2SC3356

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Rev.3.00
Jun 28, 2011

NPN Silicon RF Transistor

NPN Epitaxial Silicon RF Transistor for Microwave Low-Noise Amplification 3-pin Minimold

FEATURES

- Low noise and high gain : NF = 1.1 dB TYP., G_a = 11 dB TYP. @ V_{CE} = 10 V, I_C = 7 mA, f = 1 GHz
- High power gain : MAG = 13 dB TYP. @ V_{CE} = 10 V, I_C = 20 mA, f = 1 GHz

<R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
2SC3356	2SC3356-A	3-pin Minimold (Pb-Free)	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC3356-T1B	2SC3356-T1B-A		3 kpcs/reel	• Pin 3 (Collector) face the perforation side of the tape

Remark To order evaluation samples, please 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.

The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

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	–	–	1.0	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1.0 V, I_C = 0	–	–	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	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 10 V, I_C = 20 mA, f = 1 GHz	–	11.5	–	dB
Noise Figure	NF	V_{CE} = 10 V, I_C = 7 mA, f = 1 GHz	–	1.1	2.0	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 10 V, I_E = 0, f = 1 MHz	–	0.55	1.0	pF

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

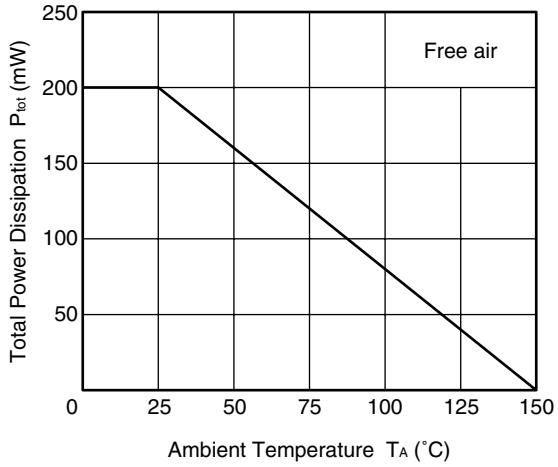
2. Collector to base capacitance when the emitter grounded

<R> h_{FE} CLASSIFICATION

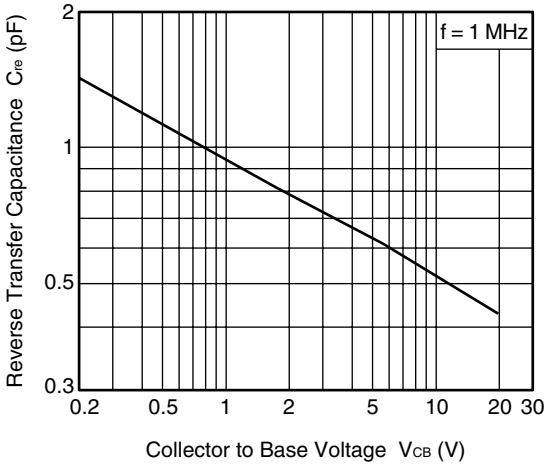
Rank	Q/YQ	R/YR	S/YS
Marking	R23	R24	R25
h_{FE} Value	50 to 100	80 to 160	125 to 250

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

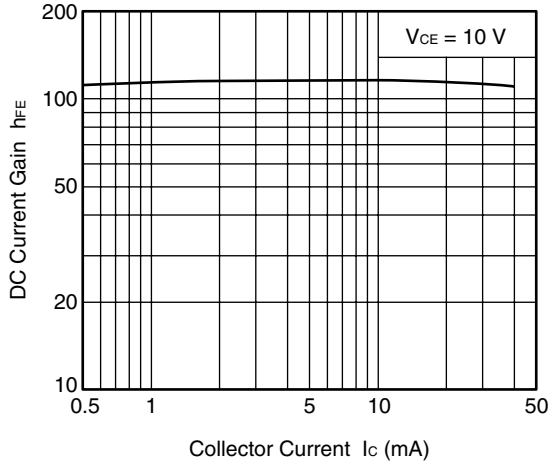
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



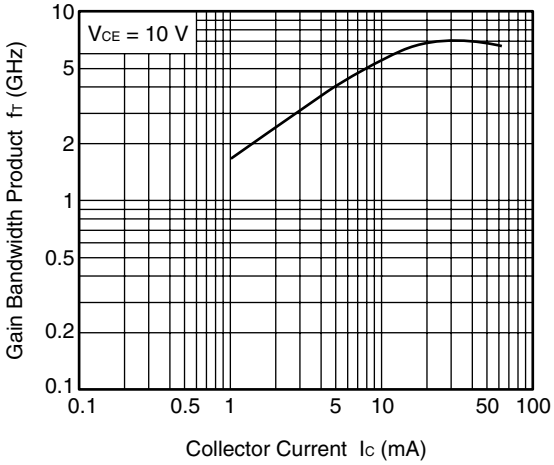
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



