

NPN SILICON RF TRANSISTOR 2SC3356

NPN EPITAXIAL SILICON RF TRANSISTOR FOR MICROWAVE LOW-NOISE AMPLIFICATION 3-PIN MINIMOLD

FEATURES

- Low noise and high gain: NF = 1.1 dB TYP., Ga = 11 dB TYP. @ VcE = 10 V, Ic = 7 mA, f = 1 GHz
- High power gain: MAG = 13 dB TYP. @ VcE = 10 V, Ic = 20 mA, f = 1 GHz

★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC3356	50 pcs (Non reel)	8 mm wide embossed taping
2SC3356-T1	3 kpcs/reel	Pin 3 (Collector) face the perforation side of the tape

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

ABSOLUTE MAXIMUM RATINGS (TA = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	Vсво	20	٧
Collector to Emitter Voltage	Vceo	12	V
Emitter to Base Voltage	VEBO	3.0	٧
Collector Current	lc	100	mA
Total Power Dissipation	Ptot Note	200	mW
Junction Temperature	Tj	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.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version. Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

Document No. PU10209EJ01V0DS (1st edition) (Previous No. P10356EJ5V1DS00)
Date Published January 2003 CP(K)
Printed in Japan



ELECTRICAL CHARACTERISTICS (TA = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	Ісво	VcB = 10 V, IE = 0 mA	ı	-	1.0	μΑ
Emitter Cut-off Current	ІЕВО	VEB = 1.0 V, Ic = 0 mA	-	-	1.0	μΑ
DC Current Gain	hfe Note 1	Vce = 10 V, Ic = 20 mA	50	120	250	-
RF Characteristics						
Gain Bandwidth Product	f⊤	Vce = 10 V, Ic = 20 mA	-	7	-	GHz
Insertion Power Gain	S _{21e} ²	Vce = 10 V, Ic = 20 mA, f = 1 GHz	-	11.5	-	dB
Noise Figure	NF	Vce = 10 V, Ic = 7 mA, f = 1 GHz	-	1.1	2.0	dB
Reverse Transfer Capacitance	Cre Note 2	Vсв = 10 V, IE = 0 mA, f = 1 MHz	-	0.55	1.0	pF

Notes 1. Pulse measurement: PW \leq 350 μ s, Duty Cycle \leq 2%

2. Collector to base capacitance when the emitter grounded

hfe CLASSIFICATION

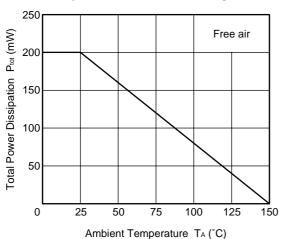
Rank	R23/Q Note	R24/R Note	R25/S Note
Marking	R23	R24	R25
hre Value	50 to 100	80 to 160	125 to 250

Note Old Specification/New Specification

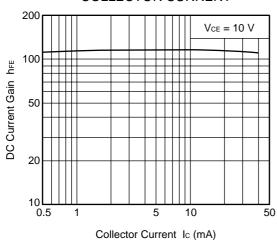


★ TYPICAL CHARACTERISTICS (T_A = +25°C, unless otherwise specified)

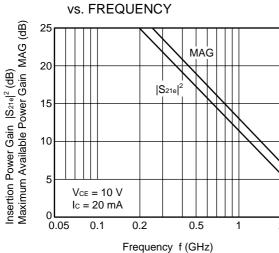
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



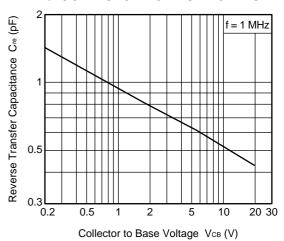
DC CURRENT GAIN vs. COLLECTOR CURRENT



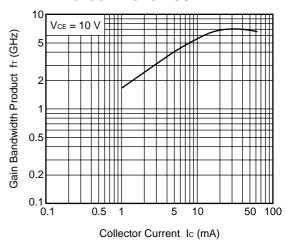
INSERTION POWER GAIN, MAG



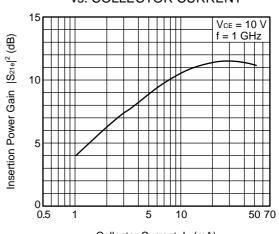
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

