

# 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**

<b>Page</b>	<b>Subjects (major changes since last revision)</b>
All	Document layout change
4-5	Electrical Characteristics slightly changed
7-8	Figures updated

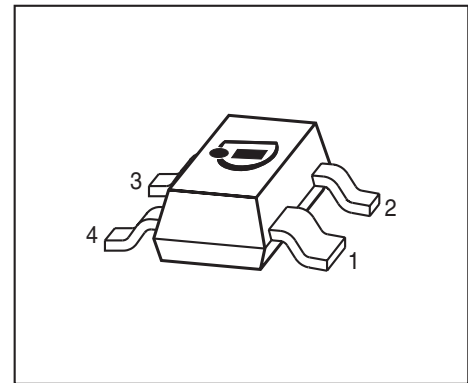
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# 1 RF Cascode Amplifier

## 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<sup>®</sup>-25 technology
- Pb-free (RoHS compliant) package



SOT143

## Applications

- Buffer amplifier
- LNAs
- Oscillator active devices

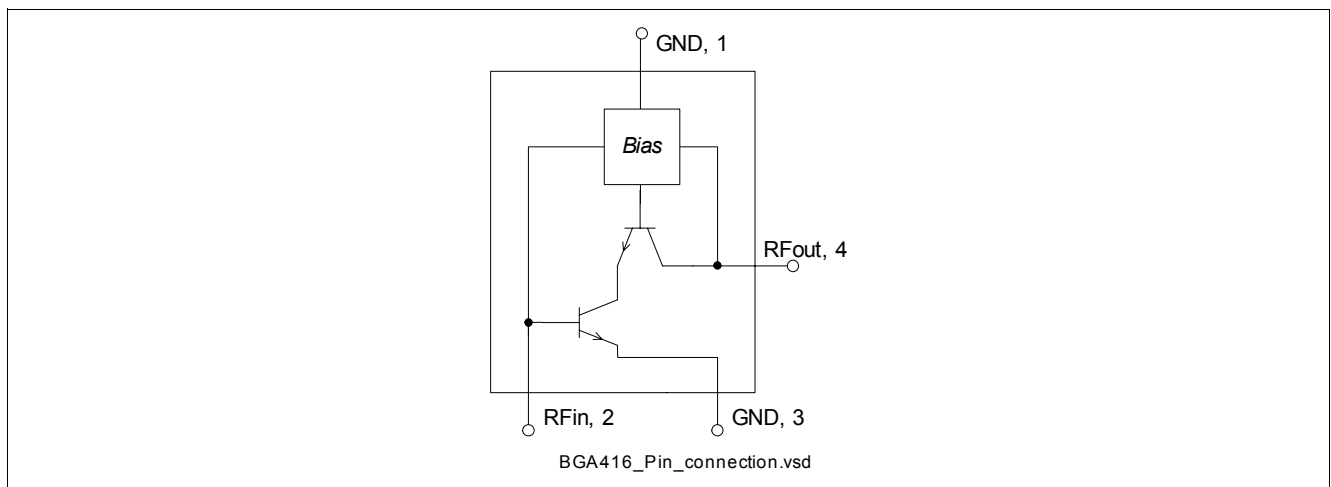


Figure 1 Pin connection

## 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 <sup>1)</sup>	$I_D$	20	mA
Current into pin RFin	$I_{in}$	0.5	mA
Input power	$P_{in}$	8	dBm
Total power dissipation, $T_S < 123^\circ\text{C}^{2)}$	$P_{tot}$	100	mW
Junction temperature	$T_J$	150	$^\circ\text{C}$
Ambient temperature range	$T_A$	-65... 150	$^\circ\text{C}$
Storage temperature range	$T_{STG}$	-65... 150	$^\circ\text{C}$

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 <sup>1)</sup>	$R_{thJS}$	270	K/W

