

BGU7073

Analog controlled high linearity low noise variable gain amplifier

Rev. 6 — 15 February 2017

Product data sheet

1. Product profile

1.1 General description

The BGU7073 is, also known as the BTS5001M, 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 BGU7073 is designed for the 1850 MHz to 2010 MHz frequency range. It has a gain control range of more than 35 dB. At maximum gain, the noise figure is 0.9 dB. The gain is analog-controlled having maximum gain at 0 V and minimum gain at 3.3 V. The LNA has two gain settings, extending the dynamic range. The BGU7073 is internally matched to 50 Ω , meaning no external matching is required, enabling ease of use. It is housed in a 16 pins 8 mm $\times$ 8 mm $\times$ 1.3 mm leadless HLQFN16R package SOT1301.

1.2 Features and benefits

- Input and output internally matched to 50 Ω
- Low noise figure of 0.9 dB
- High input IP3 of 1 dBm
- High $P_{I(1dB)}$ of -11.6 dBm
- LNA with 2 gain settings, giving high dynamic 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
GS = LOW (see Table 9); $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; input and output $50\text{ }\Omega$; 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 = 1950 MHz						
$I_{CC(tot)}$	total supply current	$V_{ctrl(Gp)} = 0\text{ V}$	210	245	280	mA
NF	noise figure	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	0.9	-	dB
		$G_p = 35\text{ dB}$	-	1.1	1.2	dB
$IP3_I$	input third-order intercept point	$G_p = 35\text{ dB}$; 2-tone; tone-spacing = 1.0 MHz	0	1.0	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	$G_p = 35\text{ dB}$	-13.5	-11.6	-	dBm
f = 1880 MHz						
$I_{CC(tot)}$	total supply current	$V_{ctrl(Gp)} = 0\text{ V}$	210	245	280	mA
NF	noise figure	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	0.8	-	dB
		$G_p = 35\text{ dB}$	-	1.0	1.2	dB
$IP3_I$	input third-order intercept point	$G_p = 35\text{ dB}$; 2-tone; tone-spacing = 1.0 MHz	0	1.1	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	$G_p = 35\text{ dB}$	-13.5	-11.4	-	dBm

2. Pinning information

2.1 Pinning

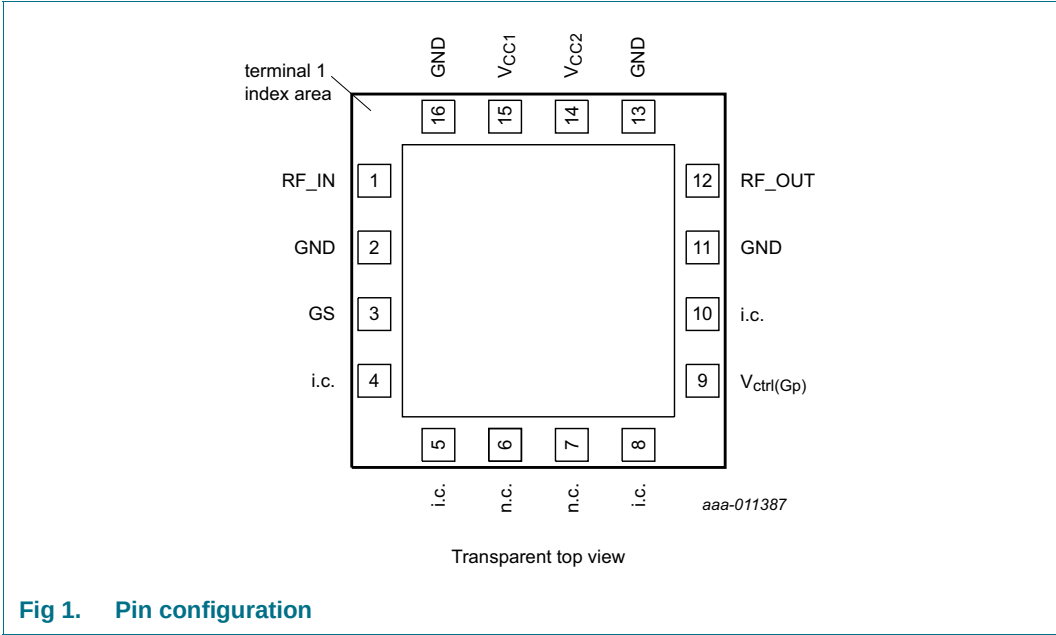


Fig 1. Pin configuration

2.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
RF_IN	1	RF input
GND	2, 11, 13, 16	ground
GS	3	gain switch control
i.c.	4, 5, 10	internally connected. Can either be left open or grounded
n.c.	6, 7	not connected. Internally left open
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
BGU7073	HLQFN16R	plastic thermal enhanced low profile quad flat package; no leads; 16 terminals; body 8 × 8 × 1.3 mm	SOT1301-1

