BGA729N6

Broadband Low Noise Amplifier for Portable and Mobile TV Applications

Data Sheet

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RF & Protection Devices

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Revision History	
Page or Item	**Subjects (major changes since previous revision)**
Revision 3.0, 2015-11-18	
9	Maximum ratings updated (Maximum value for voltage at pin AO)
10	Input return loss updated
Revision 2.0, 2015-09-30	
7	Marking updated
7, 8, 10	Electrical performance updated
11	Bill of materials updated
12	Marking layout drawing updated

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Broadband Low Noise Amplifier for Portable and Mobile TV Applications **BGA729N6**

Features

- Insertion power gain: 16.3 dB
- Insertion Loss in bypass mode: 4.2 dB
- Low noise figure: 1.05 dB / 4.3 dB in high gain / bypass mode
- Low current consumption: 6.3 mA
- Power off function
- Operating frequency: 70 - 1000 MHz
- Three-state control: OFF-, bypass- and high gain-Mode
- Supply voltage: 1.5 V to 3.3 V
- Ultra small TSNP-6-2 leadless package (footprint: 0.7 x 1.1 mm^2)
- B7HF Silicon Germanium technology
- No external matching inductor required
- RF input and output internally matched to 50 Ω
- Only 2 external SMD component necessary
- 2 kV HBM ESD protection (including AI-pin)
- Pb-free (RoHS compliant) package

RoHS

Product Name	Marking	Package
BGA729N6	M	TSNP-6-2

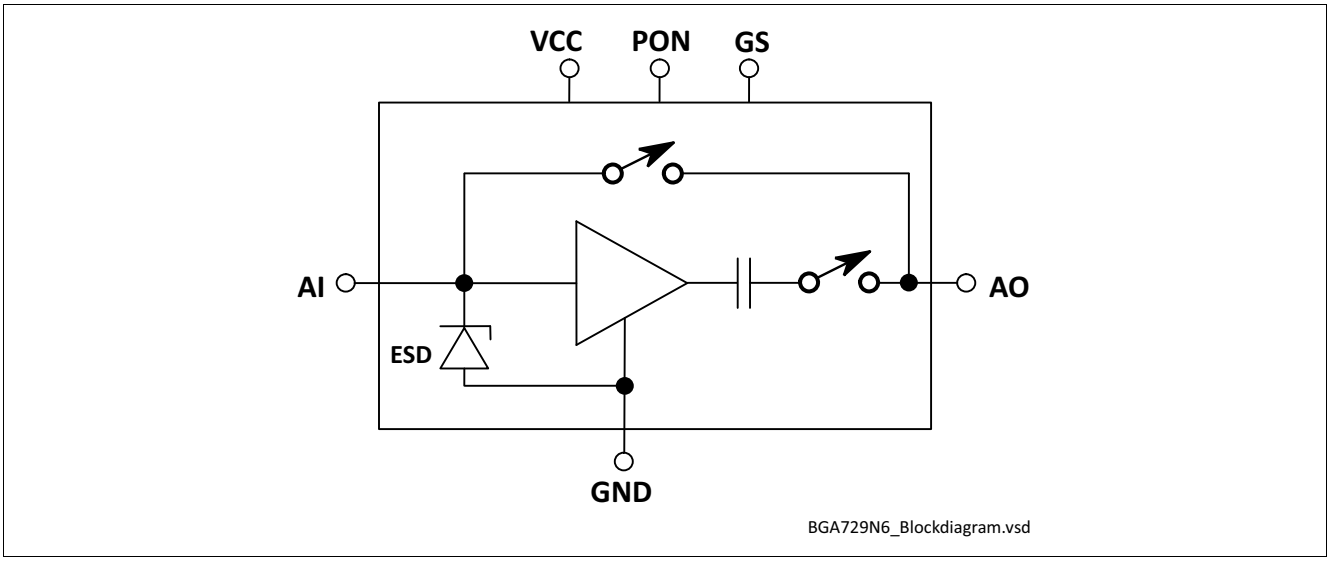

Figure 1 Block Diagram

Description

The BGA729N6 is a broadband low power low noise amplifier (LNA) MMIC for portable and mobile TV applications which covers a wide frequency range from 70 MHz to 1000 MHz. The LNA provides 16.3 dB gain and 1.05 dB noise figure at a current consumption of 6.3 mA in the application configuration described in **Chapter 3**. In bypass mode the LNA provides an insertion loss of 4.2 dB. The bypass mode with much higher linearity enables this LNA to work with much lower current consumption than commonly used TV LNAs. The BGA729N6 is based upon Infineon Technologies' B7HF Silicon Germanium technology. It operates from 1.5 V to 3.3 V supply voltage.

