

BGA612

Silicon Germanium Broadband MMIC Amplifier

RF & Protection Devices



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BGA612, Silicon Germanium Broadband MMIC Amplifier

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

Previous Version: 2003-11-04

| Page | Subjects (major changes since last revision) |
|-------------|---|
| All | New Chip Version with integrated ESD protection |
| 5 | Electrical Characteristics slightly changed |
| 7-8 | Figures updated |
| All | Document layout change |
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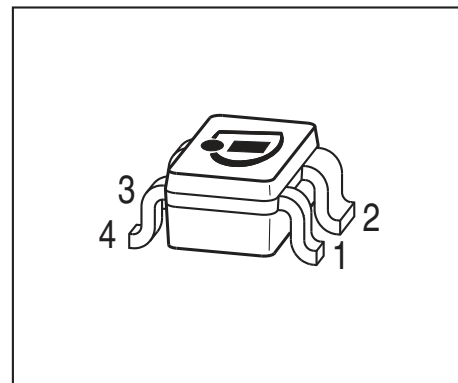
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1 Silicon Germanium Broadband MMIC Amplifier

Feature

- Cascadable 50 Ω-gain block
- 3 dB-bandwidth: DC to 2.8 GHz with 17.5 dB typical gain at 1.0 GHz
- Compression point $P_{-1dB} = 7$ dBm at 2.0 GHz
- Noise figure $F_{50\Omega} = 2.1$ dB at 2 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

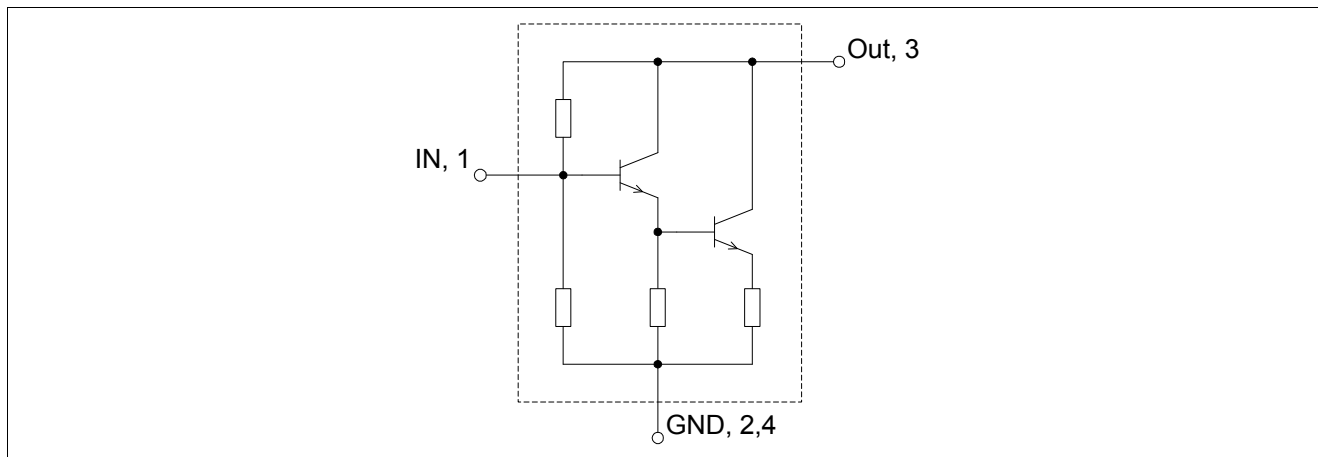


Figure 1 Pin connection

Description

BGA612 is a broadband matched, general purpose MMIC amplifier in a Darlington configuration. It is optimized for a typical supply current of 20 mA.

