

2SC3356

NPN Silicon RF Transistor

R09DS0021EJ0300

Rev.3.00

Jun 28, 2011

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 : $MAG = 13 \text{ dB TYP.}$ @ $V_{CE} = 10 \text{ V}$, $I_c = 20 \text{ mA}$, $f = 1 \text{ GHz}$

<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 • Pin 3 (Collector) face the perforation side of the tape |
| 2SC3356-T1B | 2SC3356-T1B-A | | 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_A = +25°C)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------|-----------------------------------|---|------|------|------|------|
| DC Characteristics | | | | | | |
| Collector Cut-off Current | I _{CB0} | V _{CB} = 10 V, I _E = 0 | – | – | 1.0 | μA |
| Emitter Cut-off Current | I _{EB0} | 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 | 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, f = 1 MHz | – | 0.55 | 1.0 | pF |

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

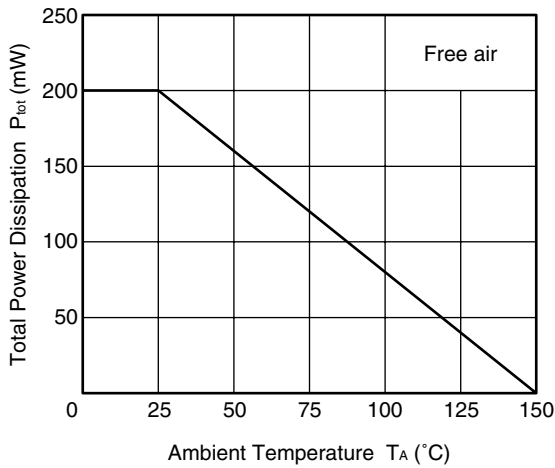
2. Collector to base capacitance when the emitter grounded

<R> h_{FE} CLASSIFICATION

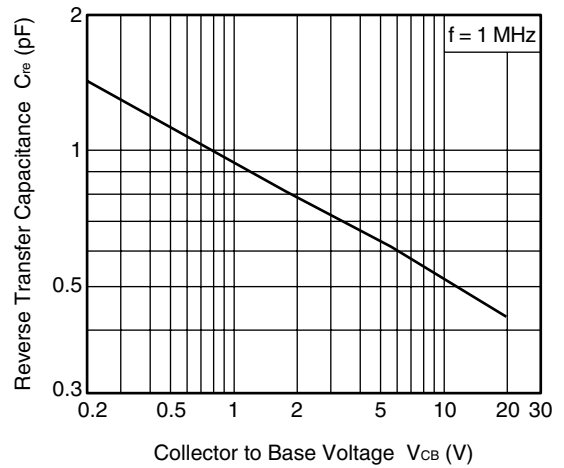
| Rank | Q/YQ | R/YR | S/YS |
|-----------------------|-----------|-----------|------------|
| Marking | R23 | R24 | R25 |
| h _{FE} Value | 50 to 100 | 80 to 160 | 125 to 250 |

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

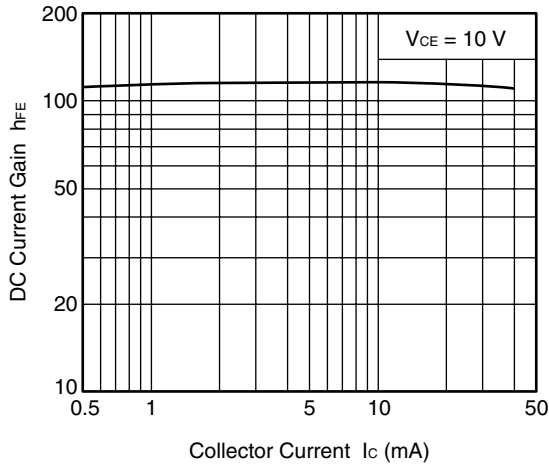
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



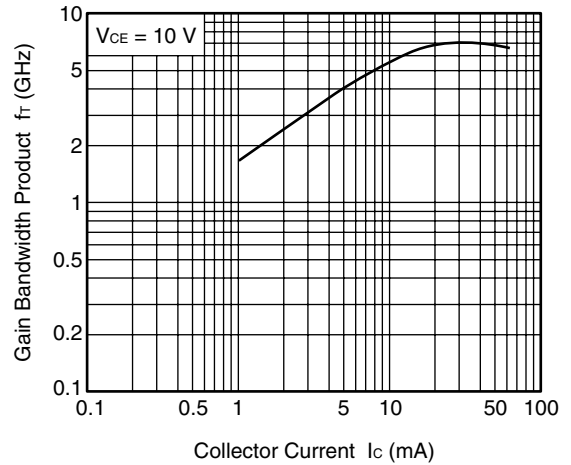
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