4. Functional diagram

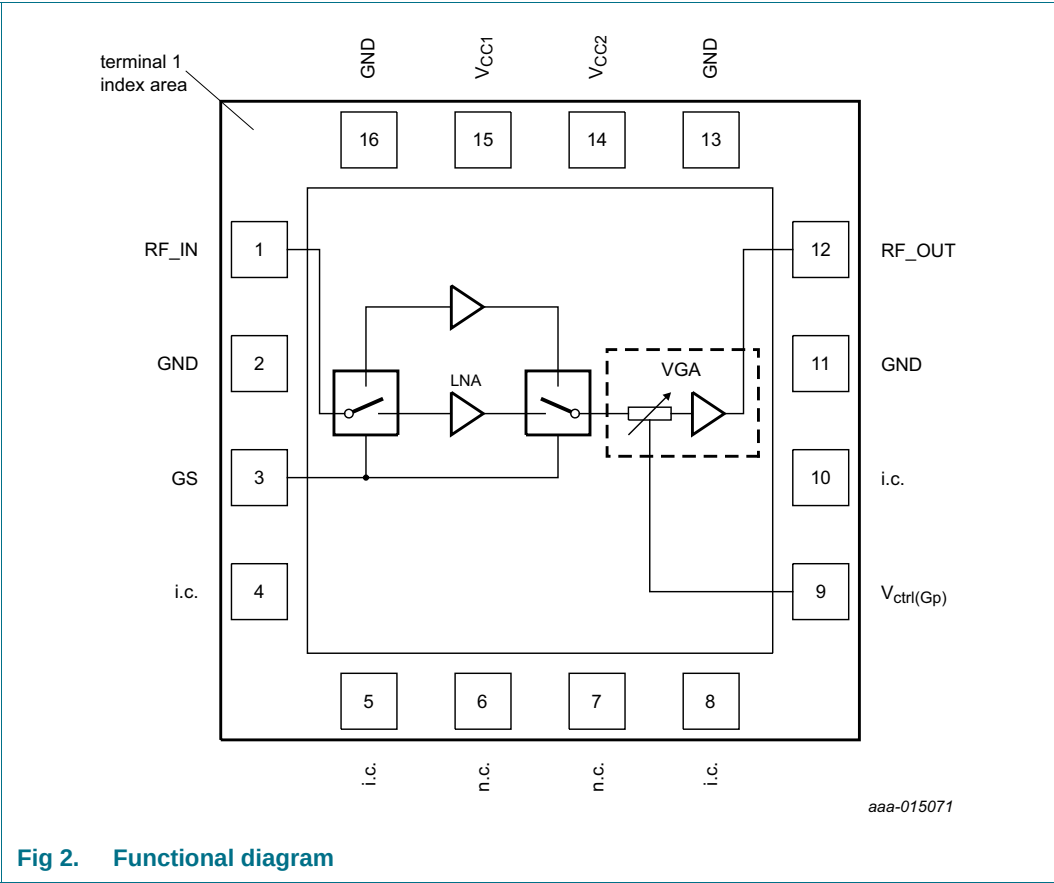


Fig 2. Functional diagram

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(GS)}	input voltage on pin GS		−1	+3.6	V
P _{I(RF)CW}	continuous waveform RF input power	V _{ctrl(Gp)} = 0 V			
		high gain mode	[1]	−10	dBm
		low gain mode	[2]	−10	dBm
T _j	junction temperature		−	150	°C
T _{stg}	storage temperature		−40	+150	°C

Table 4. Limiting values ...continued

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

Symbol	Parameter	Conditions	Min	Max	Unit
V _{ESD}	electrostatic discharge voltage	Human Body Model (HBM) According to ANSI/ESDA/JEDEC standard JS-001	-	±2	kV
		Charged Device Model (CDM) According to JEDEC standard JESD22-C101	-	±750	V

[1] high gain mode: GS = LOW (see [Table 9](#)).[2] low gain mode: GS = HIGH (see [Table 9](#)).

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(GS)}	input voltage on pin GS		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]	43	K/W

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

8. Characteristics

Table 7. Characteristics high gain modeGS = LOW (see [Table 9](#)); 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 = 1950 MHz						
I _{CC(tot)}	total supply current	V _{ctrl(Gp)} = 0 V (maximum power gain)	210	245	280	mA
G _{p(min)}	minimum power gain	V _{ctrl(Gp)} = 3.3 V	-	8.5	-	dB
G _{p(max)}	maximum power gain	V _{ctrl(Gp)} = 0 V	-	37.4	-	dB
G _{p(flat)}	power gain flatness	1920 MHz ≤ f ≤ 2010 MHz; 18 dB ≤ G _p ≤ 35 dB	-	0.6	-	dB
NF	noise figure	V _{ctrl(Gp)} = 0 V (maximum power gain)	-	0.9	-	dB
		G _p = 35 dB	-	1.1	1.2	dB
		G _p = 18 dB	-	5.8	-	dB

Table 7. Characteristics high gain mode ...continued

GS = LOW (see Table 9); $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; input and output $50\text{ }\Omega$; 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
IP _{3I}	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		$G_p = 35\text{ dB}$	0	1.0	-	dBm
		$G_p = 30\text{ dB}$	-	4.1	-	dBm
		$G_p = 29\text{ dB}$	-	4.5	-	dBm
		$G_p = 18\text{ dB}$	-	5.5	-	dBm
P _{I(1dB)}	input power at 1 dB gain compression	$G_p = 35\text{ dB}$	-13.5	-11.6	-	dBm
		$G_p = 30\text{ dB}$	-	-7.8	-	dBm
		$G_p = 29\text{ dB}$	-	-7.4	-	dBm
		$G_p = 18\text{ dB}$	-	-6.3	-	dBm
RL _{in}	input return loss	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	33.7	-	dB
		$G_p = 35\text{ dB}$	-	27.8	-	dB
RL _{out}	output return loss	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	19.5	-	dB
K	Rollett stability factor	$0\text{ GHz} \leq f \leq 12.75\text{ GHz}$	1	-	-	
f = 1880 MHz						
I _{CC(tot)}	total supply current	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	210	245	280	mA
G _{p(min)}	minimum power gain	$V_{ctrl(Gp)} = 3.3\text{ V}$	-	7.9	-	dB
G _{p(max)}	maximum power gain	$V_{ctrl(Gp)} = 0\text{ V}$	-	37.0	-	dB
G _{p(flat)}	power gain flatness	$1850\text{ MHz} \leq f \leq 1910\text{ MHz}$; $18\text{ dB} \leq G_p \leq 35\text{ dB}$	-	0.3	-	dB
NF	noise figure	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	0.8	-	dB
		$G_p = 35\text{ dB}$	-	1.0	1.35	dB
		$G_p = 18\text{ dB}$	-	5.9	-	dB
IP _{3I}	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		$G_p = 35\text{ dB}$	0	1.1	-	dBm
		$G_p = 30\text{ dB}$	-	4.0	-	dBm
		$G_p = 29\text{ dB}$	-	4.3	-	dBm
		$G_p = 18\text{ dB}$	-	5.0	-	dBm
P _{I(1dB)}	input power at 1 dB gain compression	$G_p = 35\text{ dB}$	-13.5	-11.6	-	dBm
		$G_p = 30\text{ dB}$	-	-7.8	-	dBm
		$G_p = 29\text{ dB}$	-	-7.4	-	dBm
		$G_p = 18\text{ dB}$	-	-6.4	-	dBm
RL _{in}	input return loss	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	33.7	-	dB
		$G_p = 35\text{ dB}$	-	28.5	-	dB
RL _{out}	output return loss	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	19.4	-	dB
K	Rollett stability factor	$0\text{ GHz} \leq f \leq 12.75\text{ GHz}$	1	-	-	

