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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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2SC5139

Silicon NPN Epitaxial

RENESAS

ADE-208-226A (Z)
2nd. Edition
Mar. 2001

Application

VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 11 \text{ GHz typ}$
- High gain, low noise figure
 $PG = 15 \text{ dB typ}$, $NF = 1.1 \text{ dB typ}$ at $f = 900 \text{ MHz}$

Outline

SMPAK



1. Emitter
2. Base
3. Collector

Note: Marking is "YZ-".

Attention: This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

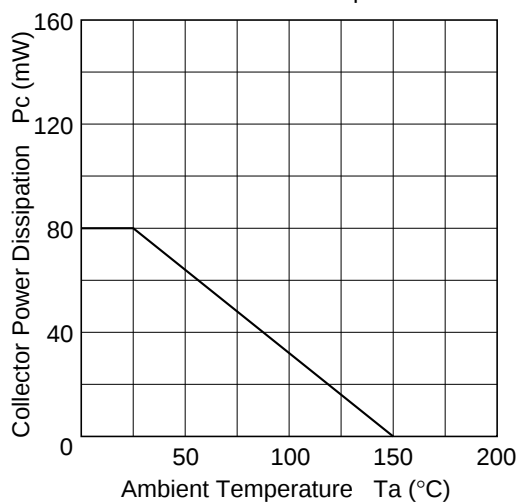
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V _{CBO}	15	V
Collector to emitter voltage	V _{CEO}	8	V
Emitter to base voltage	V _{EBO}	1.5	V
Collector current	I _C	50	mA
Collector power dissipation	P _C	80	mW
Junction temperature	T _j	150	°C
Storage temperature	T _{stg}	−55 to +150	°C

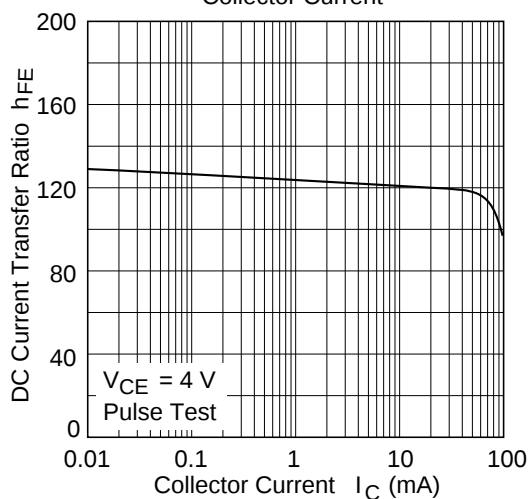
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	V _{(BR)CBO}	15	—	—	V	I _C = 10 μA, I _E = 0
Collector cutoff current	I _{CBO}	—	—	1	μA	V _{CB} = 12 V, I _E = 0
	I _{CEO}	—	—	1	mA	V _{CE} = 8 V, R _{BE} =
Emitter cutoff current	I _{EBO}	—	—	10	μA	V _{EB} = 1.5 V, I _C = 0
DC current transfer ratio	h _{FE}	50	120	250		V _{CE} = 4 V, I _C = 20 mA
Collector output capacitance	Cob	—	0.65	1.15	pF	V _{CB} = 5 V, I _E = 0, f = 1 MHz
Gain bandwidth product	f _T	8	11	—	GHz	V _{CE} = 4 V, I _C = 20 mA
Power gain	PG	11.5	15	—	dB	V _{CE} = 4 V, I _C = 20 mA, f = 900 MHz
Noise figure	NF	—	1.1	2.0	dB	V _{CE} = 4 V, I _C = 5 mA, f = 900 MHz

