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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Data Sheet 3 Rev. 2.1, 2011-09-02



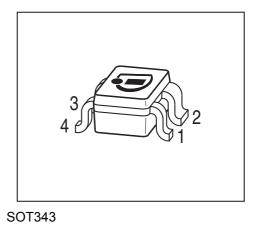
Silicon Germanium Broadband MMIC Amplifier

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





Applications

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

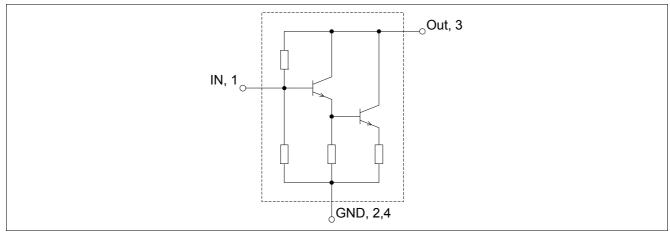


Figure 1 Pin connection

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.

| Туре | Package | Marking |
|--------|---------|---------|
| BGA612 | SOT343 | BNs |

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

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Electrical Characteristics

Maximum Ratings

Table 1 Maximum ratings

| Symbol | Limit Value | Unit | |
|------------------|--|--|--|
| V_{D} | 2.8 | V | |
| I_{D} | 80 | mA | |
| I_{in} | 0.7 | mA | |
| P_{in} | 10 | dBm | |
| P_{tot} | 225 | mW | |
| T_{J} | 150 | °C | |
| T_{A} | -65 150 | °C | |
| T_{STG} | -65 150 | °C | |
| V _{ESD} | 1000 | V | |
| | $V_{ m D}$ $I_{ m D}$ $I_{ m in}$ $P_{ m tot}$ $T_{ m J}$ $T_{ m A}$ | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | |

¹⁾ Valid for $Z_{\rm S}$ = $Z_{\rm L}$ = 50 Ω , $V_{\rm CC}$ = 5 V, $R_{\rm Bias}$ = 135 Ω

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 $T_{\rm A}$ = 25 °C (measured in test circuit specified in **Figure 2**) $V_{\rm CC}$ = 5 V, $R_{\rm Bias}$ = 135 Ω , Frequency = 2 GHz, unless otherwise specified

Table 3 Electrical Characteristics

| Parameter | Symbol | Values | | | Unit | Note / |
|--|------------------|--------|------|------|------|-----------------------|
| | | Min. | Тур. | Max. | | Test Condition |
| Insertion power gain | $ S_{21} ^2$ | | 18.0 | | dB | f = 0.1 GHz |
| | | | 17.5 | | dB | f = 1.0 GHz |
| | | | 16.3 | | dB | f = 2.0 GHz |
| Noise figure ($Z_{\rm S}$ = 50 Ω) | $F_{50\Omega}$ | | 1.8 | | dB | f = 0.1 GHz |
| | | | 2.0 | | dB | f= 1.0 GHz |
| | | | 2.1 | | dB | f = 2.0 GHz |
| Output power at 1 dB gain compression | $P_{	ext{-1dB}}$ | | 7 | | dBm | |
| Output third order intercept point | OIP_3 | | 17 | | dBm | |
| Input return loss | $RL_{\sf in}$ | | 17 | | dB | |
| Output return loss | RL_{out} | | 17 | | dB | |
| Total device current | I_{D} | | 20 | | mA | |

²⁾ $\ensuremath{\mathit{T}_{\mathrm{S}}}$ is measured on the ground lead at the soldering point



Electrical Characteristics

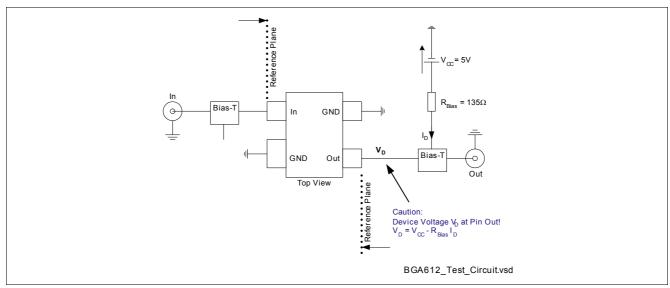
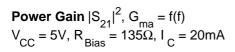
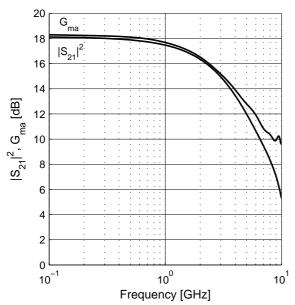