Table 8. Characteristics low gain mode

GS = HIGH (see Table 9); $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; input and output $50\text{ }\Omega$; 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 = 1950 MHz						
$I_{CC(tot)}$	total supply current	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	210	245	280	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)} = 3.3\text{ V}$	-	-7.9	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)} = 0\text{ V}$	-	20.5	-	dB
$G_{p(flat)}$	power gain flatness	$1920\text{ MHz} \leq f \leq 2010\text{ MHz}$; $3\text{ dB} \leq G_p \leq 17\text{ dB}$	-	0.1	-	dB
NF	noise figure	$G_p = 17\text{ dB}$	-	9.7	-	dB
		$G_p = 3\text{ dB}$	-	19.7	-	dB
IP3 _i	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		$G_p = 17\text{ dB}$	-	18.4	-	dBm
		$G_p = 12\text{ dB}$	-	20.0	-	dBm
		$G_p = 11\text{ dB}$	-	20.8	-	dBm
		$G_p = 3\text{ dB}$	-	18.1	-	dBm
P _{i(1dB)}	input power at 1 dB gain compression	$G_p = 17\text{ dB}$	-	5.7	-	dBm
		$G_p = 12\text{ dB}$	-	9.2	-	dBm
		$G_p = 11\text{ dB}$	-	9.0	-	dBm
		$G_p = 3\text{ dB}$	-	9.5	-	dBm
RL _{in}	input return loss	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	34.0	-	dB
		$G_p = 17\text{ dB}$	-	31.6	-	dB
RL _{out}	output return loss	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	-	14.8	-	dB
K	Rollett stability factor	$0\text{ GHz} \leq f \leq 12.75\text{ GHz}$	1	-	-	
f = 1880 MHz						
$I_{CC(tot)}$	total supply current	$V_{ctrl(Gp)} = 0\text{ V}$ (maximum power gain)	210	245	280	mA
$G_{p(min)}$	minimum power gain	$V_{ctrl(Gp)} = 3.3\text{ V}$	-	-8.4	-	dB
$G_{p(max)}$	maximum power gain	$V_{ctrl(Gp)} = 0\text{ V}$	-	20.4	-	dB
$G_{p(flat)}$	power gain flatness	$1850\text{ MHz} \leq f \leq 1910\text{ MHz}$; $3\text{ dB} \leq G_p \leq 17\text{ dB}$	-	0.1	-	dB
NF	noise figure	$G_p = 17\text{ dB}$	-	9.9	-	dB
		$G_p = 3\text{ dB}$	-	19.8	-	dB
IP3 _i	input third-order intercept point	2-tone; tone-spacing = 1.0 MHz				
		$G_p = 17\text{ dB}$	-	18.7	-	dBm
		$G_p = 12\text{ dB}$	-	19.7	-	dBm
		$G_p = 11\text{ dB}$	-	20.2	-	dBm
		$G_p = 3\text{ dB}$	-	18.6	-	dBm
P _{i(1dB)}	input power at 1 dB gain compression	$G_p = 17\text{ dB}$	-	5.8	-	dBm
		$G_p = 12\text{ dB}$	-	9.4	-	dBm
		$G_p = 11\text{ dB}$	-	9.3	-	dBm
		$G_p = 3\text{ dB}$	-	9.4	-	dBm

Table 8. Characteristics low gain mode ...continued

GS = HIGH (see Table 9); 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.

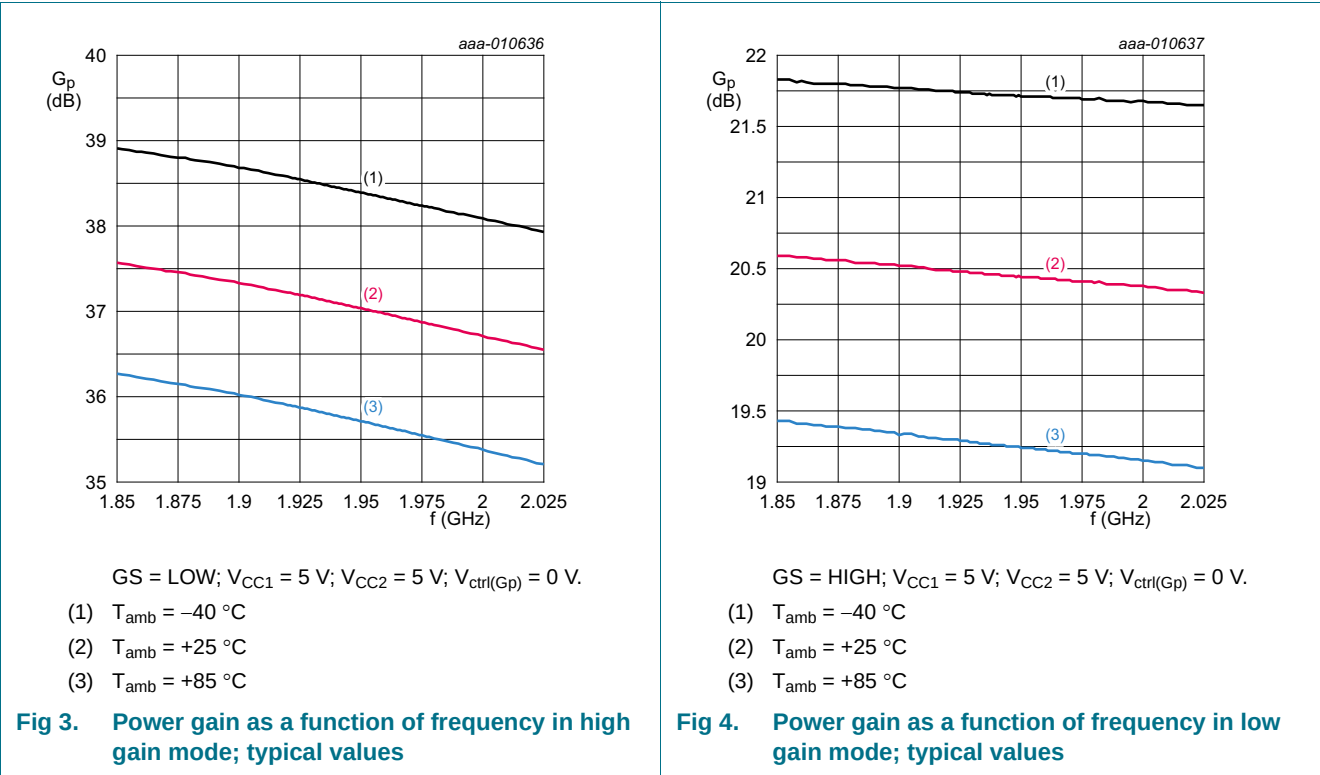
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RL _{in}	input return loss	V _{ctrl(Gp)} = 0 V (maximum power gain)	-	26.9	-	dB
		G _p = 17 dB	-	27.3	-	dB
RL _{out}	output return loss	V _{ctrl(Gp)} = 0 V (maximum power gain)	-	14.3	-	dB
K	Rollett stability factor	0 GHz ≤ f ≤ 12.75 GHz	1	-	-	

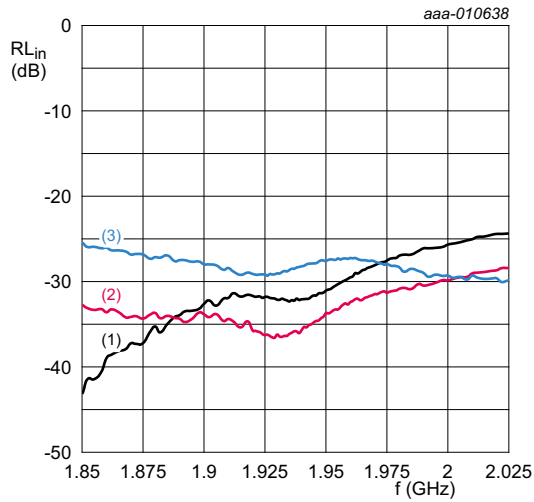
Table 9. Gain switch truth table

V_{CC1} = 5 V; V_{CC2} = 5 V; T_{amb} = 25 °C

Gain mode	GS	
	logic	V _{I(GS)}
high gain mode	LOW	0 V to 0.5 V
low gain mode	HIGH	2 V to 3.3 V

