

# BGA614

Silicon Germanium Broadband MMIC Amplifier

RF & Protection Devices



**Edition 2011-09-02**

**Published by Infineon Technologies AG,  
81726 München, Germany**

**© Infineon Technologies AG 2011.  
All Rights Reserved.**

**Attention please!**

The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

**Information**

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

**Warnings**

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

---

**BGA614, Silicon Germanium Broadband MMIC Amplifier**

**Revision History: 2011-09-02, Rev. 2.1**

**Previous Version: 2003-11-04**

| <b>Page</b> | <b>Subjects (major changes since last revision)</b> |
|-------------|---|
| All         | New Chip Version with integrated ESD protection     |
| 5           | Electrical Characteristics slightly changed         |
| 7-8         | Figures updated                                     |
| All         | Document layout change                              |
|             |   |
|             |   |
|             |   |
|             |   |
|             |   |

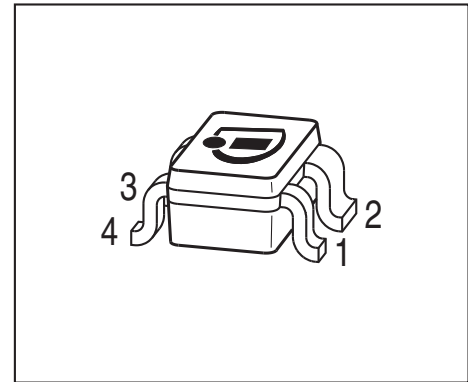
**Trademarks**

SIEGET<sup>®</sup> is a registered trademark of Infineon Technologies AG.

# 1 Silicon Germanium Broadband MMIC Amplifier

## Feature

- Cascadable 50 Ω-gain block
- 3 dB-bandwidth: DC to 2.4 GHz with 19 dB typical gain at 1.0 GHz
- Compression point  $P_{-1dB} = 12$  dBm at 2.0 GHz
- Noise figure  $F_{50\Omega} = 2.1$  dB at 2.0 GHz
- Absolute stable
- 70 GHz  $f_T$  - Silicon Germanium technology
- 1 kV HBM ESD protection (Pin-to-Pin)
- Pb-free (RoHS compliant) package



SOT343

## Applications

- Driver amplifier for GSM/PCS/CDMA/UMTS
- Broadband amplifier for SAT-TV & LNBs
- Broadband amplifier for CATV

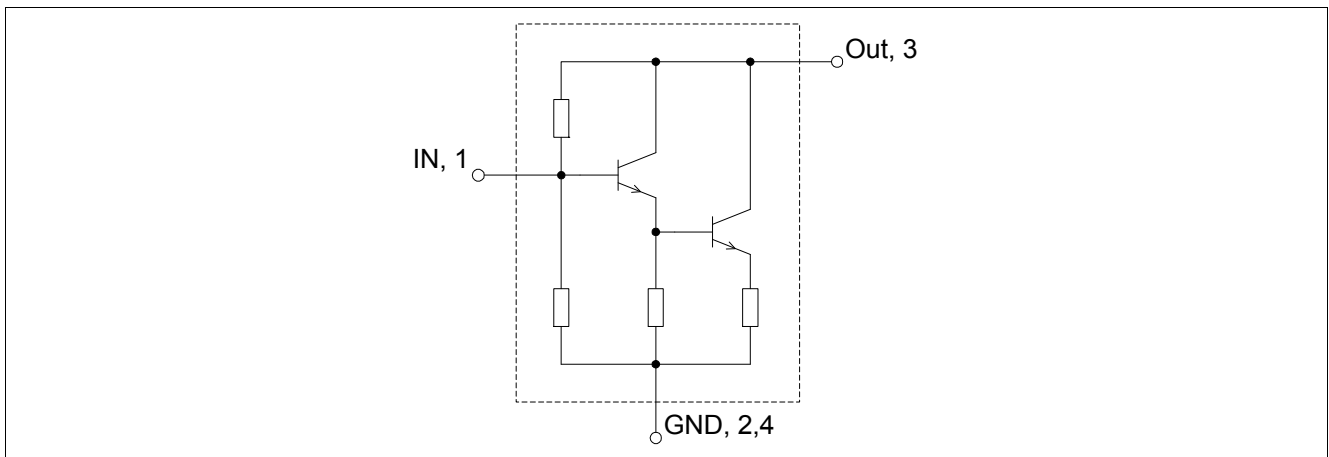


Figure 1 Pin connection

## Description

BGA614 is a broadband matched, general purpose MMIC amplifier in a Darlington configuration. It is optimized for a typical supply current of 40 mA.

