

# NE85633 / 2SC3356

Data Sheet

NPN Silicon RF Transistor

R09DS0021EJ0300

Rev.3.00

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

Jun 28, 2011

## 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
NE85633 2SC3356	NE85633-A 2SC3356-A	3-pin Minimold (Pb-Free)	50 pcs (Non reel)	• 8 mm wide embossed taping  • Pin 3 (Collector) face the perforation side of the tape
NE85633-T1B 2SC3356-T1B	NE85633-T1B-A 2SC3356-T1BA		3 kpcs/reel	

**Remark** To order evaluation samples, please 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 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<sub>A</sub> = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I <sub>CB0</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0	–	–	1.0	μA
Emitter Cut-off Current	I <sub>EB0</sub>	V <sub>EB</sub> = 1.0 V, I <sub>C</sub> = 0	–	–	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, f = 1 MHz	–	0.55	1.0	pF

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

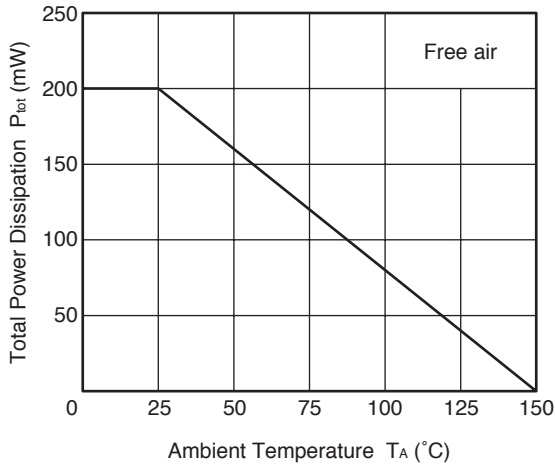
**2.** Collector to base capacitance when the emitter grounded

<R> h<sub>FE</sub> CLASSIFICATION

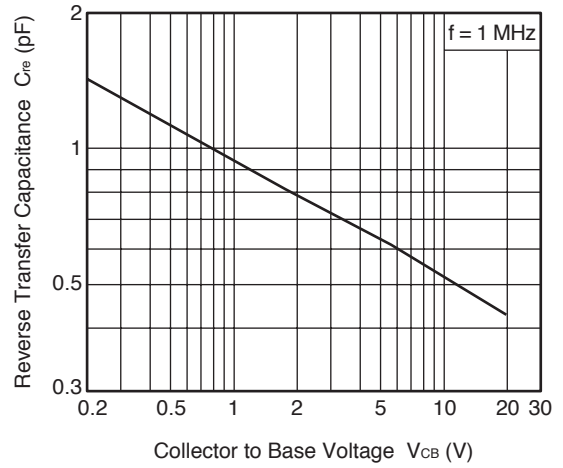
Rank	Q/YQ	R/YR	S/YS
Marking	R23	R24	R25
h <sub>FE</sub> Value	50 to 100	80 to 160	125 to 250

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

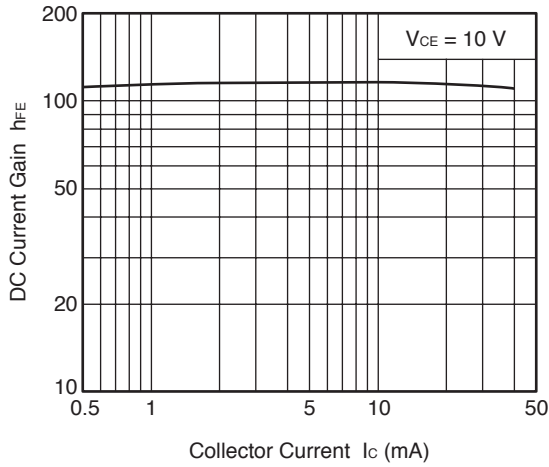
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



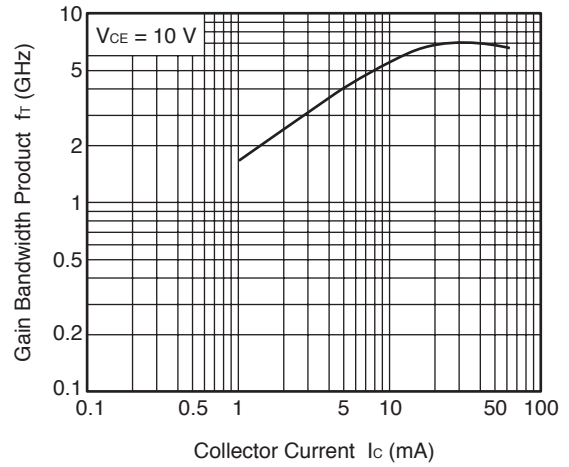
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



