

MICROWAVE LOW NOISE AMPLIFIER
NPN SILICON EPITAXIAL TRANSISTOR
4 PINS MINI MOLD

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 pins mini-mold package which enables high-isolation gain.

FEATURES

- Low Noise
NF = 1.1 dB TYP. @ $V_{CE} = 10\text{ V}$, $I_c = 7\text{ mA}$, $f = 1.0\text{ GHz}$
- High Power Gains
 $|S_{21e}|^2 = 13\text{ dB TYP. @ } V_{CE} = 10\text{ V}$, $I_c = 20\text{ mA}$, $f = 1.0\text{ GHz}$

ORDERING INFORMATION

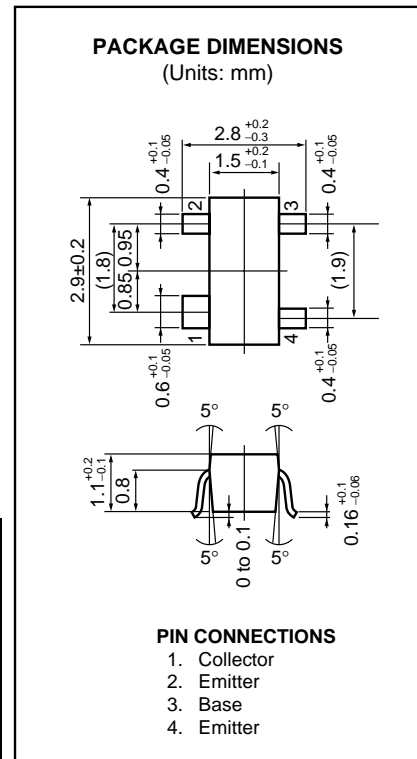
PART NUMBER	QUANTITY	PACKING STYLE
2SC4093-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Base), Pin4 (Emitter) face to perforation side of the tape.
2SC4093-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Collector), Pin2 (Emitter) face to perforation side of the tape.

* Please contact with responsible NEC person, if you require evaluation sample.

Unit sample quantity shall be 50 pcs. (Part No.: 2SC4093)

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

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_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 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I _{CB0}			1.0	μA	V _{CB} = 10 V, I _E = 0
Emitter Cutoff Current	I _{EB0}			1.0	μA	V _{EB} = 10 V, I _C = 0
DC Current Gain	h _{FE}	50	120	250		V _{CE} = 10 V, I _C = 20 mA
Gain Bandwidth Product	f _T		7.0		GHz	V _{CE} = 10 V, I _C = 20 mA
Feed-Back Capacitance	C _{re}		0.6	0.95	pF	V _{CB} = 10 V, I _E = 0, f = 1.0 MHz
Insertion Power Gain	S _{21e} ²	11	13		dB	V _{CE} = 10 V, I _C = 20 mA, f = 1.0 GHz
Noise Figure	NF		1.1	2.0	dB	V _{CE} = 10 V, I _C = 7 mA, f = 1.0 GHz