Pin Definition and Function

Table 1 Pin Definition and Function

Pin No.	Name	Function
1	GS	High gain / bypass mode control
2	VCC	DC supply
3	AO	LNA output
4	GND	Ground
5	AI	LNA input
6	PON	Power on / off control

Gain Mode Selection Truth Table

Table 2 Gain Mode Selection Truth Table

Control Voltage V_{PON}	Control Voltage V_{GS}	Gain Mode
High	Low	High Gain
High	High	Bypass
Low	High	Bypass
Low	Low	OFF

1 Maximum Ratings

Table 3 Maximum Ratings

Parameter[1]	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Voltage at pin VCC	V_{CC}	-0.3	–	3.6	V	–
Voltage at pin AI	V_{AI}	-0.3	–	0.9	V	–
Voltage at pin AO	V_{AO}	-0.3	–	V_{CC} + 0.3	V	–
Voltage at pin PON	V_{PON}	-0.3	–	V_{CC} + 0.3	V	–
Voltage at pin GS	V_{GS}	-0.3	–	V_{CC} + 0.3	V	–
Voltage at GND pins	V_{GND}	-0.3	–	0.3	V	–
Current into pin VCC	I_{CC}	–	–	16	mA	–
RF input power	P_{IN}	–	–	+2	dBm	–
Total power dissipation, T_S < tbd. °C[2]	P_{tot}	–	–	60	mW	–
Junction temperature	T_J	–	–	150	°C	–
Ambient temperature range	T_A	-40	–	85	°C	–
Storage temperature range	T_{STG}	-65	–	150	°C	–
ESD capability all pins	V_{ESD_HBM}	–	–	2000	V	according to JESD22A-114

1) All voltages refer to GND-Node unless otherwise noted

2) T_S is measured on the ground lead at the soldering point

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

2 Electrical Characteristics

Table 4 Electrical Characteristics:[1] T_A = 25 °C, V_{CC} = V_{PON} = 2.8 V, V_{GS} = 0 / 2.8 V, f = 70 - 1000 MHz

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_{CC}	1.5	–	3.3	V	–
Supply current	I_{CC}	–	6.3	–	mA	High gain mode
		–	0.55	–	mA	Bypass mode
		–	0.2	5	µA	OFF-mode
Current into PON pin	I_{PON}	–	10	–	µA	High gain mode
Current into GS pin	I_{GS}	–	60	–	µA	Bypass mode
Insertion power gain f = 470 MHz	$\|S_{21}\|^2$	–	16.3	–	dB	High gain mode
		–	-4.2	–	dB	Bypass mode
Noise figure[2] Z_S = 50 Ω	NF	–	1.05	–	dB	High gain mode
		–	4.3	–	dB	Bypass mode
Input return loss f = 470 MHz	RL_{in}	–	10	–	dB	High gain mode
		–	15	–	dB	Bypass mode
Output return loss f = 470 MHz	RL_{out}	–	17	–	dB	High gain mode
		–	13	–	dB	Bypass mode
Reverse isolation	$1/\|S_{12}\|^2$	–	28	–	dB	High gain mode
		–	4.2	–	dB	Bypass mode
Power gain settling time[3]	t_S	–	4	–	µs	OFF- to ON-mode
Inband input 1dB-compression point, f = 470 MHz	IP_{1dB}	–	-15	–	dBm	High gain mode
		–	+6	–	dBm	Bypass mode
Inband input 3rd-order intercept point[4] f_1 = 470 MHz , f_2 = f_1 + 1 MHz	IIP_3	–	-6	–	dBm	High gain mode
		–	+20	–	dBm	Bypass mode
Stability	k	–	> 1	–		f = 20 MHz ... 10 GHz

1) Based on the application described in chapter 3
2) PCB losses are subtracted
3) To be within 1 dB of the final gain
4) High gain mode: Input power = -30 dBm for each tone / Bypass mode: Input power = -10 dBm for each tone

