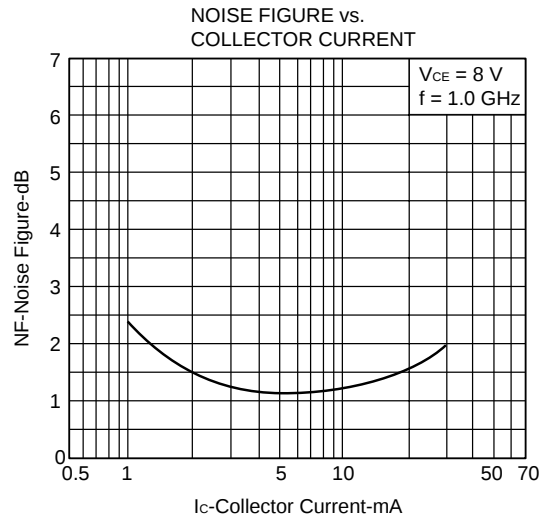
h_{FE} Classification

Class	R36/RCF *	R37/RCG *	R38/RCH *
Marking	R36	R37	R38
h_{FE}	50 to 100	80 to 160	125 to 250

* Old Specification / New Specification

TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



**S-PARAMETER**

$V_{CE} = 8.0\text{ V}$, $I_C = 5.0\text{ mA}$, $Z_O = 50\ \Omega$

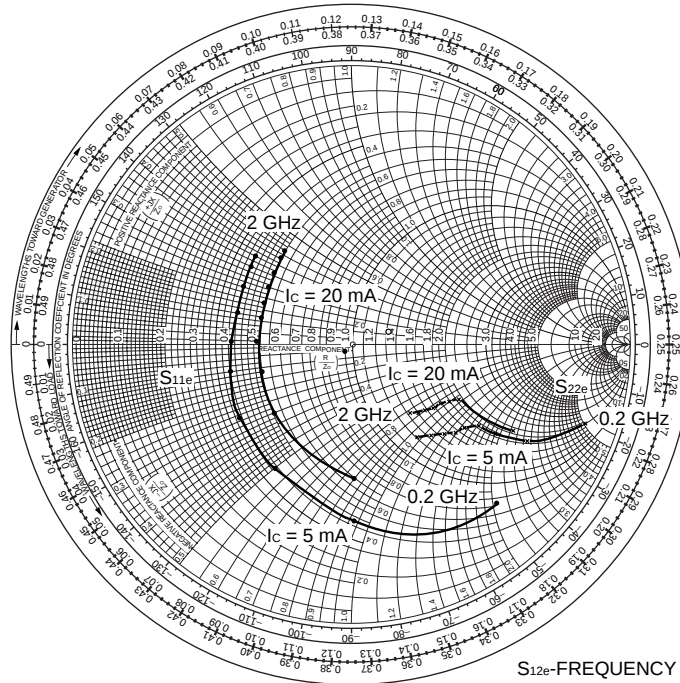
f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.774	-47.8	12.689	146.5	0.031	65.4	0.882	-19.1
400	0.631	-88.8	9.952	119.4	0.048	53.4	0.723	-29.5
600	0.523	-120.9	7.813	100.9	0.058	46.2	0.611	-33.4
800	0.460	-145.1	5.966	87.6	0.067	43.9	0.564	-34.5
1000	0.426	-166.6	4.841	76.7	0.074	43.8	0.515	-37.6
1200	0.416	178.2	4.065	68.8	0.083	43.5	0.488	-39.6
1400	0.417	163.0	3.413	60.7	0.087	41.2	0.459	-44.1
1600	0.430	152.1	3.035	54.1	0.098	42.8	0.443	-45.9
1800	0.443	142.1	2.659	48.0	0.105	40.1	0.428	-51.1
2000	0.458	136.5	2.482	44.3	0.114	43.0	0.414	-53.5