8.1 Graphs

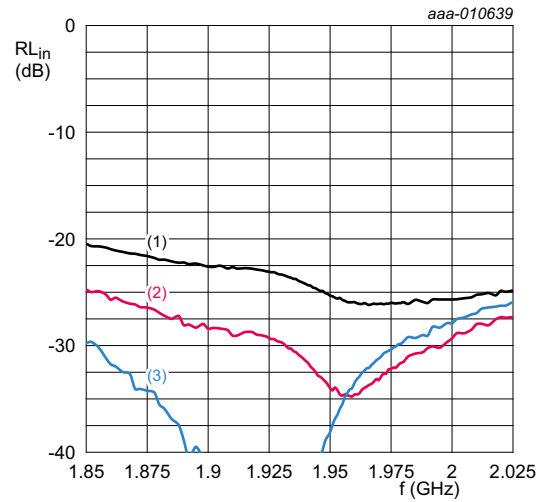




GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $V_{ctrl(Gp)} = 0\text{ V}$.

- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = +25\text{ °C}$
- (3) $T_{amb} = +85\text{ °C}$

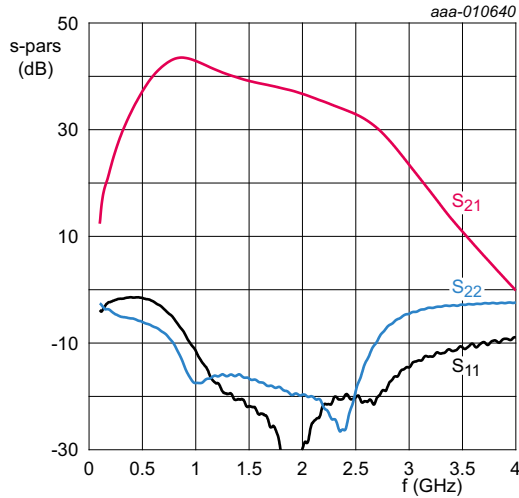
Fig 5. Input return loss as a function of frequency in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $V_{ctrl(Gp)} = 0\text{ V}$.

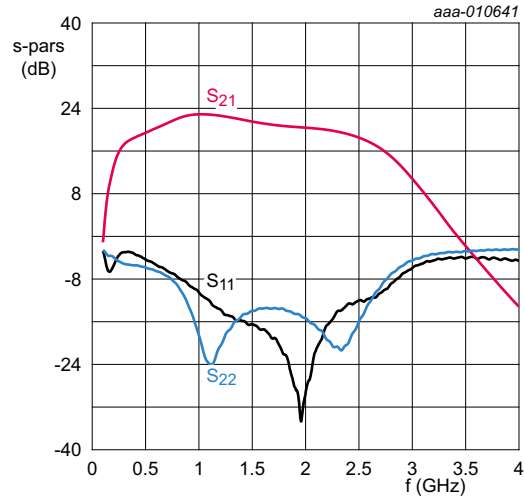
- (1) $T_{amb} = -40\text{ °C}$
- (2) $T_{amb} = +25\text{ °C}$
- (3) $T_{amb} = +85\text{ °C}$

Fig 6. Input return loss as a function of frequency in low gain mode; typical values



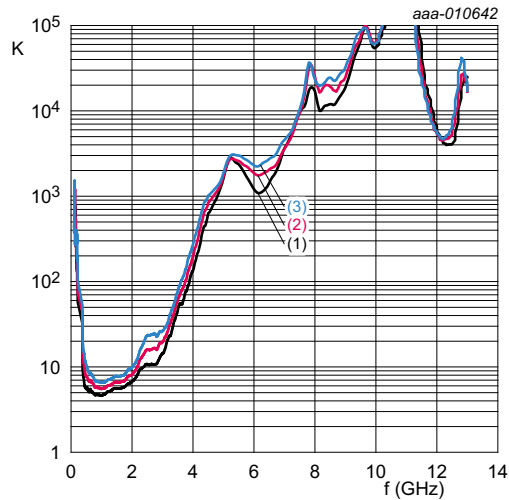
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $V_{ctrl(Gp)} = 0\text{ V}$;
 $T_{amb} = 25\text{ °C}$.

Fig 7. S-parameters as a function of frequency in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $V_{ctrl(Gp)} = 0\text{ V}$;
 $T_{amb} = 25\text{ °C}$.

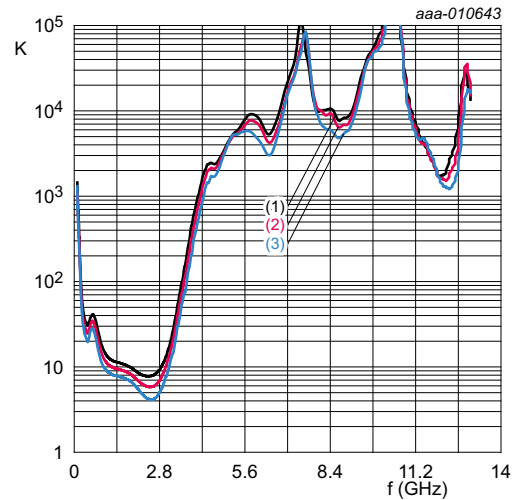
Fig 8. S-parameters as a function of frequency in low gain mode; typical values



GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $V_{ctrl(Gp)} = 0\text{ V}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

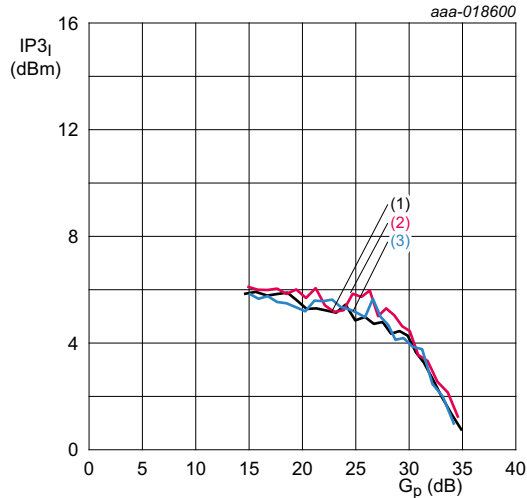
Fig 9. Rollett stability factor as a function of frequency in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $V_{ctrl(Gp)} = 0\text{ V}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