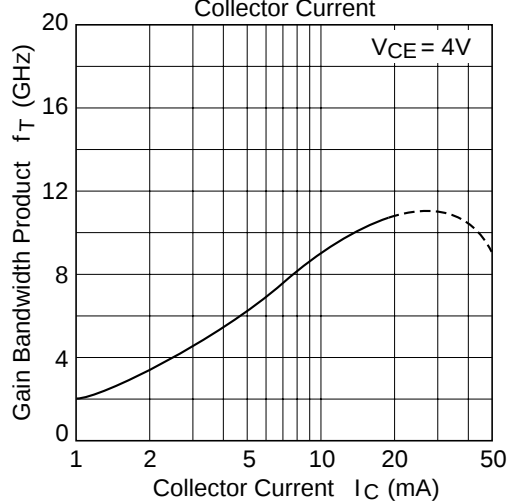
Maximum Collector Dissipation Curve



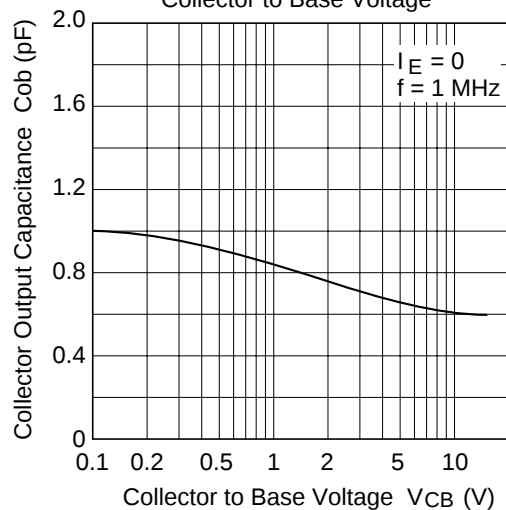
DC Current Transfer Ratio vs. Collector Current

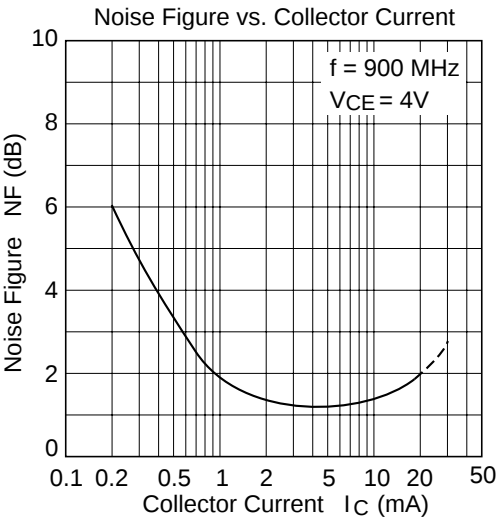
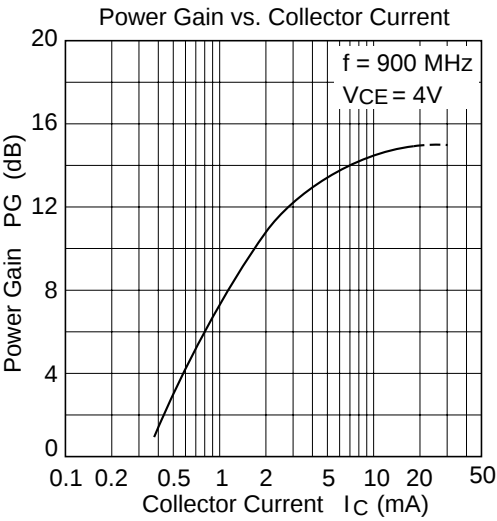


Gain Bandwidth Product vs. Collector Current

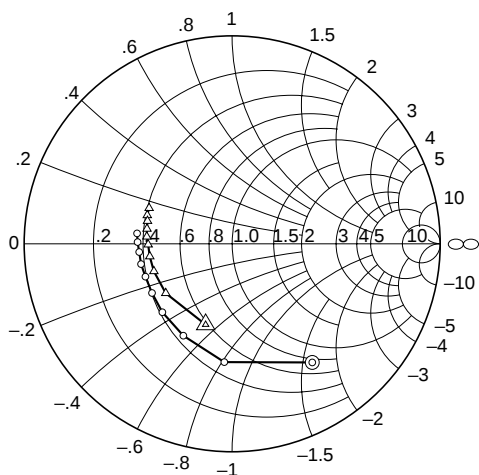


Collector Output Capacitance vs. Collector to Base Voltage





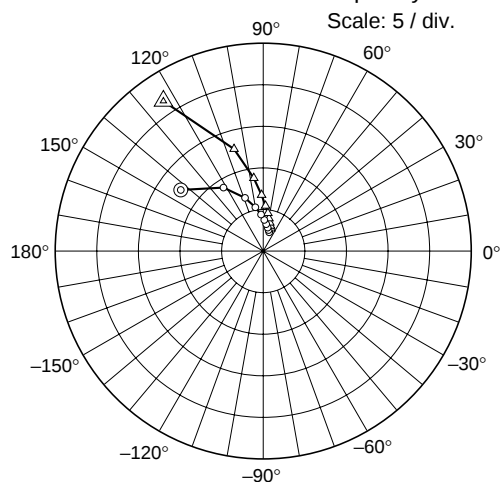
S11 Parameter vs. Frequency



Condition: $V_{CE} = 4 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5 \text{ mA}$)
△ — △ ($I_C = 20 \text{ mA}$)

