BGA614 Silicon Germanium Broadband MMIC Amplifier

RF & Protection Devices



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BGA614

BGA614, 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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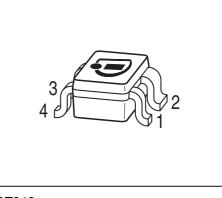
Silicon Germanium Broadband MMIC Amplifier

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 $f_{\rm T}$ 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

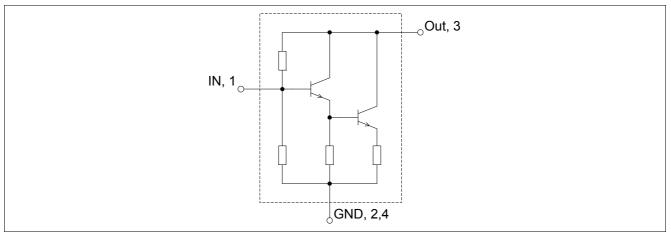


Figure 1 Pin connection

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.

Туре	Package	Marking
BGA614	SOT343	BOs

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



Electrical Characteristics

Maximum Ratings

Table 1 Maximum ratings

Parameter	Symbol	Limit Value	Unit	
Device voltage	VD	3	V	
Device current	ID	80	mA	
Current into pin In	I _{in}	0.7	mA	
Input power ¹⁾	$P_{\rm in}$	10	dBm	
Total power dissipation, $T_{\rm S}$ < 102 °C ²⁾	P _{tot}	240	mW	
Junction temperature	T	150	°C	
Ambient temperature range	T _A	-65 150	°C	
Storage temperature range	$T_{\rm STG}$	-65 150	°C	
ESD capability all pins (HBM: JESD22-A114)	V _{ESD}	1000	V	

1)Valid for $Z_{\rm S}$ = $Z_{\rm L}$ = 50 Ω , $V_{\rm CC}$ = 5 V, $R_{\rm Bias}$ = 62 Ω

2) $T_{\rm S}$ is measured on the ground lead at the soldering point

Note: All Voltages refer to GND-Node

Thermal resistance

Table 2Thermal resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R _{thJS}	200	K/W

1) For calculation of $R_{\rm thJA}$ 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} = 5 V, R_{Bias} = 62 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$		19.8		dB	<i>f</i> = 0.1 GHz
			19.0		dB	<i>f</i> = 1.0 GHz
			17.5		dB	<i>f</i> = 2.0 GHz
Noise figure ($Z_{\rm S}$ = 50 Ω)	$F_{50\Omega}$		1.8		dB	<i>f</i> = 0.1 GHz
			2.0		dB	<i>f</i> = 1.0 GHz
			2.1		dB	<i>f</i> = 2.0 GHz
Output power at 1 dB gain compression	P _{-1dB}		12		dBm	
Output third order intercept point	OIP ₃		25		dBm	
Input return loss	<i>RL</i> _{in}		18		dB	
Output return loss	RL _{out}		20		dB	
Total device current	ID		40		mA	



BGA614

Electrical Characteristics

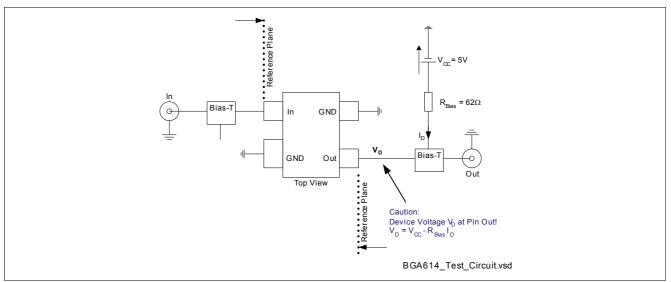


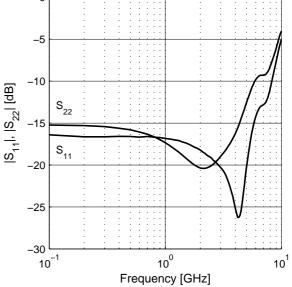
Figure 2 Test Circuit for Electrical Characteristics and S-Parameter



