# BGA416

## RF Cascode Amplifier

Small Signal Discretes

Never stop thinking

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**BGA416, RF Cascode Amplifier**

**Revision History: 2008-04-21, Rev. 2.1**

**Previous Version: 2005-07-26**

| Page | Subjects (major changes since last revision) |
|---|---|
| All | Document layout change |
| 4-5 | Electrical Characteristics slightly changed |
| 7-8 | Figures updated |
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**Trademarks**

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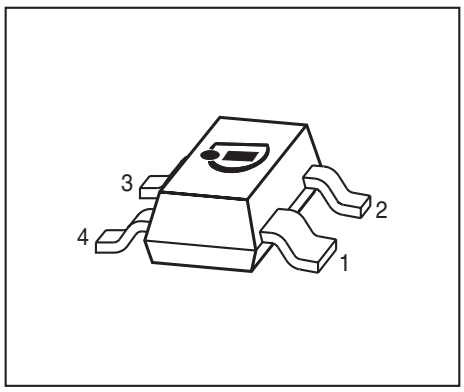
# 1 RF Cascode Amplifier

**Feature**

- $G_{MA}$ = 23 dB at 900 MHz
- Ultra high reverse isolation, 60 dB at 900 MHz
- Low noise figure, $F_{50\Omega}$ = 1.2 dB at 900 MHz
- On chip bias circuitry, 5.5 mA bias current at $V_{CC}$ = 3 V
- Typical supply voltage: 2.5 to 5.0 V
- SIEGET®-25 technology
- Pb-free (RoHS compliant) package




SOT143

**Applications**

- Buffer amplifier
- LNAs
- Oscillator active devices

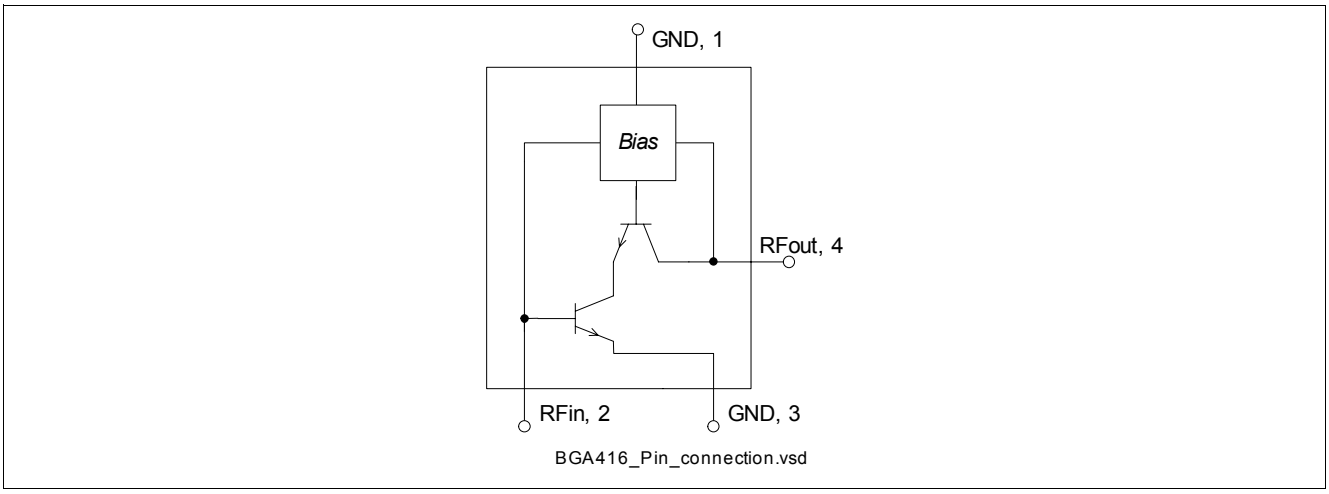



**Figure 1 Pin connection**

**Description**

BGA416 is a monolithic silicon cascode amplifier with high reverse isolation. A bias network is integrated for simplified biasing.

| Type | Package | Marking |
|---|---|---|
| BGA416 | SOT143 | C1s |

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

### Maximum Ratings

**Table 1 Maximum ratings**

| Parameter | Symbol | Limit Value | Unit |
|---|---|---|---|
| Voltage at pin RFout | $V_{OUT}$ | 6 | V |
| Device current[1)] | $I_D$ | 20 | mA |
| Current into pin RFin | $I_{in}$ | 0.5 | mA |
| Input power | $P_{in}$ | 8 | dBm |
| Total power dissipation, $T_S$ < 123°C[2)] | $P_{tot}$ | 100 | mW |
| Junction temperature | $T_J$ | 150 | °C |
| Ambient temperature range | $T_A$ | -65... 150 | °C |
| Storage temperature range | $T_{STG}$ | -65... 150 | °C |

