# **BGA612**

Silicon Germanium Broadband MMIC Amplifier

**Small Signal Discretes** 



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# **BGA612, Silicon Germanium Broadband MMIC Amplifier**

Revision History: 2008-04-24, 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			

## **Trademarks**

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Data Sheet 3 Rev. 2.1, 2008-04-24



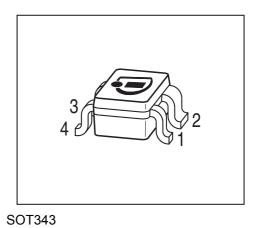
Silicon Germanium Broadband MMIC Amplifier

# 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<sub>-1dB</sub> = 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<sup>1)</sup>





### **Applications**

- Driver amplifier for GSM/PCS/CDMA/UMTS
- · Broadband amplifier for SAT-TV & LNBs
- · Broadband amplifier for CATV
- 1) Pb-containing package may be available upon special request

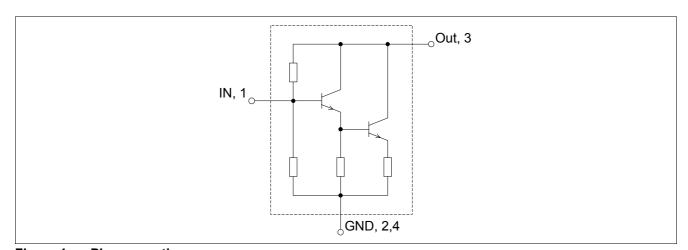


Figure 1 Pin connection

### **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



### **Electrical Characteristics**

# **Maximum Ratings**

Table 1 **Maximum ratings** 

Parameter	Symbol	Limit Value	Unit	
Device voltage	$V_{D}$	2.8	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, $T_{\rm S}$ < 105 °C <sup>2)</sup>	$P_{tot}$	225	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 <sub>ESD</sub>	1000	V	

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

<sup>1)</sup> For calculation of  $R_{\mathrm{thJA}}$  please refer to Application Note Thermal Resistance

#### **Electrical Characteristics** 2

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  $\Omega$ , Frequency = 2 GHz, unless otherwise specified

Table 3 **Electrical Characteristics** 

Parameter	Symbol	Values			Unit	Note /
		Min.	Тур.	Max.		<b>Test Condition</b>
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 $\Omega$ )	$F_{50\Omega}$		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	

<sup>1)</sup>Valid for  $Z_{\rm S}$  =  $Z_{\rm L}$  = 50  $\Omega$ ,  $V_{\rm CC}$  = 5 V,  $R_{\rm Bias}$  = 135  $\Omega$ 2)  $T_{\rm S}$  is measured on the ground lead at the soldering point



# **Electrical Characteristics**

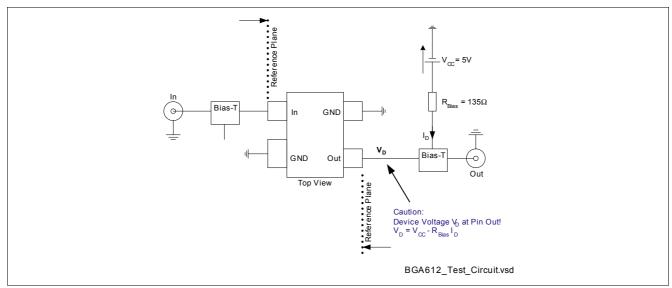
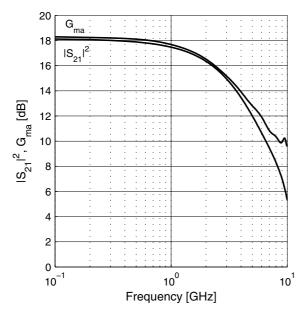


