

# BGA614

Silicon Germanium Broadband MMIC Amplifier

RF & Protection Devices



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**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

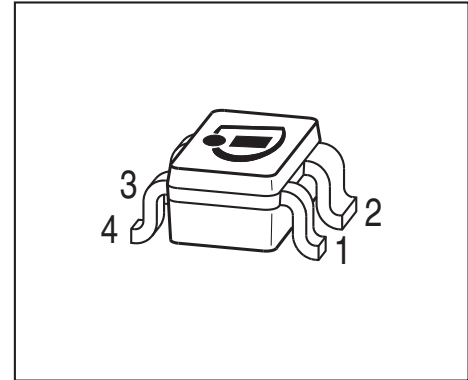
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# 1 Silicon Germanium Broadband MMIC Amplifier

## 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

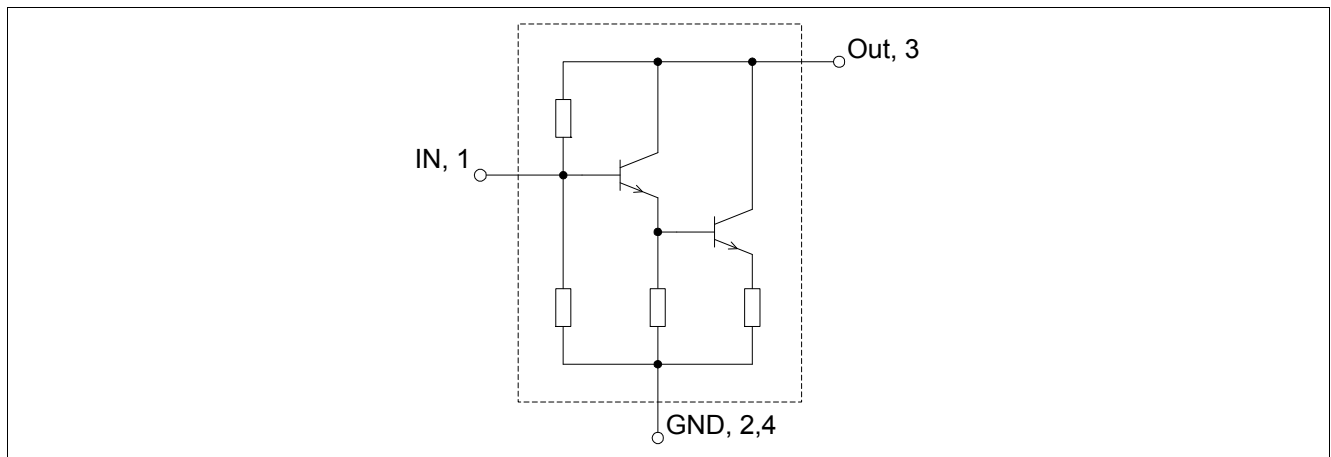