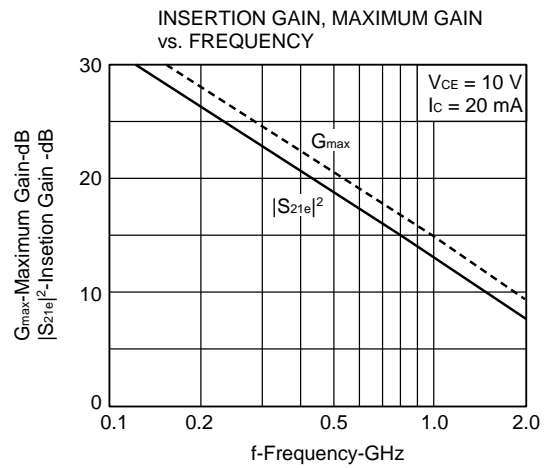
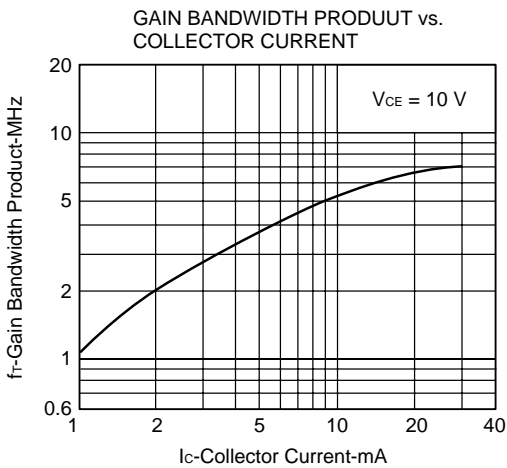
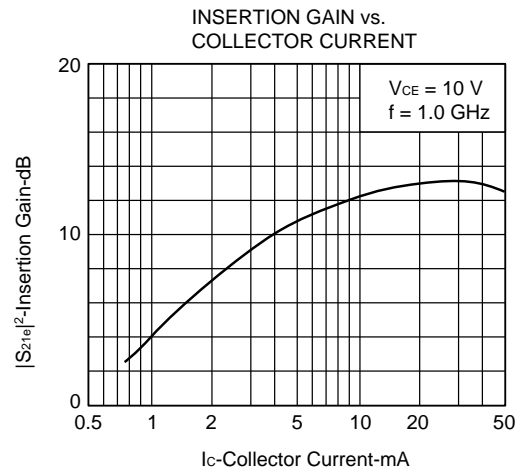
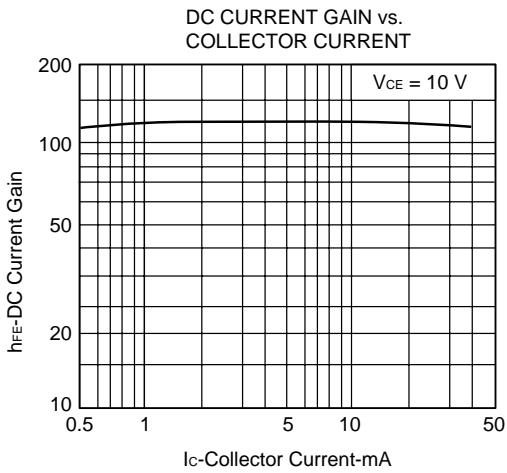
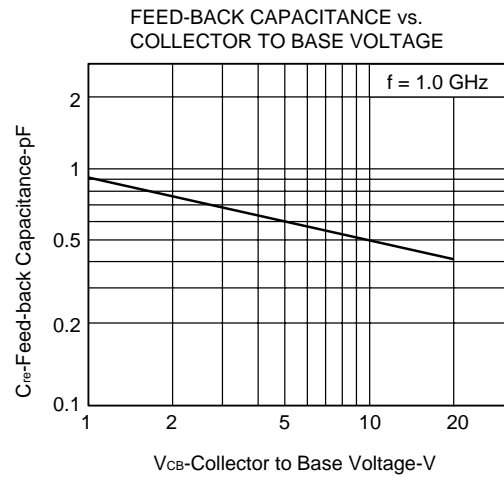
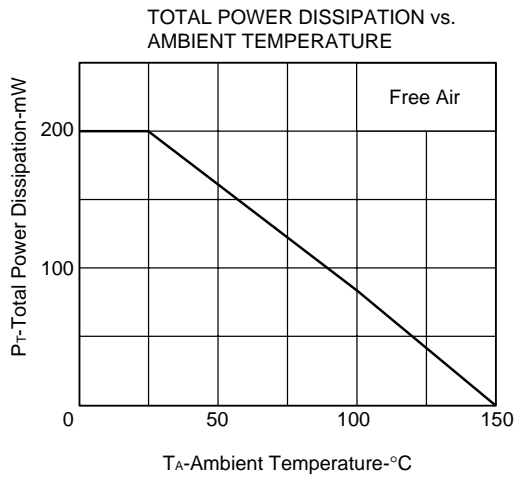
Classification of h_{FE}

