

BGU7032

1 GHz wideband low-noise amplifier with bypass

Rev. 2 — 14 September 2010

Product data sheet

1. Product profile

1.1 General description

The BGU7032 MMIC is a wideband amplifier with bypass mode. It is designed specifically for high linearity, low-noise applications over a frequency range of 40 MHz to 1 GHz. It is especially suited to Set-Top Box applications.

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

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features and benefits

- Internally biased
- Programmable between $G_p = 10$ dB and bypass
- Flat gain between 40 MHz and 1 GHz
- Noise figure of 4.5 dB
- High linearity with an $IP3_O$ of 29 dBm
- $75\ \Omega$ input and output impedance
- Power-down during bypass mode
- Bypass mode current consumption < 5 mA
- ESD protection > 2 kV Human Body Model (HBM) on all pins

1.3 Applications

- Terrestrial and cable Set-Top Boxes (STB)
- Silicon and “Can” tuners
- Personal and Digital Video Recorders (PVR and 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 $V_{CC} = 5\text{ V}$; $Z_S = Z_L = 75\text{ }\Omega$; $R_{bias} = 43\text{ }\Omega$; $40\text{ MHz} \leq f_1 \leq 1000\text{ MHz}$.

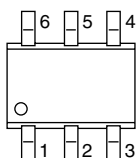
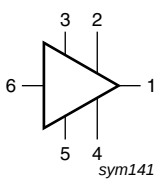
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage	RF input AC coupled	4.75	5.0	5.25	V
$I_{CC(tot)}$	total supply current	$G_p = 10\text{ dB mode}$	[1]	-	43	mA
		bypass mode	[1]	-	4	mA
T_{amb}	ambient temperature		-10	-	+70	$^{\circ}\text{C}$
NF	noise figure	$G_p = 10\text{ dB mode}$	[1]	-	4.5	dB
		bypass mode	[1]	-	2.5	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	1 GHz; $G_p = 10\text{ dB mode}$	[1]	-	14	dBm
IP3O	output third-order intercept point	$G_p = 10\text{ dB mode}$	[1][2]	-	29	dBm

[1] Mode depends on setting of V_{CTRL} ; see [Table 8](#).

[2] 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 $P_i = -10\text{ dBm}$.

2. Pinning information

Table 2. Pinning

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

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BGU7032	-	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 4. Marking codes

Type number	Marking code
BGU7032	SD%

Note: % character indicates the location of production.

5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage	RF input AC coupled	-0.6	5.25	V
$V_{ctrl(Gp)}$	power gain control voltage	pin CTRL	[1] 0	V_{CC}	V
$I_{CC(tot)}$	total supply current		-	60	mA
P_{tot}	total power dissipation	$T_{sp} \leq 100\text{ }^{\circ}\text{C}$	[2] -	250	mW
P_i	input power	single tone	-	10	dBm
T_{stg}	storage temperature		-65	+150	$^{\circ}\text{C}$
T_j	junction temperature		-	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature		-10	+70	$^{\circ}\text{C}$
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM); according to JEDEC standard 22-A114E	2	-	kV

[1] $V_{ctrl(Gp)}$ must not exceed V_{CC} ; I_{CTRL} must be limited to 5 mA (maximum).

[2] T_{sp} is the temperature at the solder point of the ground lead.

Remark: $V_{ctrl(Gp)}$ must not exceed V_{CC} ; I_{CTRL} must be limited to a maximum of 5 mA.

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		240	K/W

7. Characteristics

Table 7. Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values at $V_{CC} = 5\text{ V}$; $Z_S = Z_L = 75\text{ }\Omega$; $R_{bias} = 43\text{ }\Omega$; $40\text{ MHz} \leq f_1 \leq 1000\text{ MHz}$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage	RF input AC coupled	4.75	5.0	5.25	V
$I_{CC(tot)}$	total supply current	$G_p = 10\text{ dB mode}$	[1] -	43	-	mA
		bypass mode	[1] -	4	-	mA
$ S_{21} ^2$	insertion power gain	$G_p = 10\text{ dB mode}$	[1] -	10	-	dB
		bypass mode	[1] -	-2	-	dB
SL_{sl}	slope straight line		-	-1	-	dB
FL	flatness of frequency response		-	-0.2	-	dB
NF	noise figure	$G_p = 10\text{ dB mode}$	[1] -	4.5	-	dB
		bypass mode	[1] -	2.5	-	dB
RL_{in}	input return loss	$G_p = 10\text{ dB mode}$	[1] -	18	-	dB
		bypass mode	[1] -	8	-	dB

Table 7. Characteristics ...continued

$T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values at $V_{CC} = 5\text{ V}$; $Z_S = Z_L = 75\text{ }\Omega$; $R_{bias} = 43\text{ }\Omega$; $40\text{ MHz} \leq f_1 \leq 1000\text{ MHz}$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RL _{out}	output return loss	$G_p = 10\text{ dB}$ mode	[1] -	12	-	dB
		bypass mode	[1] -	8	-	dB
P _{L(1dB)}	output power at 1 dB gain compression	1 GHz; $G_p = 10\text{ dB}$ mode	[1] -	14	-	dBm
IP3 _O	output third-order intercept point	$G_p = 10\text{ dB}$ mode	[1][2] -	29	-	dBm
		bypass mode	[1][2] -	29	-	dBm

[1] Mode depends on setting of $V_{ctrl(Gp)}$ (V_{CTRL}); see Table 8.