Figure 1 Pin connection

## 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	

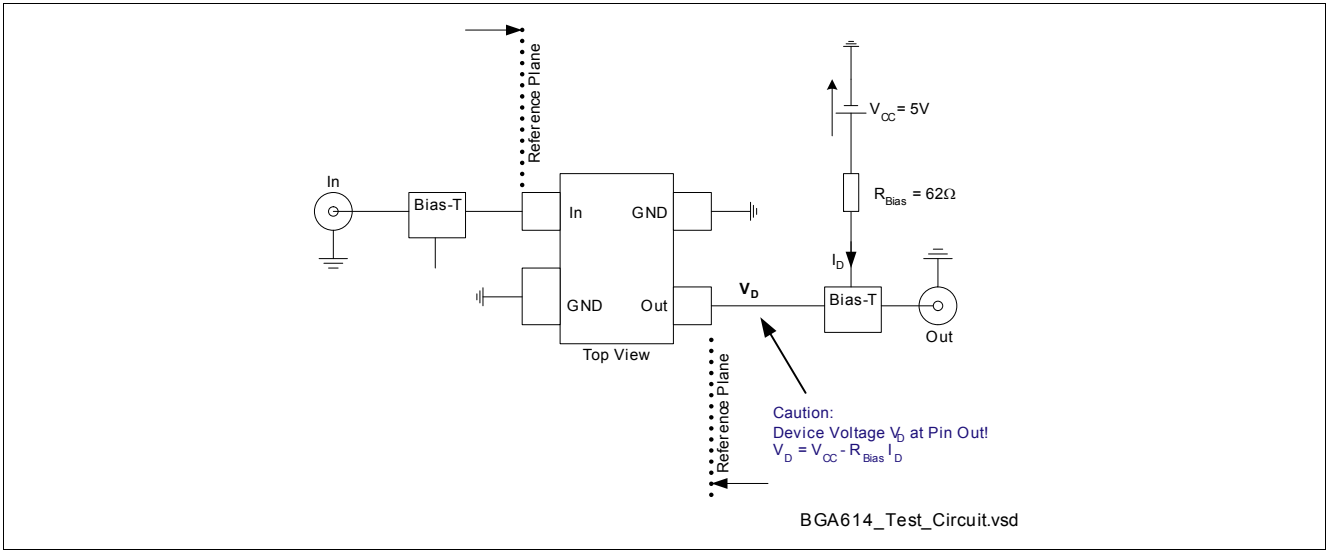
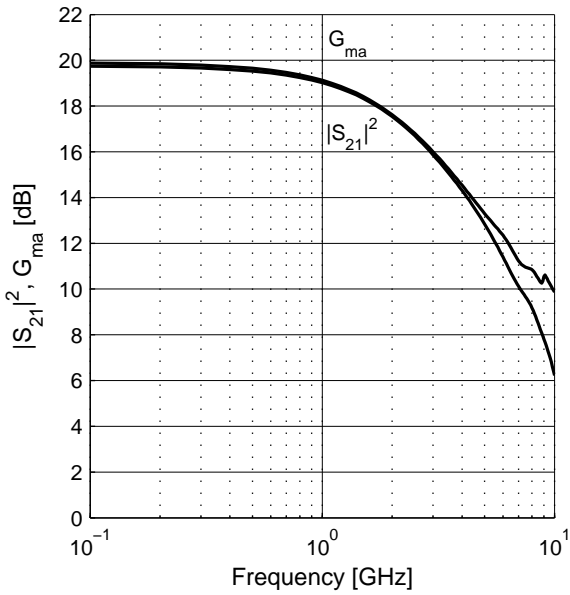


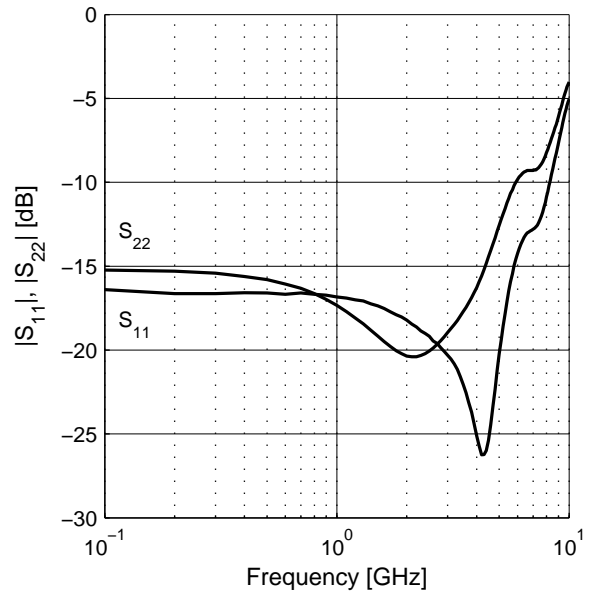
Figure 2 Test Circuit for Electrical Characteristics and S-Parameter

### 3 Measured Parameters

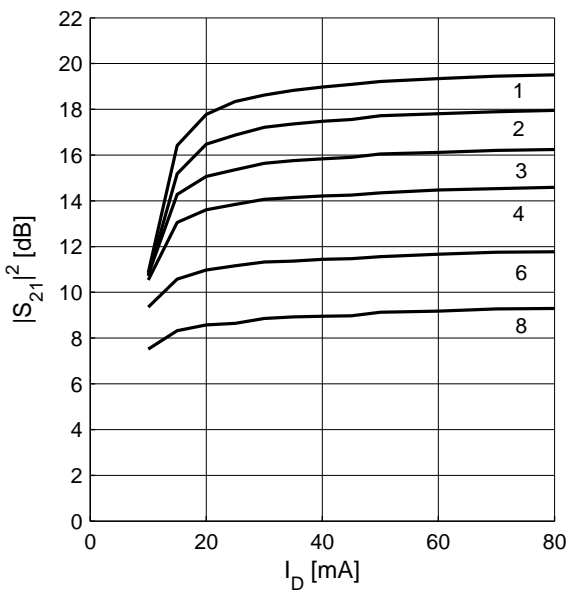
**Power Gain**  $|S_{21}|^2, G_{ma} = f(f)$   
 $V_{CC} = 5V, R_{Bias} = 62\Omega, I_C = 40mA$