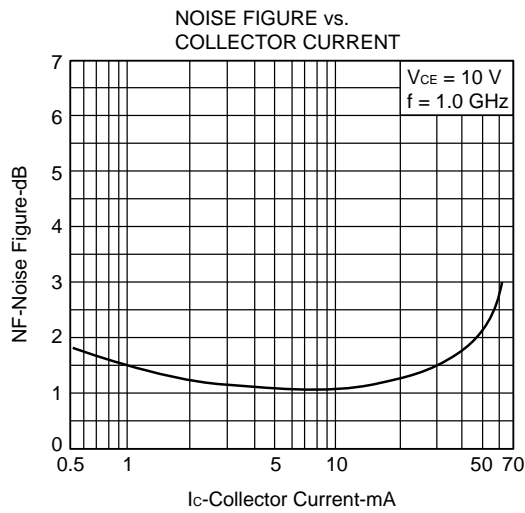
Rank	R26/RBF *	R27/RBG *	R28/RBH *
Marking	R26	R27	R28
Range	50 to 100	80 to 160	125 to 250

* Old Specification / New Specification

h_{FE} Test Conditions: V_{CE} = 10 V, I_C = 20 mA

TYPICAL CHARACTERISTICS (T_A = 25 °C)





S-PARAMETER

$V_{CE} = 10\text{ V}$, $I_c = 5\text{ mA}$, $Z_0 = 50\ \Omega$

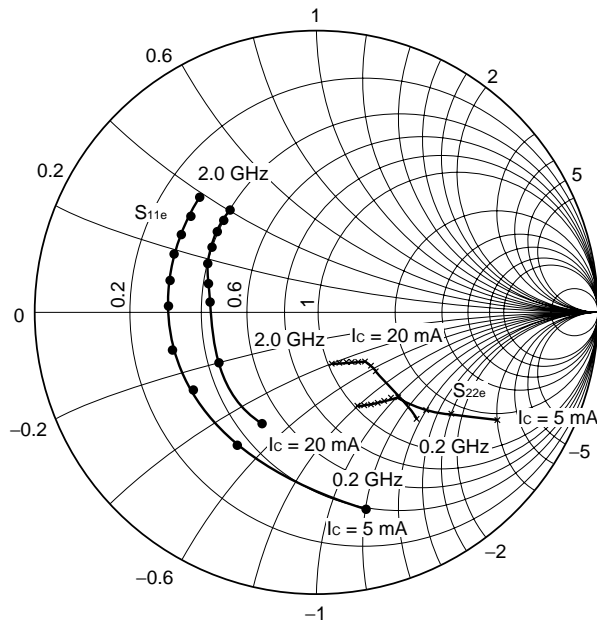
f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.730	-76.5	11.712	129.6	0.048	47.2	0.772	-28.1
400	0.583	-118.8	7.379	105.6	0.056	43.2	0.600	-34.9
600	0.522	-146.2	5.551	92.2	0.072	38.6	0.526	-37.7
800	0.518	-166.5	4.026	80.8	0.072	40.5	0.471	-39.8
1000	0.519	178.3	3.406	71.9	0.088	40.5	0.441	-41.6
1200	0.539	166.6	2.744	63.1	0.089	44.3	0.428	-45.4
1400	0.552	157.4	2.512	55.2	0.106	45.6	0.406	-49.4
1600	0.555	149.0	2.122	48.5	0.111	44.8	0.388	-56.1
1800	0.570	140.9	2.028	41.9	0.134	49.3	0.380	-61.8
2000	0.582	134.0	1.740	36.4	0.135	47.3	0.367	-68.0

