BGU7061

Analog high linearity low noise variable gain amplifier

Rev. 2 — 29 January 2015

Product data sheet

1. Product profile

1.1 General description

The BGU7061 is a fully integrated analog-controlled variable gain amplifier module. Its low noise and high linearity performance makes it ideal for sensitive receivers in cellular base station applications. The BGU7061 is operating in the 770 MHz to 915 MHz frequency range and has a gain control range of more than 35 dB. At maximum gain the noise figure is 0.74 dB. The gain is analog-controlled having maximum gain at 0 V and minimum gain at 3.3 V. The LNA can be bypassed extending the dynamic range. The BGU7061 is internally matched to 50 ohm, meaning no external matching is required, enabling ease of use. It is housed in a 16 pins 8 mm × 8 mm × 1.3 mm leadless HLQFN16R package SOT1301.

1.2 Features and benefits

- Input and output internally matched to 50 Ω
- Low noise figure of 0.74 dB
- High input IP3 of 2 dBm
- High $P_{i(1dB)}$ of −12.5 dBm
- Bypass mode of LNA giving high dynamic gain range
- Gain control range of 0 dB to 35 dB
- Single 5 V supply
- Single analog gain control of 0 V to 3.3 V
- Unconditionally stable up to 12.75 GHz
- Moisture sensitivity level 3
- ESD protection at all pins

1.3 Applications

- Cellular base stations, remote radio heads
- 3G, LTE infrastructure
- Low noise applications with variable gain and high linearity requirements
- Active antenna

1.4 Quick reference data

Table 1.   Quick reference data

GS1 = LOW; GS2 = HIGH (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; T_{amb} = 25 °C; input and output 50 Ω;
*unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
f = 900 MHz							
$I_{CC(tot)}$	total supply current	high gain mode	[1]	197	229	267	mA
		low gain mode	[2]	175	199	230	mA
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	[1]	-	0.74	-	dB
		G_p = 35 dB	[1]	-	0.87	1.05	dB
IP3$_I$	input third-order intercept point	G_p = 35 dB; 2-tone; tone-spacing = 1.0 MHz	[1]	1	2.0	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	[1]	−13.5	−12.5	-	dBm
f = 788 MHz							
$I_{CC(tot)}$	total supply current	high gain mode	[1]	197	229	267	mA
		low gain mode	[2]	175	199	230	mA
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	[1]	-	0.64	-	dB
		G_p = 35 dB	[1]	-	0.86	1.05	dB
IP3$_I$	input third-order intercept point	G_p = 35 dB; 2-tone; tone-spacing = 1.0 MHz	[1]	0	1.3	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	[1]	−13.5	−12.4	-	dBm
f = 830 MHz							
$I_{CC(tot)}$	total supply current	high gain mode	[1]	197	229	267	mA
		low gain mode	[2]	175	199	230	mA
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	[1]	-	0.61	-	dB
		G_p = 35 dB	[1]	-	0.75	1.05	dB
IP3$_I$	input third-order intercept point	G_p = 35 dB; 2-tone; tone-spacing = 1.0 MHz	[1]	0.5	1.5	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	[1]	−13.5	−12.4	-	dBm
f = 850 MHz							
$I_{CC(tot)}$	total supply current	high gain mode	[1]	197	229	267	mA
		low gain mode	[2]	175	199	230	mA
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	[1]	-	0.64	-	dB
		G_p = 35 dB	[1]	-	0.77	1.05	dB
IP3$_I$	input third-order intercept point	G_p = 35 dB; 2-tone; tone-spacing = 1.0 MHz	[1]	0.5	1.6	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	[1]	−13.5	−12.4	-	dBm

[1]   high gain mode: GS1 = LOW; GS2 = HIGH (see Table 15)

[2]   low gain mode: GS1 = HIGH; GS2 = LOW (see Table 15)

BGU7061

Product data sheet **Rev. 2 — 29 January 2015** **2 of 27**

2. Pinning information

2.1 Pinning

Fig 1.   Pin configuration
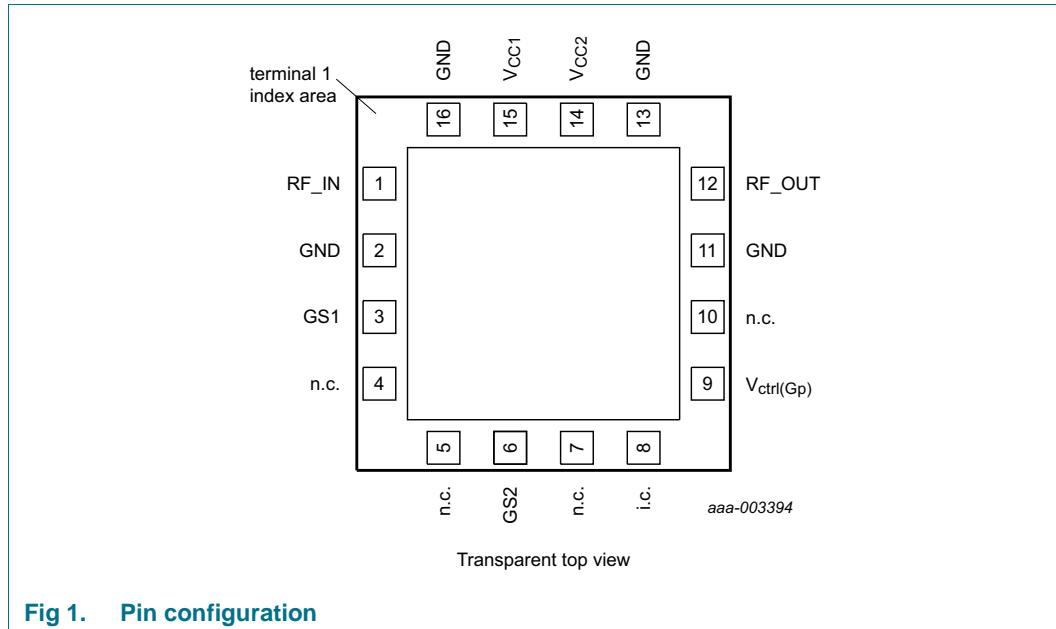
2.2 Pin description

Table 2.   Pin description

Symbol	Pin	Description
RF_IN	1	RF input
GND	2, 11, 13, 16	ground
GS1	3	gain switch control 1
n.c.	4, 5, 7, 10	not connected, internally open
GS2	6	gain switch control 2
i.c.	8	internally connected to ground
$V_{ctrl(Gp)}$	9	power gain control voltage
RF_OUT	12	RF output
V_{CC2}	14	supply voltage 2
V_{CC1}	15	supply voltage 1

3. Ordering information

Table 3.   Ordering information

| Type number	Package		
	Name	**Description**	**Version**
BGU7061	HLQFN16R	plastic thermal enhanced low quad flat package; no leads; 16 terminals; body $8 \times 8 \times 1.3$ mm	SOT1301-1

4.　Functional diagram

Fig 2.　Functional diagram
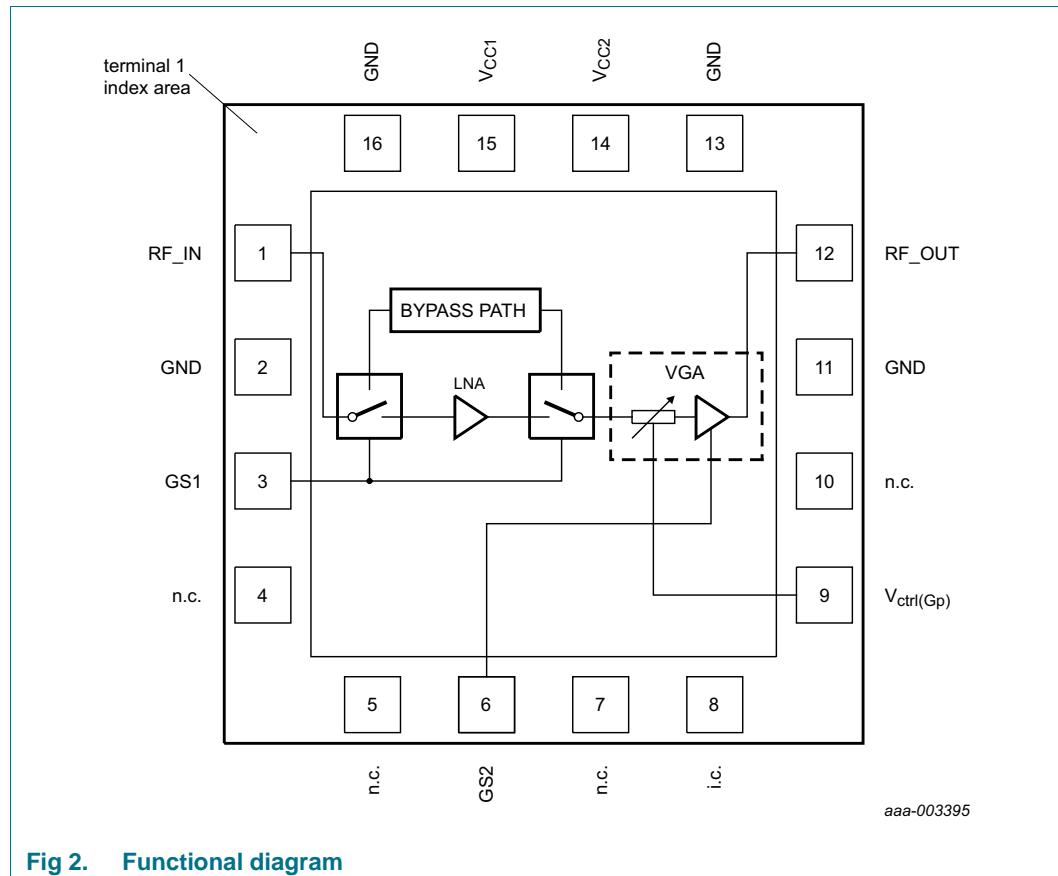
5. Limiting values