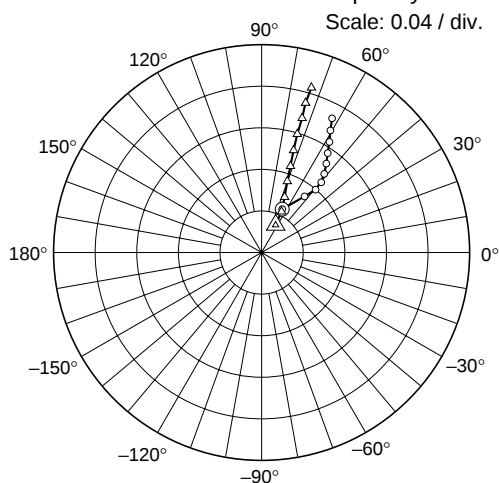
S21 Parameter vs. Frequency



Condition: $V_{CE} = 4 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5 \text{ mA}$)
△ — △ ($I_C = 20 \text{ mA}$)

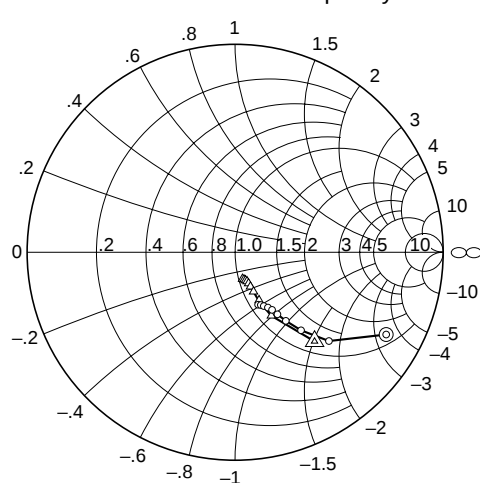
S12 Parameter vs. Frequency



Condition: $V_{CE} = 4 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5 \text{ mA}$)
△ — △ ($I_C = 20 \text{ mA}$)

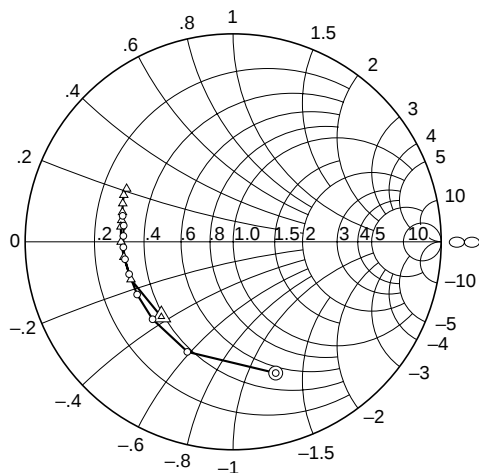
S22 Parameter vs. Frequency



Condition: $V_{CE} = 4 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

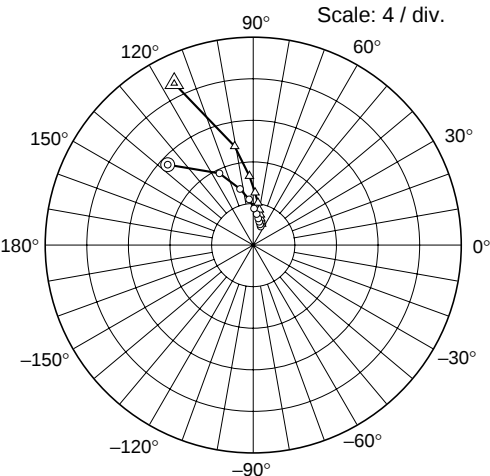
○ — ○ ($I_C = 5 \text{ mA}$)
△ — △ ($I_C = 20 \text{ mA}$)