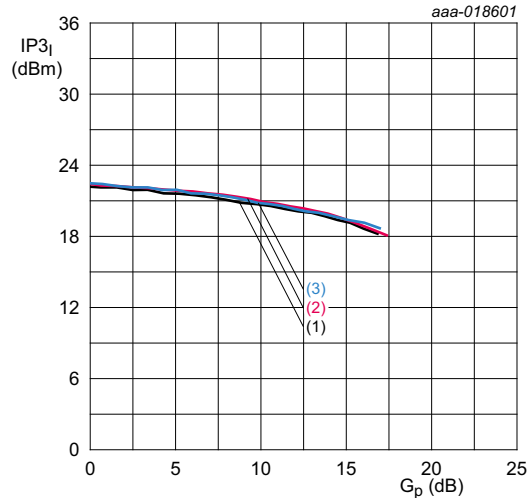
Fig 10. Rollett stability factor as a function of frequency in low gain mode; typical values



GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1995\text{ MHz}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

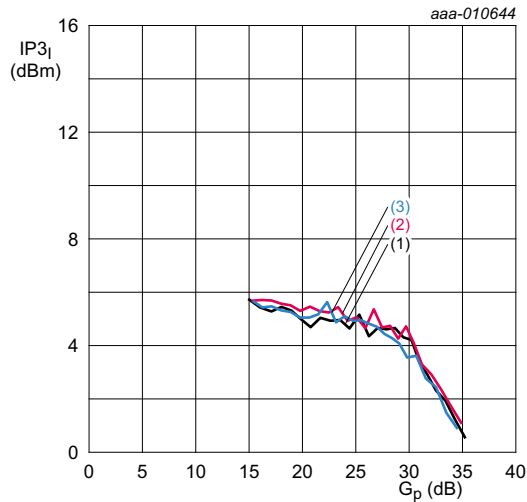
Fig 11. Input third-order intercept point as a function of power gain in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1995\text{ MHz}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

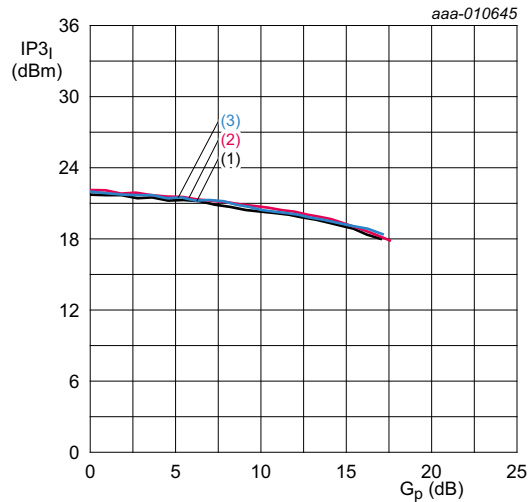
Fig 12. Input third-order intercept point as a function of power gain in low gain mode; typical values



GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.

- (1) $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = +85\text{ }^{\circ}\text{C}$

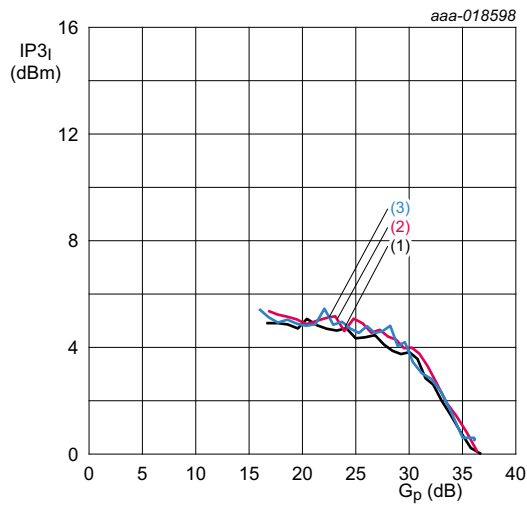
Fig 13. Input third-order intercept point as a function of power gain in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.

- (1) $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = +85\text{ }^{\circ}\text{C}$

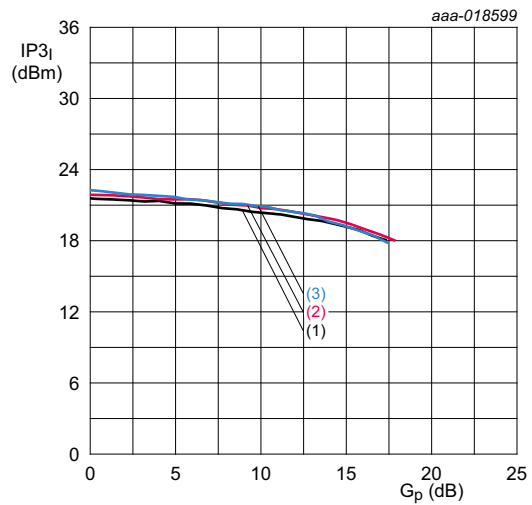
Fig 14. Input third-order intercept point as a function of power gain in low gain mode; typical values



GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1880\text{ MHz}$.

- (1) $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = +85\text{ }^{\circ}\text{C}$

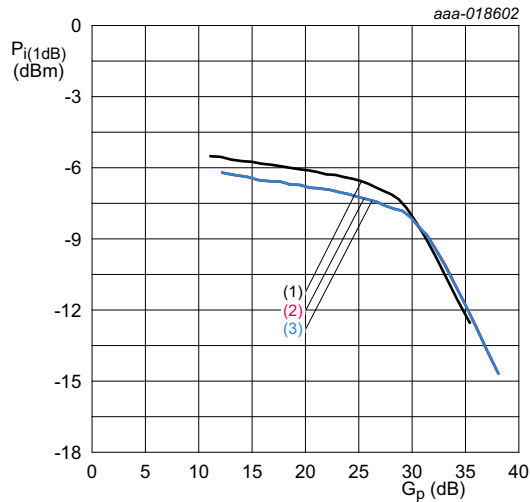
Fig 15. Input third-order intercept point as a function of power gain in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1880\text{ MHz}$.