Table 4.   Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CC}	supply voltage			0	6	V
$V_{ctrl(Gp)}$	power gain control voltage			−1	+3.6	V
$V_{I(GS1)}$	input voltage on pin GS1			−1	+3.6	V
$V_{I(GS2)}$	input voltage on pin GS2			−1	+3.6	V
$P_{i(RF)CW}$	continuous waveform RF input power	$V_{ctrl(Gp)}$ = 0 V; 777 MHz ≤ f ≤ 915 MHz				
		high gain mode	[1]	-	10	dBm
		low gain mode	[2]	-	15	dBm
T_j	junction temperature			-	150	°C
T_{stg}	storage temperature			−40	+150	°C
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM); according to ANSI/ESDA-JEDEC JS-001-2020-Device Testing, Human Body Model		-	±2	kV
		Charged Device Model (CDM); according to JEDEC standard 22-C101		-	±750	V

[1]   high gain mode: GS1 = LOW; GS2 = HIGH (see Table 15)

[2]   low gain mode: GS1 = HIGH; GS2 = LOW (see Table 15)

6. Recommended operating conditions

Table 5.   Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC1}	supply voltage 1		4.75	5	5.25	V
V_{CC2}	supply voltage 2		4.75	5	5.25	V
$V_{ctrl(Gp)}$	power gain control voltage		0	-	3.3	V
$V_{I(GS1)}$	input voltage on pin GS1		0	-	3.3	V
$V_{I(GS2)}$	input voltage on pin GS2		0	-	3.3	V
Z_0	characteristic impedance		-	50	-	Ω
T_{case}	case temperature		−40	-	+85	°C

7. Thermal characteristics

Table 6.   Thermal characteristics

Symbol	Parameter	Conditions		Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case		[1]	42	K/W

[1]   The case temperature is measured at the ground solder pad.

8. Characteristics

8.1 Characteristics at f = 900 MHz

Table 7. Characteristics high gain mode

GS1 = LOW; GS2 = HIGH (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 900 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		197	229	267	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	12.7	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	36.7	-	dB
$G_{p(flat)}$	power gain flatness	880 MHz $\leq$ f $\leq$ 915 MHz; 18 dB $\leq$ G_p $\leq$ 35 dB	-	0.0	-	dB
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	0.74	-	dB
		G_p = 35 dB	-	0.87	1.05	dB
		G_p = 18 dB	-	6.47	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		G_p = 35 dB	1	2.0	-	dBm
		G_p = 30 dB	-	4.8	-	dBm
		G_p = 29 dB	-	5.0	-	dBm
		G_p = 18 dB	-	6.3	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	−13.5	−12.5	-	dBm
		G_p = 30 dB	-	−7.6	-	dBm
		G_p = 29 dB	-	−6.8	-	dBm
		G_p = 18 dB	-	−4.8	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	30.5	-	dB
		G_p = 35 dB	-	28.0	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	17.5	-	dB
K	Rollett stability factor	0 GHz $\leq$ f $\leq$ 12.75 GHz	1	-	-	

Table 8. Characteristics low gain mode

GS1 = HIGH; GS2 = LOW (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 900 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		175	199	230	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	−5.9	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	18.3	-	dB
$G_{p(flat)}$	power gain flatness	880 MHz $\leq$ f $\leq$ 915 MHz; 3 dB $\leq$ G_p $\leq$ 17 dB	-	0.0	-	dB
NF	noise figure	G_p = 17 dB	-	11.2	-	dB
		G_p = 3 dB	-	22.9	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz			-	
		G_p = 17 dB	-	21.4	-	dBm
		G_p = 12 dB	-	26.5	-	dBm
		G_p = 11 dB	-	27.4	-	dBm
		G_p = 3 dB	-	31.2	-	dBm

BGU7061

All information provided in this document is subject to legal disclaimers.

© NXP Semiconductors N.V. 2015. All rights reserved.

Product data sheet **Rev. 2 — 29 January 2015** 6 of 27

Table 8. **Characteristics low gain mode** *…continued*
GS1 = HIGH; GS2 = LOW (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 900 MHz; T_{amb} = 25 ℃; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 17 dB	-	5.6	-	dBm
		G_p = 12 dB	-	10.4	-	dBm
		G_p = 11 dB	-	11.1	-	dBm
		G_p = 3 dB	-	13.2	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	25.1	-	dB
		G_p = 17 dB	-	22.7	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	18.3	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

8.2 Characteristics at f = 788 MHz

Table 9. **Characteristics high gain mode**
GS1 = LOW; GS2 = HIGH (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 788 MHz; T_{amb} = 25 ℃; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		197	229	267	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	12.6	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	37.3	-	dB
$G_{p(flat)}$	power gain flatness	777 MHz ≤ f ≤ 798 MHz; 18 dB ≤ G_p ≤ 35 dB	-	0.1	-	dB
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	0.64	-	dB
		G_p = 35 dB	-	0.86	1.05	dB
		G_p = 18 dB	-	6.27	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		G_p = 35 dB	0	1.3	-	dBm
		G_p = 30 dB	-	3.5	-	dBm
		G_p = 29 dB	-	3.7	-	dBm
		G_p = 18 dB	-	5.5	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	−13.5	−12.4	-	dBm
		G_p = 30 dB	-	−7.8	-	dBm
		G_p = 29 dB	-	−7.1	-	dBm
		G_p = 18 dB	-	−5.6	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	20.0	-	dB
		G_p = 35 dB	-	20.5	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	18.6	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

BGU7061

Product data sheet **Rev. 2 — 29 January 2015** **7 of 27**

Table 10. Characteristics low gain mode

GS1 = HIGH; GS2 = LOW (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 788 MHz; T_{amb} = 25 ℃; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		175	199	230	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	−5.9	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	18.8	-	dB
$G_{p(flat)}$	power gain flatness	777 MHz ≤ f ≤ 798 MHz; 3 dB ≤ G_p ≤ 17 dB	-	0.0	-	dB
NF	noise figure	G_p = 17 dB	-	11.4	-	dB
		G_p = 3 dB	-	22.9	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz			-	
		G_p = 17 dB	-	21.0	-	dBm
		G_p = 12 dB	-	25.7	-	dBm
		G_p = 11 dB	-	26.8	-	dBm
		G_p = 3 dB	-	32.1	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 17 dB	-	5.8	-	dBm
		G_p = 12 dB	-	10.5	-	dBm
		G_p = 11 dB	-	11.2	-	dBm
		G_p = 3 dB	-	13.9	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	25.6	-	dB
		G_p = 17 dB	-	25.8	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	21.0	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

8.3 Characteristics at f = 830 MHz

Table 11. Characteristics high gain mode

GS1 = LOW; GS2 = HIGH (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz; T_{amb} = 25 ℃; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		197	229	267	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	12.7	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	36.8	-	dB
$G_{p(flat)}$	power gain flatness	815 MHz ≤ f ≤ 840 MHz; 18 dB ≤ G_p ≤ 35 dB	-	0.1	-	dB
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	0.61	-	dB
		G_p = 35 dB	-	0.75	1.05	dB
		G_p = 18 dB	-	5.49	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		G_p = 35 dB	0.5	1.5	-	dBm
		G_p = 30 dB	-	4.0	-	dBm
		G_p = 29 dB	-	4.3	-	dBm
		G_p = 18 dB	-	6.0	-	dBm