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

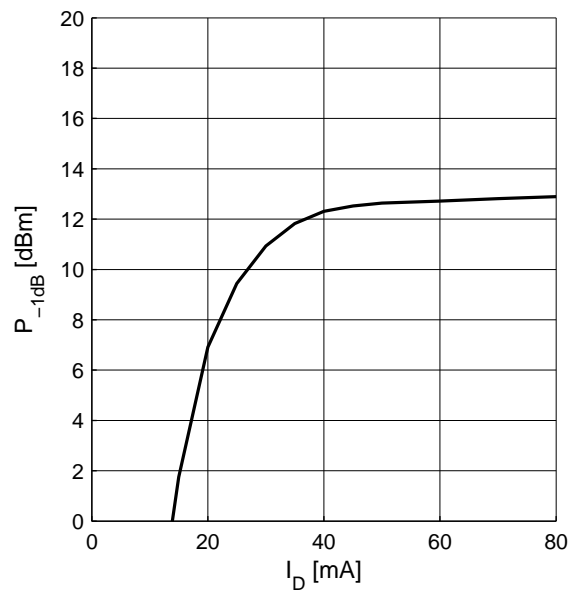


**Power Gain**  $|S_{21}| = f(I_D)$   
 $f = \text{parameter in GHz}$



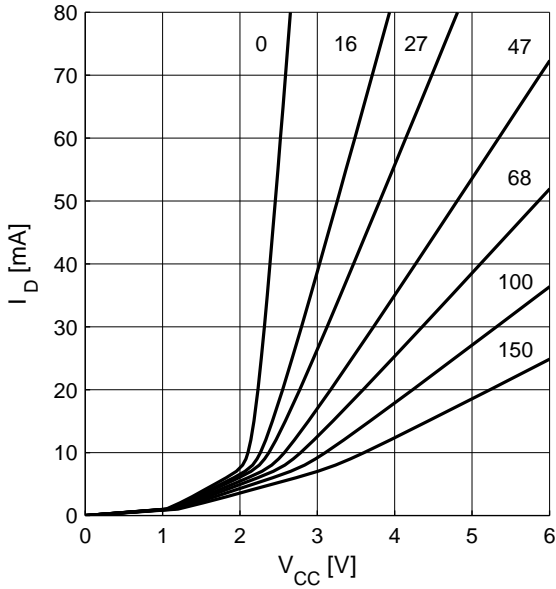
**Output Compression Point**

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



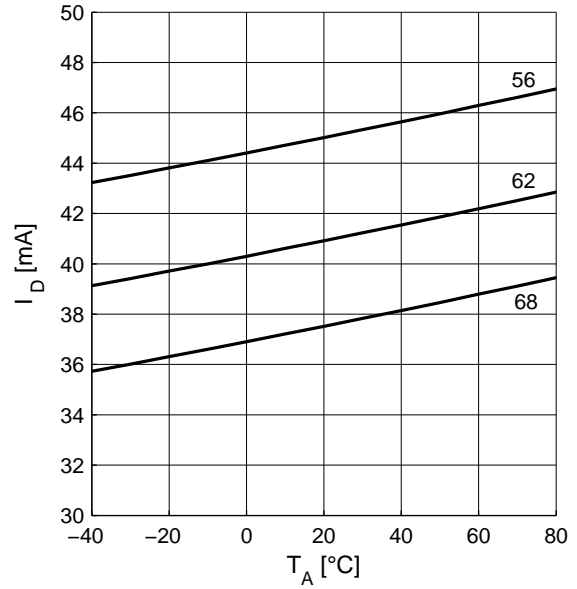
**Device Current  $I_D = f(V_{CC})$**

$R_{Bias}$  = 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  $^{\circ}C$