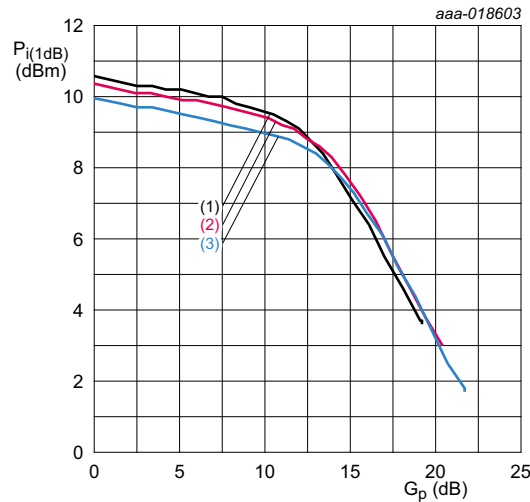
- (1) $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = +85\text{ }^{\circ}\text{C}$

Fig 16. Input third-order intercept point as a function of power gain in low gain mode; typical values



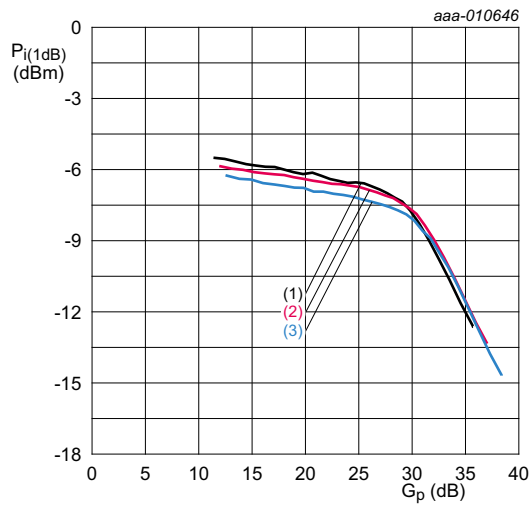
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1955\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 17. Input power at 1 dB gain compression as a function of power gain in high gain mode; typical values



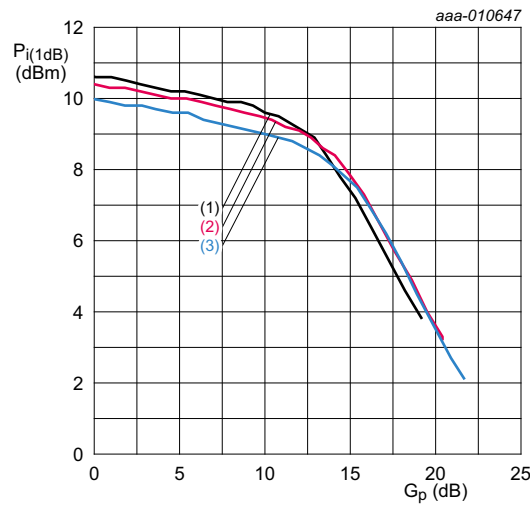
GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1955\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 18. Input power at 1 dB gain compression as a function of power gain in low gain mode; typical values



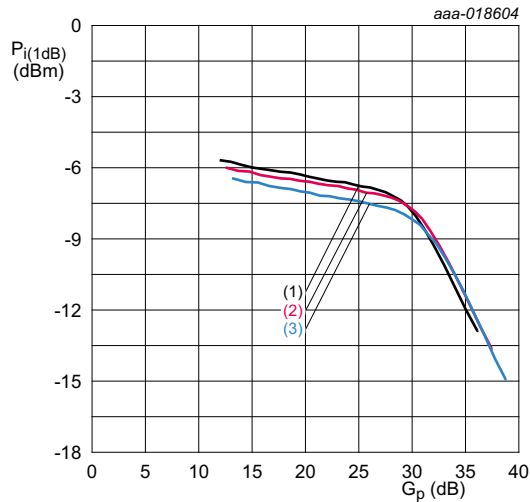
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 19. Input power at 1 dB gain compression as a function of power gain in high gain mode; typical values



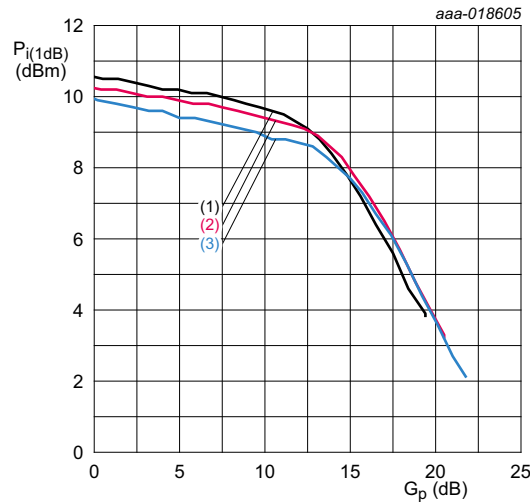
GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

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



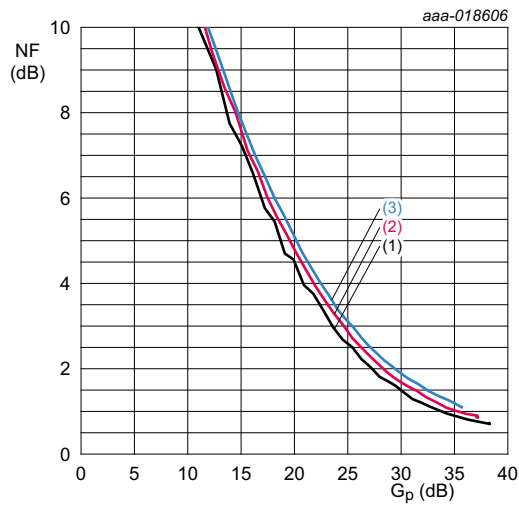
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1880\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

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



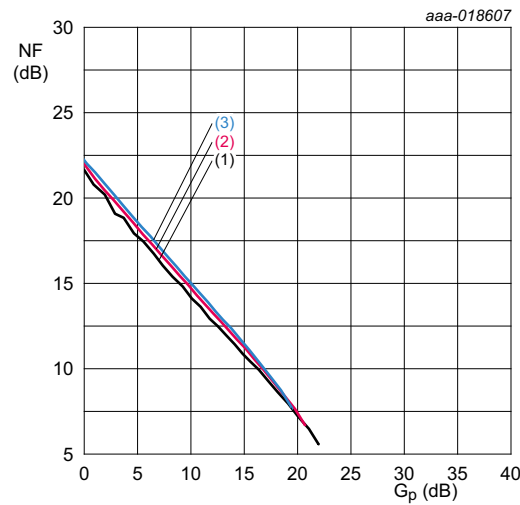
GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1880\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

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



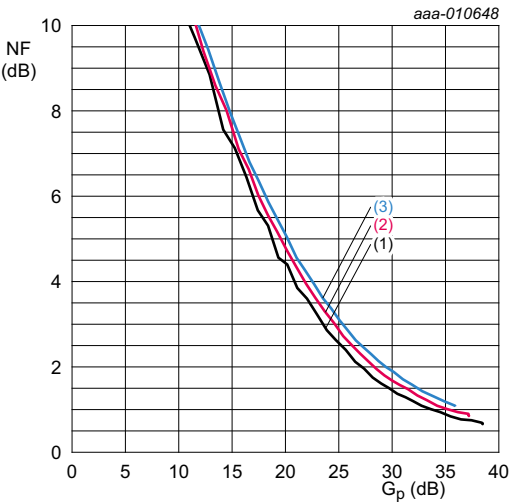
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1995\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 23. Noise figure as a function of power gain in high gain mode; typical values