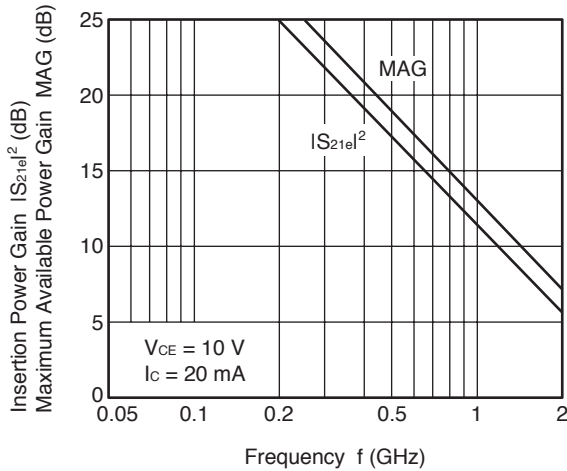
DC CURRENT GAIN vs. COLLECTOR CURRENT



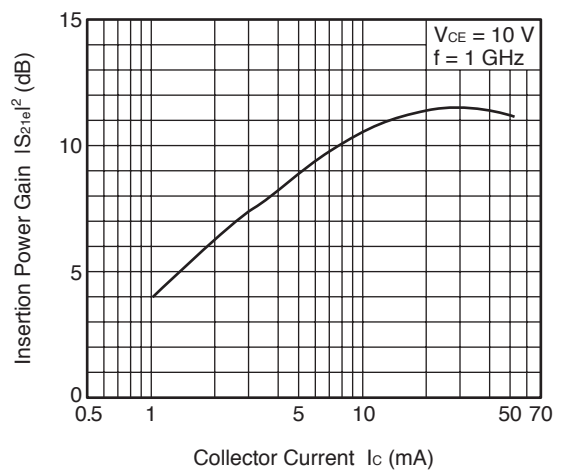
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG vs. FREQUENCY

