

# BGU7041

## 1 GHz wideband low-noise amplifier

Rev. 2 — 13 September 2011

Product data sheet

## 1. Product profile

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### 1.1 General description

The BGU7041 MMIC is a 3.3 V wideband amplifier with internal biasing. It is designed specifically for high linearity, low-noise applications over a frequency range of 40 MHz to 1 GHz. It is especially suited for Set-Top Box applications.

The LNA is housed in a 6-pin SOT363 plastic SMD package.

### 1.2 Features and benefits

- Voltage supply of 3.3 V
- Internally biased
- Gain of 10 dB
- Flat gain between 40 MHz and 1 GHz
- Noise figure of 3.8 dB
- High linearity with an  $IP3_O$  of 29 dBm
- 75  $\Omega$  input and output impedance
- ESD protection > 2 kV Human Body Model (HBM) and > 1.5 kV Charged Device Model (CDM) on all pins

### 1.3 Applications

- Terrestrial Silicon and cable Set-Top Boxes (STB)
- Silicon and “Can” tuners
- Personal Video Recorders (PVR) and Digital Video Recorders (DVR)
- Home networking and in-house signal distribution



### 1.4 Quick reference data

**Table 1. Quick reference data**

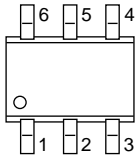
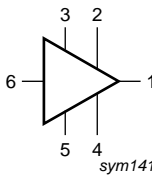
$T_{amb} = 25\text{ }^{\circ}\text{C}$ ; typical values at  $V_{CC} = 3.3\text{ V}$ ;  $Z_S = Z_L = 75\ \Omega$ ;  $R_{bias} = 7.5\ \Omega$ ;  $40\text{ MHz} \leq f_1 \leq 1000\text{ MHz}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CC}$	supply voltage	RF input AC coupled	3.1	3.3	3.5	V
$I_{CC(tot)}$	total supply current		-	38	-	mA
$T_{amb}$	ambient temperature		-10	-	+70	$^{\circ}\text{C}$
NF	noise figure		-	3.8	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	1 GHz	-	12	-	dBm
IP3O	output third-order intercept point		[1]	29	-	dBm

[1] The fundamental frequency ( $f_1$ ) is 1000 MHz. The intermodulation product (IM3) is  $2 \times f_2 - f_1$ , where  $f_2 = f_1 \pm 1\text{ MHz}$ . Input power  $P_1 = -10\text{ dBm}$ .

## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	RF_OUT		
2	$V_{CC}$		
3	n.c.		
4	n.c.		
5	GND		
6	RF_IN		

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		Version
	Name	Description	
BGU7041	-	plastic surface-mounted package; 6 leads	SOT363

## 4. Marking

**Table 4. Marking**

Type number	Marking code	Description
BGU7041	*VA	* = p : made in Hong Kong * = W : made in China * = t : made in Malaysia

## 5. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage	RF input AC coupled	-0.6	3.5	V
I <sub>CC(tot)</sub>	total supply current	configurable with external resistor	-	60	mA
P <sub>tot</sub>	total power dissipation	T <sub>sp</sub> ≤ 100 °C	[1]	250	mW
P <sub>i</sub>	input power	single tone	-	10	dBm
T <sub>stg</sub>	storage temperature		-65	+150	°C
T <sub>j</sub>	junction temperature		-	150	°C
T <sub>amb</sub>	ambient temperature		-10	+70	°C
V <sub>ESD</sub>	electrostatic discharge voltage	Human Body Model (HBM); according to JEDEC standard 22-A114E	2	-	kV
		Charged Device Model (CDM); according to JEDEC standard 22-C101B	1.5	-	kV

[1] T<sub>sp</sub> is the temperature at the solder point of the ground lead.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		240	K/W

## 7. Characteristics

**Table 7. Characteristics**

T<sub>amb</sub> = 25 °C; typical values at V<sub>CC</sub> = 3.3 V; Z<sub>S</sub> = Z<sub>L</sub> = 75 Ω; R<sub>bias</sub> = 7.5 Ω; 40 MHz ≤ f<sub>1</sub> ≤ 1000 MHz.