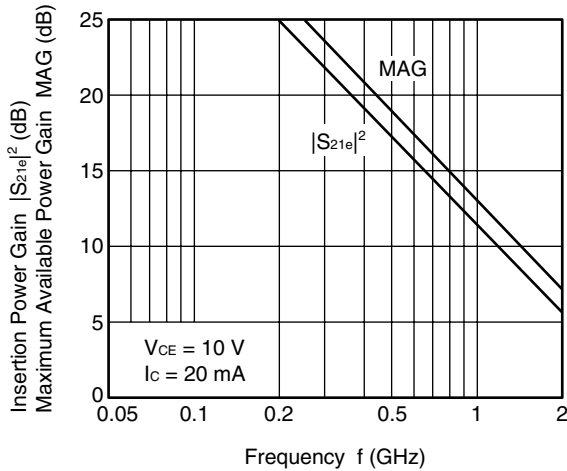
DC CURRENT GAIN vs. COLLECTOR CURRENT



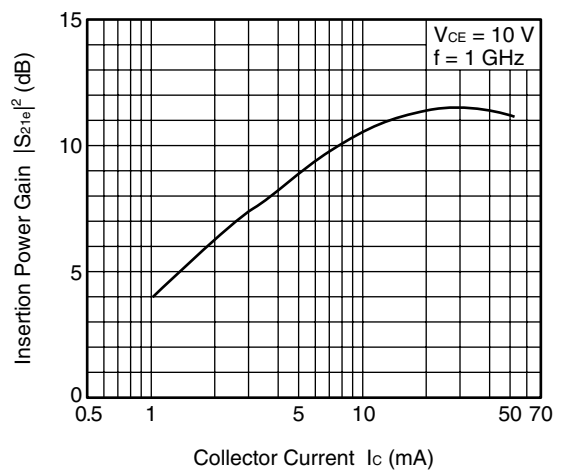
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG vs. FREQUENCY

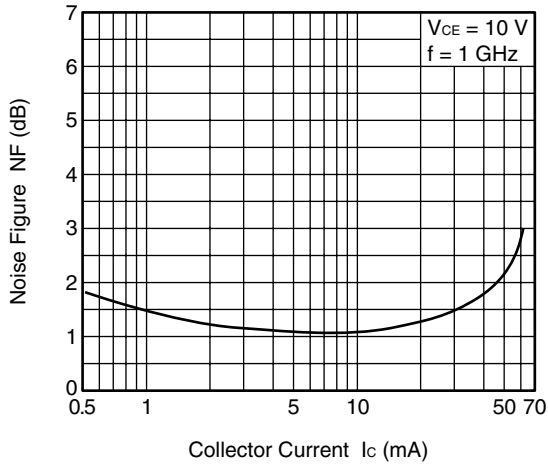


INSERTION POWER GAIN vs. COLLECTOR CURRENT

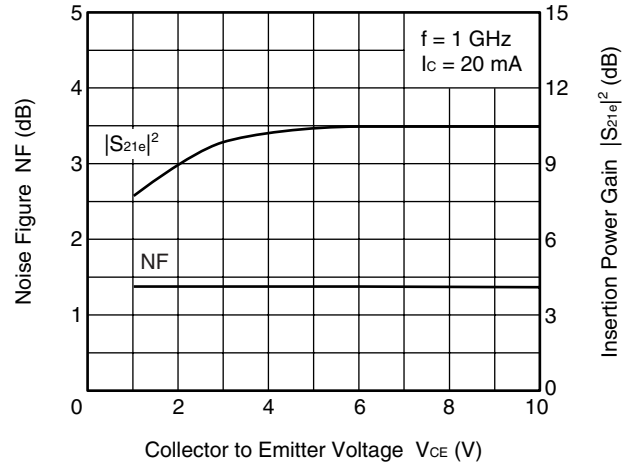


Remark The graphs indicate nominal characteristics.

