Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

DATA SHEET

CEL

SILICON TRANSISTOR

NE68139 / 2SC4094 JEITA Part No.

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

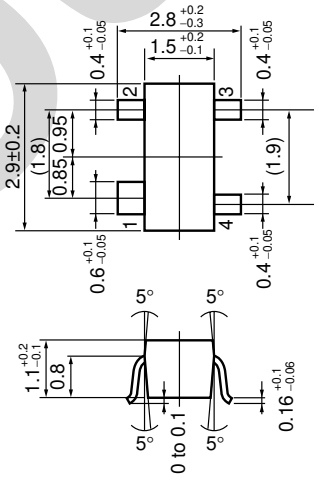
DESCRIPTION

The NE68139 / 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 a 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

PACKAGE DIMENSIONS
(Units: mm)



PIN CONNECTIONS
1. Collector
2. Emitter
3. Base
4. Emitter

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °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	°C
Storage Temperature	T_{stg}	–65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °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} = 8V, 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

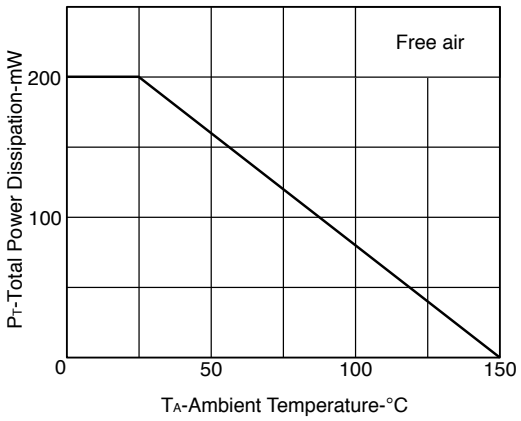
ORDERING INFORMATION

Part Number	Order Number	Quantity
NE68139-T1 2SC4094-T1	NE68139-T1-A 2SC4094-T1-A	3 kpcs/Reel

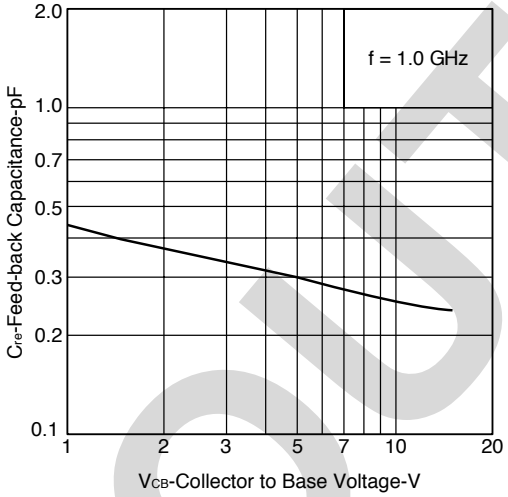
Document No. P10366EJ1V1DS00 (1st edition)
Date Published March 1997 N

TYPICAL CHARACTERISTICS (T_A = 25 °C)

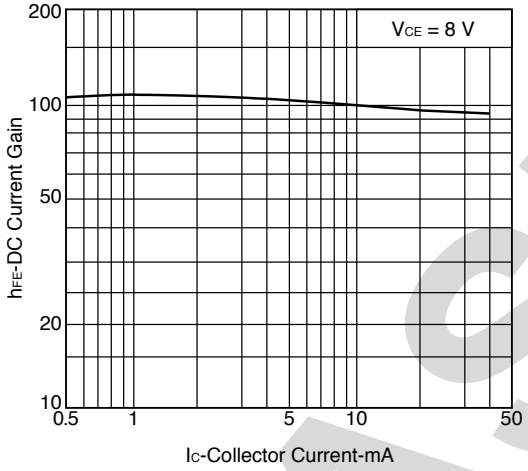
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



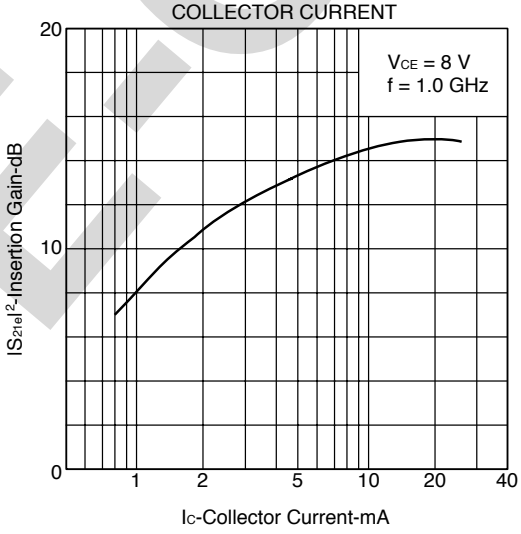
FEED-BACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