Table 11. Characteristics high gain mode *…continued*

GS1 = LOW; GS2 = HIGH (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	−13.5	−12.4	-	dBm
		G_p = 30 dB	-	−7.6	-	dBm
		G_p = 29 dB	-	−6.9	-	dBm
		G_p = 18 dB	-	−4.8	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	24.0	-	dB
		G_p = 35 dB	-	24.8	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	18.0	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

Table 12. Characteristics low gain mode

GS1 = HIGH; GS2 = LOW (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		175	199	230	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	−6.1	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	18.4	-	dB
$G_{p(flat)}$	power gain flatness	815 MHz ≤ f ≤ 840 MHz; 3 dB ≤ G_p ≤ 17 dB	-	0.0	-	dB
NF	noise figure	G_p = 17 dB	-	10.4	-	dB
		G_p = 3 dB	-	22.0	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz			-	
		G_p = 17 dB	-	21.7	-	dBm
		G_p = 12 dB	-	26.9	-	dBm
		G_p = 11 dB	-	27.7	-	dBm
		G_p = 3 dB	-	31.4	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 17 dB	-	5.8	-	dBm
		G_p = 12 dB	-	10.5	-	dBm
		G_p = 11 dB	-	11.9	-	dBm
		G_p = 3 dB	-	13.6	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	25.5	-	dB
		G_p = 17 dB	-	24.0	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	19.4	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

8.4 Characteristics at f = 850 MHz

Table 13. Characteristics high gain mode

GS1 = LOW; GS2 = HIGH (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 850 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		197	229	267	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	12.7	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	36.7	-	dB
$G_{p(flat)}$	power gain flatness	825 MHz ≤ f ≤ 865 MHz; 18 dB ≤ G_p ≤ 35 dB	-	0.1	-	dB
NF	noise figure	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	0.64	-	dB
		G_p = 35 dB	-	0.77	1.05	dB
		G_p = 18 dB	-	5.54	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		G_p = 35 dB	0.5	1.6	-	dBm
		G_p = 30 dB	-	4.5	-	dBm
		G_p = 29 dB	-	4.7	-	dBm
		G_p = 18 dB	-	6.0	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 35 dB	−13.5	−12.4	-	dBm
		G_p = 30 dB	-	−7.6	-	dBm
		G_p = 29 dB	-	−6.9	-	dBm
		G_p = 18 dB	-	−5.1	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	25.1	-	dB
		G_p = 35 dB	-	26.5	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	17.5	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

Table 14. Characteristics low gain mode

GS1 = HIGH; GS2 = LOW (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 850 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC(tot)}$	total supply current		175	199	230	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)}$ = 3.3 V	-	−6.0	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)}$ = 0 V	-	18.3	-	dB
$G_{p(flat)}$	power gain flatness	825 MHz ≤ f ≤ 865 MHz; 3 dB ≤ G_p ≤ 17 dB	-	0.0	-	dB
NF	noise figure	G_p = 17 dB	-	10.4	-	dB
		G_p = 3 dB	-	22.1	-	dB
$IP3_I$	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz			-	
		G_p = 17 dB	-	21.6	-	dBm
		G_p = 12 dB	-	26.5	-	dBm
		G_p = 11 dB	-	27.5	-	dBm
		G_p = 3 dB	-	31.4	-	dBm

Table 14. Characteristics low gain mode …*continued*

GS1 = HIGH; GS2 = LOW (see Table 15); V_{CC1} = 5 V; V_{CC2} = 5 V; f = 850 MHz; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified. All RF parameters have been characterized at the device RF input and RF output terminals.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{i(1dB)}$	input power at 1 dB gain compression	G_p = 17 dB	-	5.7	-	dBm
		G_p = 12 dB	-	10.5	-	dBm
		G_p = 11 dB	-	11.2	-	dBm
		G_p = 3 dB	-	13.5	-	dBm
RL_{in}	input return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	25.1	-	dB
		G_p = 17 dB	-	23.5	-	dB
RL_{out}	output return loss	$V_{ctrl(Gp)}$ = 0 V (maximum power gain)	-	18.7	-	dB
K	Rollett stability factor	0 GHz $\leq$ f $\leq$ 12.75 GHz	1	-	-	

8.5 Gain switch truth table

Table 15. Gain switch truth table
V_{CC1} = 5 V; V_{CC2} = 5 V; T_{amb} = 25 °C

Gain mode	GS1		GS2	
	logic	V_{GS1}	logic	V_{GS2}
high gain mode	LOW	0 V to 0.5 V	HIGH	2 V to 3.3 V
low gain mode	HIGH	2 V to 3.3 V	LOW	0 V to 0.5 V

8.6 Graphs

GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V.

(1) T_{amb} = −40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Fig 3. Power gain as a function of frequency in high gain mode; typical values

GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V.

(1) T_{amb} = −40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Fig 4. Power gain as a function of frequency in low gain mode; typical values

BGU7061

All information provided in this document is subject to legal disclaimers.

© NXP Semiconductors N.V. 2015. All rights reserved.

Product data sheet **Rev. 2 — 29 January 2015** 11 of 27

GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V.

(1) T_{amb} = −40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Fig 5. Input return loss as a function of frequency in high gain mode; typical values
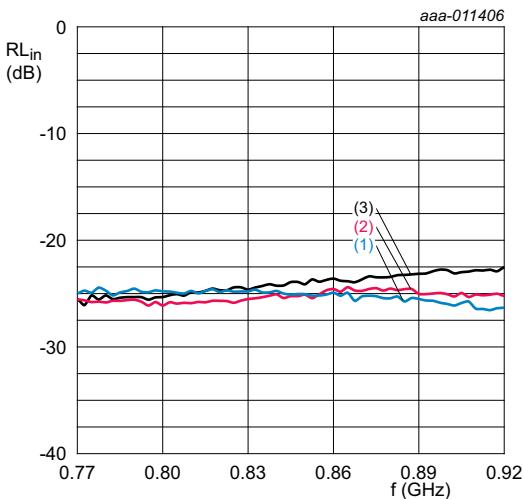
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V.

(1) T_{amb} = −40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Fig 6. Input return loss as a function of frequency in low gain mode; typical values
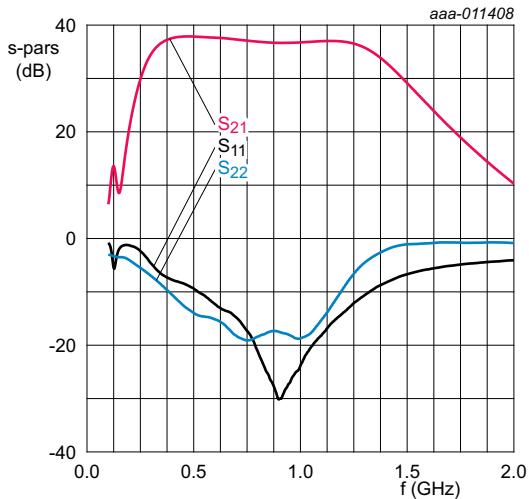
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V; T_{amb} = 25 °C.

Fig 7. S-parameters as a function of frequency in high gain mode; typical values
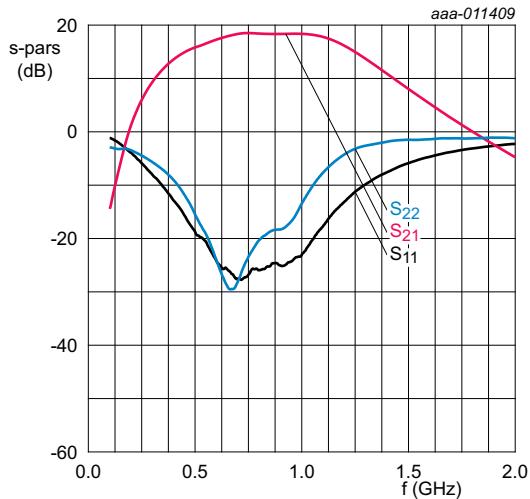
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V; T_{amb} = 25 °C.