[2] 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 $P_i = -10\text{ dBm}$.

Table 8. Gain selection (pin CTRL)

$-10\text{ }^{\circ}\text{C} \leq T_{amb} \leq +70\text{ }^{\circ}\text{C}$; recommended power-up condition: $V_{CTRL} = \text{logic } 0 \text{ or } < 0.7\text{ V}$.

$V_{ctrl(Gp)}$ (V_{CTRL}) (V)	Mode
≤ 0.7	bypass
≥ 4.3	$G_p = 10\text{ dB}$

Remark: $V_{ctrl(Gp)}$ must not exceed V_{CC} ; I_{CTRL} must be limited to a maximum of 5 mA.

Table 9. List of componentsSee [Figure 1](#) and [Figure 2](#).

Component	Description	Value	Remarks	Function
C1, C2	capacitor	10 nF		DC blocking
C3, C4	capacitor	10 nF		decoupling
C5	capacitor	10 μ F		decoupling
L1	chip ferrite bead	1.5 k Ω	[1] Murata BLM18HE152SN1DF	RF choke
R1	resistor	43 Ω	[1] R _{bias}	bias setting
R2	resistor	1.8 k Ω		current limiting
X1, X2	connector	75 Ω	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

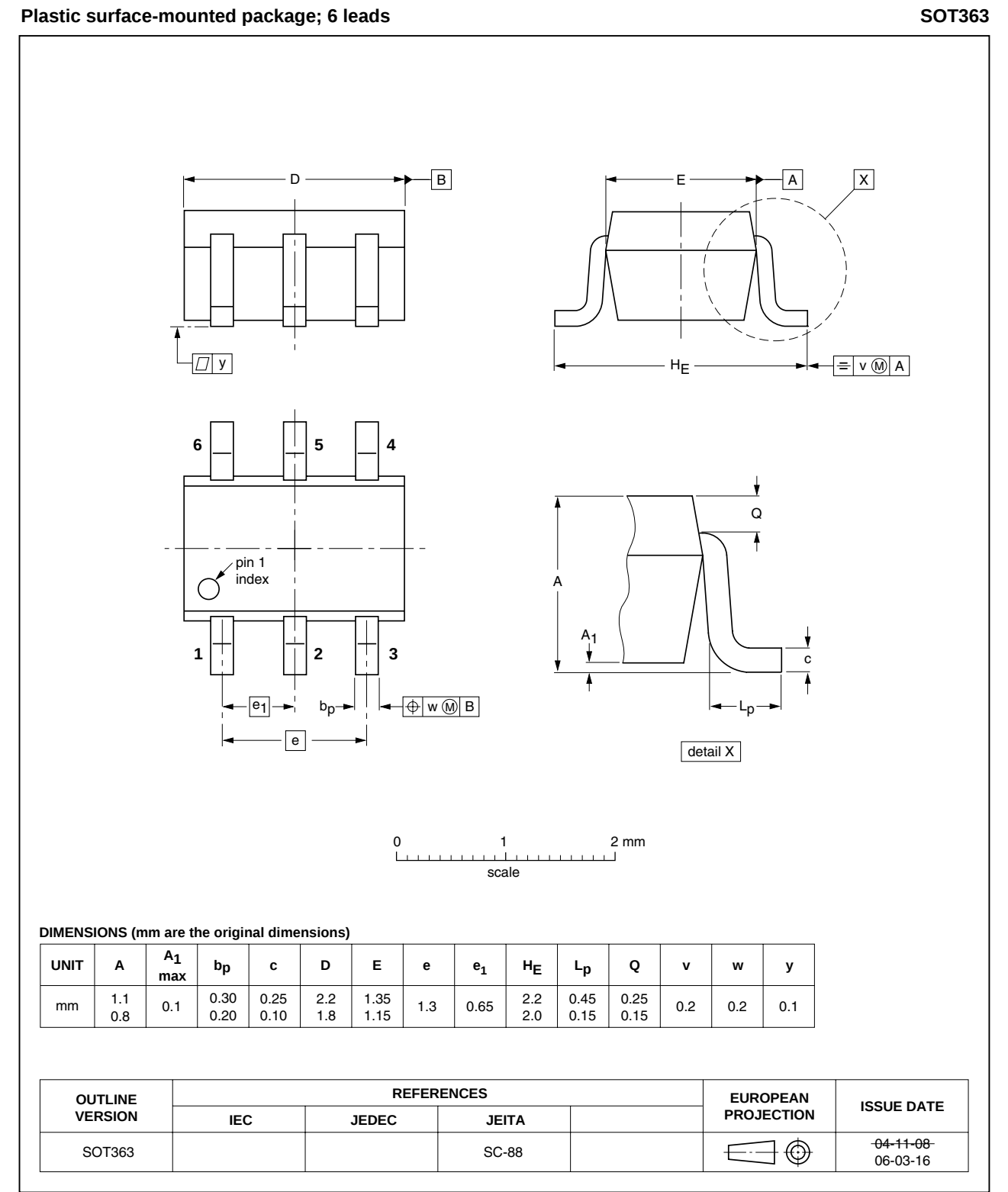


Fig 3.
Package outline SOT363

10. Abbreviations

Table 10. Abbreviations

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

11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU7032 v.2	20100914	Product data sheet	-	BGU7032 v.1
Modifications:	• The status of this data sheet has been changed to Product data sheet.			
BGU7032 v.1	20100817	Preliminary data sheet	-	-

12. Legal information

12.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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