The BGA614 is based on Infineon Technologies' B7HF Silicon Germanium technology.

| Type   | Package | Marking |
|--------|---------|---------|
| BGA614 | SOT343  | BOs     |

Note: **ESD**: Electrostatic discharge sensitive device, observe handling precaution

## Maximum Ratings

**Table 1** Maximum ratings

| Parameter   | Symbol    | Limit Value | Unit |
|---|-----------|-------------|------|
| Device voltage                                    | $V_D$     | 3           | V    |
| Device current                                    | $I_D$     | 80          | mA   |
| Current into pin In                               | $I_{in}$  | 0.7         | mA   |
| Input power <sup>1)</sup>                         | $P_{in}$  | 10          | dBm  |
| Total power dissipation, $T_S < 102\text{ °C}^2)$ | $P_{tot}$ | 240         | mW   |
| Junction temperature                              | $T_J$     | 150         | °C   |
| Ambient temperature range                         | $T_A$     | -65... 150  | °C   |
| Storage temperature range                         | $T_{STG}$ | -65... 150  | °C   |
| ESD capability all pins (HBM: JESD22-A114)        | $V_{ESD}$ | 1000        | V    |

1) Valid for  $Z_S = Z_L = 50\ \Omega$ ,  $V_{CC} = 5\text{ V}$ ,  $R_{Bias} = 62\ \Omega$

2)  $T_S$  is measured on the ground lead at the soldering point

Note: All Voltages refer to GND-Node

## Thermal resistance

**Table 2** Thermal resistance

| Parameter                                | Symbol     | Value | Unit |
|--|------------|-------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | 200   | K/W  |

1) For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

## 2 Electrical Characteristics

Electrical characteristics at  $T_A = 25\text{ °C}$  (measured in test circuit specified in [Figure 2](#))

$V_{CC} = 5\text{ V}$ ,  $R_{Bias} = 62\ \Omega$ , Frequency = 2 GHz, unless otherwise specified

**Table 3** Electrical Characteristics

| Parameter                             | Symbol         | Values |      |      | Unit | Note / Test Condition |
|---------------------------------------|----------------|--------|------|------|------|-----------------------|
|                                       |                | Min.   | Typ. | Max. |      |                       |
| Insertion power gain                  | $ S_{21} ^2$   |        | 19.8 |      | dB   | $f = 0.1\text{ GHz}$  |
|                                       |                |        | 19.0 |      | dB   | $f = 1.0\text{ GHz}$  |
|                                       |                |        | 17.5 |      | dB   | $f = 2.0\text{ GHz}$  |
| Noise figure ( $Z_S = 50\ \Omega$ )   | $F_{50\Omega}$ |        | 1.8  |      | dB   | $f = 0.1\text{ GHz}$  |
|                                       |                |        | 2.0  |      | dB   | $f = 1.0\text{ GHz}$  |
|                                       |                |        | 2.1  |      | dB   | $f = 2.0\text{ GHz}$  |
| Output power at 1 dB gain compression | $P_{-1dB}$     |        | 12   |      | dBm  |                       |
| Output third order intercept point    | $OIP_3$        |        | 25   |      | dBm  |                       |
| Input return loss                     | $RL_{in}$      |        | 18   |      | dB   |                       |
| Output return loss                    | $RL_{out}$     |        | 20   |      | dB   |                       |
| Total device current                  | $I_D$          |        | 40   |      | mA   |                       |