3 Application Information

Application Board Configuration

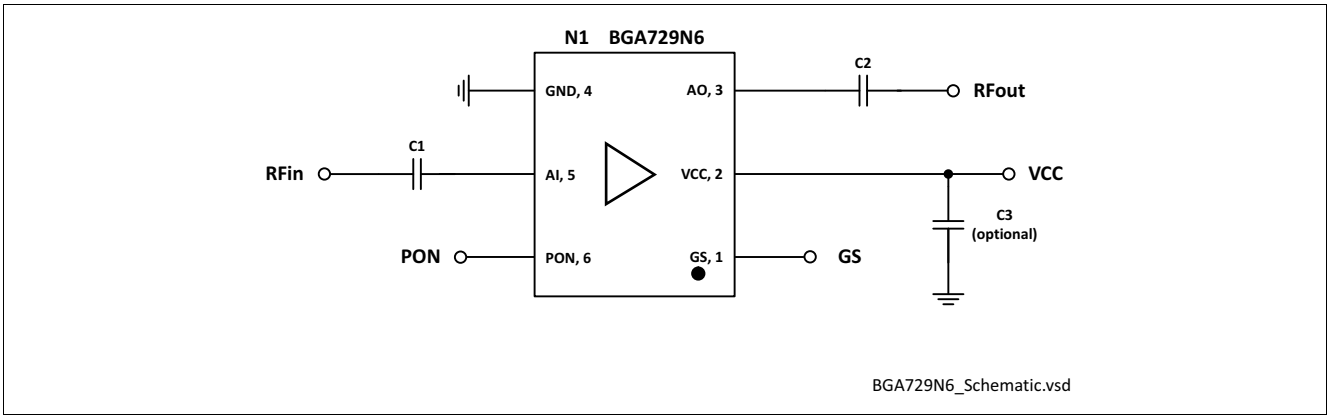

Figure 2 Application Schematic BGA729N6

Table 5 Bill of Materials

Name	Value	Package	Manufacturer	Function
C1	1 nF	0402	Various	DC block [1)]
C2	1 nF	0402	Various	DC block [1)]
C3 (optional)	≥ 1 nF	0402	Various	RF bypass [2)]
N1	BGA729N6	TSNP-6-2	Infineon	SiGe LNA

1) DC block might be necessary due to internal LNA bias voltage @ AI (LNA Analog Input pin). The DC block can be realized with pre-filter (e.g. SAW)

2) RF bypass recommended to mitigate power supply noise

Note: No external DC blocking capacitor at RFout is required in typical applications as long as no DC is applied.

A list of all application notes is available at **http://www.infineon.com/ltelna**

4 Package Information

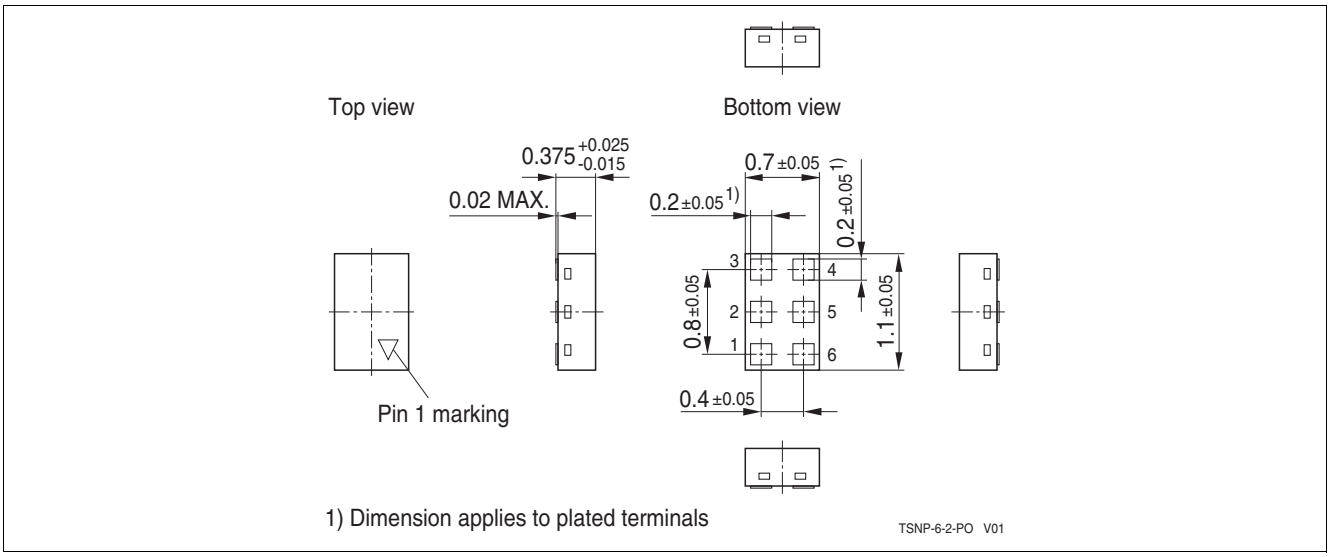

Figure 3 TSNP-6-2 Package Outline (top, side and bottom views)