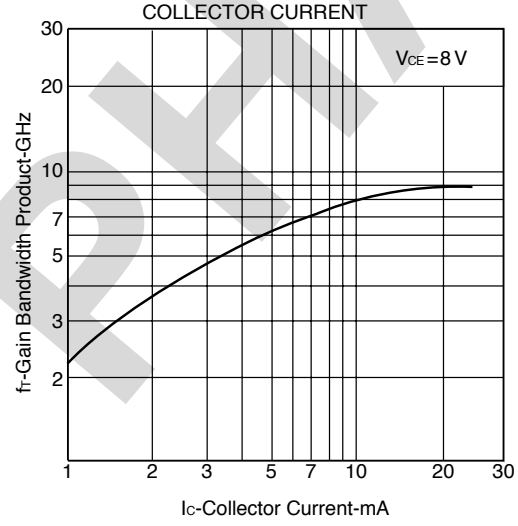
DC CURRENT GAIN vs. COLLECTOR CURRENT



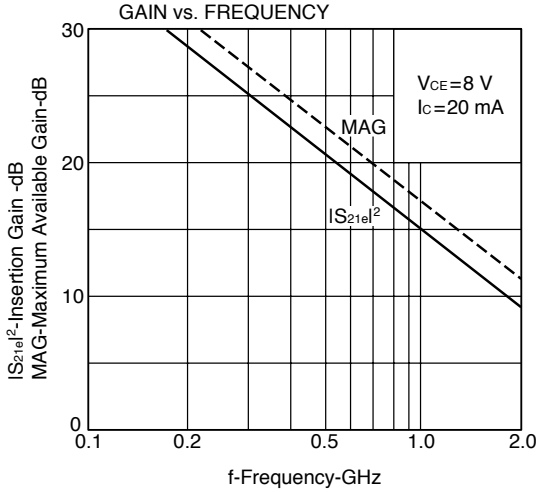
INSERTION GAIN vs. COLLECTOR CURRENT

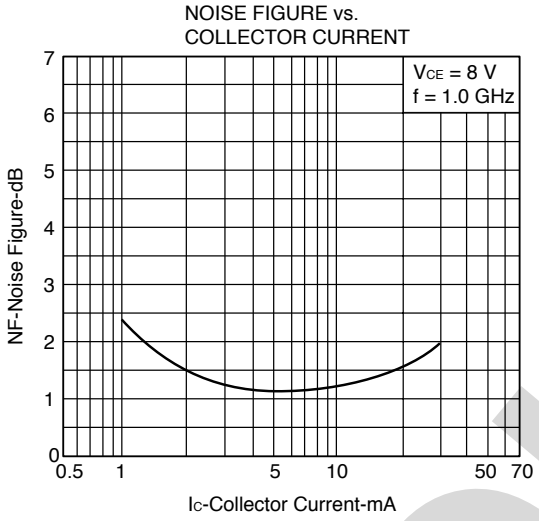


GAIN BANDWIDTH PRODUT vs. COLLECTOR CURRENT



MAXIMUM AVAILABLE GAIN, INSERTION GAIN vs. FREQUENCY





S-PARAMETER

V_{CE} = 8.0 V, I_C = 5.0 mA, Z_O = 50 Ω

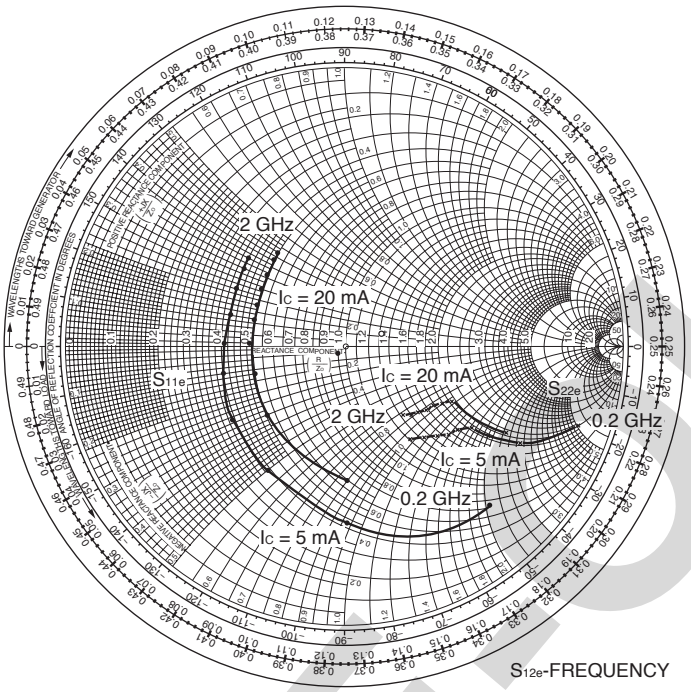
f (MHz)	$\lvert S_{11}\rvert$	$\angle S_{11}$	$\lvert S_{21}\rvert$	$\angle S_{21}$	$\lvert S_{12}\rvert$	$\angle S_{12}$	$\lvert S_{22}\rvert$	$\angle S_{22}$
200	0.774	–47.8	12.689	146.5	0.031	65.4	0.882	–19.1
400	0.631	–88.8	9.952	119.4	0.048	53.4	0.723	–29.5
600	0.523	–120.9	7.813	100.9	0.058	46.2	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 V, I_C = 20.0 mA, Z_O = 50 Ω

f (MHz)	$\lvert S_{11}\rvert$	$\angle S_{11}$	$\lvert S_{21}\rvert$	$\angle S_{21}$	$\lvert S_{12}\rvert$	$\angle S_{12}$	$\lvert S_{22}\rvert$	$\angle S_{22}$
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