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

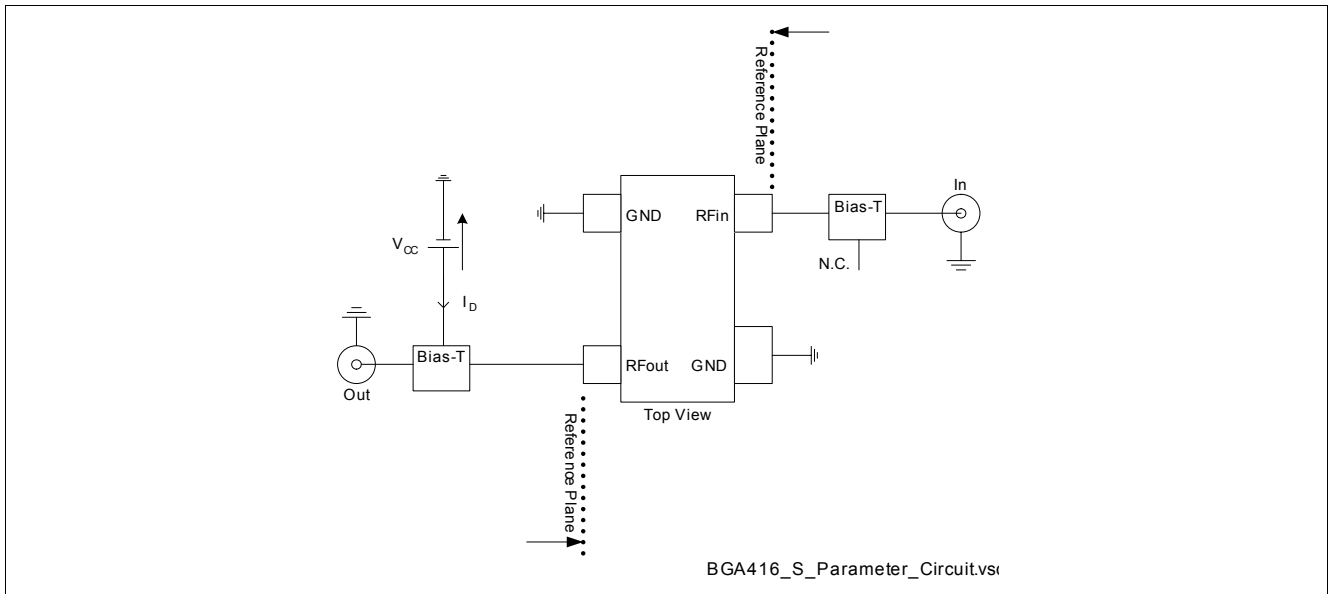
## 2 Electrical Characteristics

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

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

**Table 3** Electrical Characteristics

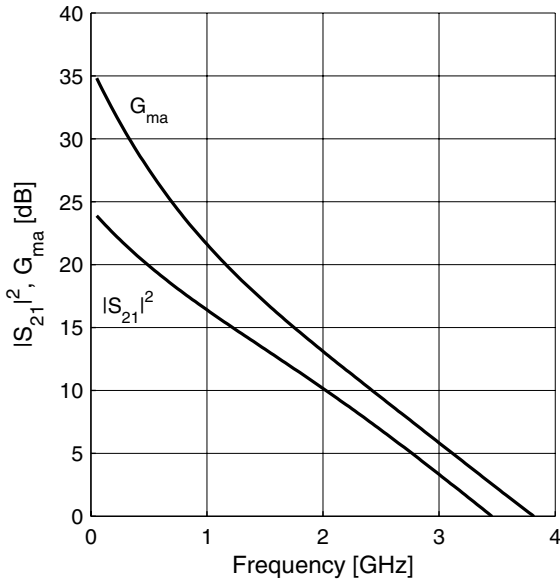
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Maximum available power gain	$G_{MA}$		23		dB	$f = 0.9\text{ GHz}$
			14		dB	$f = 1.8\text{ GHz}$
Insertion power gain	$ S_{21} ^2$		17		dB	$f = 0.9\text{ GHz}$
			11		dB	$f = 1.8\text{ GHz}$
Reverse isolation	$ S_{12} $		60		dB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



