

DATA SHEET

NEC

NPN SILICON RF TRANSISTOR 2SC3356

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

FEATURES

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

★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC3356	50 pcs (Non reel)	<ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 3 (Collector) face the perforation side of the tape
2SC3356-T1	3 kpcs/reel	

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

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

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	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$

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.

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 mA	–	–	1.0	μA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1.0 V, I _C = 0 mA	–	–	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	S _{21e} 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 mA, 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

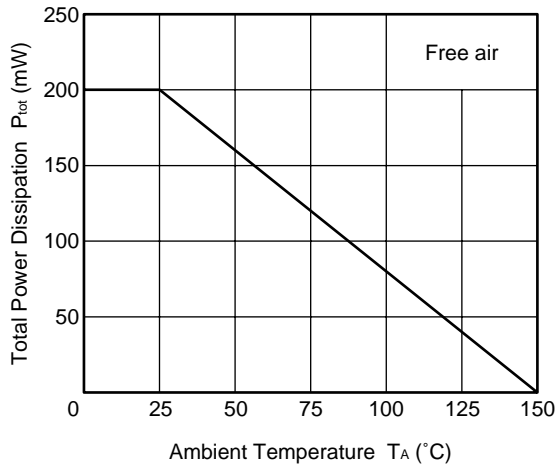
h_{FE} CLASSIFICATION

Rank	R23/Q ^{Note}	R24/R ^{Note}	R25/S ^{Note}
Marking	R23	R24	R25
h _{FE} Value	50 to 100	80 to 160	125 to 250

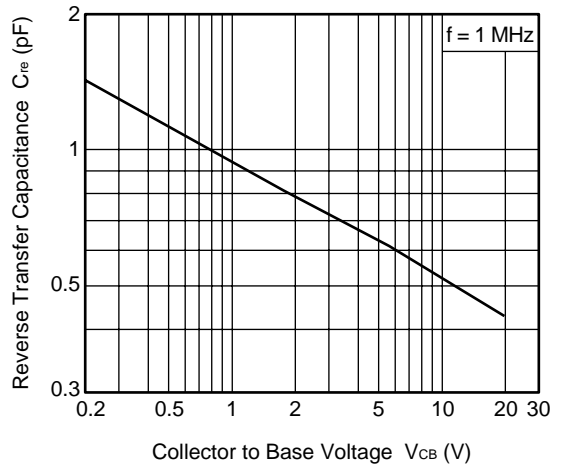
Note Old Specification/New Specification

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

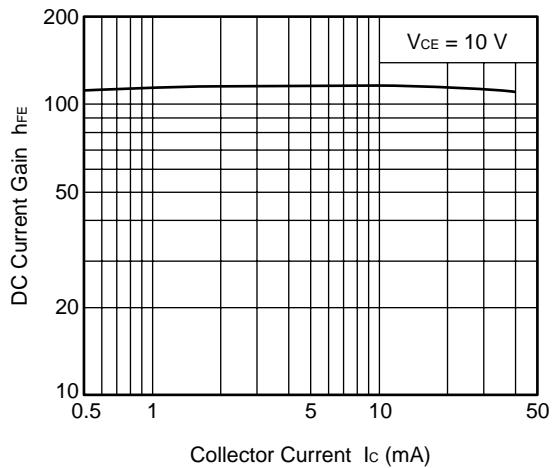
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



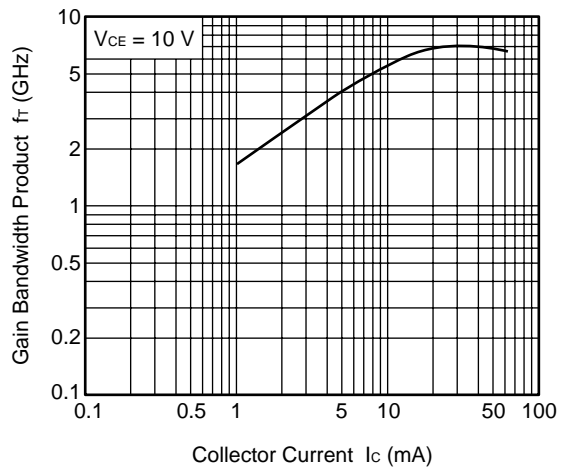
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



