

# 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"> <li>• 8 mm wide embossed taping</li> <li>• Pin 3 (Collector) face the perforation side of the tape</li> </ul>
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	$P_{tot}^{\text{Note}}$	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<sub>A</sub> = +25°C)**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA	–	–	1.0	μA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1.0 V, I <sub>C</sub> = 0 mA	–	–	1.0	μA
★ DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	50	120	250	–
RF Characteristics						
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	–	7	–	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA, f = 1 GHz	–	11.5	–	dB
Noise Figure	NF	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 7 mA, f = 1 GHz	–	1.1	2.0	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 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

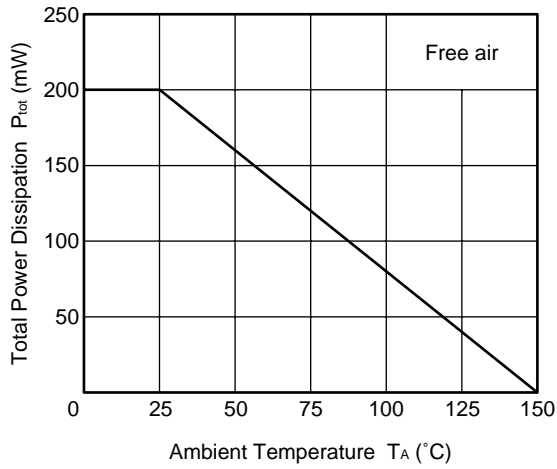
**h<sub>FE</sub> CLASSIFICATION**

Rank	R23/Q <sup>Note</sup>	R24/R <sup>Note</sup>	R25/S <sup>Note</sup>
Marking	R23	R24	R25
h <sub>FE</sub> Value	50 to 100	80 to 160	125 to 250

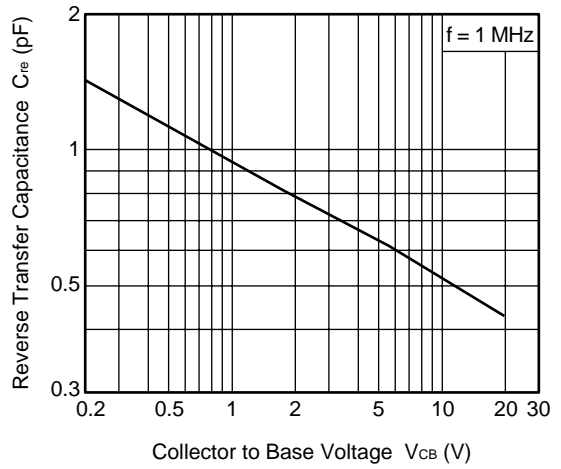
**Note** Old Specification/New Specification

★ TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)

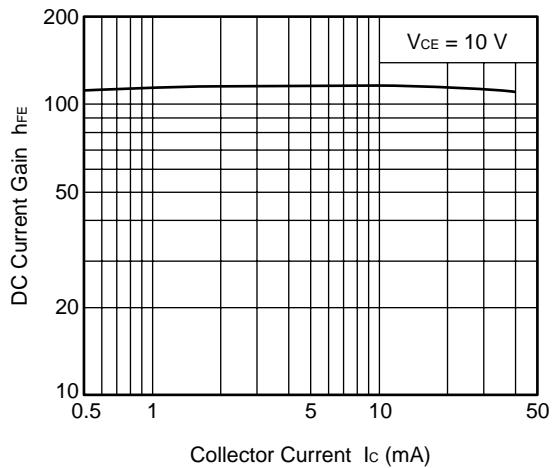
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



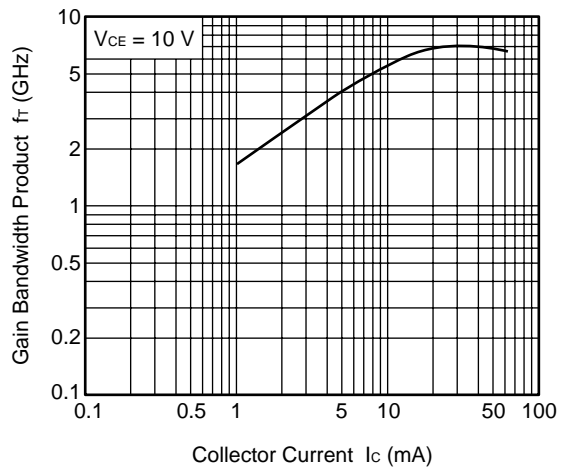
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