S11 Parameter vs. Frequency



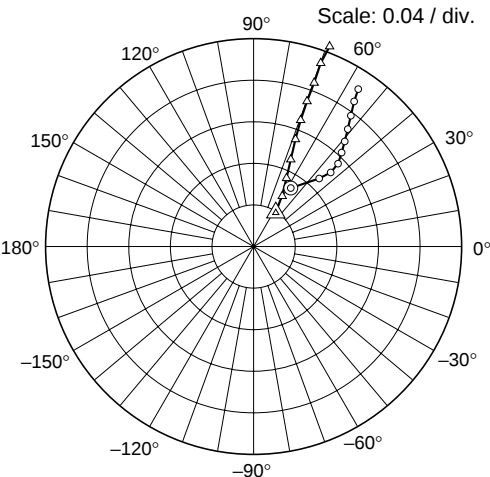
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

S21 Parameter vs. Frequency



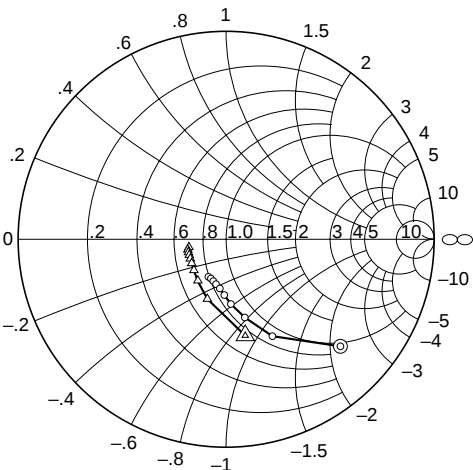
Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

S12 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

S22 Parameter vs. Frequency

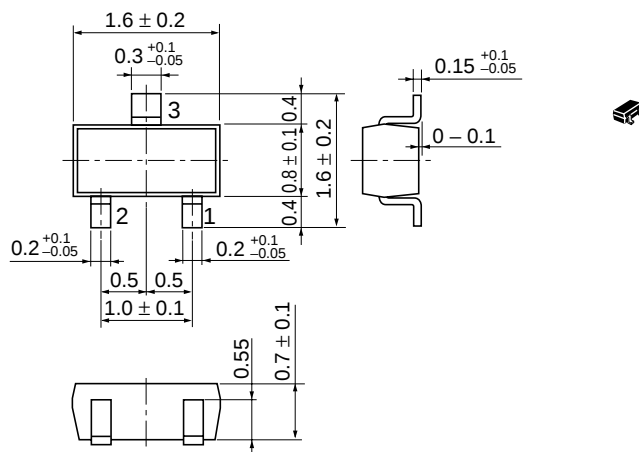


Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)
○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	SMPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.003 g

Cautions

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HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.

Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	:	http://semiconductor.hitachi.com/
	Europe	:	http://www.hitachi-eu.com/hel/ecg
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For further information write to:

Hitachi Semiconductor
(America) Inc.

179 East Tasman Drive,
San Jose, CA 95134

Tel: <1> (408) 433-1990

Fax: <1> (408) 433-0223

Hitachi Europe GmbH
Electronic Components Group

Dornacher Straße 3
D-85622 Feldkirchen, Munich

Germany

Tel: <49> (89) 9 9180-0

Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.

Electronic Components Group.

Whitebrook Park

Lower Cookham Road

Maidenhead

Berkshire SL6 8YA, United Kingdom

Tel: <44> (1628) 585000

Fax: <44> (1628) 585160

Hitachi Asia Ltd.

Hitachi Tower

16 Collyer Quay #20-00,

Singapore 049318

Tel: <65>-538-6533/538-8577

Fax: <65>-538-6933/538-3877

URL: <http://www.hitachi.com.sg>

Hitachi Asia Ltd.

(Taipei Branch Office)

4/F, No. 167, Tun Hwa North Road,

Hung-Kuo Building,

Taipei (105), Taiwan

Tel: <886>-(2)-2718-3666

Fax: <886>-(2)-2718-8180

Telex: 23222 HAS-TP

URL: <http://www.hitachi.com.tw>

Hitachi Asia (Hong Kong) Ltd.

Group III (Electronic Components)

7/F., North Tower,

World Finance Centre,

Harbour City, Canton Road

Tsim Sha Tsui, Kowloon,

Hong Kong

Tel: <852>-(2)-735-9218

Fax: <852>-(2)-730-0281

URL: <http://www.hitachi.com.hk>