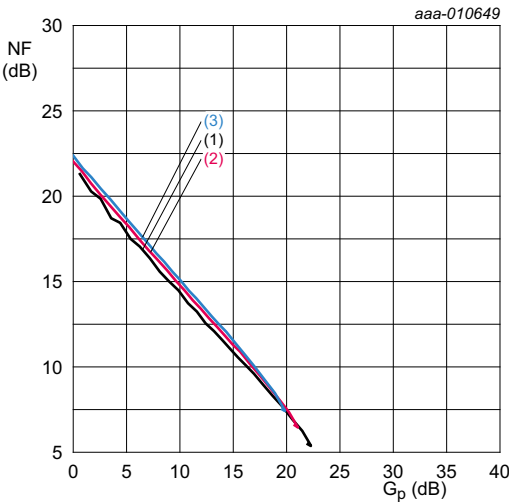
GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1995\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 24. Noise figure as a function of power gain in low gain mode; typical values



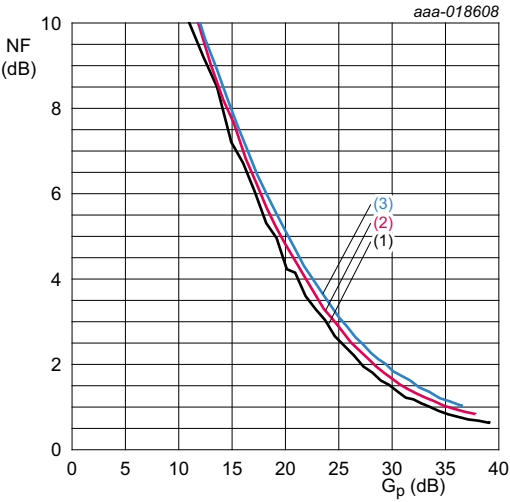
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 25. Noise figure as a function of power gain in high gain mode; typical values



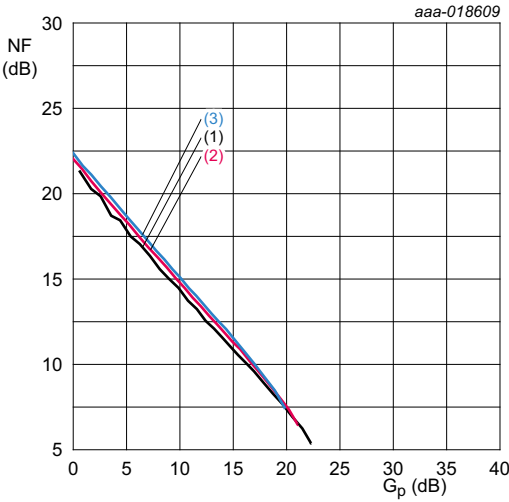
GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 26. Noise figure as a function of power gain in low gain mode; typical values



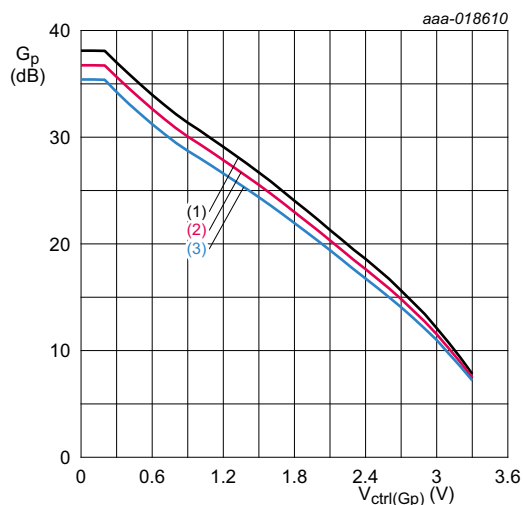
GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1880\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

Fig 27. Noise figure as a function of power gain in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1880\text{ MHz}$.
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = +25^\circ\text{C}$
(3) $T_{amb} = +85^\circ\text{C}$

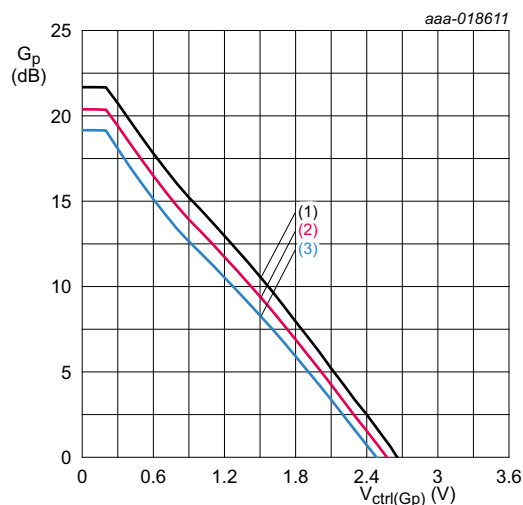
Fig 28. Noise figure as a function of power gain in low gain mode; typical values



GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1995\text{ MHz}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

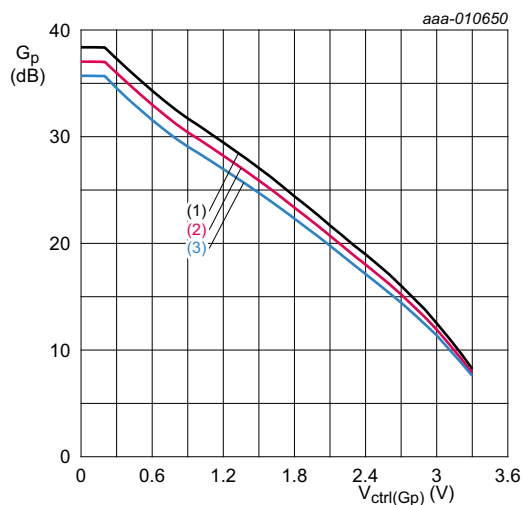
Fig 29. Power gain as a function of power gain control voltage in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1995\text{ MHz}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

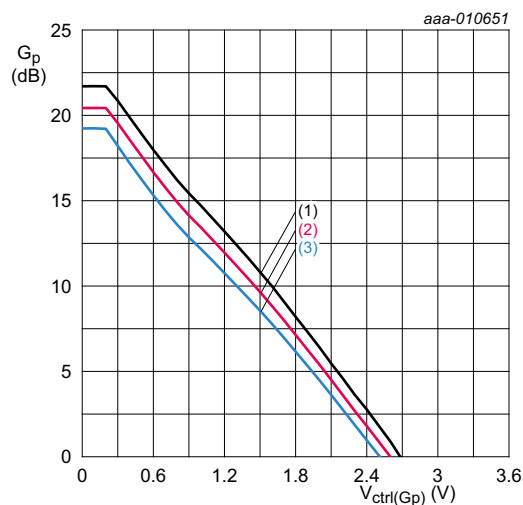
Fig 30. Power gain as a function of power gain control voltage in low gain mode; typical values