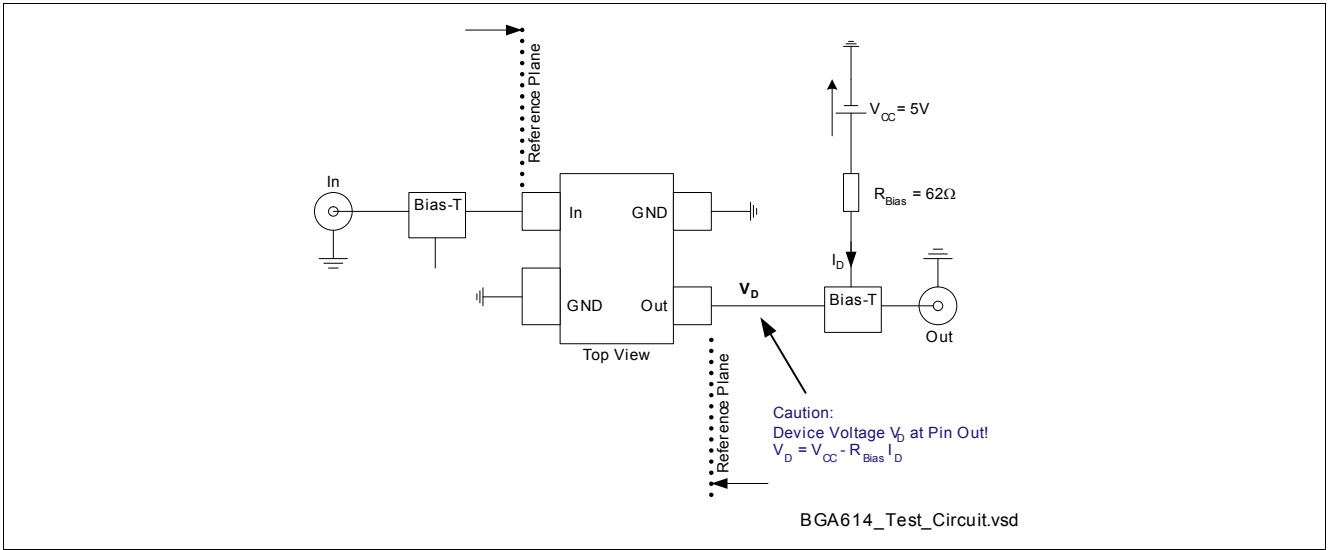
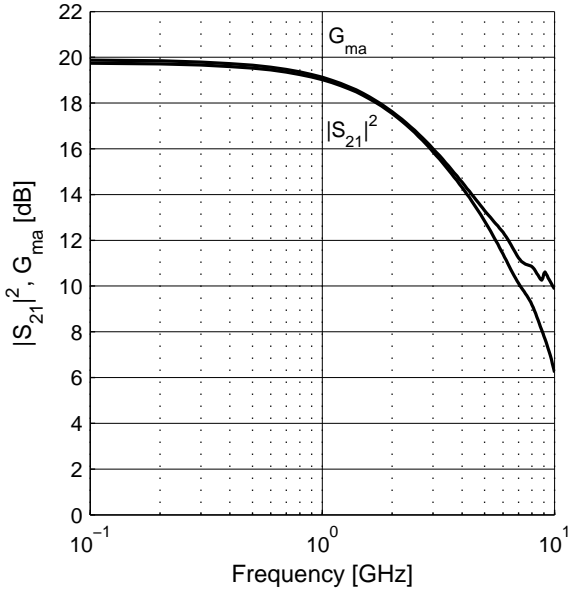


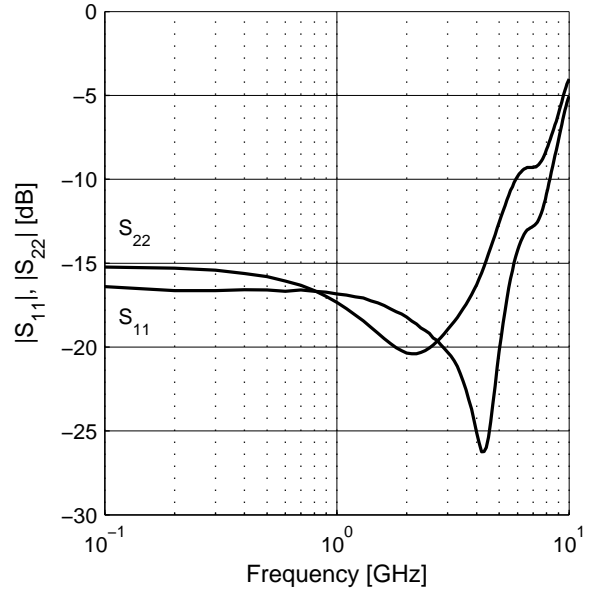
Figure 2 Test Circuit for Electrical Characteristics and S-Parameter