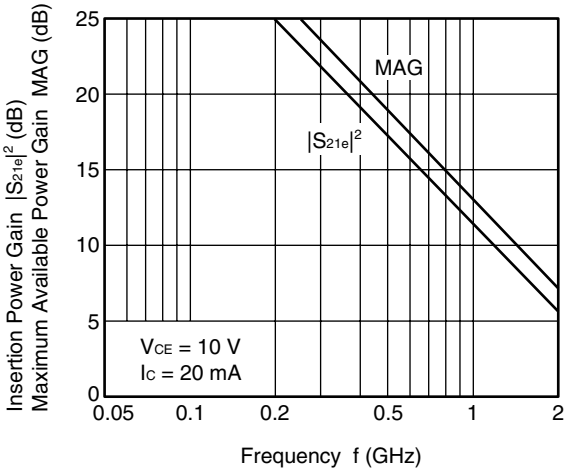
DC CURRENT GAIN vs. COLLECTOR CURRENT



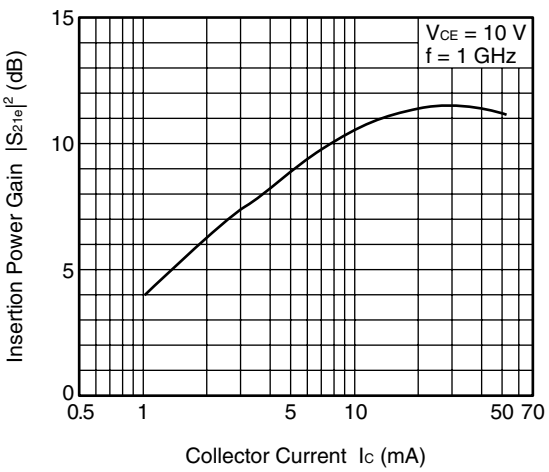
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG vs. FREQUENCY

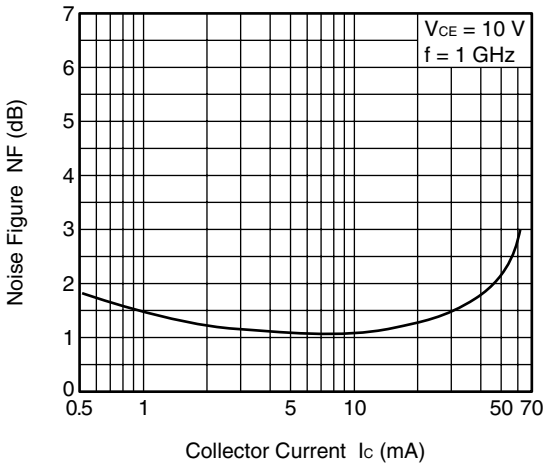


INSERTION POWER GAIN vs. COLLECTOR CURRENT

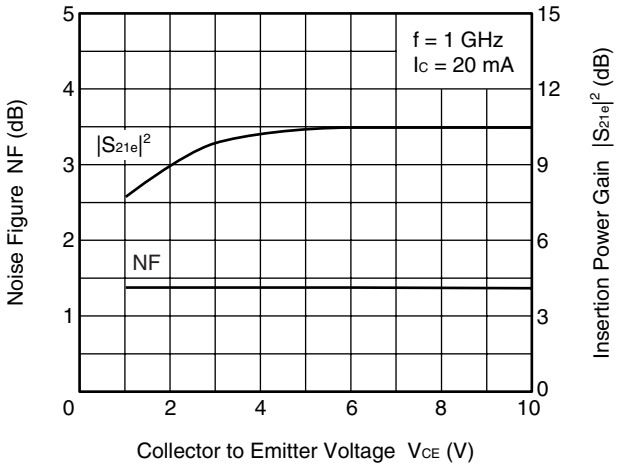


Remark The graphs indicate nominal characteristics.

NOISE FIGURE vs.
COLLECTOR CURRENT



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

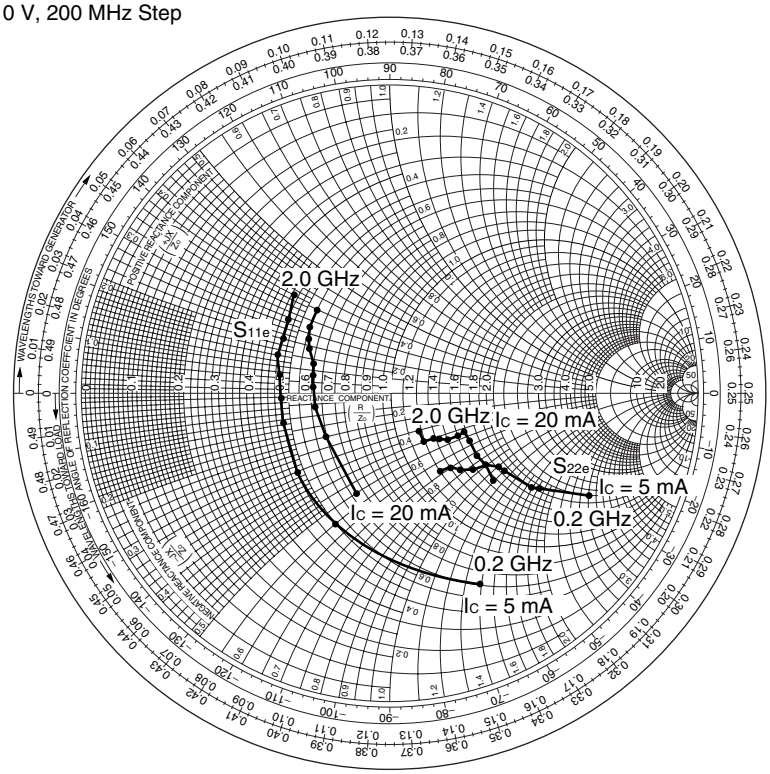


Remark The graphs indicate nominal characteristics.