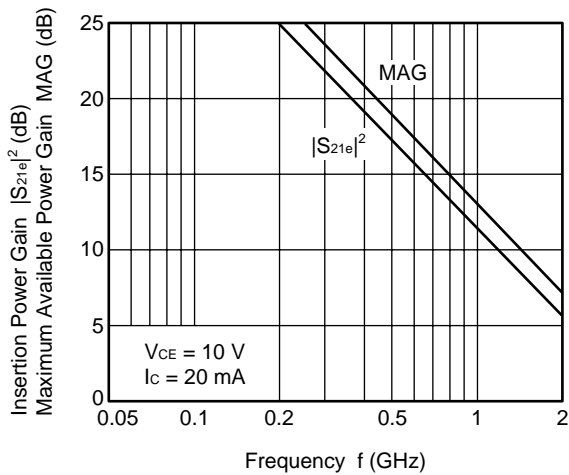
DC CURRENT GAIN vs. COLLECTOR CURRENT



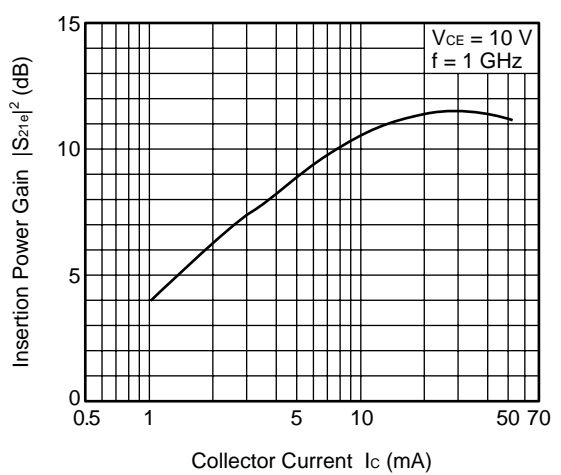
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



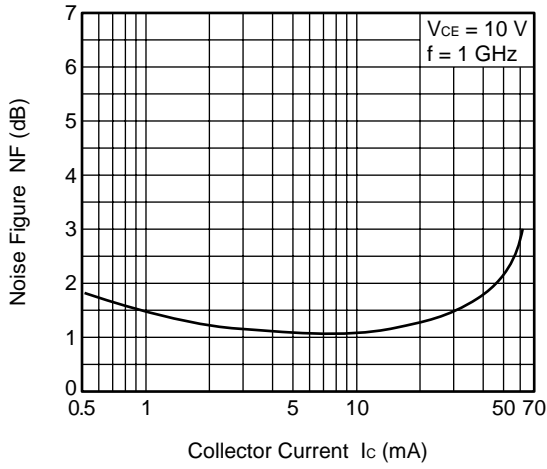
INSERTION POWER GAIN, MAG vs. FREQUENCY



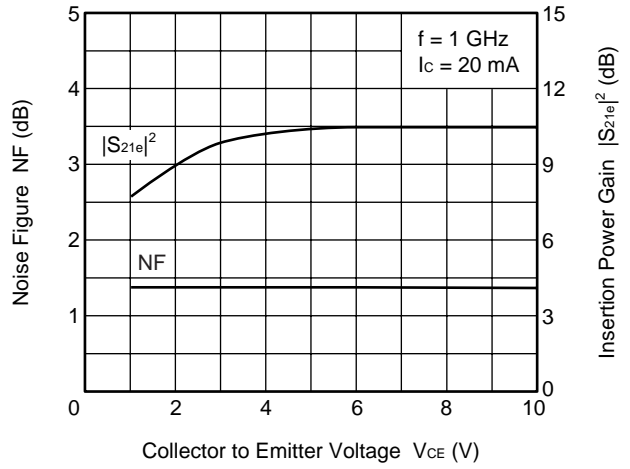
INSERTION POWER GAIN vs. COLLECTOR CURRENT



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.

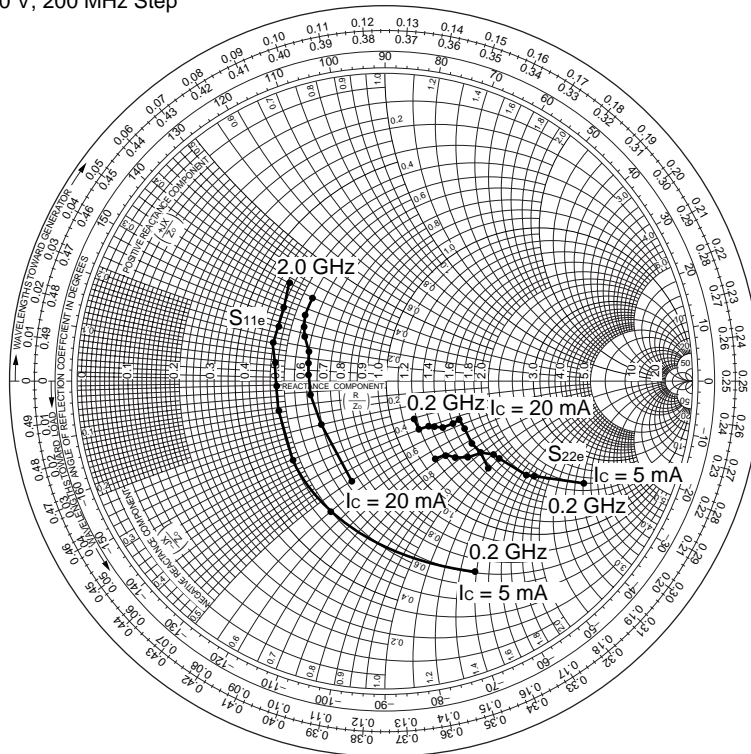
[RF and Microwave] → [Device Parameters]