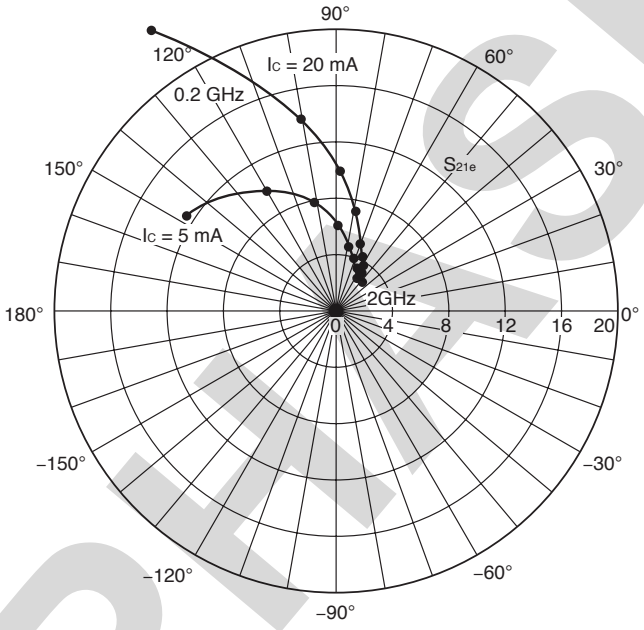
S-PARAMETER

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



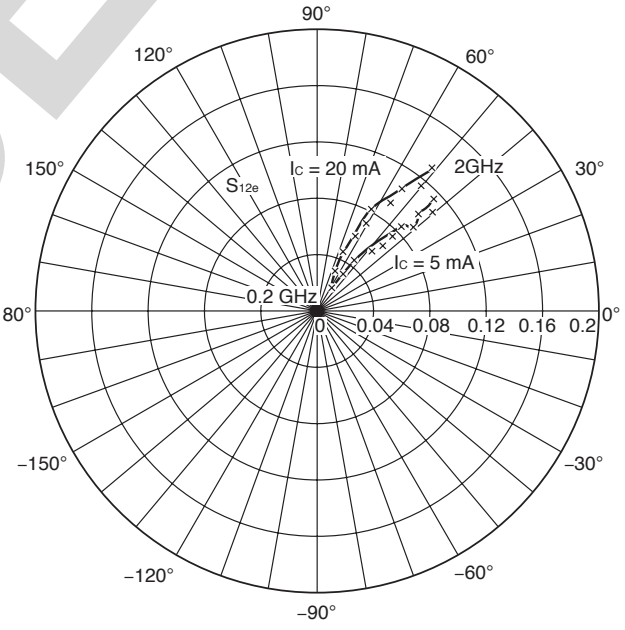
S_{21e}-FREQUENCY

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



S_{12e}-FREQUENCY

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



NOTICE

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. California Eastern Laboratories and Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
2. California Eastern Laboratories has used reasonable care in preparing the information included in this document, but California Eastern Laboratories does not warrant that such information is error free. California Eastern Laboratories and Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
3. California Eastern Laboratories and Renesas Electronics do not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of California Eastern Laboratories or Renesas Electronics or others.
4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. California Eastern Laboratories and Renesas Electronics assume no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
5. Renesas Electronics products are classified according to the following two quality grades: “Standard” and “High Quality”. The recommended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below. “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 etc. “High Quality”: Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc. Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. California Eastern Laboratories and Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by California Eastern Laboratories or Renesas Electronics.
6. You should use the Renesas Electronics products described in this document within the range specified by California Eastern Laboratories, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. California Eastern Laboratories shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
8. Please contact a California Eastern Laboratories sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. California Eastern Laboratories and Renesas Electronics assume no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
10. It is the responsibility of the buyer or distributor of California Eastern Laboratories, who distributes, disposes of, or otherwise places the Renesas Electronics product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, California Eastern Laboratories and Renesas Electronics assume no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of California Eastern Laboratories.
12. Please contact a California Eastern Laboratories sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

NOTE 1: “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.
NOTE 2: “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.
NOTE 3: Products and product information are subject to change without notice.

CEL Headquarters • 4590 Patrick Henry Drive, Santa Clara, CA 95054 • Phone (408) 919-2500 • www.cel.com

For a complete list of sales offices, representatives and distributors,
Please visit our website: **www.cel.com/contactus**