1) Device current is equal to current into pin RFout

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)] | $R_{thJS}$ | 270 | K/W |

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

## 2 Electrical Characteristics

Electrical characteristics at $T_A$ = 25 °C (measured in test circuit specified in **Figure 2**)

$V_{CC}$ = 3 V, unless otherwise specified

**Table 3 Electrical Characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Maximum available power gain | $G_{MA}$ | | 23 | | dB | $f$ = 0.9 GHz |
| | | | 14 | | dB | $f$ = 1.8 GHz |
| Insertion power gain | $\|S_{21}\|^2$ | | 17 | | dB | $f$ = 0.9 GHz |
| | | | 11 | | dB | $f$ = 1.8 GHz |
| Reverse isolation | $\|S_{12}\|$ | | 60 | | dB | $f$ = 0.9 GHz |
| | | | 40 | | dB | $f$ = 1.8 GHz |
| Noise figure ($Z_S$ = 50 Ω) | $F_{50\Omega}$ | | 1.2 | | dB | $f$ = 0.9 GHz |
| | | | 1.6 | | dB | $f$ = 1.8 GHz |
| Output power at 1 dB gain compression ($Z_S$ = $Z_L$ = 50 Ω) | $P_{-1dB}$ | | -3 | | dBm | $f$ = 0.9 GHz |
| | | | -3 | | dBm | $f$ = 1.8 GHz |
| Output third order intercept point ($Z_S$ = $Z_L$ = 50 Ω) | $OIP_3$ | | 14 | | dBm | $f$ = 0.9 GHz |
| | | | 14 | | dBm | $f$ = 1.8 GHz |
| Device current | $I_D$ | | 5.5 | | mA | |

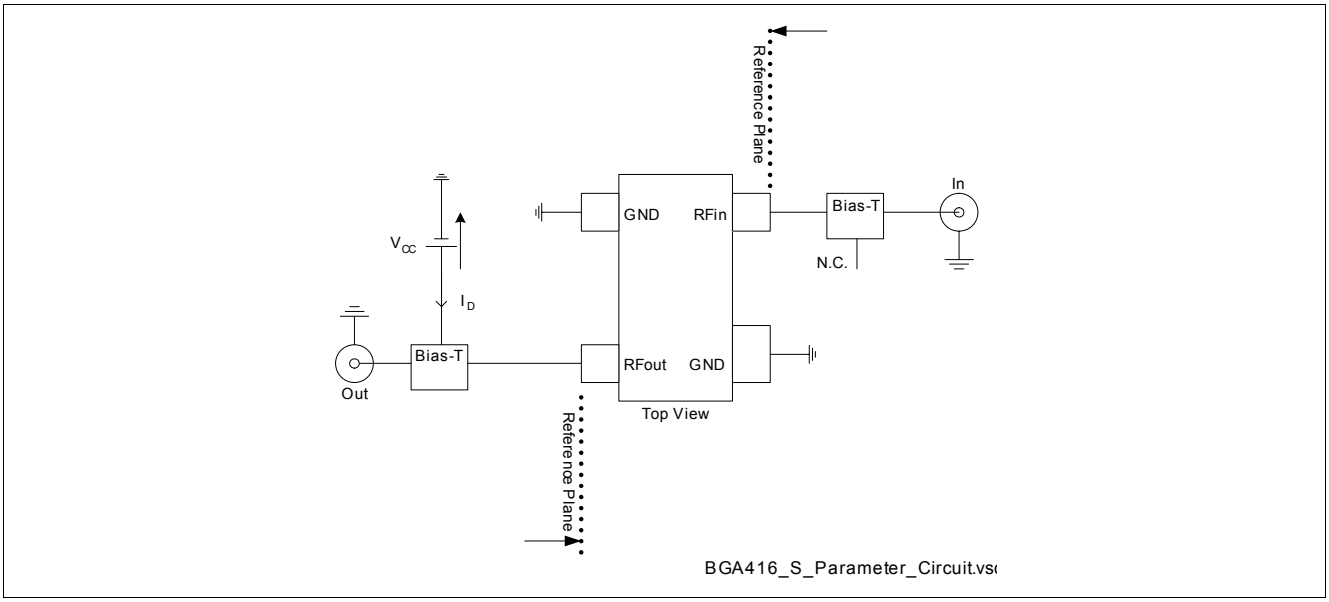
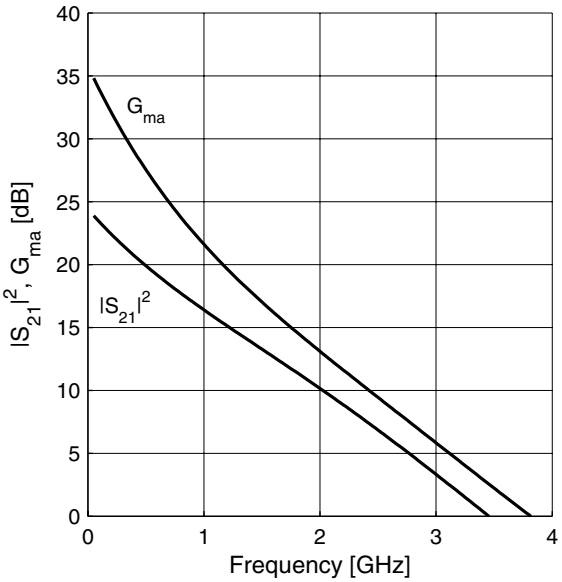