Fig 8. S-parameters as a function of frequency in low gain mode; typical values
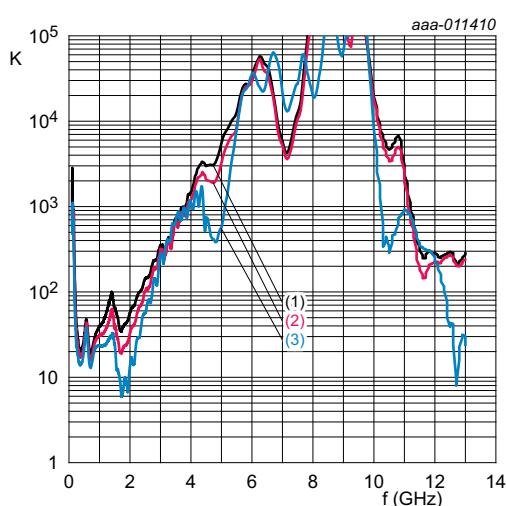
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 9. Rollet stability factor as a function of frequency in high gain mode; typical values
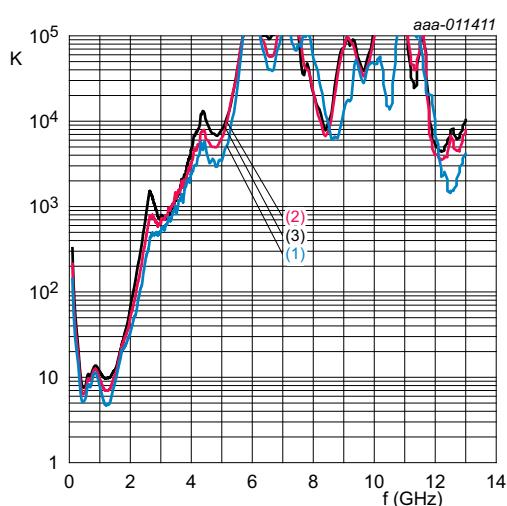
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; $V_{ctrl(Gp)}$ = 0 V.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 10. Rollet stability factor as a function of frequency in low gain mode; typical values
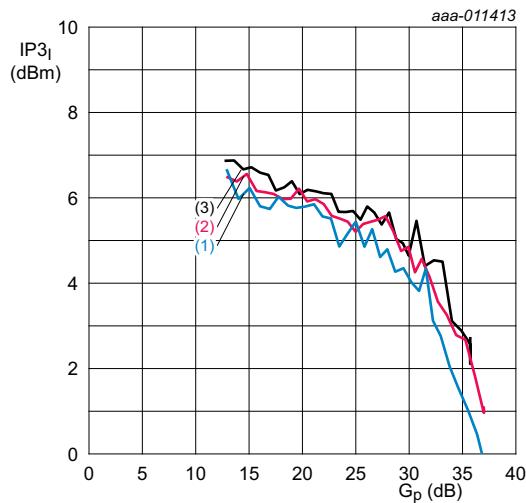
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 11. Input third-order intercept point as a function of power gain in high gain mode; typical values
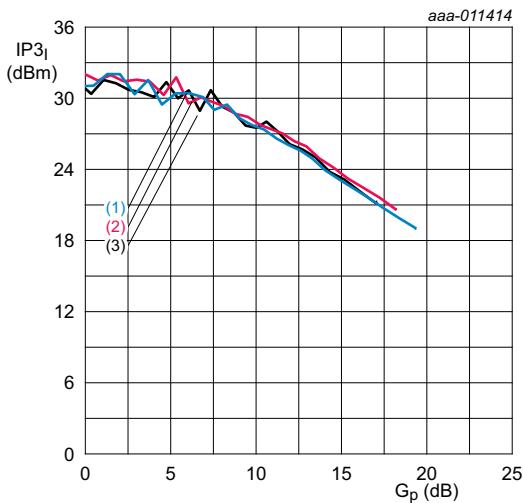
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 12. Input third-order intercept point as a function of power gain in low gain mode; typical values

BGU7061

Product data sheet **Rev. 2 — 29 January 2015** **13 of 27**
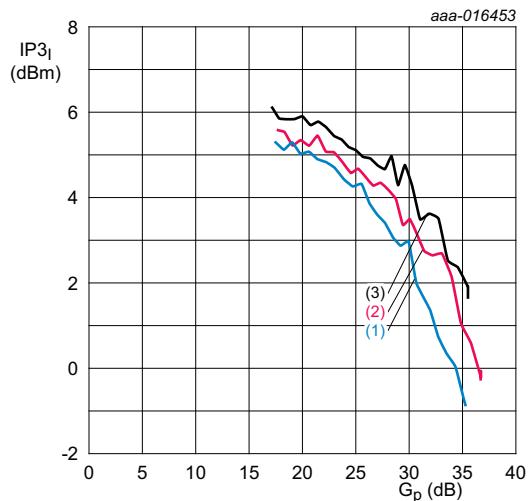
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 13. Input third-order intercept point as a function of power gain in high gain mode; typical values
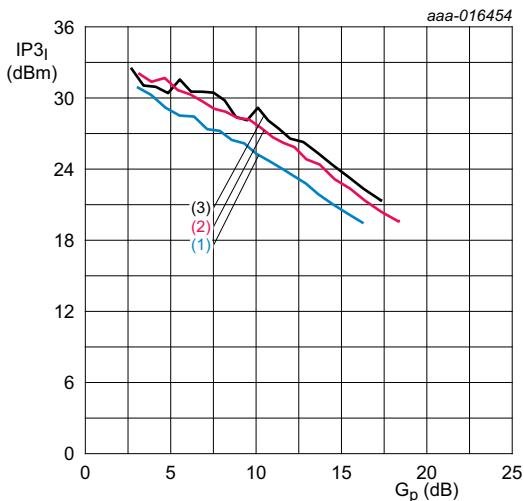
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 14. Input third-order intercept point as a function of power gain in low gain mode; typical values
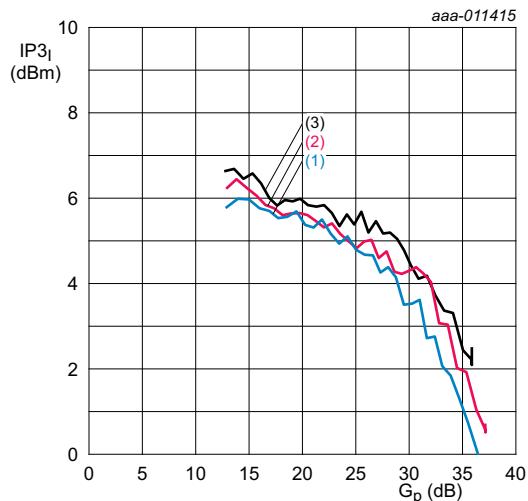
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 15. Input third-order intercept point as a function of power gain in high gain mode; typical values
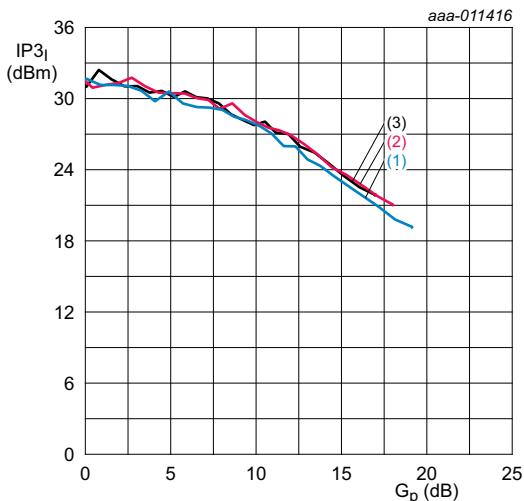
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 16. Input third-order intercept point as a function of power gain in low gain mode; typical values
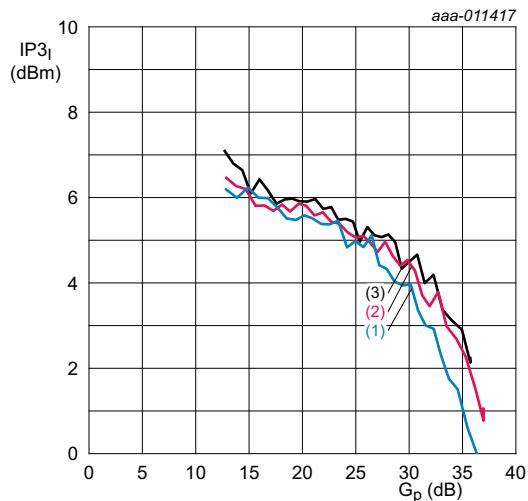
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 17. Input third-order intercept point as a function of power gain in high gain mode; typical values
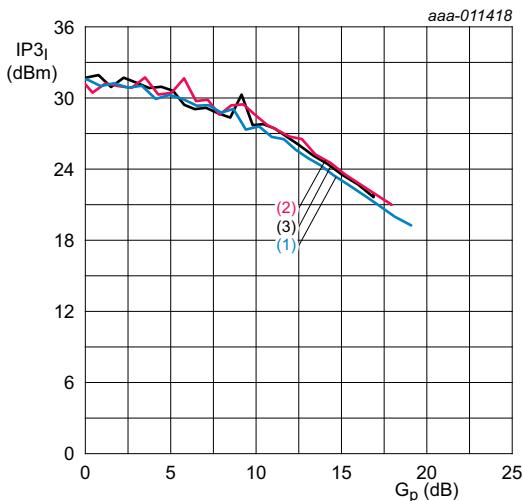
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 18. Input third-order intercept point as a function of power gain in low gain mode; typical values
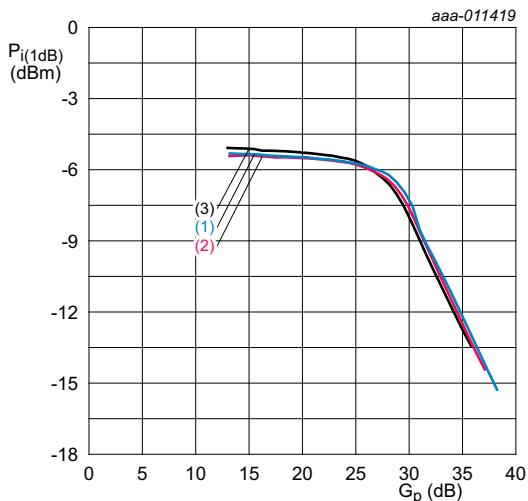
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 19. Input power at 1 dB gain compression as a function of power gain in high gain mode; typical values
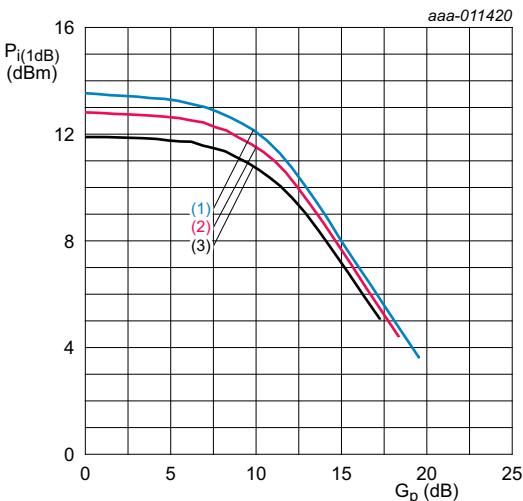
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 20. Input power at 1 dB gain compression as a function of power gain in low gain mode; typical values