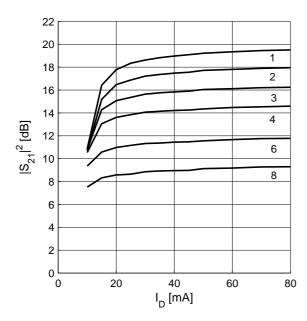
3 **Measured Parameters**

Power Gain $|S_{21}|^2$, $G_{ma} = f(f)$ $V_{CC} = 5V$, $R_{Bias} = 62\Omega$, $I_C = 40mA$ 22 G_{ma} 20 18 |S₂₁|² 16 $|S_{21}|^2$, G_{ma} [dB] 14 12 10 8 6 4 2 0 10⁻¹ 10⁰ 10¹ Frequency [GHz]

 $\begin{array}{l} \textbf{Matching} \; |S_{11}|, \; |S_{22}| = f(f) \\ \textbf{V}_{CC} = 5 \textbf{V}, \; \textbf{R}_{Bias} = 62 \Omega, \; \textbf{I}_{C} = 40 \textbf{mA} \end{array}$ 0 -5 -10 S₂₂ -15

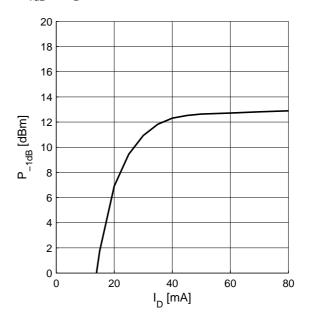


Power Gain $|S_{21}| = f(I_D)$ f = parameter in GHz



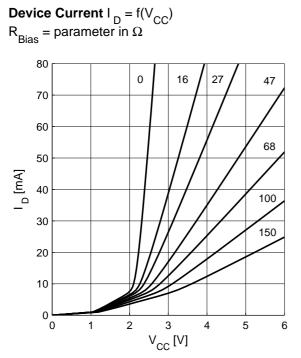
Output Compression Point

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

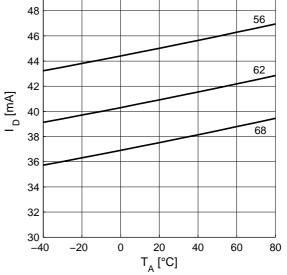




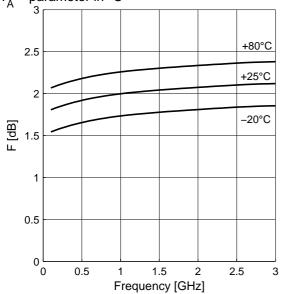
Measured Parameters



Device Current I $_{D} = f(T_{A})$ V_{CC} = 5V,R_{Bias} = parameter in Ω



Noise figure F = f(f) $V_{CC} = 5V, R_{Bias} = 62\Omega, Z_{S} = 50\Omega$ $T_{A} = parameter in °C$





Package Information

4 Package Information

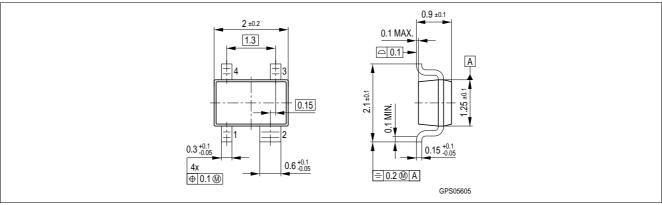


Figure 3 Package Outline SOT343

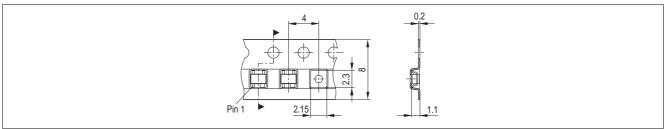


Figure 4 Tape for SOT343