Figure 2 Test Circuit for Electrical Characteristics and S-Parameter

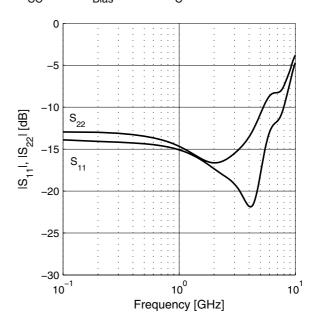
**Measured Parameters** 

# **3** Measured Parameters

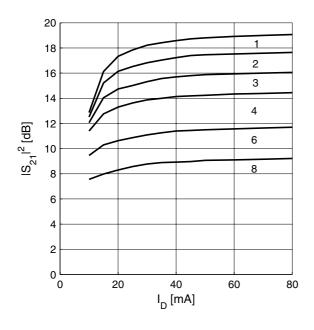
Power Gain 
$$|S_{21}|^2$$
,  $G_{ma} = f(f)$   
 $V_{CC} = 5V$ ,  $R_{Bias} = 135Ω$ ,  $I_{C} = 20mA$ 



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

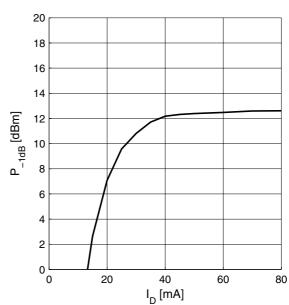


**Power Gain**  $|S_{21}| = f(I_D)$  f = parameter in GHz



# **Output Compression Point**

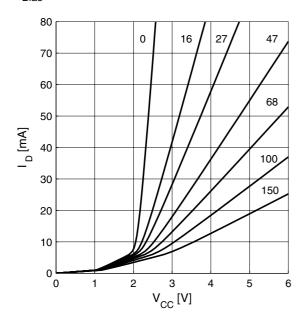
$$\boldsymbol{P}_{-1dB} = \boldsymbol{f}(\boldsymbol{I}_{D}), \, \boldsymbol{f} = 2GHz$$



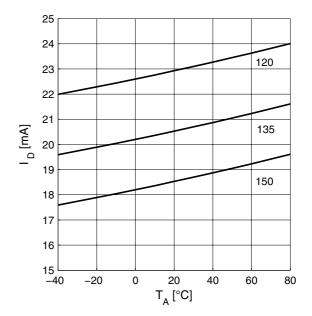


## **Measured Parameters**

$$\begin{array}{l} \textbf{Device Current I}_{D} = \text{f(V}_{CC}) \\ \textbf{R}_{Bias} = \text{parameter in } \Omega \\ \end{array}$$

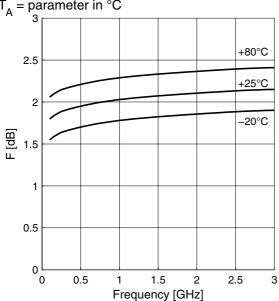


# Device Current I $_{\rm D}$ = f(T $_{\rm A}$ ) V $_{\rm CC}$ = 5V, R $_{\rm Bias}$ = parameter in Ω



# 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

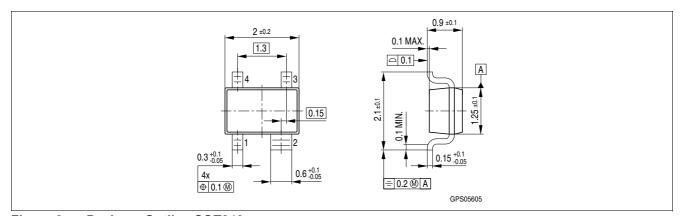


Figure 3 Package Outline SOT343

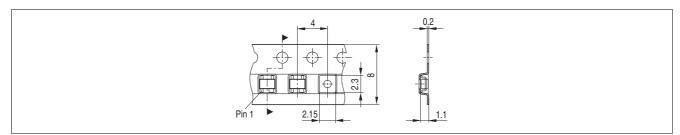


Figure 4 Tape for SOT343