BGU7061

All information provided in this document is subject to legal disclaimers.

© NXP Semiconductors N.V. 2015. All rights reserved.

Product data sheet **Rev. 2 — 29 January 2015** **15 of 27**

aaa-016455
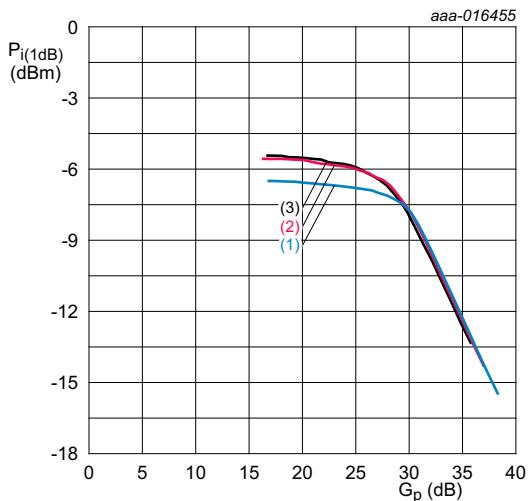
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 21. Input power at 1 dB gain compression as a function of power gain in high gain mode; typical values

aaa-016456
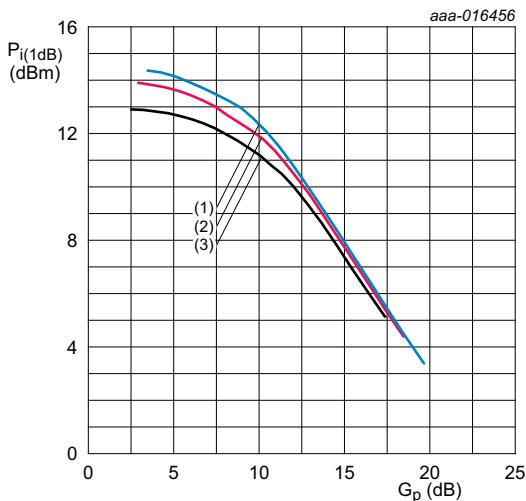
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 22. Input power at 1 dB gain compression as a function of power gain in low gain mode; typical values

aaa-011421
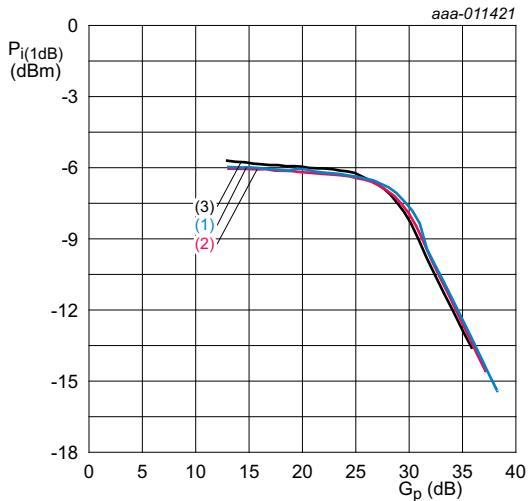
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 23. Input power at 1 dB gain compression as a function of power gain in high gain mode; typical values

aaa-011422
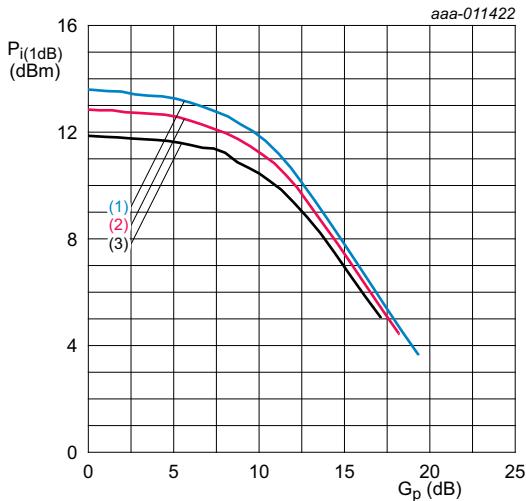
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 24. Input power at 1 dB gain compression as a function of power gain in low gain mode; typical values

BGU7061

Product data sheet **Rev. 2 — 29 January 2015** **16 of 27**
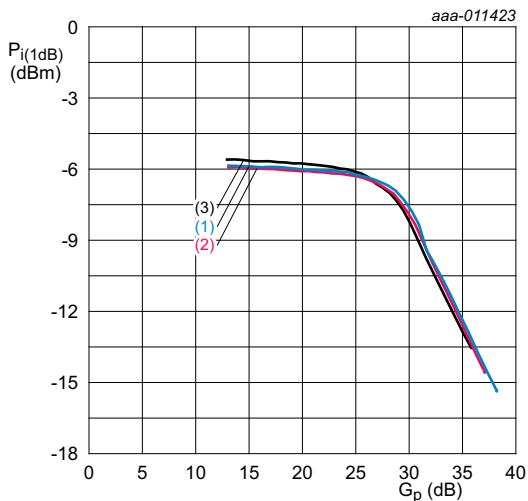
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 25. Input power at 1 dB gain compression as a function of power gain in high gain mode; typical values
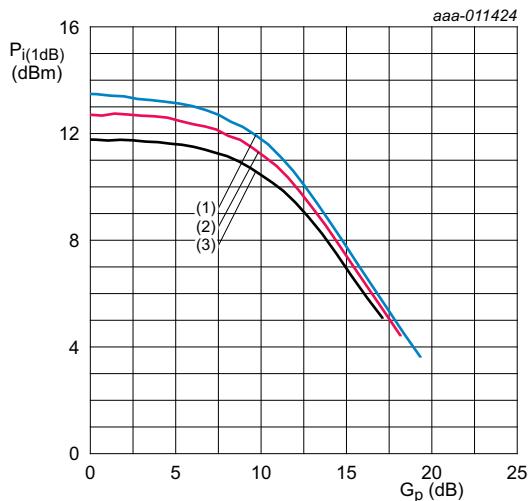
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

**Fig 26. Input power at 1 dB gain compression as a function of power gain in low gain mode; typical values**
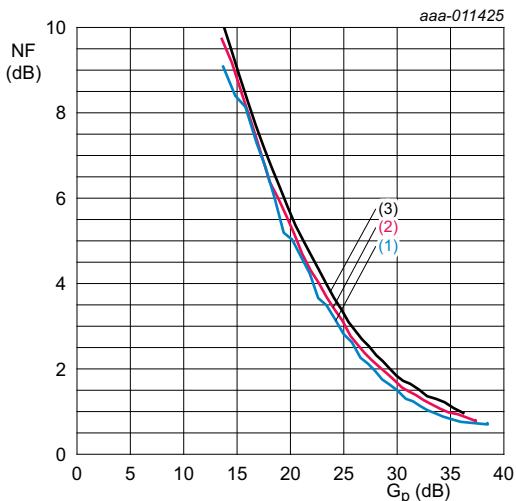
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 27. Noise figure as a function of power gain in high gain mode; typical values
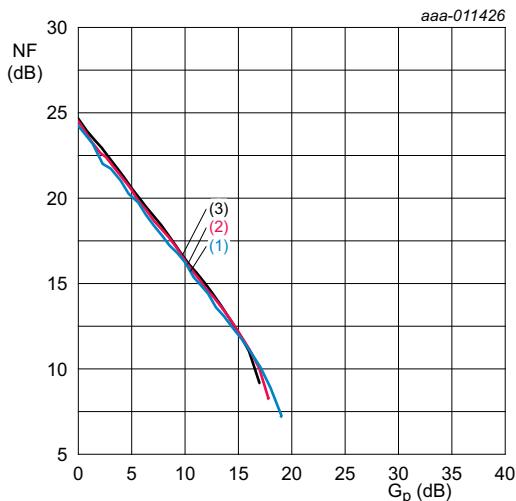
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 28. Noise figure as a function of power gain in low gain mode; typical values

BGU7061

All information provided in this document is subject to legal disclaimers.