NOISE FIGURE vs.
COLLECTOR CURRENT



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

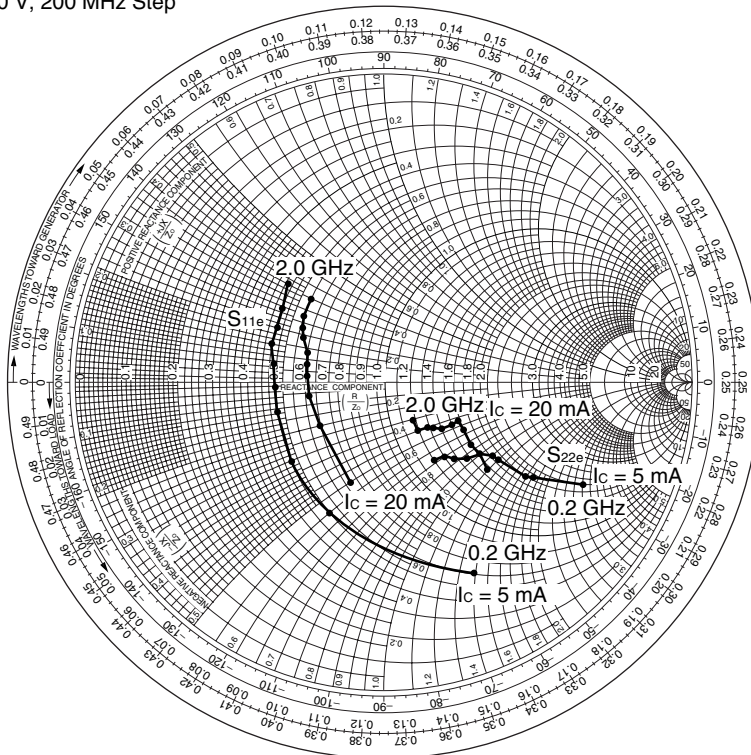


Remark The graphs indicate nominal characteristics.

SMITH CHART

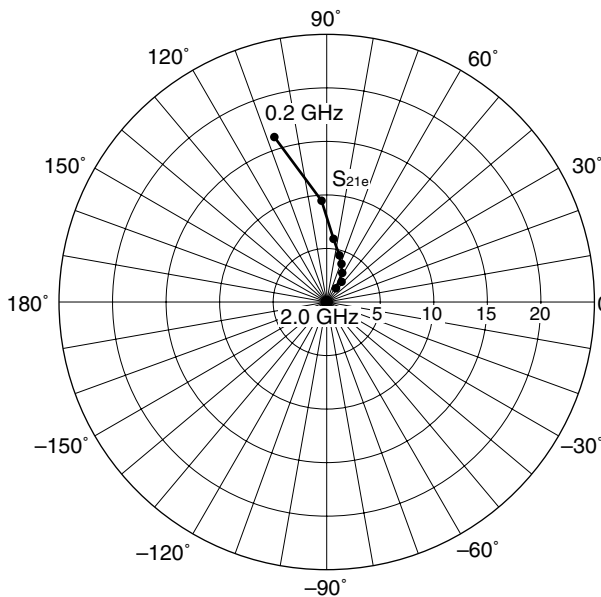
S_{11e}, S_{22e}-FREQUENCY

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



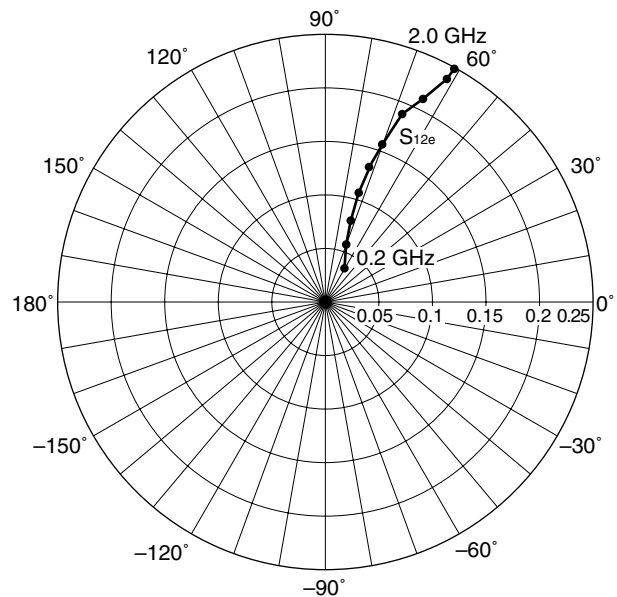
S_{21e}-FREQUENCY

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.

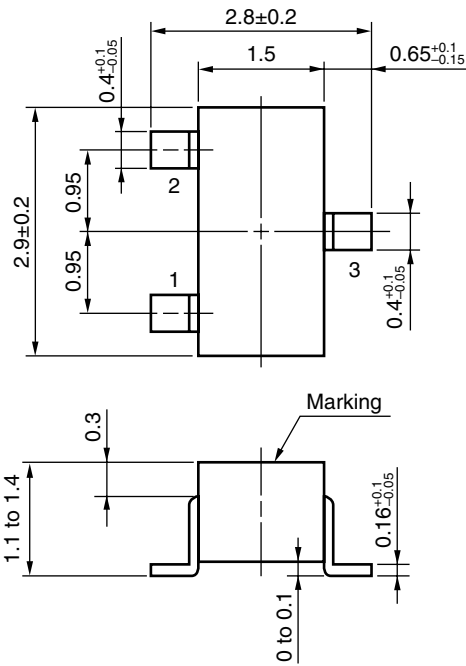
Click here to download S-parameters.

[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 h_{FE} CLASSIFICATION |

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