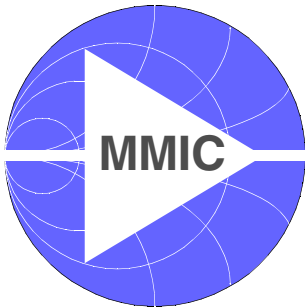


# BGA612

Silicon Germanium  
Broadband MMIC Amplifier



Secure Mobile Solutions  
Silicon Discretes



Never stop thinking.

**Edition 2003-11-04**

**Published by Infineon Technologies AG,  
St.-Martin-Strasse 53,  
D-81541 München**

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**BGA612****Data sheet****Revision History:        2003-11-04**Previous Version:        2002-05-27

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Page	Subjects (major changes since last revision)
	Preliminary status removed

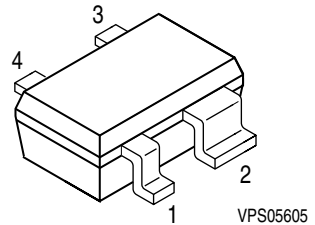
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## Silicon Germanium Broadband MMIC Amplifier

**BGA612**

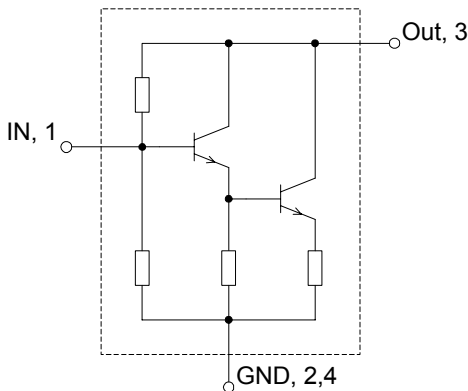
### Features

- Cascadable 50Ω-gain block
- 3 dB-bandwidth: DC to 2.8 GHz with 17.0 dB typical gain at 1.0 GHz
- Compression point  $P_{-1dB} = 7$  dBm at 2.0 GHz
- Noise figure  $F_{50\Omega} = 2.35$  dB at 2.0 GHz
- Absolute stable
- 70 GHz  $f_T$  - Silicon Germanium technology



### Applications

- Driver amplifier for GSM/PCS/CDMA/UMTS
- Broadband amplifier for SAT-TV & LNBS
- Broadband amplifier for CATV



### Description

The BGA612 is a broadband matched, general purpose MMIC amplifier in a Darlington configuration. It is optimized for a typical supply current of 20mA.

The BGA612 is based on Infineon Technologies' B7HF Silicon Germanium technology.

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

Type	Package	Marking	Chip
BGA612	SOT343	BNs	T0545

**Maximum Ratings**

Parameter	Symbol	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, $T_S < 105^\circ\text{C}$ <sup>2)</sup>	$P_{tot}$	225	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	$^\circ\text{C}$
Thermal resistance: junction-soldering point	$R_{th_{JS}}$	200	K/W

Notes:

All Voltages refer to GND-Node

<sup>1)</sup> Valid for  $Z_S=Z_L=50\Omega$ ,  $V_{CC}=5V$ ,  $R_{Bias}=135\Omega$

<sup>2)</sup>  $T_S$  is measured on the ground lead at the soldering point

**Electrical Characteristics** at  $T_A=25^\circ\text{C}$  (measured in test circuit specified in fig. 1)

$V_{CC}=5V$ ,  $R_{Bias}=135\Omega$ , Frequency=2GHz, unless otherwise specified

Parameter	Symbol	min.	typ.	max.	Unit
Insertion power gain	$ S_{21} ^2$				dB
$f = 0.1\text{GHz}$		-	17.5	-	
$f = 1.0\text{GHz}$		-	17.0	-	
$f = 2.0\text{GHz}$		-	15.8	-	
Noise Figure ( $Z_S=50\Omega$ )	$F_{50\Omega}$				dB
$f = 0.1\text{GHz}$		-	1.95	-	
$f = 1.0\text{GHz}$		-	2.25	-	
$f = 2.0\text{GHz}$		-	2.35	-	
Output Power at 1dB Gain Compression	$P_{-1dB}$	-	7	-	dBm
Output Third Order Intercept Point	$OIP_3$	-	17	-	dBm
Input Return Loss	$RL_{In}$	-	18	-	dB
Output Return Loss	$RL_{Out}$	-	21	-	dB
Total Device Current	$I_D$	-	20	-	mA