© NXP Semiconductors N.V. 2015. All rights reserved.

Product data sheet **Rev. 2 — 29 January 2015** **17 of 27**
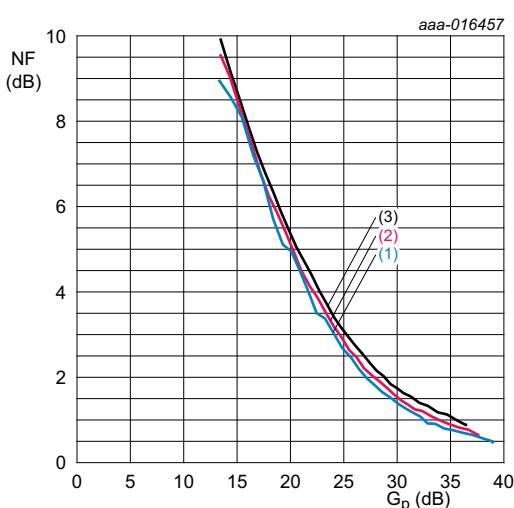
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 29.   Noise figure as a function of power gain in high gain mode; typical values
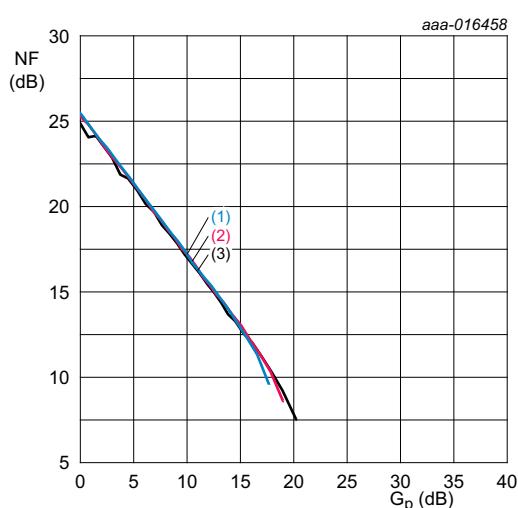
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 30.   Noise figure as a function of power gain in low gain mode; typical values
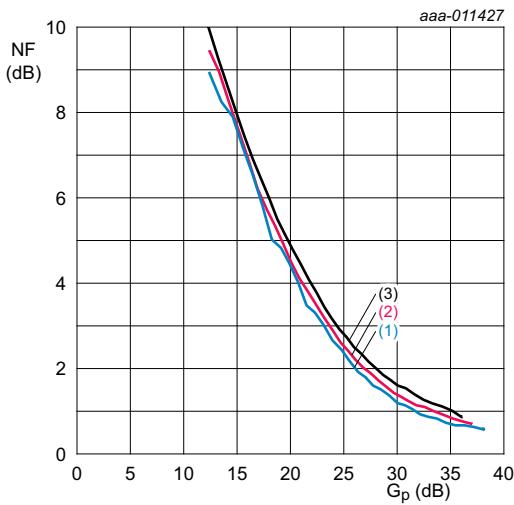
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 31.   Noise figure as a function of power gain in high gain mode; typical values
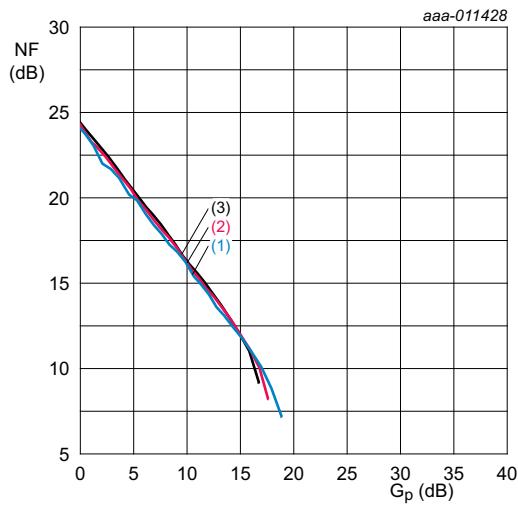
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 32.   Noise figure as a function of power gain in low gain mode; typical values
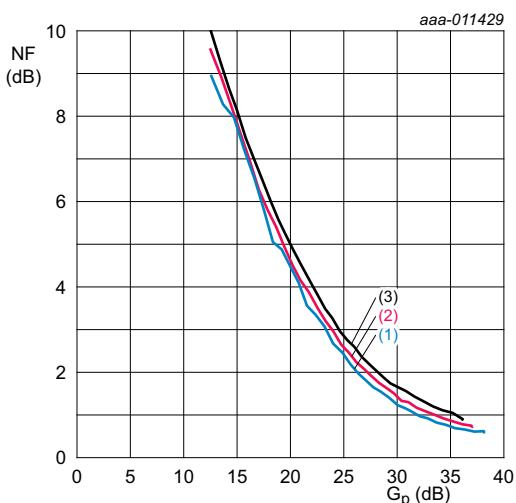
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 33. Noise figure as a function of power gain in high gain mode; typical values
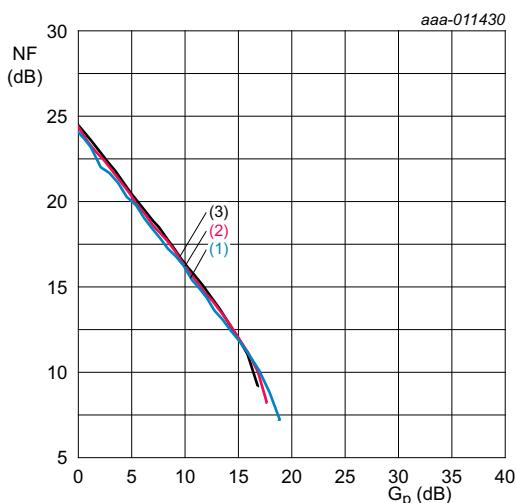
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 34. Noise figure as a function of power gain in low gain mode; typical values
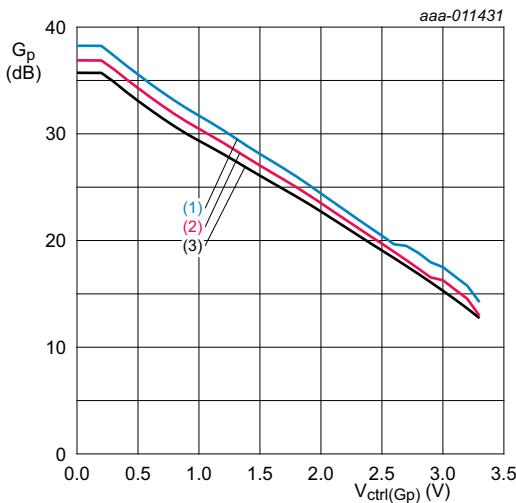
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 35. Power gain as a function of power gain control voltage in high gain mode; typical values
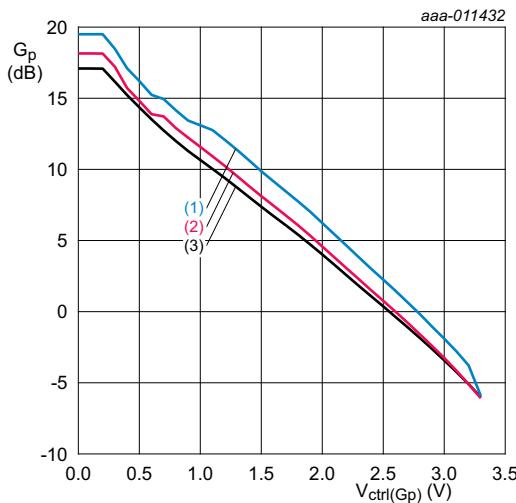
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 900 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 36. Power gain as a function of power gain control voltage in low gain mode; typical values
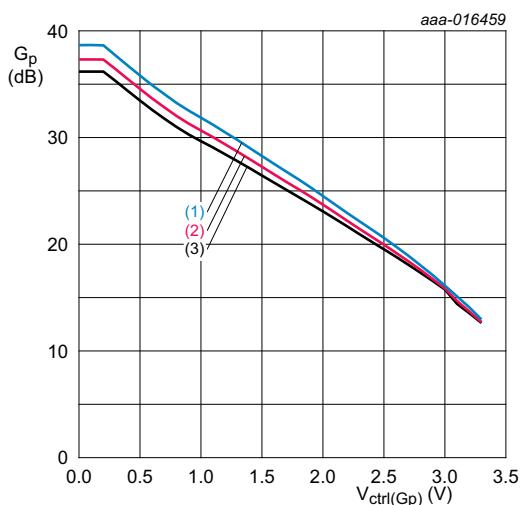
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 37. Power gain as a function of power gain control voltage in high gain mode; typical values
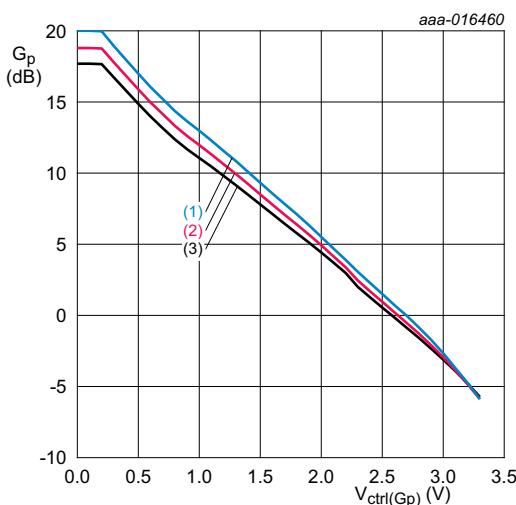
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 788 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 38. Power gain as a function of power gain control voltage in low gain mode; typical values
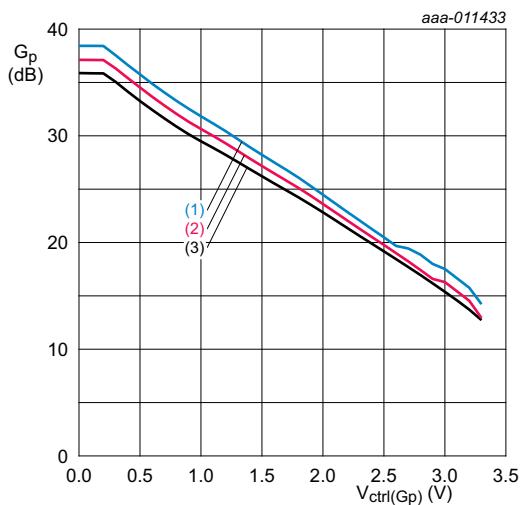
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 39. Power gain as a function of power gain control voltage in high gain mode; typical values
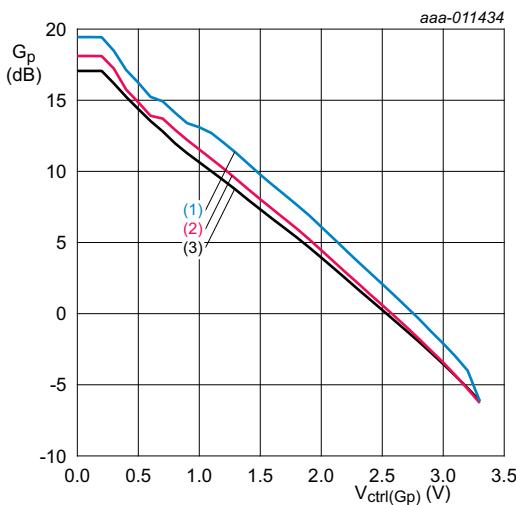
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 830 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 40. Power gain as a function of power gain control voltage in low gain mode; typical values