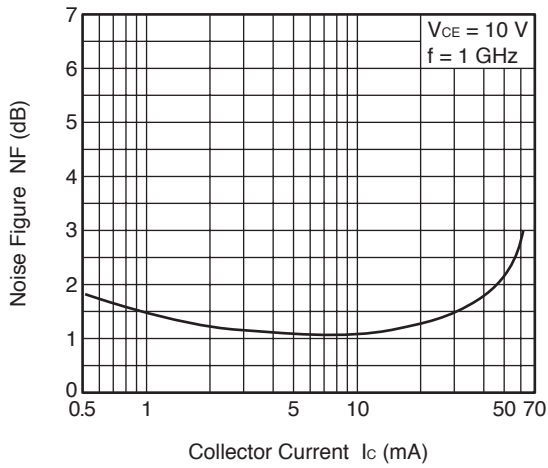


INSERTION POWER GAIN vs. COLLECTOR CURRENT

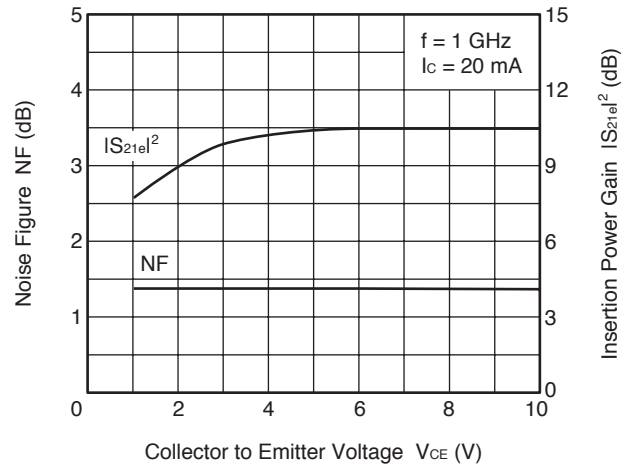


**Remark** The graphs indicate nominal characteristics.

NOISE FIGURE vs.  
COLLECTOR CURRENT



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

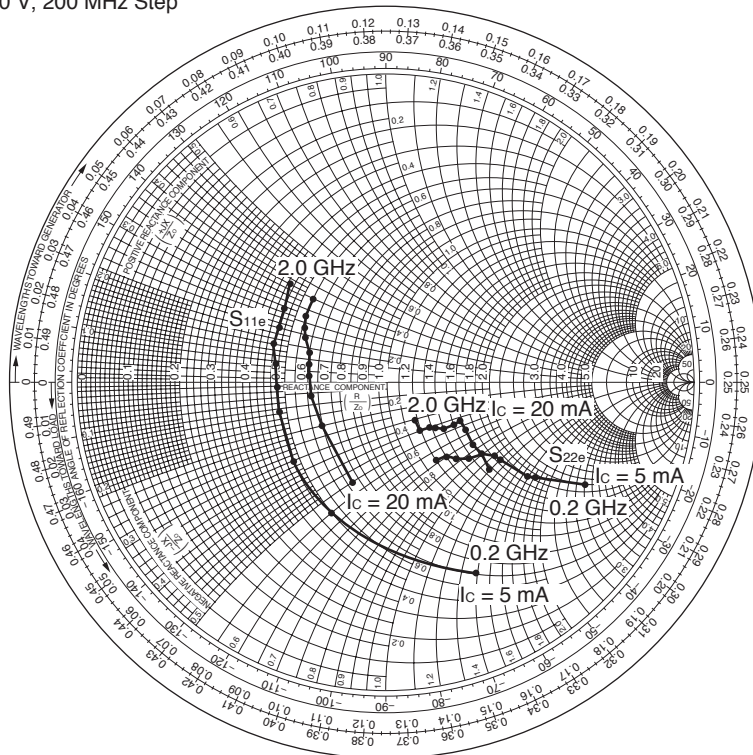


**Remark** The graphs indicate nominal characteristics.

**SMITH CHART**

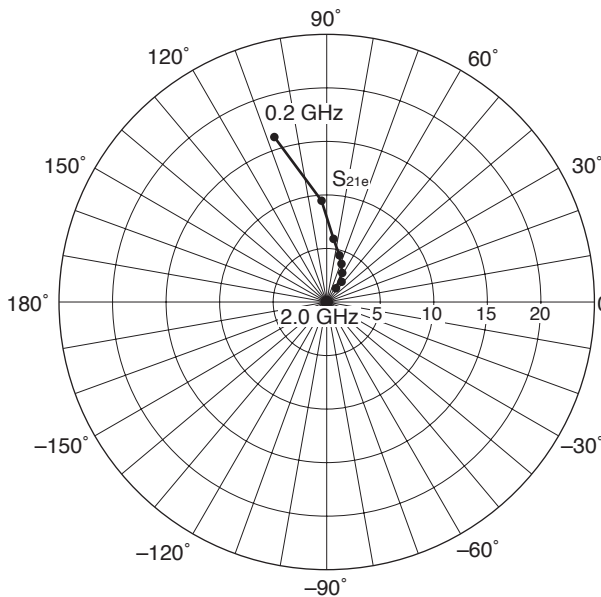
S<sub>11e</sub>, S<sub>22e</sub>-FREQUENCY

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



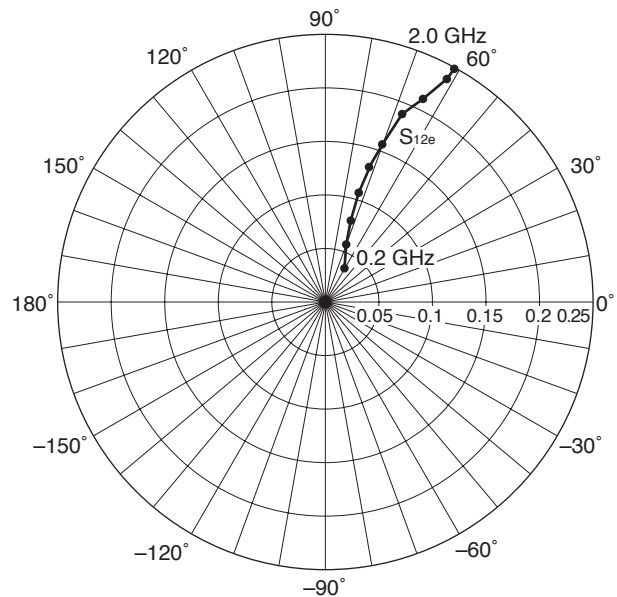
S<sub>21e</sub>-FREQUENCY

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



## **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.

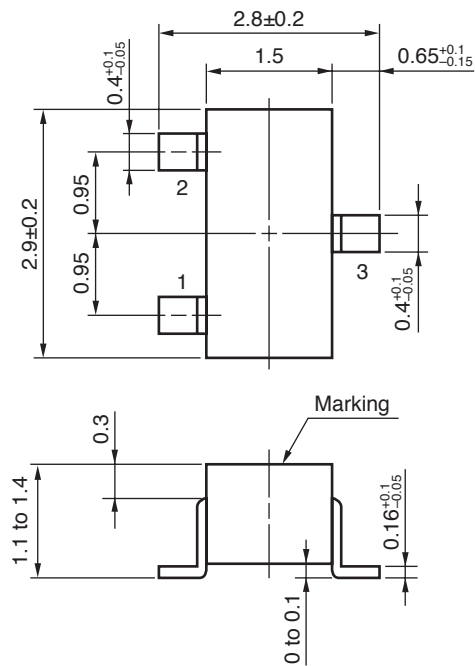
[RF and Microwave] → [Device Parameters]

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

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## PACKAGE DIMENSIONS

## 3-PIN MINIMOLD (UNIT: mm)



## PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

<b>Revision History</b>	<b>2SC3356 Data Sheet</b>
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Rev.	Date	Description	
		Page	Summary
-	Jun 2004	-	Previous No. :PU10209EJ02V0DS
3.00	Jun 28, 2011	p.1	Modification of <b>ORDERING INFORMATION</b>
		p.2	Modification of $h_{FE}$ <b>CLASSIFICATION</b>

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