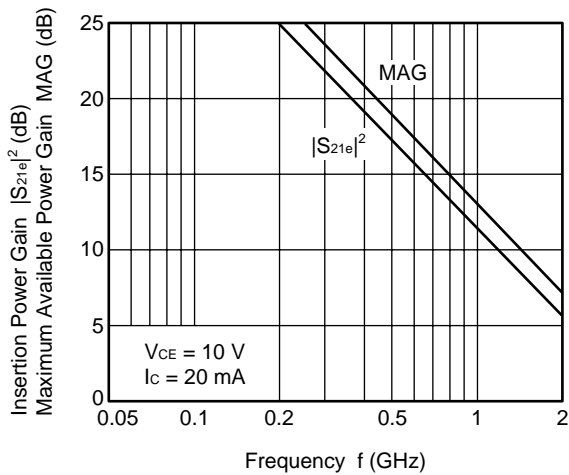
DC CURRENT GAIN vs. COLLECTOR CURRENT



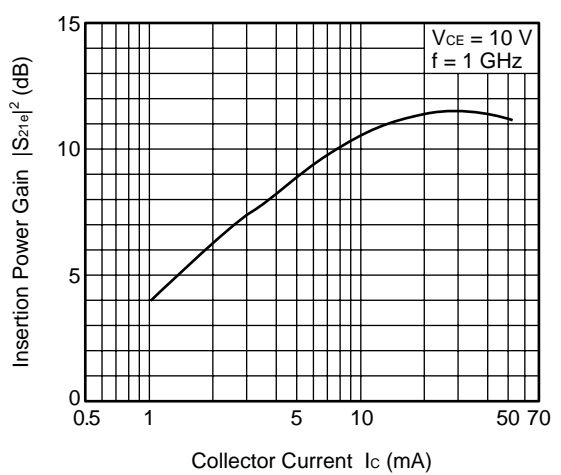
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



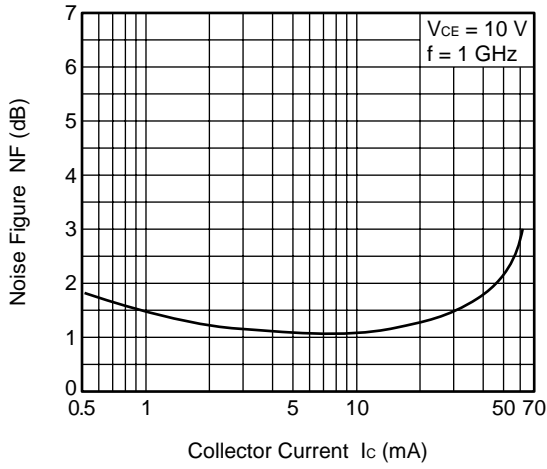
INSERTION POWER GAIN, MAG vs. FREQUENCY



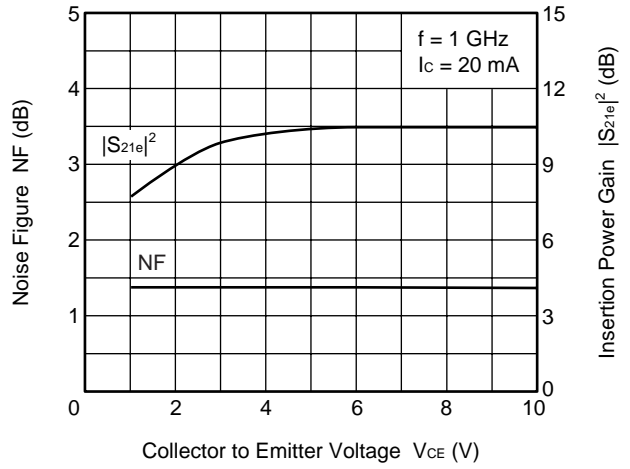
INSERTION POWER GAIN vs. COLLECTOR CURRENT



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.

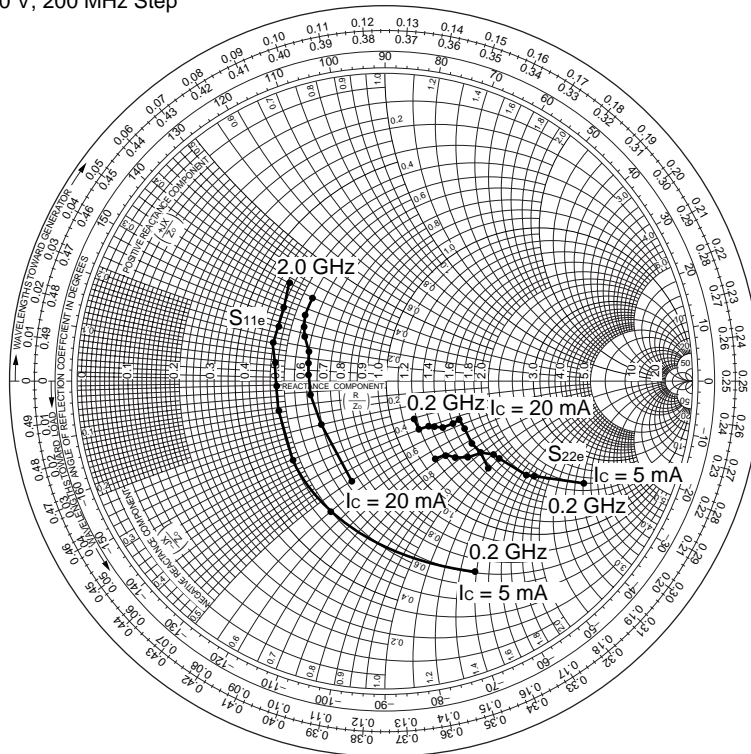
[RF and Microwave] → [Device Parameters]