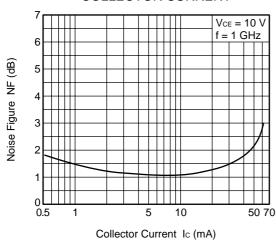


INSERTION POWER GAIN vs. COLLECTOR CURRENT

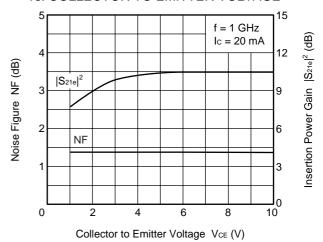


Collector Current Ic (mA)

NOISE FIGURE vs. COLLECTOR CURRENT



NOISE FIGURE, INSERTION POWER GAIN vs. COLLECTOR TO EMITTER VOLTAGE



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

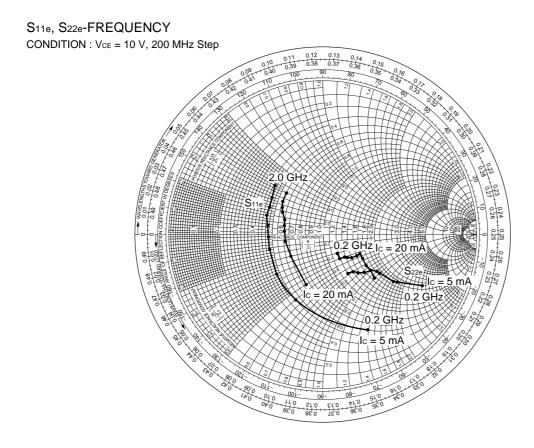
S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

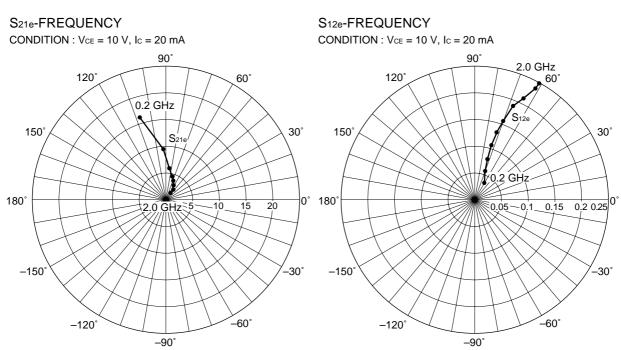
Click here to download S-parameters.

 $[\mathsf{RF} \ \mathsf{and} \ \mathsf{Microwave}] \to [\mathsf{Device} \ \mathsf{Parameters}]$

URL http://www.csd-nec.com/

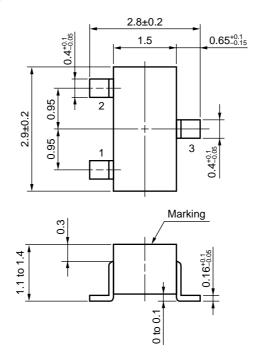
SMITH CHART





★ PACKAGE DIMENSIONS

3-PIN MINIMOLD (UNIT: mm)



PIN CONNECTIONS

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

- The information in this document is current as of January, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.
- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of
 third parties by or arising from the use of NEC semiconductor products listed in this document or any other
 liability arising from the use of such products. No license, express, implied or otherwise, is granted under any
 patents, copyrights or other intellectual property rights of NEC or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative
 purposes in semiconductor product operation and application examples. The incorporation of these
 circuits, software and information in the design of customer's equipment shall be done under the full
 responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third
 parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers
 agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize
 risks of damage to property or injury (including death) to persons arising from defects in NEC
 semiconductor products, customers must incorporate sufficient safety measures in their design, such as
 redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:
 - "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product 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": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.

(Note)

- (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.
- (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8F 00 4-0110

NEC 2SC3356

▶Business issue

NEC Compound Semiconductor Devices, Ltd.

5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited

 Hong Kong Head Office
 TEL: +852-3107-7303
 FAX: +852-3107-7309

 Taipei Branch Office
 TEL: +886-2-8712-0478
 FAX: +886-2-2545-3859

 Korea Branch Office
 TEL: +82-2-528-0301
 FAX: +82-2-528-0302

NEC Electronics (Europe) GmbH http://www.ee.nec.de/

TEL: +49-211-6503-01 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. http://www.cel.com/

TEL: +1-408-988-3500 FAX: +1-408-988-0279

▶Technical issue

NEC Compound Semiconductor Devices, Ltd. http://www.csd-nec.com/

Sales Engineering Group, Sales Division

E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918