The BGA612 is based on Infineon Technologies' B7HF Silicon Germanium technology.

| Type | Package | Marking |
|--------|---------|---------|
| BGA612 | SOT343 | BNs |

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

Maximum Ratings

Table 1 Maximum ratings

| Parameter | Symbol | Limit Value | Unit |
|---|-----------|-------------|------|
| Device voltage | V_D | 2.8 | V |
| Device current | I_D | 80 | mA |
| Current into pin In | I_{in} | 0.7 | mA |
| Input power ¹⁾ | P_{in} | 10 | dBm |
| Total power dissipation, $T_S < 105\text{ °C}^2)$ | P_{tot} | 225 | 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 $Z_S = Z_L = 50\ \Omega$, $V_{CC} = 5\text{ V}$, $R_{Bias} = 135\ \Omega$

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 ¹⁾ | 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](#))

$V_{CC} = 5\text{ V}$, $R_{Bias} = 135\ \Omega$, 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$ | | 18.0 | | dB | $f = 0.1\text{ GHz}$ |
| | | | 17.5 | | dB | $f = 1.0\text{ GHz}$ |
| | | | 16.3 | | 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} | | 7 | | dBm | |
| Output third order intercept point | OIP_3 | | 17 | | dBm | |
| Input return loss | RL_{in} | | 17 | | dB | |
| Output return loss | RL_{out} | | 17 | | dB | |
| Total device current | I_D | | 20 | | mA | |

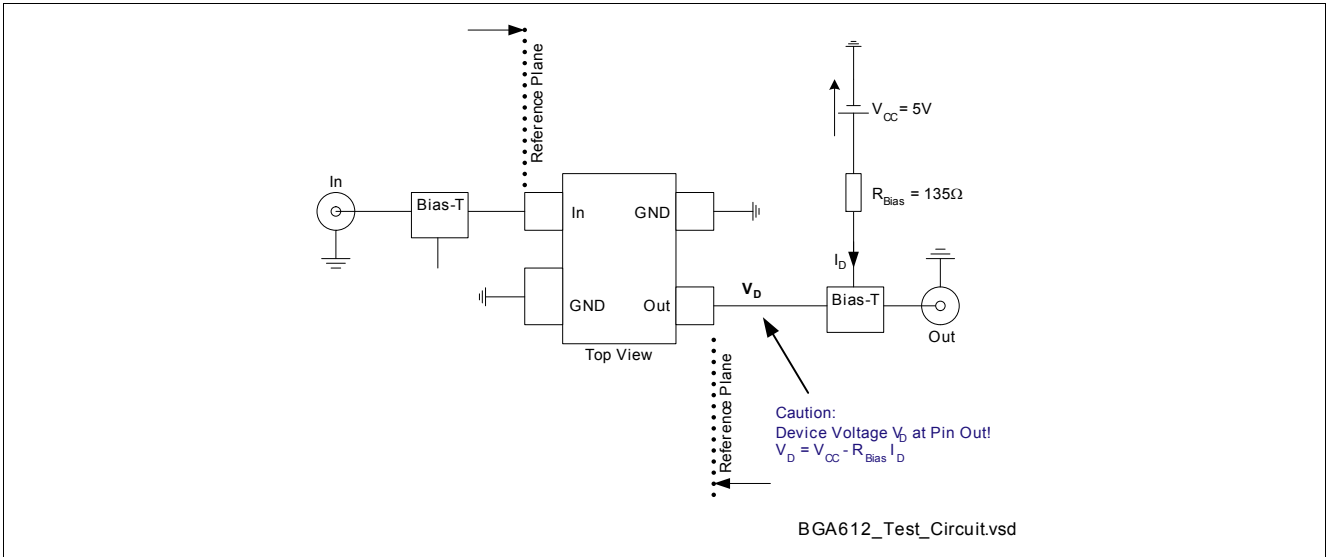
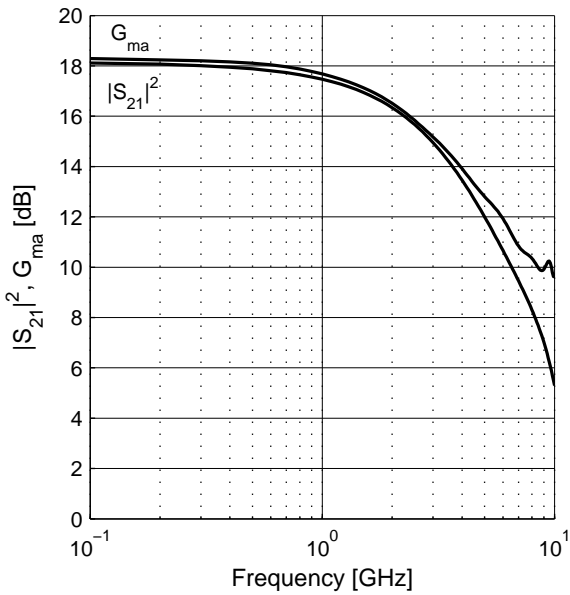