$V_{CE} = 10\text{ V}$, $I_c = 20\text{ mA}$, $Z_0 = 50\ \Omega$

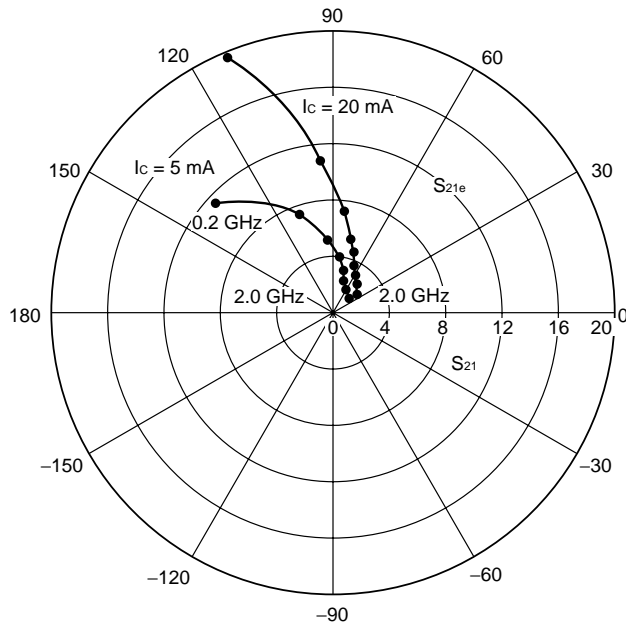
f (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.454	-114.9	19.635	111.0	0.033	46.1	0.497	-42.5
400	0.395	-153.0	10.412	93.3	0.041	58.1	0.359	-41.2
600	0.384	-172.8	7.454	84.4	0.060	55.6	0.315	-41.0
800	0.408	173.4	5.318	75.5	0.073	61.1	0.283	-42.5
1000	0.420	162.6	4.450	68.8	0.094	58.2	0.256	-43.2
1200	0.442	154.7	3.571	61.4	0.103	58.7	0.247	-47.8
1400	0.455	147.7	3.253	54.6	0.127	55.3	0.227	-53.0
1600	0.468	141.2	2.737	49.0	0.137	53.1	0.212	-62.2
1800	0.486	133.9	2.618	43.0	0.165	52.1	0.198	-67.4
2000	0.502	128.7	2.237	38.4	0.170	48.4	0.186	-75.5

S-PARAMETER

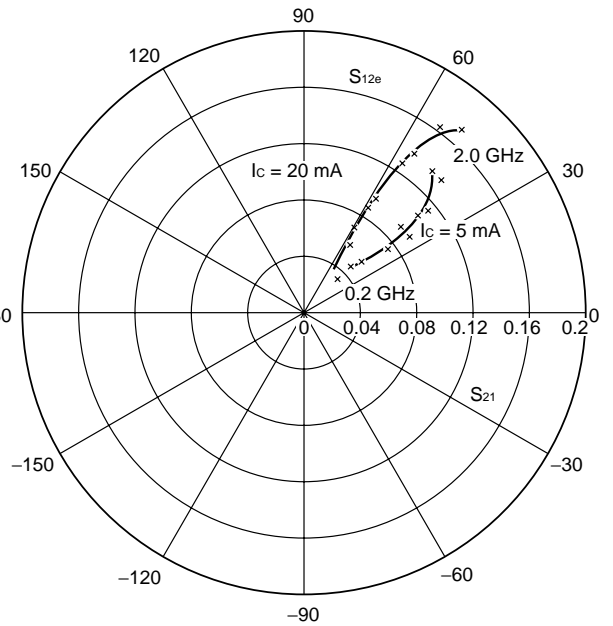
S_{11e} , S_{22e} -FREQUENCY
 $V_{CE} = 10\text{ V}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



S_{21e} -FREQUENCY
 $V_{CE} = 10\text{ V}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



S_{12e} -FREQUENCY
 $V_{CE} = 10\text{ V}$
 freq. = 0.2 to 2 GHz (Step 200 MHz)



[MEMO]

[MEMO]

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

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.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.