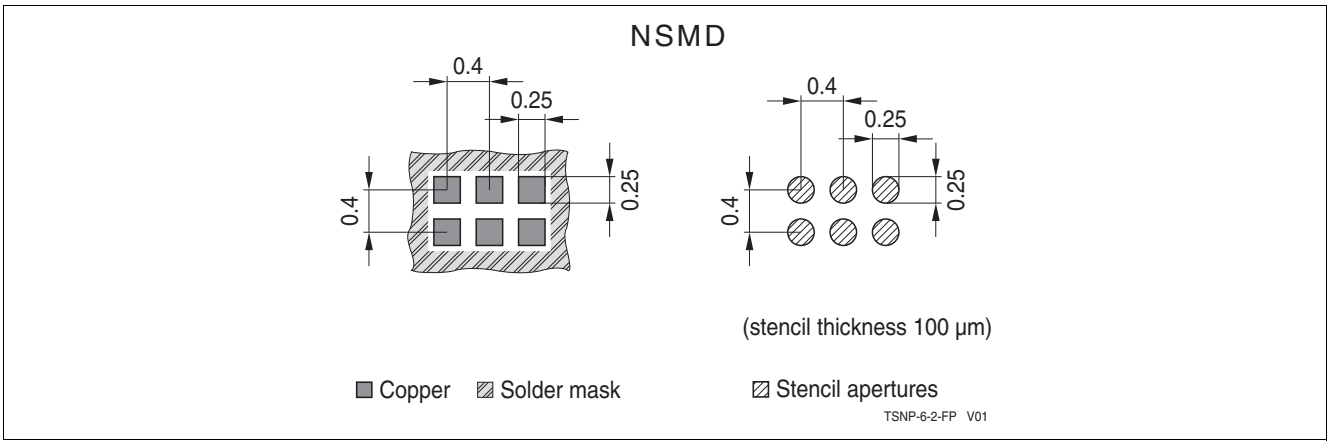

Figure 4 Footprint Recommendation TSNP-6-2

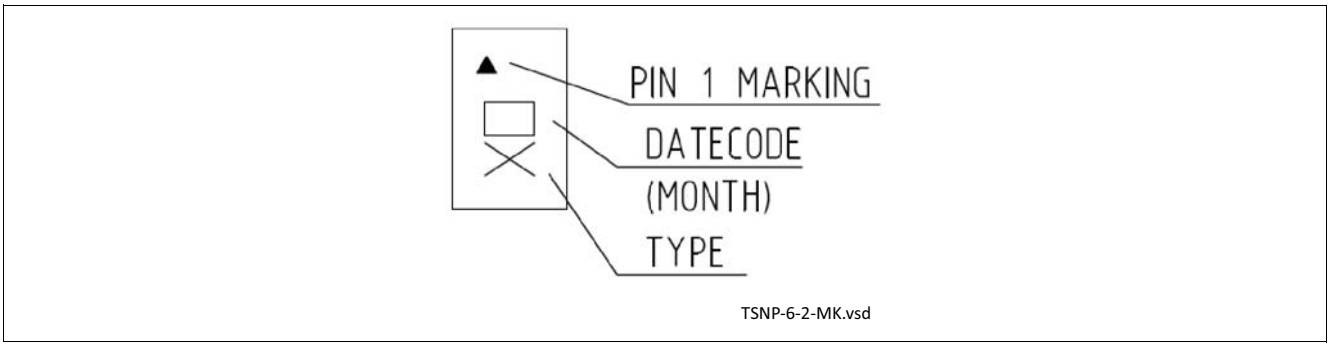

Figure 5 Marking Layout (top view)

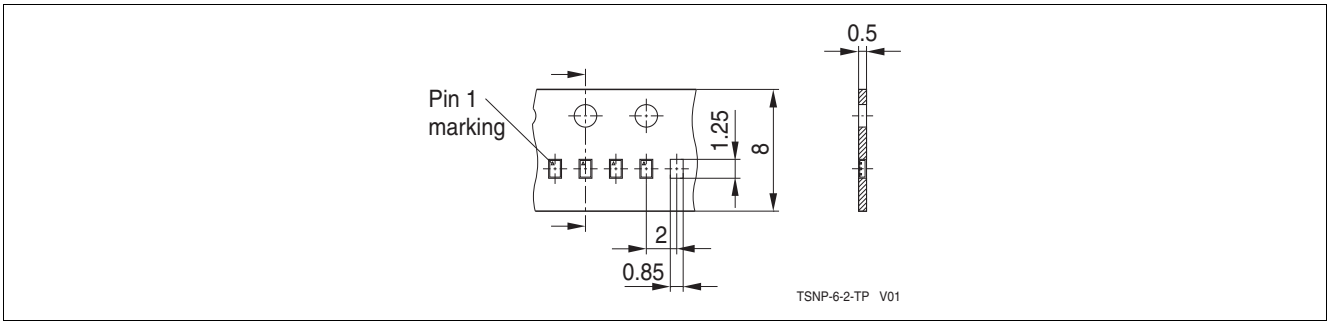

Figure 6 Tape & Reel Dimensions (reel diameter 180 mm, pieces/reel 15000)

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