BGU7061

Product data sheet **Rev. 2 — 29 January 2015** **20 of 27**
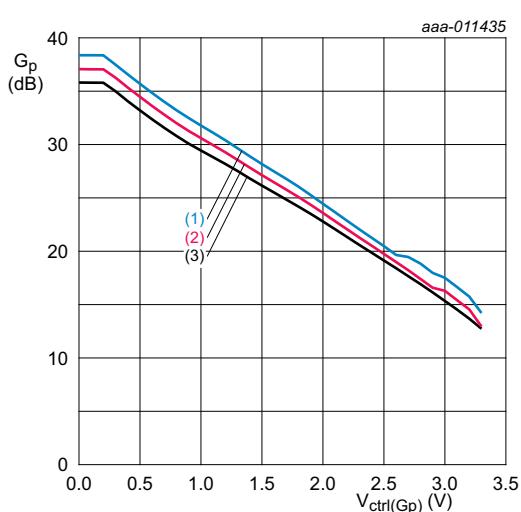
GS1 = LOW; GS2 = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 41. Power gain as a function of power gain control voltage in high gain mode; typical values
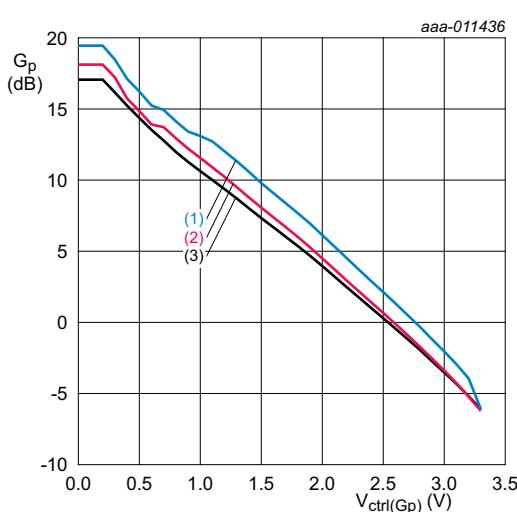
GS1 = HIGH; GS2 = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V;
f = 850 MHz.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 42. Power gain as a function of power gain control voltage in low gain mode; typical values

9. Application information

Table 16.   List of components
For application circuit see Figure 43.

Component	Description	Value		Remarks
C1, C2	capacitor	1 nF	[1]	0402
C3, C4, C5, C6, C12	capacitor	100 pF	[1]	0402
C7, C8, C9, C10,	capacitor	optional		
C11, C17	capacitor	100 nF	[1]	0402
C13, C14, C15, C16	capacitor	optional		
L1, L2	inductor	10 nH	[2]	0402

[1]   Murata GRM1555 series.

[2]   Murata LQG15 series.