### 3 Measured Parameters

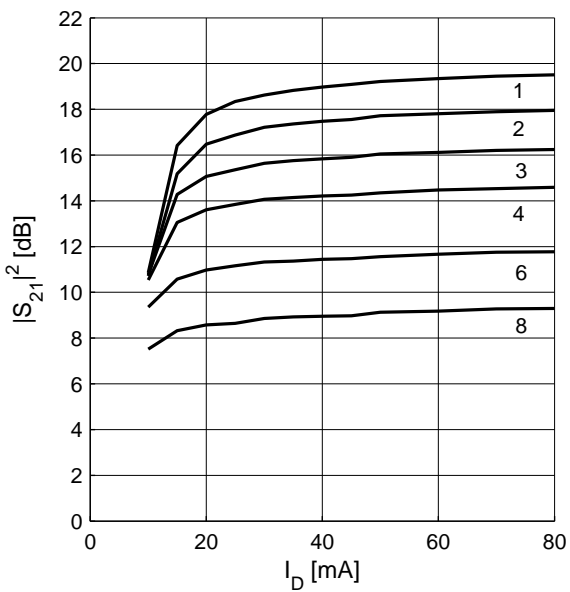
**Power Gain**  $|S_{21}|^2, G_{ma} = f(f)$   
 $V_{CC} = 5V, R_{Bias} = 62\Omega, I_C = 40mA$



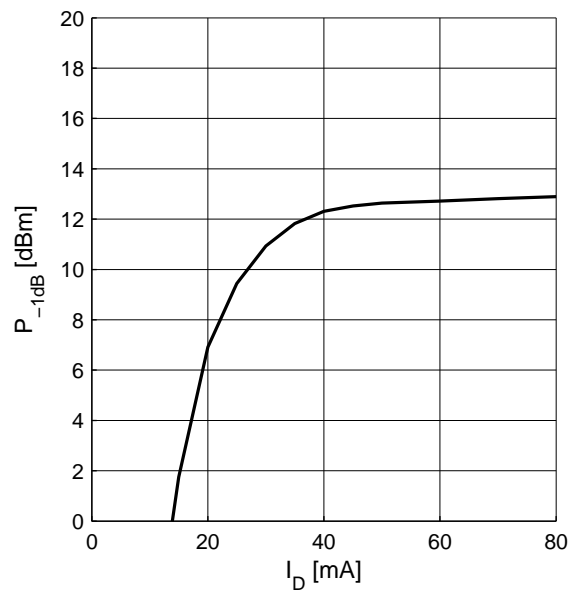
**Matching**  $|S_{11}|, |S_{22}| = f(f)$   
 $V_{CC} = 5V, R_{Bias} = 62\Omega, I_C = 40mA$