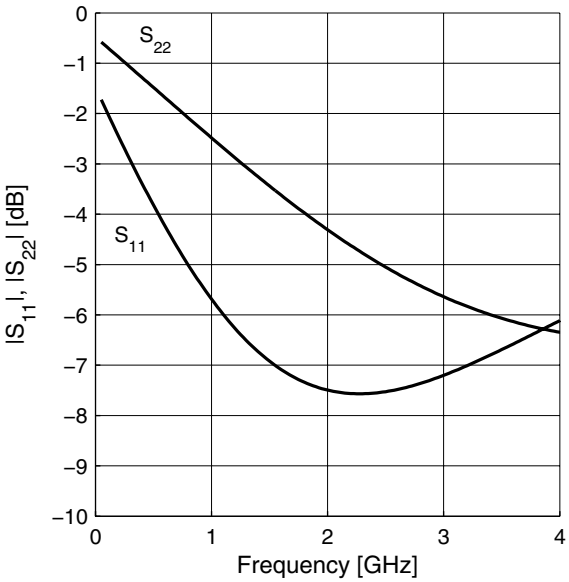

**Figure 2 Test Circuit for Electrical Characteristics**

# 3 Measured Parameters

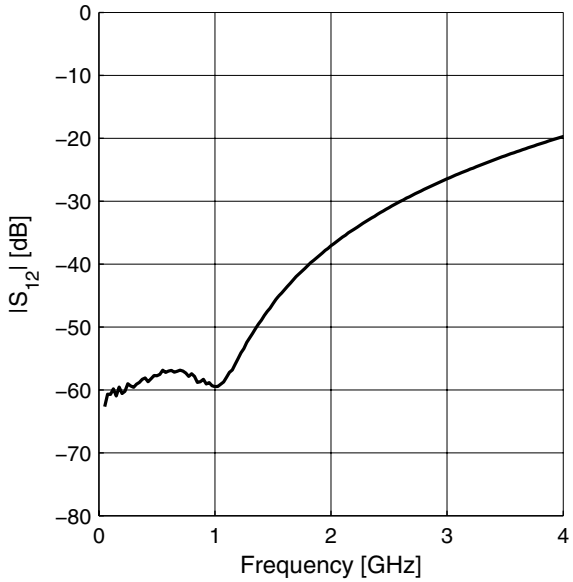
**Power Gain** $|S_{21}|^2$, $G_{ma}$ = f(f)
$V_{CC}$ = 3V, $I_D$ = 5.5mA