BGU7061

Product data sheet   **Rev. 2 — 29 January 2015**   **21 of 27**
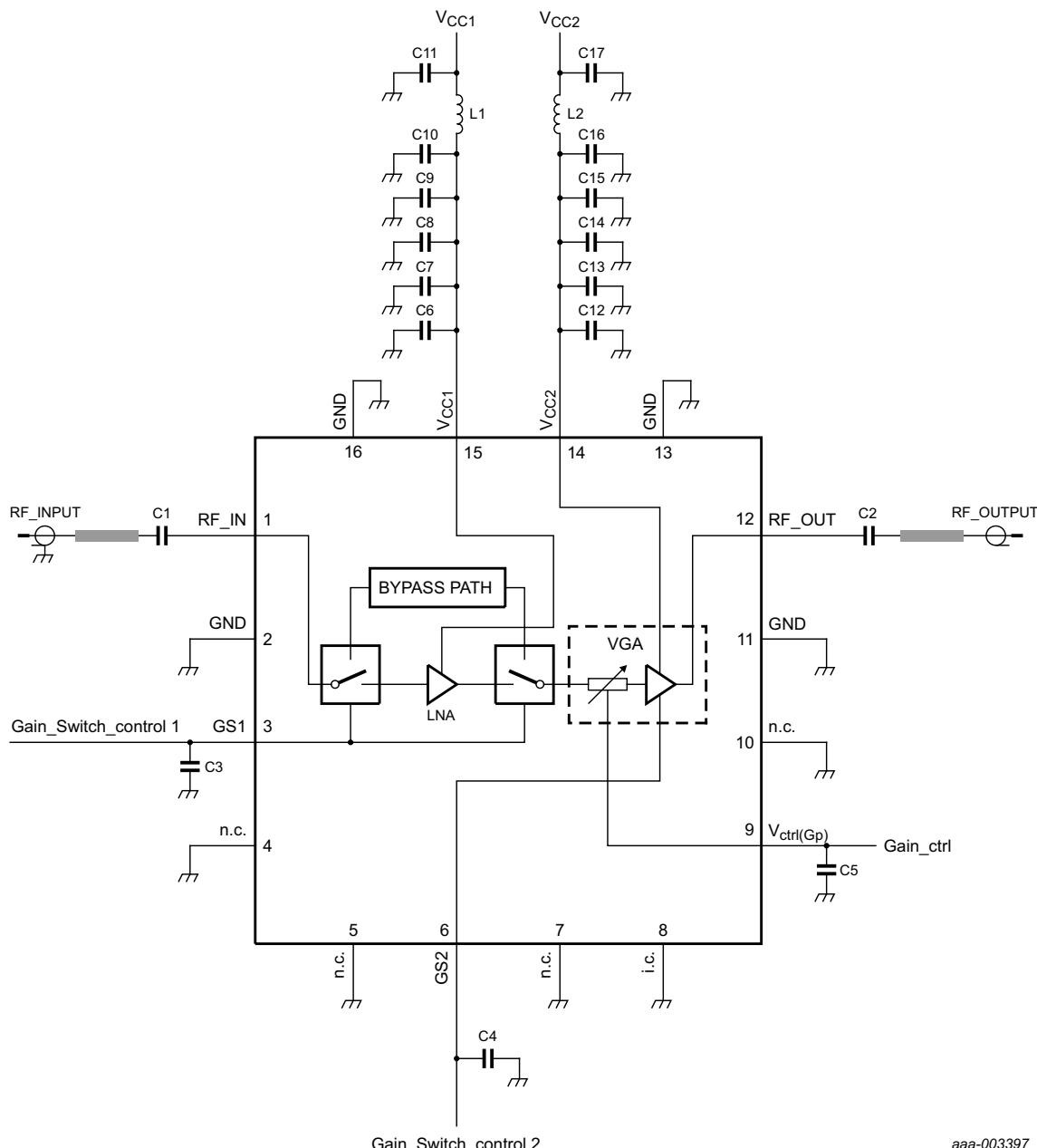
See Table 16 for a list of components.

Fig 43. Schematic layout for application circuit

10. Package outline

HLQFN16R: plastic thermal enhanced low profile quad flat package; no leads; 16 terminals; body 8 x 8 x 1.3 mm   SOT1301-1

Dimensions

Unit	A	b	D	D_h	E	E_h	e	e_1	e_2	L	L_1	v	w	y	y_1
	max	1.40	0.75	8.1	5.85	8.1	5.85				0.75	0.15				
mm	nom	1.30	0.70	8.0	5.80	8.0	5.80	1.42	4.26	4.26	0.70	0.10	0.1	0.05	0.08	0.1
	min	1.25	0.65	7.9	5.75	7.9	5.75				0.65	0.05				

sot1301-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1301-1						~~11-08-23~~ 11-08-29
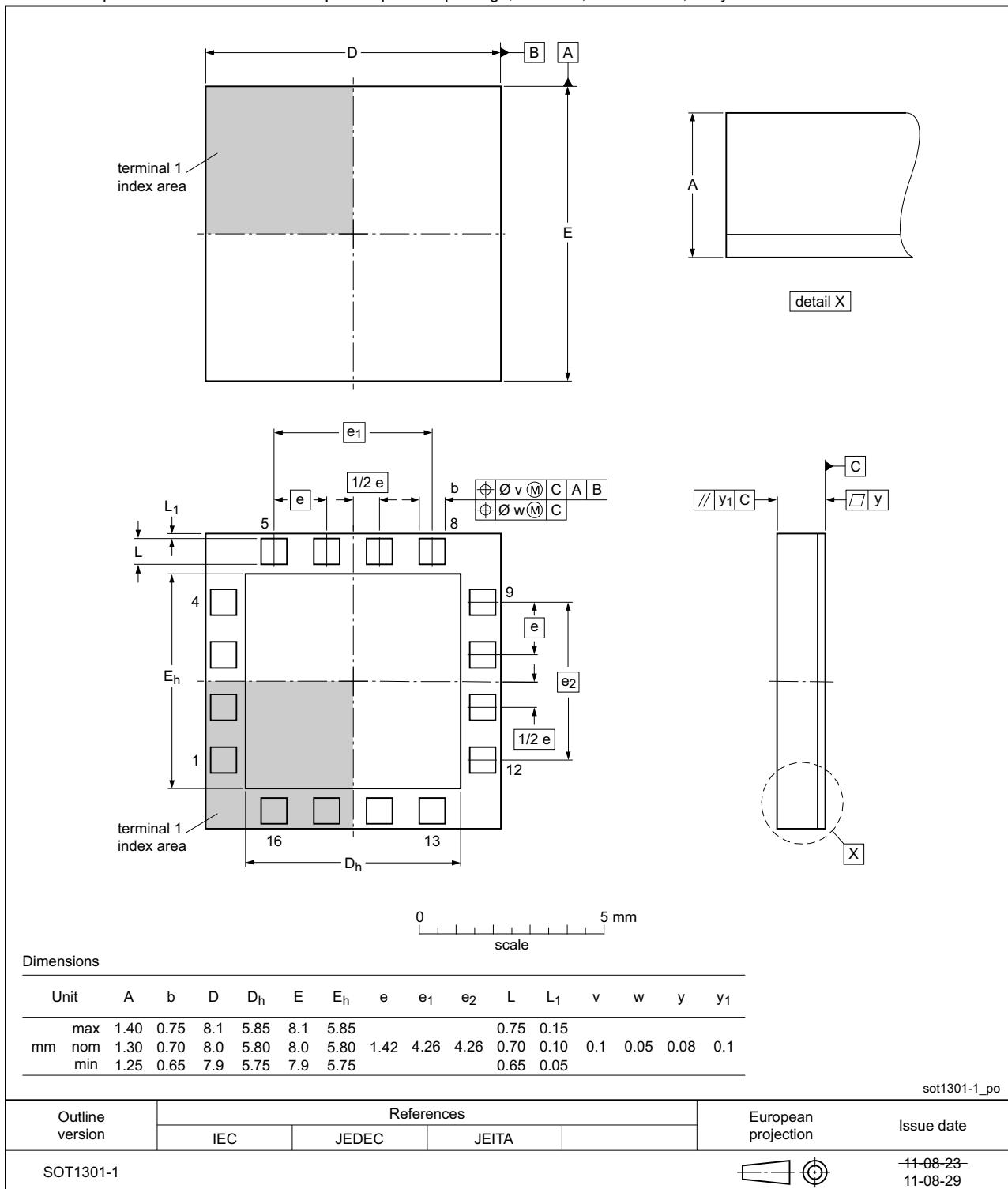
Fig 44.   Package outline SOT1301-1 (HLQFN16R)

BGU7061

All information provided in this document is subject to legal disclaimers.

© NXP Semiconductors N.V. 2015. All rights reserved.

Product data sheet   Rev. 2 — 29 January 2015   23 of 27

11. Abbreviations

Table 17.   Abbreviations

Acronym	Description
3G	3rd Generation
ESD	ElectroStatic Discharge
LNA	Low Noise Amplifier
LTE	Long Term Evolution

12. Revision history

Table 18.   Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU7061 v.2	20150129	Product data sheet	-	BGU7061 v.1
Modifications:	• Section 1.1 on page 1: the frequency range has been extended to go from 770 MHz to 915 MHz • Section 1.4 on page 2: data measured at a frequency of 788 MHz has been added. • Section 1.4 on page 2: IP3$_i$ data measured at frequencies 830 MHz and 850 MHz have been changed. • Section 8.2 on page 7: section has been added • Table 11 on page 8: IP3$_i$ data have been changed • Table 13 on page 10: IP3$_i$ data have been changed • Figure 3 on page 11: figure has been updated • Figure 4 on page 11: figure has been updated • Figure 5 on page 12: figure has been updated • Figure 6 on page 12: figure has been updated • Figure 13 on page 14: figure has been added • Figure 14 on page 14: figure has been added • Figure 21 on page 16: figure has been added • Figure 22 on page 16: figure has been added • Figure 29 on page 18: figure has been added • Figure 30 on page 18: figure has been added • Figure 37 on page 20: figure has been added • Figure 38 on page 20: figure has been added			
BGU7061 v.1	20140121	Product data sheet	-	-

13. Legal information

13.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

13.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

13.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

14. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

BGU7061   All information provided in this document is subject to legal disclaimers.

Product data sheet   **Rev. 2 — 29 January 2015**   **26 of 27**

15. Contents