$V_{CE} = 8.0\text{ V}$, $I_C = 20.0\text{ mA}$, $Z_O = 50\ \Omega$

f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.461	-89.8	23.331	121.6	0.021	60.7	0.665	-27.7
400	0.364	-135.8	13.501	99.2	0.033	61.2	0.511	-30.5
600	0.338	-163.4	9.535	86.4	0.046	61.5	0.448	-29.5
800	0.330	177.9	7.083	77.5	0.056	62.1	0.430	-29.5
1000	0.334	163.2	5.604	69.3	0.070	60.0	0.402	-32.5
1200	0.344	153.9	4.722	63.5	0.084	60.4	0.385	-34.8
1400	0.359	143.1	3.982	56.8	0.091	54.9	0.362	-39.5
1600	0.383	136.1	3.517	51.1	0.104	54.5	0.350	-42.1
1800	0.401	128.3	3.094	45.6	0.116	49.9	0.337	-47.4
2000	0.419	124.7	2.882	42.7	0.127	50.8	0.323	-50.5

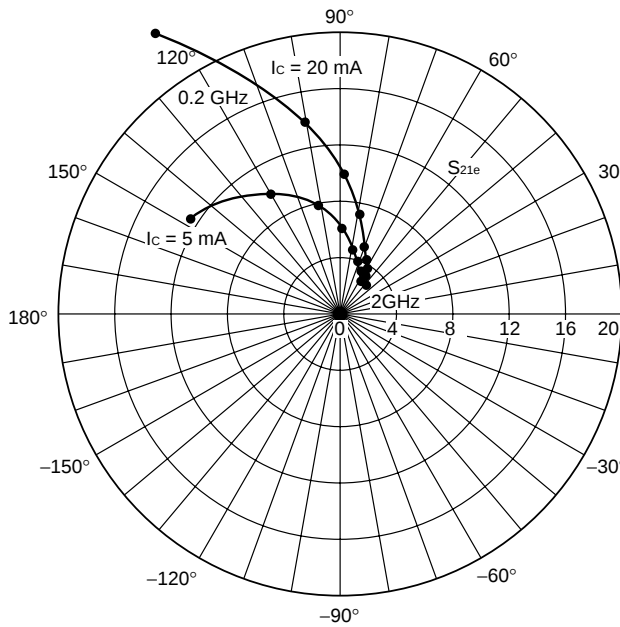
S-PARAMETER

S_{11e} , S_{22e} -FREQUENCY CONDITION $V_{CE} = 8\text{ V}$, $I_C = 20/5\text{ mA}$, freq. = 0.2 to 2 GHz (Step 200 MHz)



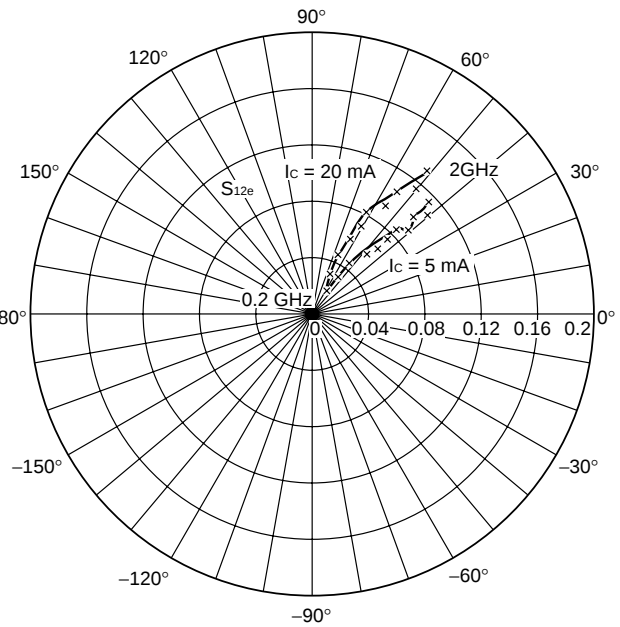
S_{21e} -FREQUENCY

CONDITION $V_{CE} = 8\text{ V}$
 $I_C = 20/5\text{ mA}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



S_{12e} -FREQUENCY

CONDITION $V_{CE} = 8\text{ V}$
 $I_C = 20/5\text{ mA}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



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Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

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)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.