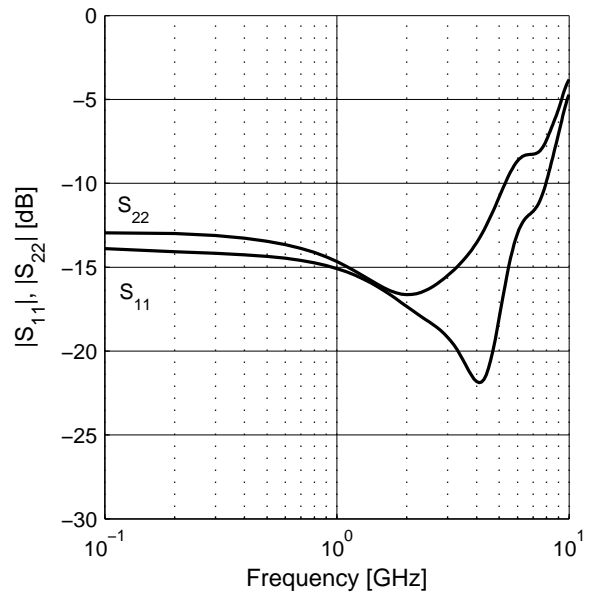
Figure 2 Test Circuit for Electrical Characteristics and S-Parameter

3 Measured Parameters

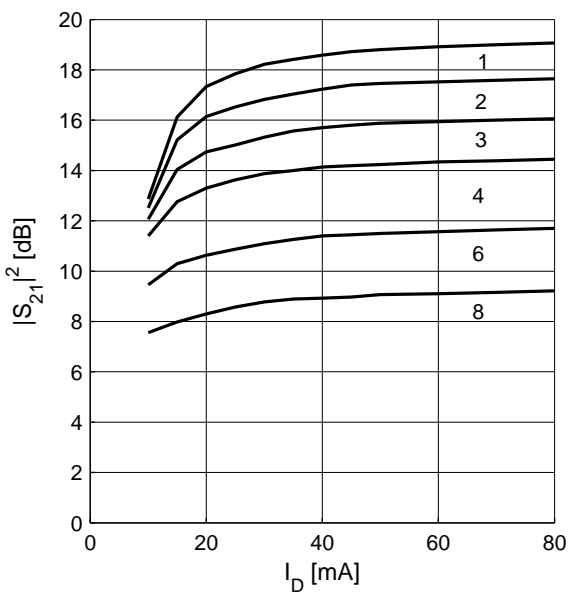
Power Gain $|S_{21}|^2, G_{ma} = f(f)$
 $V_{CC} = 5V, R_{Bias} = 135\Omega, I_C = 20mA$



Matching $|S_{11}|, |S_{22}| = f(f)$
 $V_{CC} = 5V, R_{Bias} = 135\Omega, I_C = 20mA$