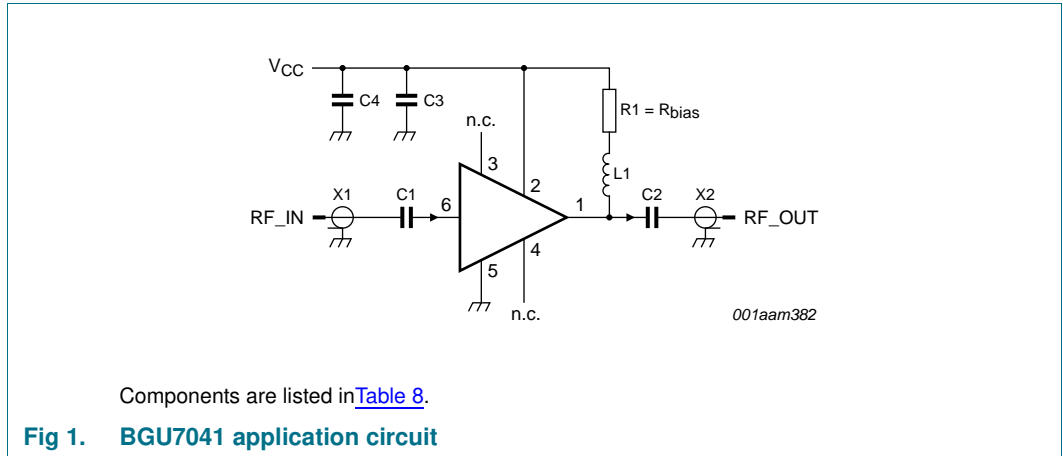
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CC</sub>	supply voltage	RF input AC coupled	3.1	3.3	3.5	V
I <sub>CC(tot)</sub>	total supply current		-	38	-	mA
S <sub>21</sub>   <sup>2</sup>	insertion power gain		-	10	-	dB
SL <sub>sl</sub>	slope straight line		-	-1	-	dB
FL	flatness of frequency response		-	0.2	-	dB
NF	noise figure		-	3.8	-	dB
RL <sub>in</sub>	input return loss		-	21	-	dB
RL <sub>out</sub>	output return loss		-	12	-	dB
P <sub>L(1dB)</sub>	output power at 1 dB gain compression	1 GHz	-	12	-	dBm
IP3 <sub>O</sub>	output third-order intercept point		[1]	29	-	dBm

[1] The fundamental frequency (f<sub>1</sub>) is 1000 MHz. The intermodulation product (IM3) is 2 × f<sub>2</sub> - f<sub>1</sub>, where f<sub>2</sub> = f<sub>1</sub> ± 1 MHz. Input power P<sub>i</sub> = -10 dBm.

## 8. Application information

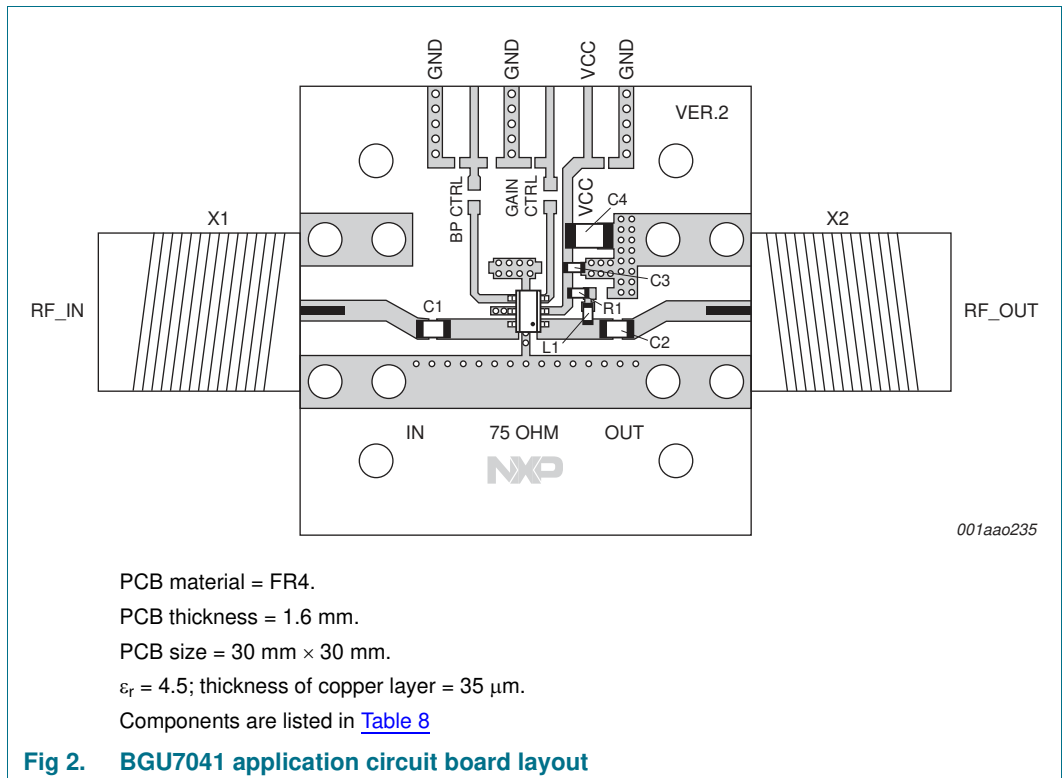
Other applications are possible. Please contact your local sales representative for more information. Application notes are available on the NXP website.

### 8.1 Application circuit



All control and supply lines must be decoupled properly. The decoupling capacitors must be placed as close to the device as possible.