Figure 2 Test Circuit for Electrical Characteristics and S-Parameter

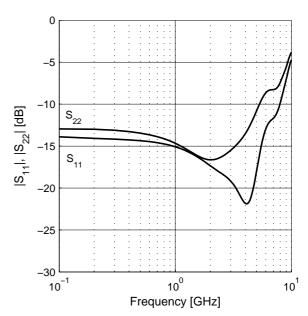
Measured Parameters

3 Measured Parameters

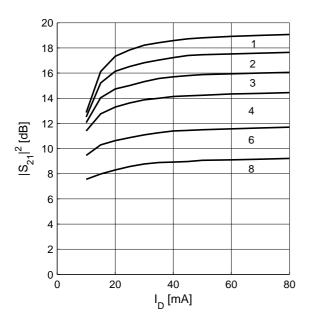




$$\begin{array}{l} \textbf{Matching} \; |\textbf{S}_{11}|, \; |\textbf{S}_{22}| = \textbf{f(f)} \\ \textbf{V}_{CC} = \textbf{5V}, \; \textbf{R}_{Bias} = \textbf{135}\Omega, \; \textbf{I}_{\;C} = \textbf{20mA} \\ \end{array}$$

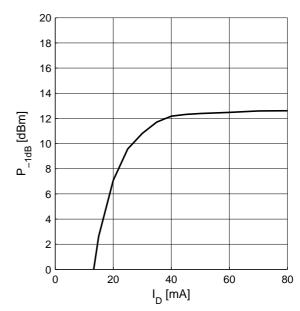


Power Gain $|S_{21}| = f(I_D)$ f = parameter in GHz



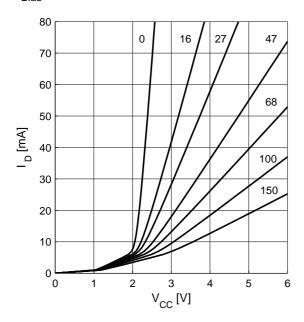
Output Compression Point

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

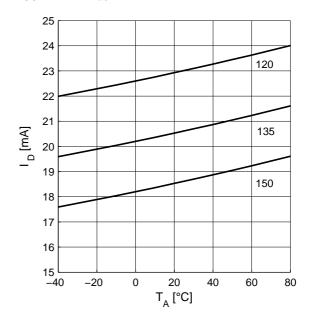




Measured Parameters

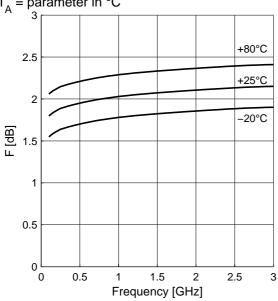


Device Current I
$$_{\rm D}$$
 = f(T $_{\rm A}$)
V $_{\rm CC}$ = 5V, R $_{\rm Bias}$ = parameter in Ω



Noise figure F = f(f)

$$V_{CC} = 5V$$
, $R_{Bias} = 135\Omega$, $Z_{S} = 50\Omega$
 $T_{A} = parameter in °C$





Package Information

4 Package Information

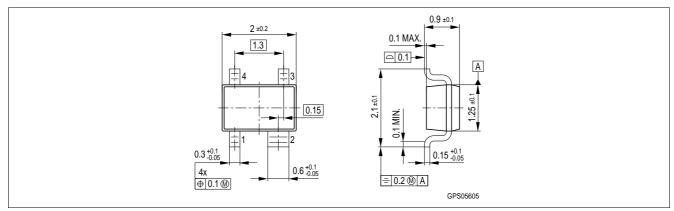


Figure 3 Package Outline SOT343

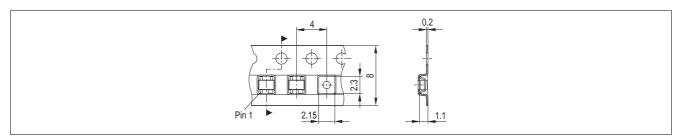


Figure 4 Tape for SOT343