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

SMITH CHART

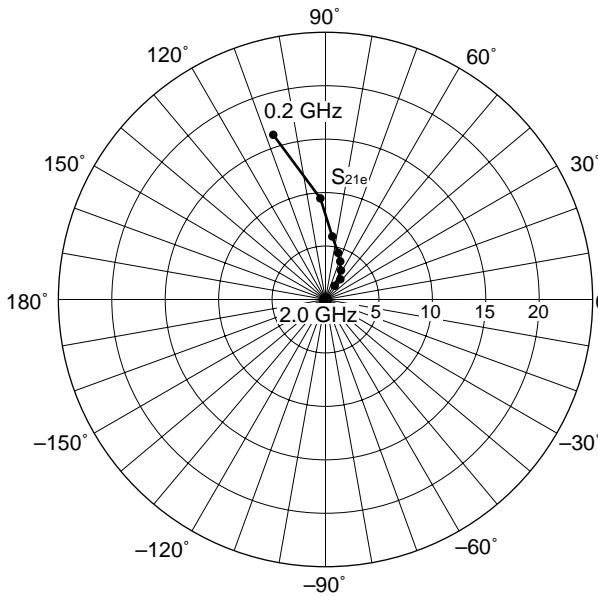
S_{11e}, S_{22e}-FREQUENCY

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



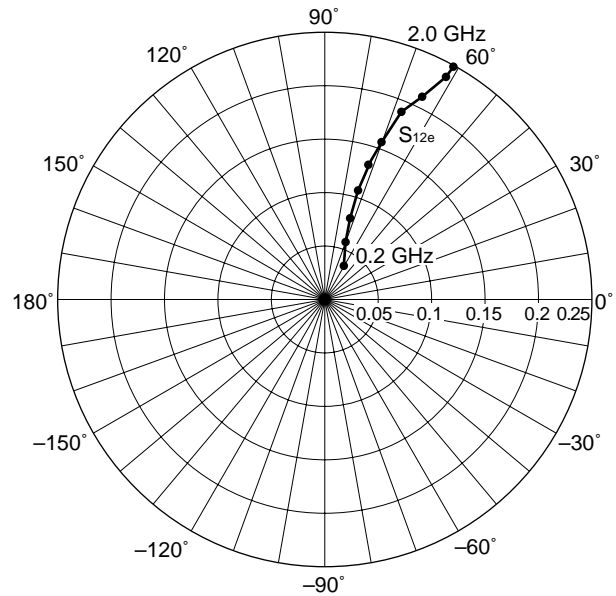
S_{21e}-FREQUENCY

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



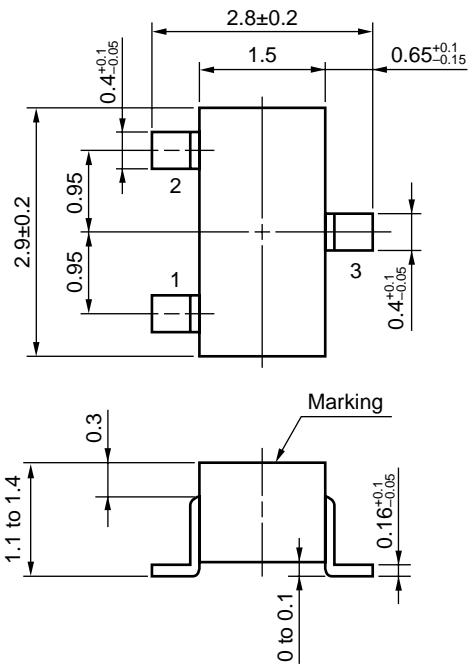
S_{12e}-FREQUENCY

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



★ 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.**
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► **Business issue**

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► **Technical issue**

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