### 8.2 Application circuit board layout



**Table 8. List of components**See [Figure 1](#) and [Figure 2](#)

Component	Description	Value	Remarks	Function
C1, C2	capacitor	10 nF		DC blocking
C3	capacitor	10 nF		decoupling
C4	capacitor	10 $\mu$ F		decoupling
L1	chip ferrite bead	1.5 k $\Omega$	[1] Murata BLM18HE152SN1DF	RF choke
R1	resistor	7.5 $\Omega$	[1] R <sub>bias</sub>	bias setting
X1, X2	connector	75 $\Omega$	F-connector, edge mount PCB reflow type, Bomar 861V509ERG	input/output

[1] L1 and R1 must have a power rating of 0.1 W or higher.

9. Package outline

Plastic surface-mounted package; 6 leads

SOT363

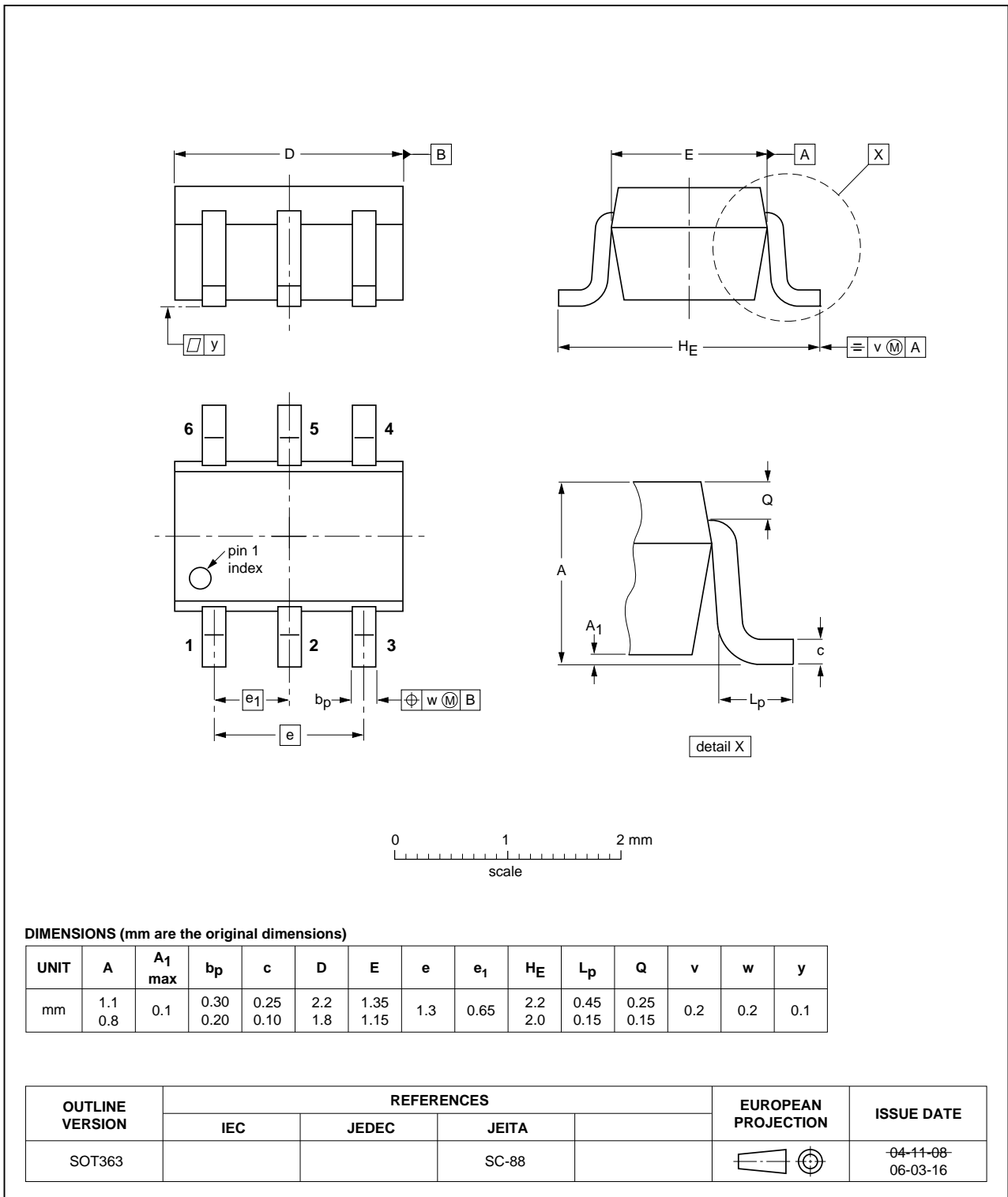


Fig 3. Package outline SOT363

## 10. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
AC	Alternating Current
DC	Direct Current
ESD	ElectroStatic Discharge
LNA	Low-Noise Amplifier
MMIC	Monolithic Microwave Integrated Circuit
PCB	Printed-Circuit Board
RF	Radio Frequency
SMD	Surface Mounted Device

## 11. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU7041 v.2	20110913	Product data sheet		BGU7041 v.1
Modifications:	<ul style="list-style-type: none"><li>Noise figure value updated</li></ul>			
BGU7041 v.1	20110629	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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