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

SMITH CHART

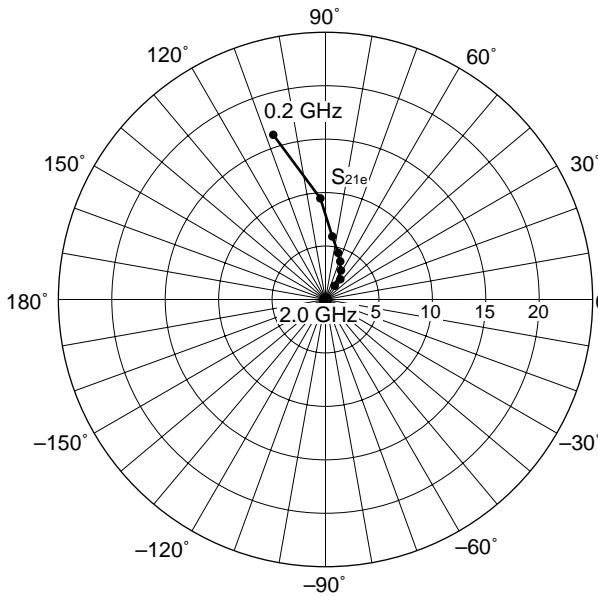
S<sub>11e</sub>, S<sub>22e</sub>-FREQUENCY

CONDITION : V<sub>CE</sub> = 10 V, 200 MHz Step



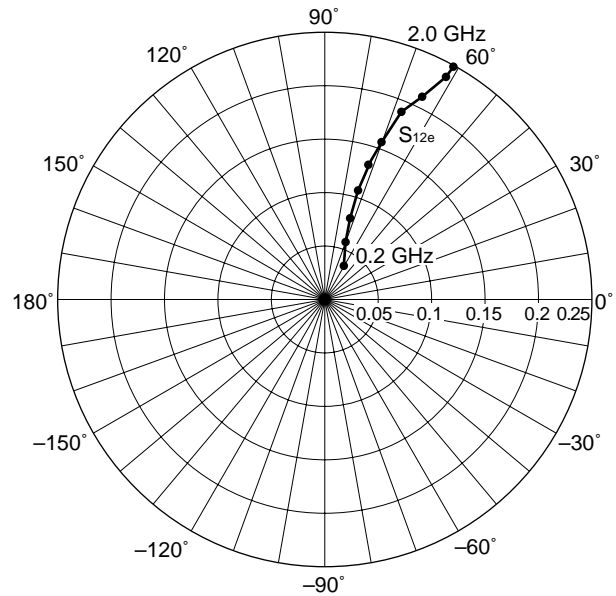
S<sub>21e</sub>-FREQUENCY

CONDITION : V<sub>CE</sub> = 10 V, I<sub>c</sub> = 20 mA



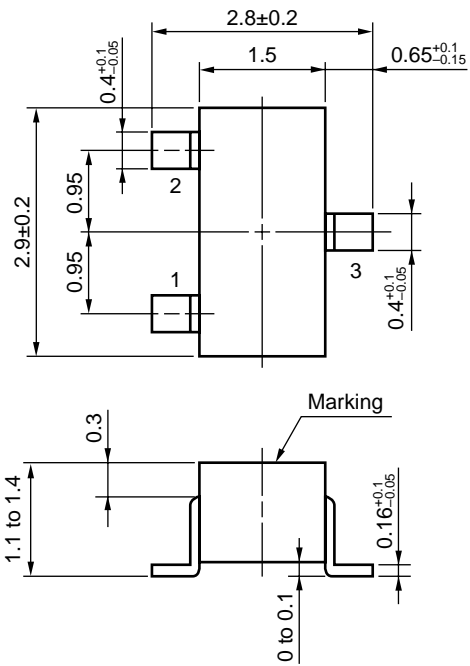
S<sub>12e</sub>-FREQUENCY

CONDITION : V<sub>CE</sub> = 10 V, I<sub>c</sub> = 20 mA



★ PACKAGE DIMENSIONS

3-PIN MINIMOLD (UNIT: mm)



**PIN CONNECTIONS**

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

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► **Business issue**

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► **Technical issue**

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