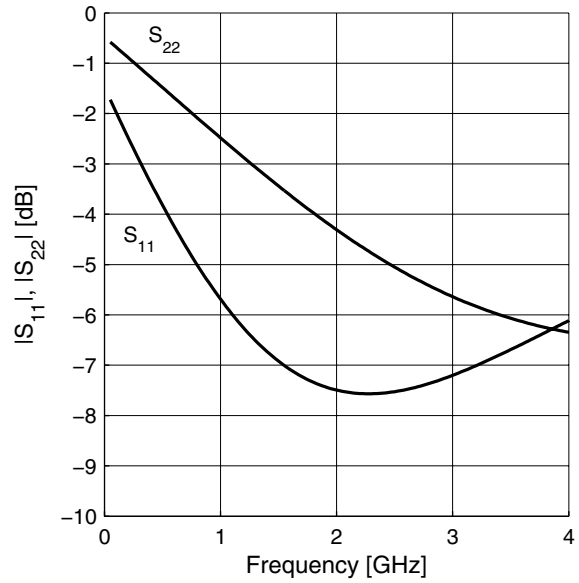
**Figure 2 Test Circuit for Electrical Characteristics**

### 3 Measured Parameters

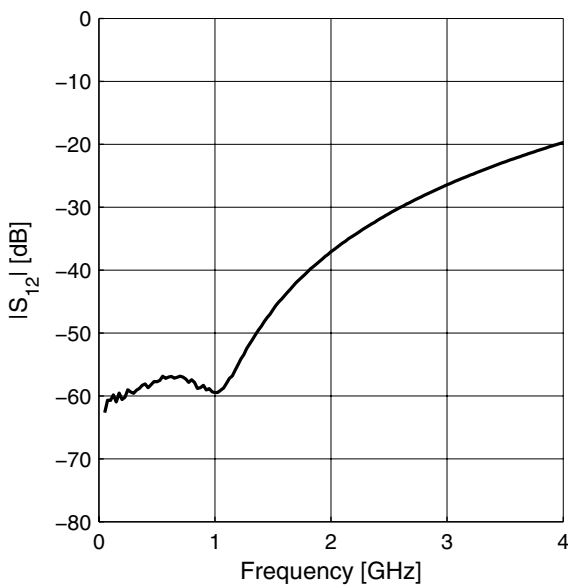
**Power Gain**  $|S_{21}|^2, G_{ma} = f(f)$   
 $V_{CC} = 3V, I_D = 5.5mA$



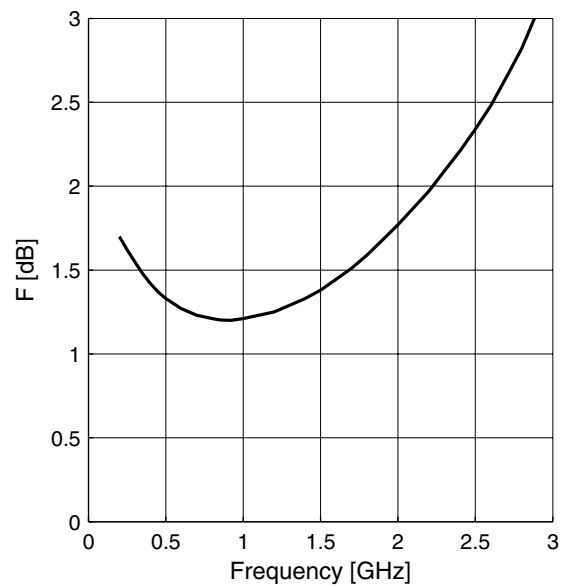
**Matching**  $|S_{11}|, |S_{22}| = f(f)$   
 $V_{CC} = 3V, I_D = 5.5mA$