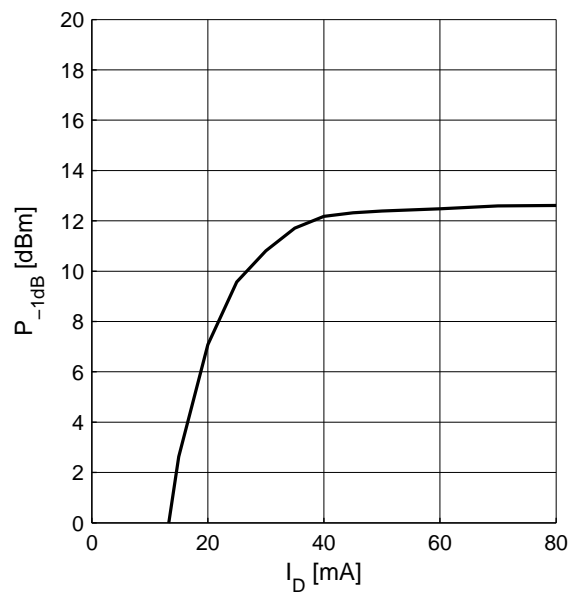


Power Gain $|S_{21}| = f(I_D)$
 $f = \text{parameter in GHz}$



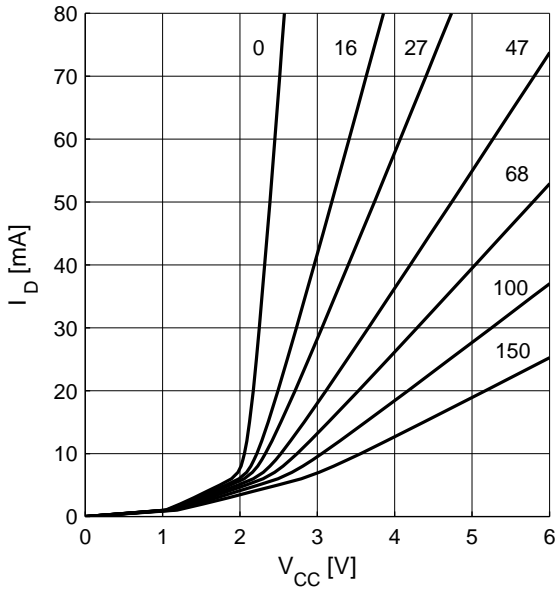
Output Compression Point

$P_{-1dB} = f(I_D), f = 2GHz$



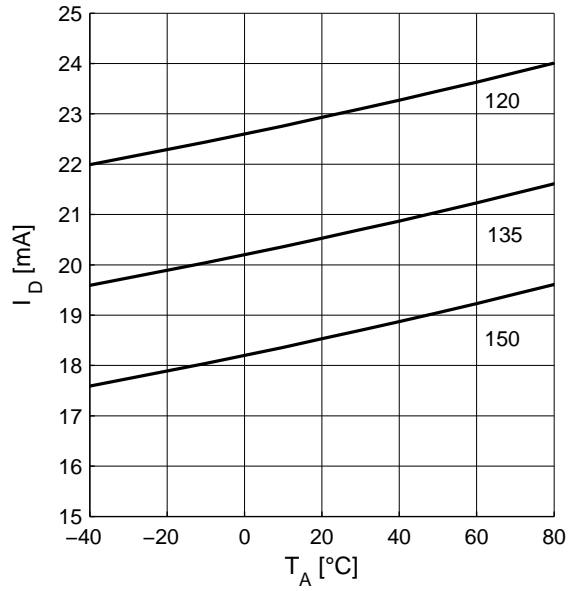
Device Current $I_D = f(V_{CC})$

R_{Bias} = parameter in Ω



Device Current $I_D = f(T_A)$

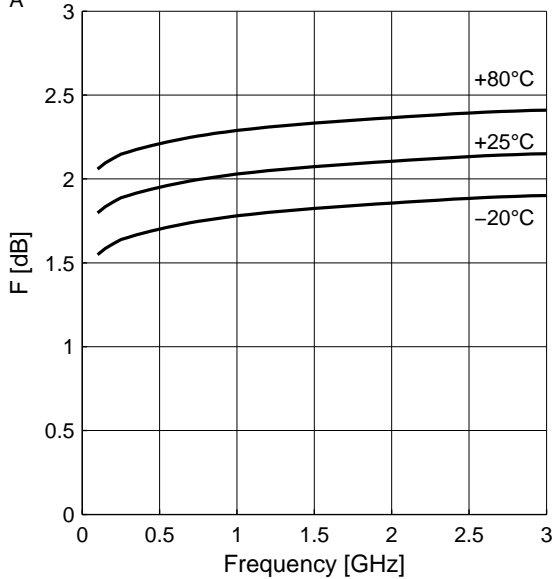