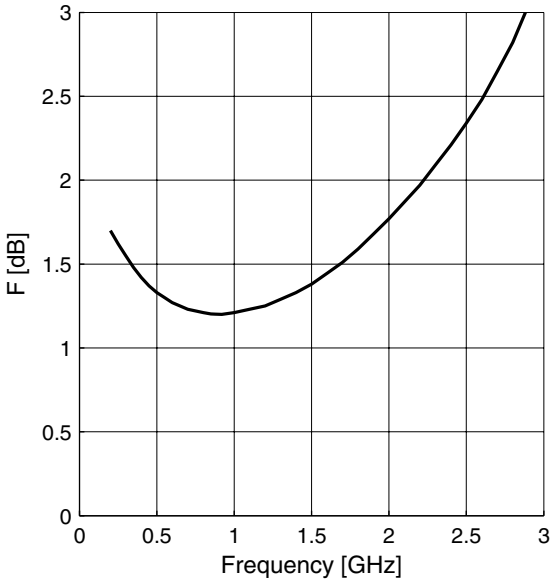

**Matching** $|S_{11}|$, $|S_{22}|$ = f(f)
$V_{CC}$ = 3V, $I_D$ = 5.5mA



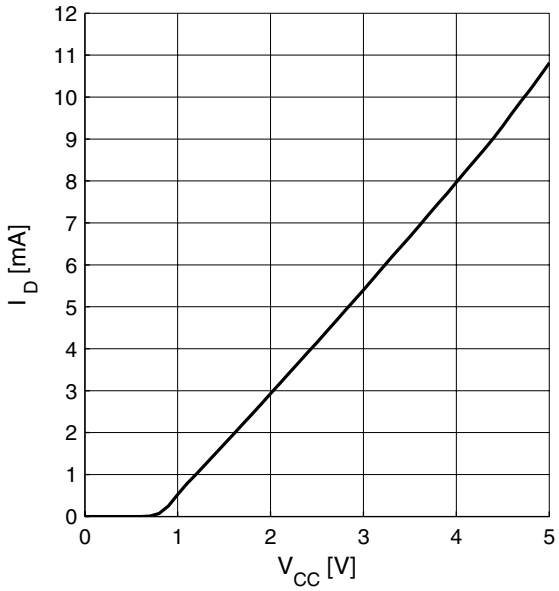

**Reverse Isolation** $|S_{12}|$ = f(f)
$V_{CC}$ = 3V, $I_D$ = 5.5mA




**Noise figure** F = f(f)
$V_{CC}$ = 3V, $I_D$ = 5.5mA



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




# 4 Package Information

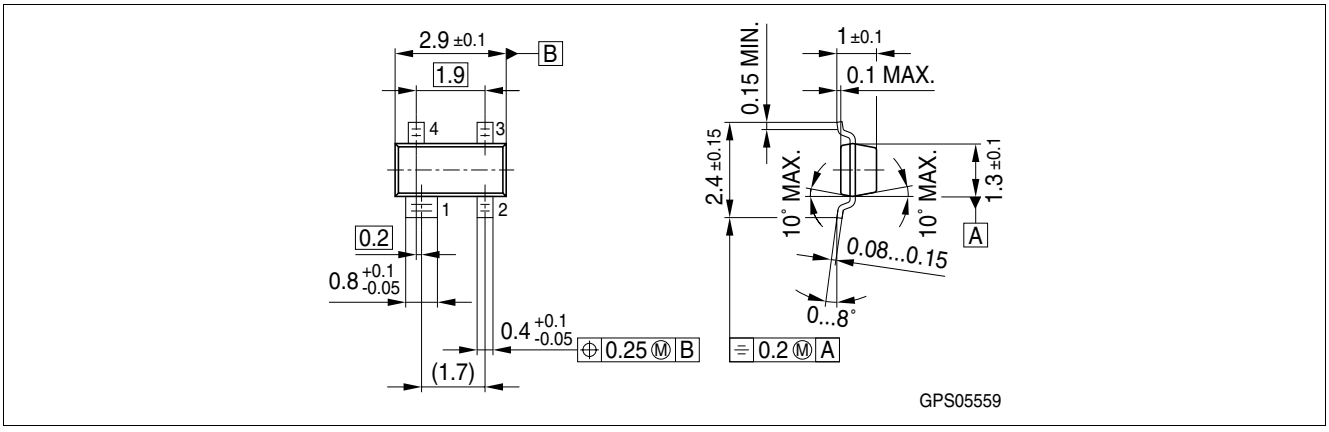



**Figure 3 Package Outline SOT143**

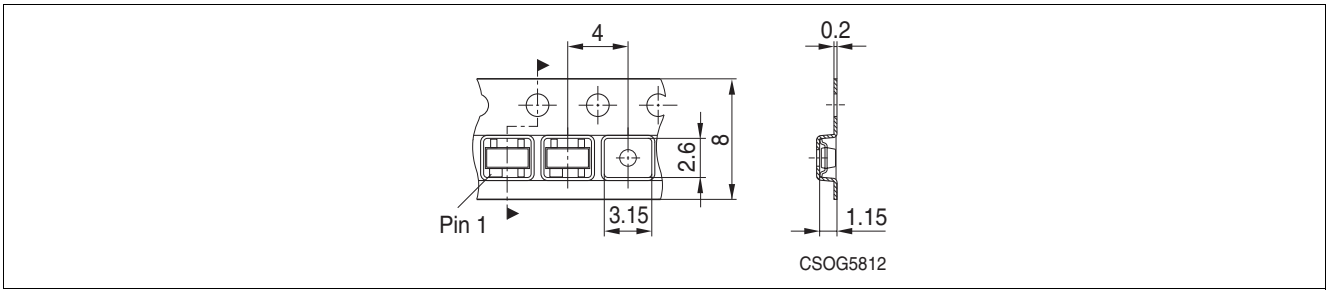



**Figure 4 Tape for SOT143**

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