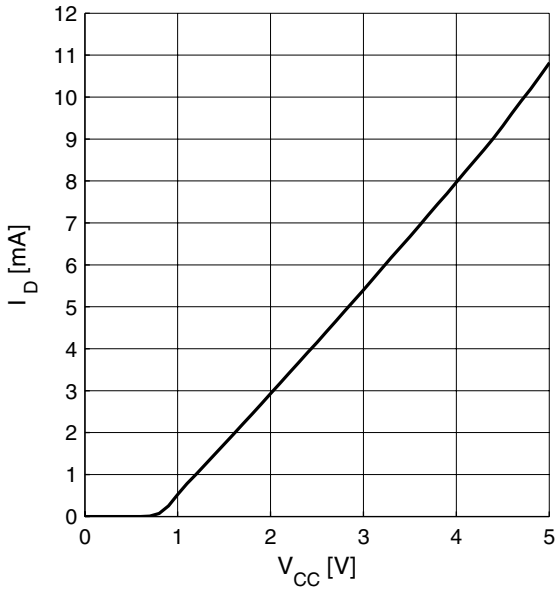
**Reverse Isolation**  $|S_{12}| = f(f)$   
 $V_{CC} = 3V, I_D = 5.5mA$



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



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



#### 4 Package Information

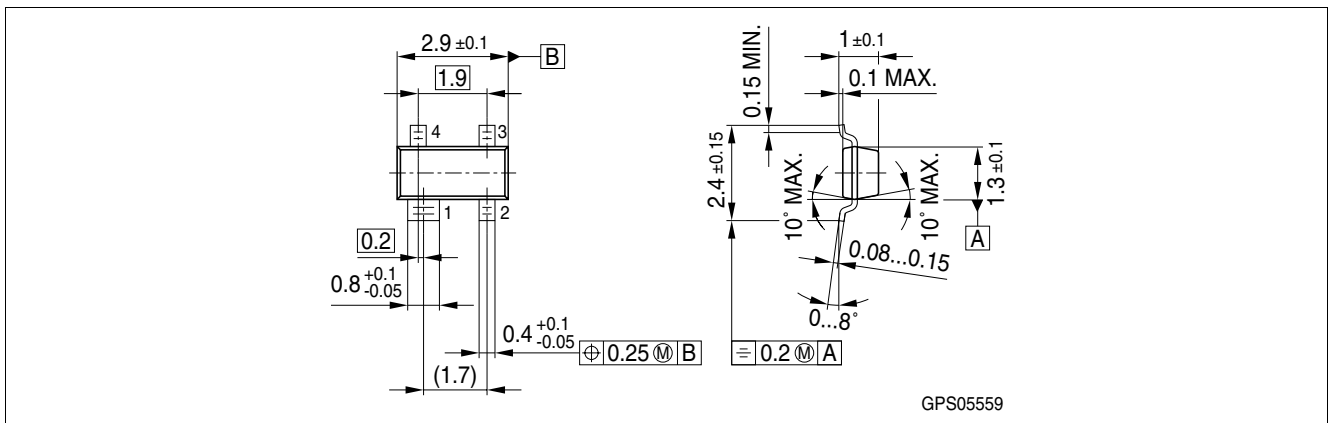


Figure 3 Package Outline SOT143

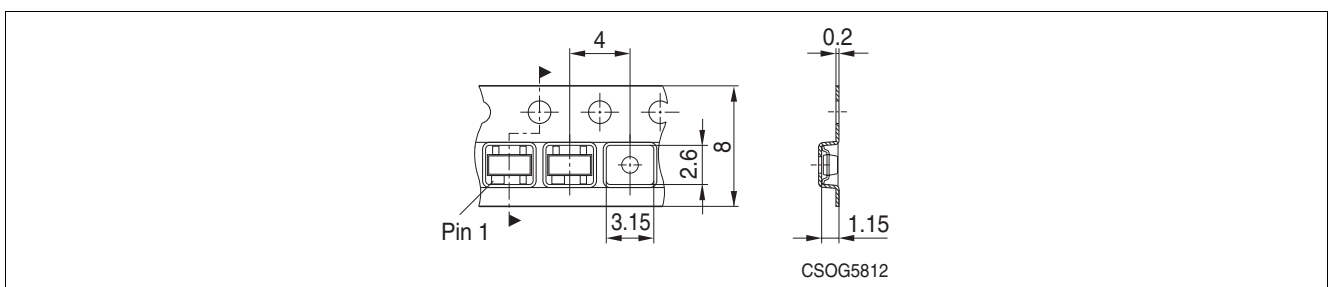


Figure 4 Tape for SOT143