$V_{CC} = 5V$, R_{Bias} = parameter in Ω



Noise figure $F = f(f)$

$V_{CC} = 5V$, $R_{Bias} = 135\Omega$, $Z_S = 50\Omega$

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



4 Package Information

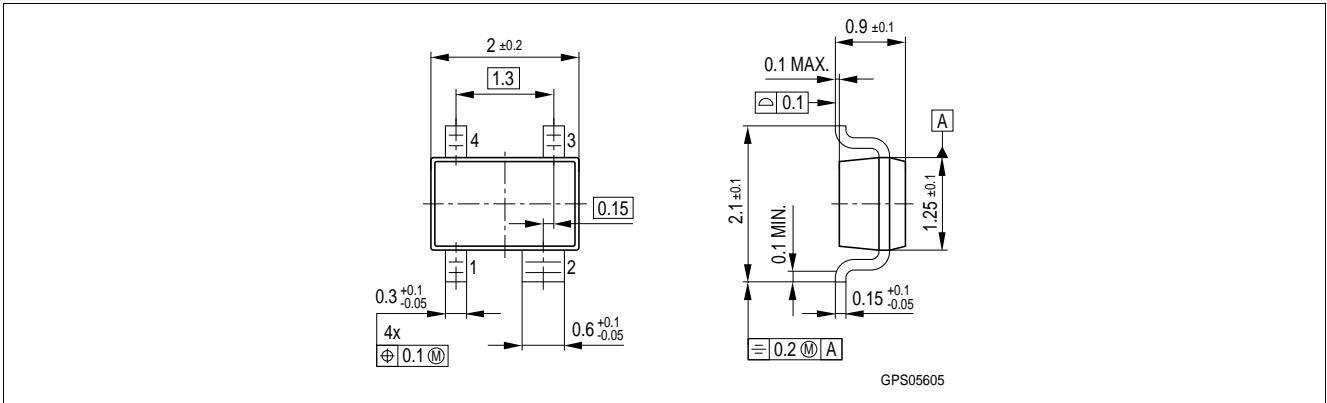


Figure 3 Package Outline SOT343

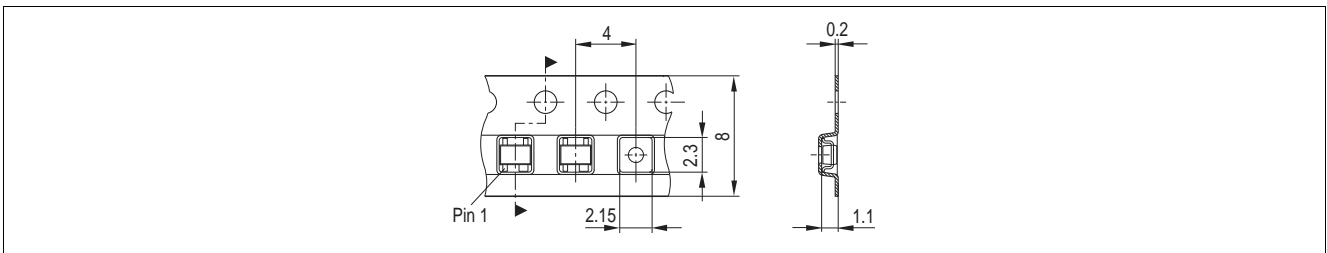


Figure 4 Tape for SOT343