**Power Gain**  $|S_{21}| = f(I_D)$   
 $f = \text{parameter in GHz}$

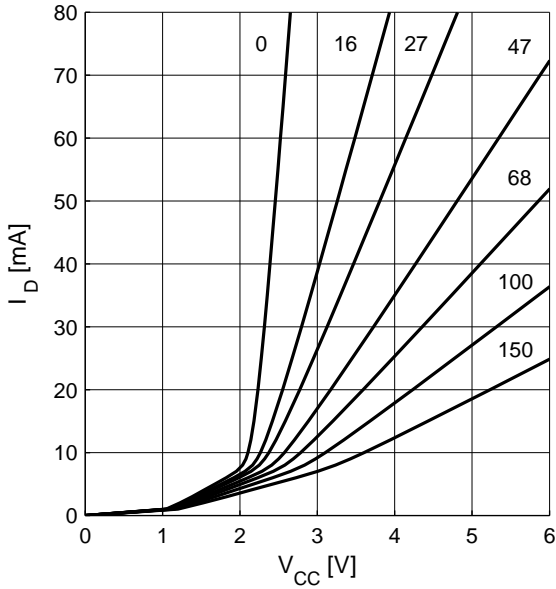


**Output Compression Point**  
 $P_{-1dB} = f(I_D), f = 2GHz$



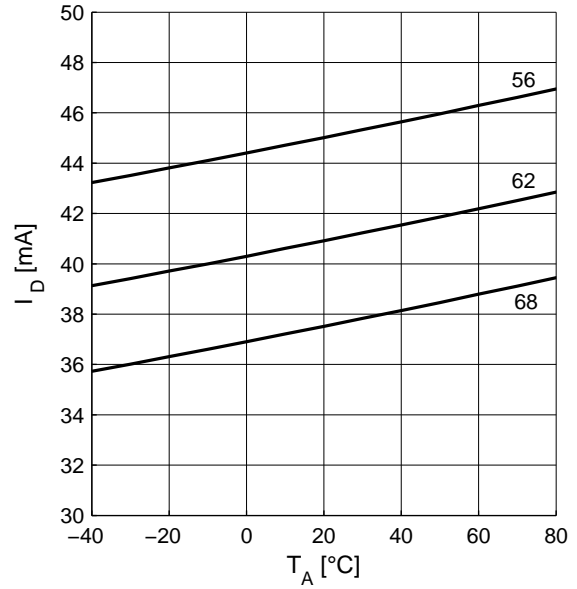
**Device Current  $I_D = f(V_{CC})$**

$R_{Bias}$  = parameter in  $\Omega$



**Device Current  $I_D = f(T_A)$**

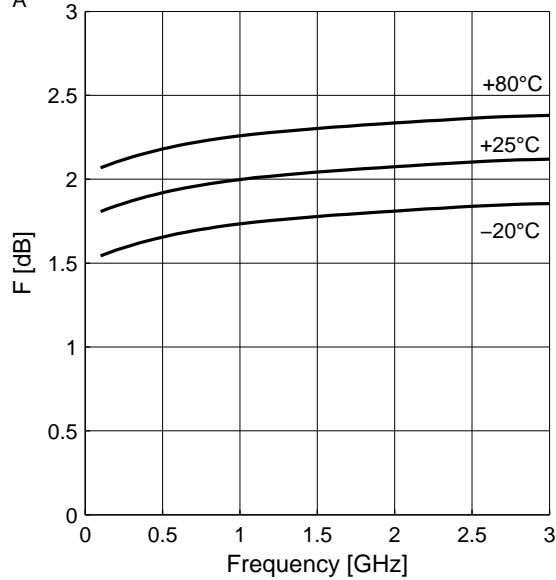
$V_{CC} = 5V, R_{Bias}$  = parameter in  $\Omega$



**Noise figure  $F = f(f)$**

$V_{CC} = 5V, R_{Bias} = 62\Omega, Z_S = 50\Omega$

$T_A$  = parameter in  $^{\circ}C$





## 4 Package Information

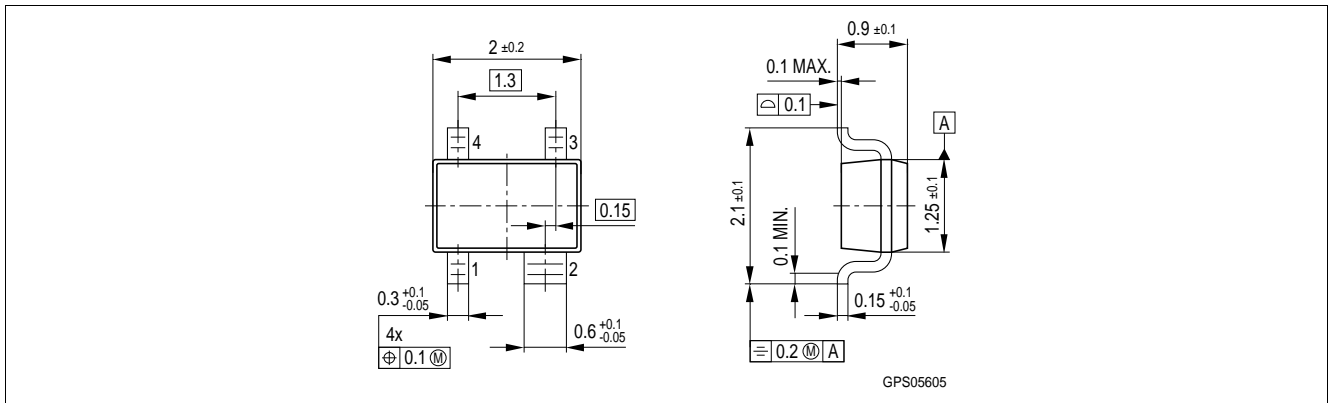


Figure 3 Package Outline SOT343

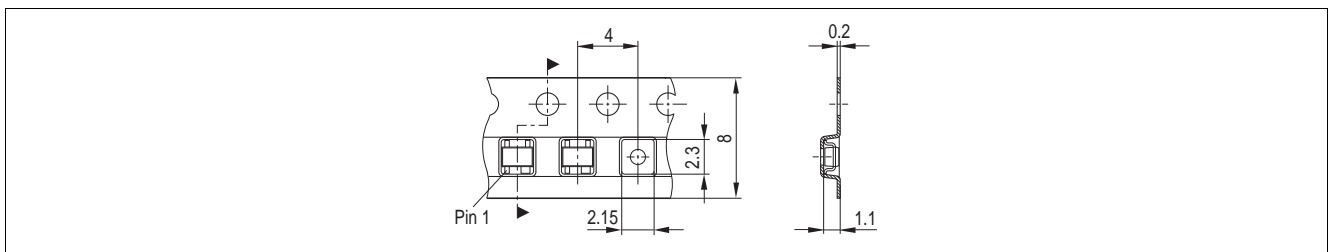


Figure 4 Tape for SOT343