SMITH CHART

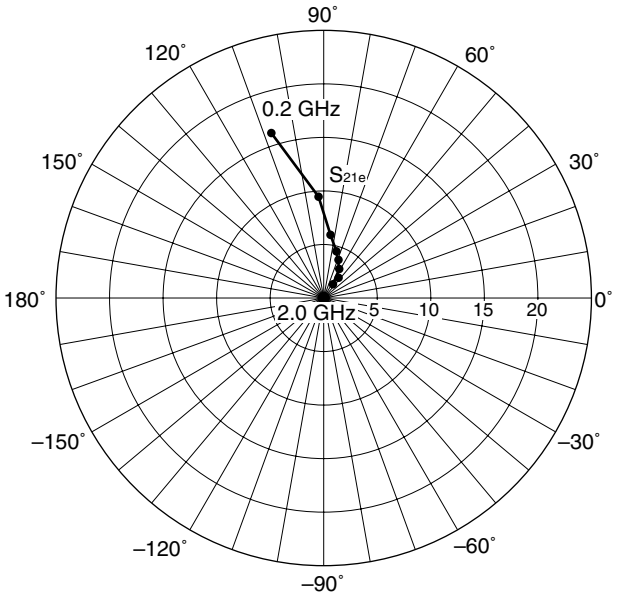
S_{11e}, S_{22e}-FREQUENCY

CONDITION : V_{CE} = 10 V, 200 MHz Step



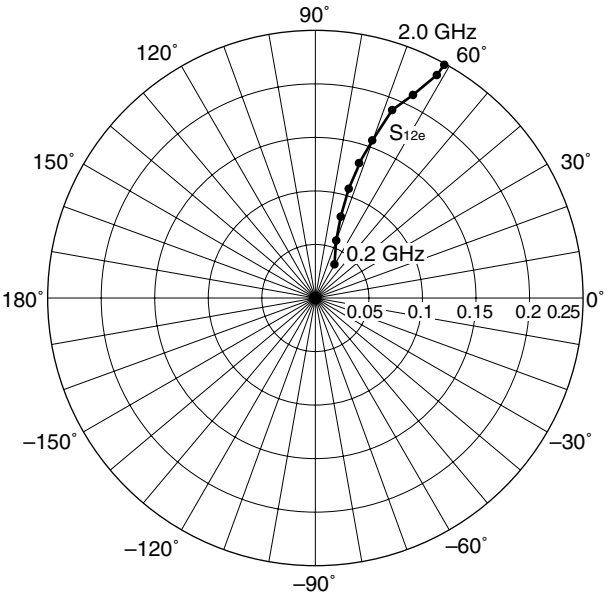
S_{21e}-FREQUENCY

CONDITION : V_{CE} = 10 V, I_C = 20 mA



S_{12e}-FREQUENCY

CONDITION : V_{CE} = 10 V, I_C = 20 mA



S-PARAMETERS

S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

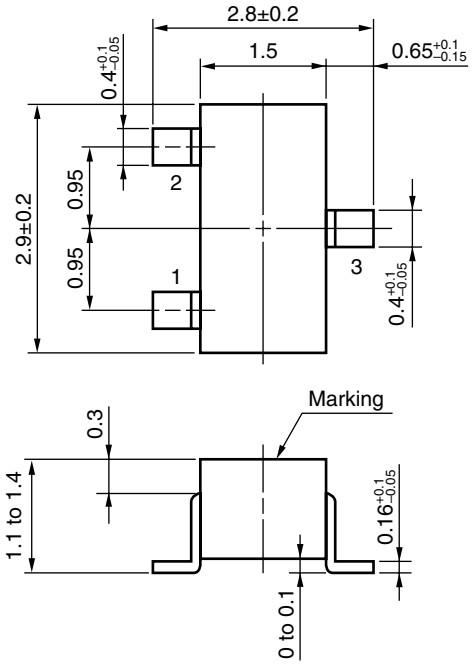
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL http://www2.renesas.com/microwave/en/download.html

PACKAGE DIMENSIONS

3-PIN MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

Revision History	2SC3356 Data Sheet

Rev.	Date	Description	
		Page	Summary
–	Jun 2004	–	Previous No. :PU10209EJ02V0DS
3.00	Jun 28, 2011	p.1	Modification of **ORDERING INFORMATION**
		p.2	Modification of $\mathbf{h_{FE}}$ **CLASSIFICATION**

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 harbourFront Avenue, #06-10, keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

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