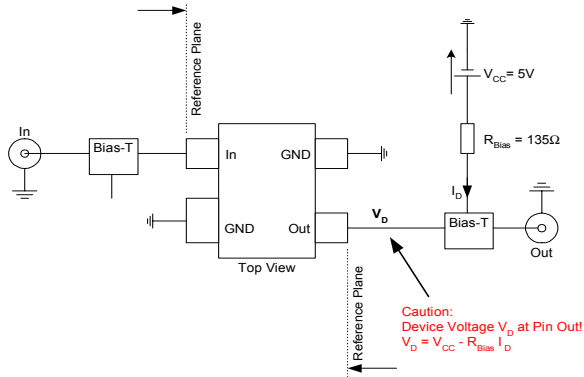


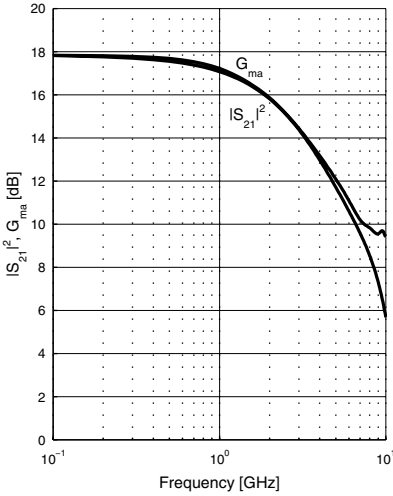
Fig.1: Test Circuit for Electrical Characteristics and S-Parameters

**S-Parameter**  $V_{CC}=5V$ ,  $R_{Bias}=135\Omega$  (see Electrical Characteristics for conditions)

Frequency [GHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
0.1	0.1803	5.5	7.6542	177.5	0.0960	0.0	0.1497	-1.2
0.2	0.1146	7.3	7.7188	173.3	0.0964	1.2	0.1499	-4.6
0.4	0.1345	7.4	7.6068	166.6	0.0956	1.8	0.1503	-11.3
0.6	0.1307	4.4	7.5301	159.7	0.0965	2.8	0.1457	-18.2
0.8	0.1310	5.5	7.3697	153.2	0.0961	4.0	0.1384	-25.5
1.0	0.1341	3.3	7.1755	146.6	0.0969	5.1	0.1292	-33.0
1.2	0.1337	3.8	6.9799	140.8	0.0978	6.4	0.1198	-40.2
1.4	0.1311	3.8	6.7873	134.4	0.0986	6.7	0.1111	-48.5
1.6	0.1302	3.8	6.5728	129.2	0.1002	8.1	0.1033	-57.4
1.8	0.1257	-1.7	6.3555	123.6	0.1018	8.8	0.0958	-67.5
2.0	0.1258	-3.5	6.1539	118.4	0.1044	9.6	0.0891	-78.0
3.0	0.0878	-9.4	5.2390	94.7	0.1172	12.1	0.0823	-146.8
4.0	0.0409	5.2	4.4689	74.0	0.1346	11.6	0.1550	170.5
5.0	0.0517	119.1	3.8775	54.8	0.1544	8.7	0.2362	148.3
6.0	0.1209	131.0	3.3943	36.2	0.1737	3.3	0.2929	129.2
7.0	0.1796	114.7	2.9678	20.2	0.1929	-2.4	0.3527	115.2
8.0	0.2594	104.3	2.6995	2.8	0.2132	-10.7	0.4330	104.6

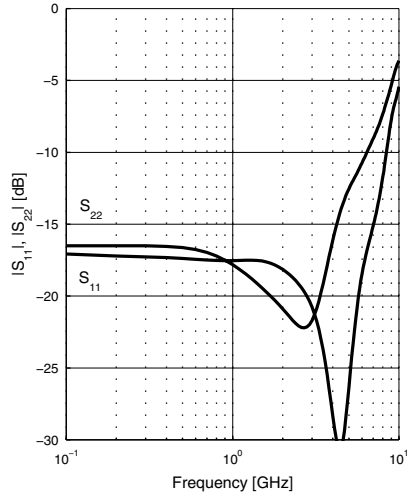
**Power Gain**  $|S_{21}|^2, G_{ma} = f(f)$

$V_{CC} = 5V, R_{Bias} = 135\Omega, I_C = 20mA$



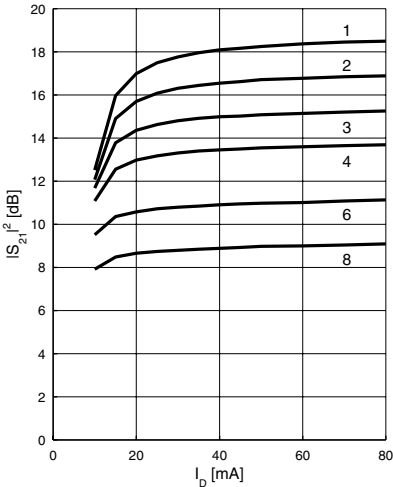
**Matching**  $|S_{11}|, |S_{22}| = f(f)$

$V_{CC} = 5V, R_{Bias} = 135\Omega, I_C = 20mA$



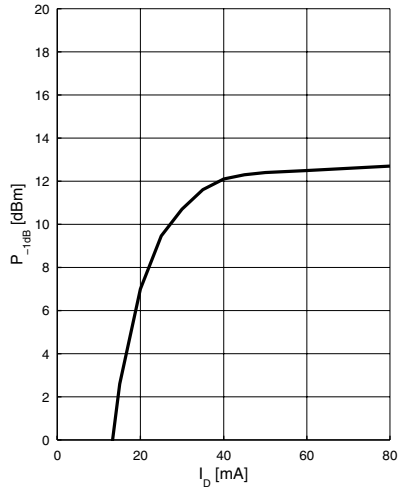
**Power Gain**  $|S_{21}| = f(I_D)$

f = parameter in GHz



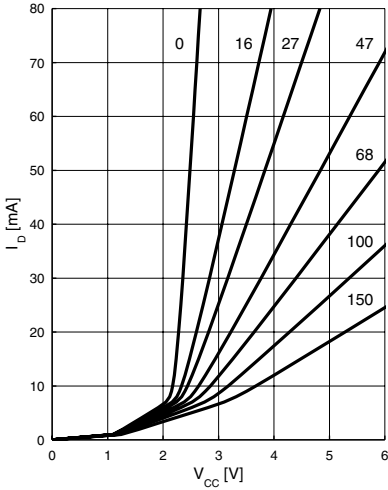
**Output Compression Point**

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



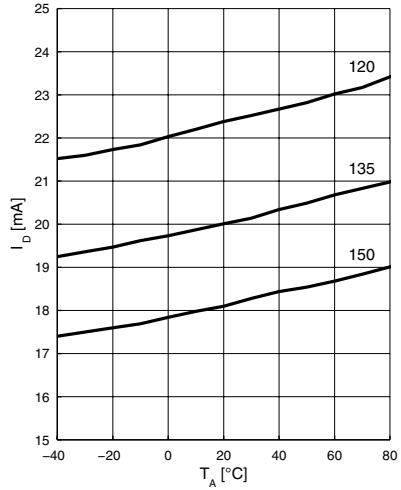
**Device Current  $I_D = f(V_{CC})$**

$R_{Bias}$  = parameter in  $\Omega$



**Device Current  $I_D = f(T_A)$**

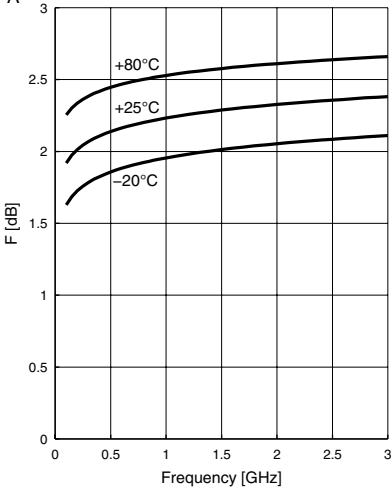
$V_{CC} = 5V$ ,  $R_{Bias}$  = parameter in  $\Omega$



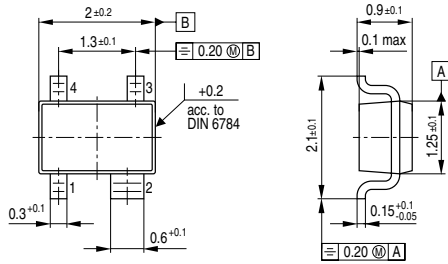
**Noise figure  $F = f(f)$**

$V_{CC} = 5V$ ,  $R_{Bias} = 135\Omega$ ,  $Z_S = 50\Omega$

$T_A$  = parameter in  $^{\circ}C$



**Package Outline**



GPS06605