GS = LOW; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

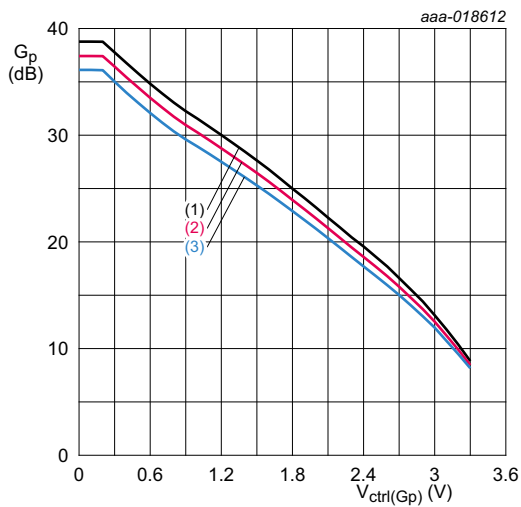
Fig 31. Power gain as a function of power gain control voltage in high gain mode; typical values



GS = HIGH; $V_{CC1} = 5\text{ V}$; $V_{CC2} = 5\text{ V}$; $f = 1950\text{ MHz}$.

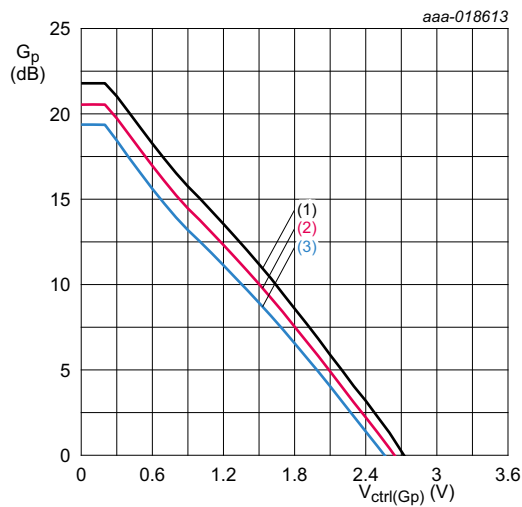
- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = +25\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = +85\text{ }^{\circ}\text{C}$

Fig 32. Power gain as a function of power gain control voltage in low gain mode; typical values



GS = LOW; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 1880 MHz.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

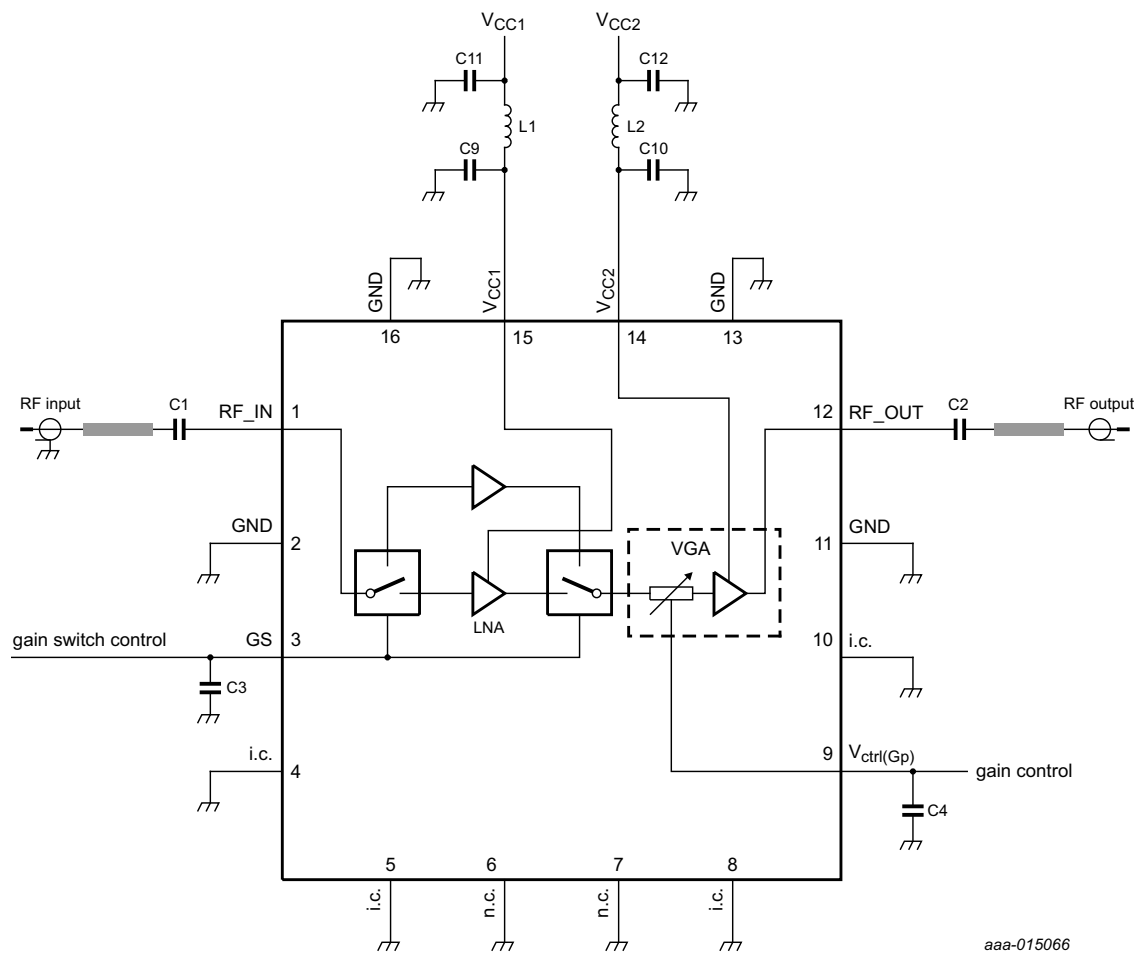
Fig 33. Power gain as a function of power gain control voltage in high gain mode; typical values



GS = HIGH; V_{CC1} = 5 V; V_{CC2} = 5 V; f = 1880 MHz.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Fig 34. Power gain as a function of power gain control voltage in low gain mode; typical values

9. Application information



See [Table 10](#) for a list of components.

Fig 35. Schematic layout for application circuit

Table 10. List of components

For application circuit, see [Figure 35](#).

Component	Description	Value	Remarks
C1, C2	capacitor	1 nF	SMD 0402; Murata GRM1555 series
C3, C4, C9, C10	capacitor	100 pF	SMD 0402; Murata GRM1555 series
C11, C12	capacitor	100 nF	SMD 0402; Murata GRM1555 series
L1, L2	inductor	10 nH	SMD 0402; Murata LQG15 series

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

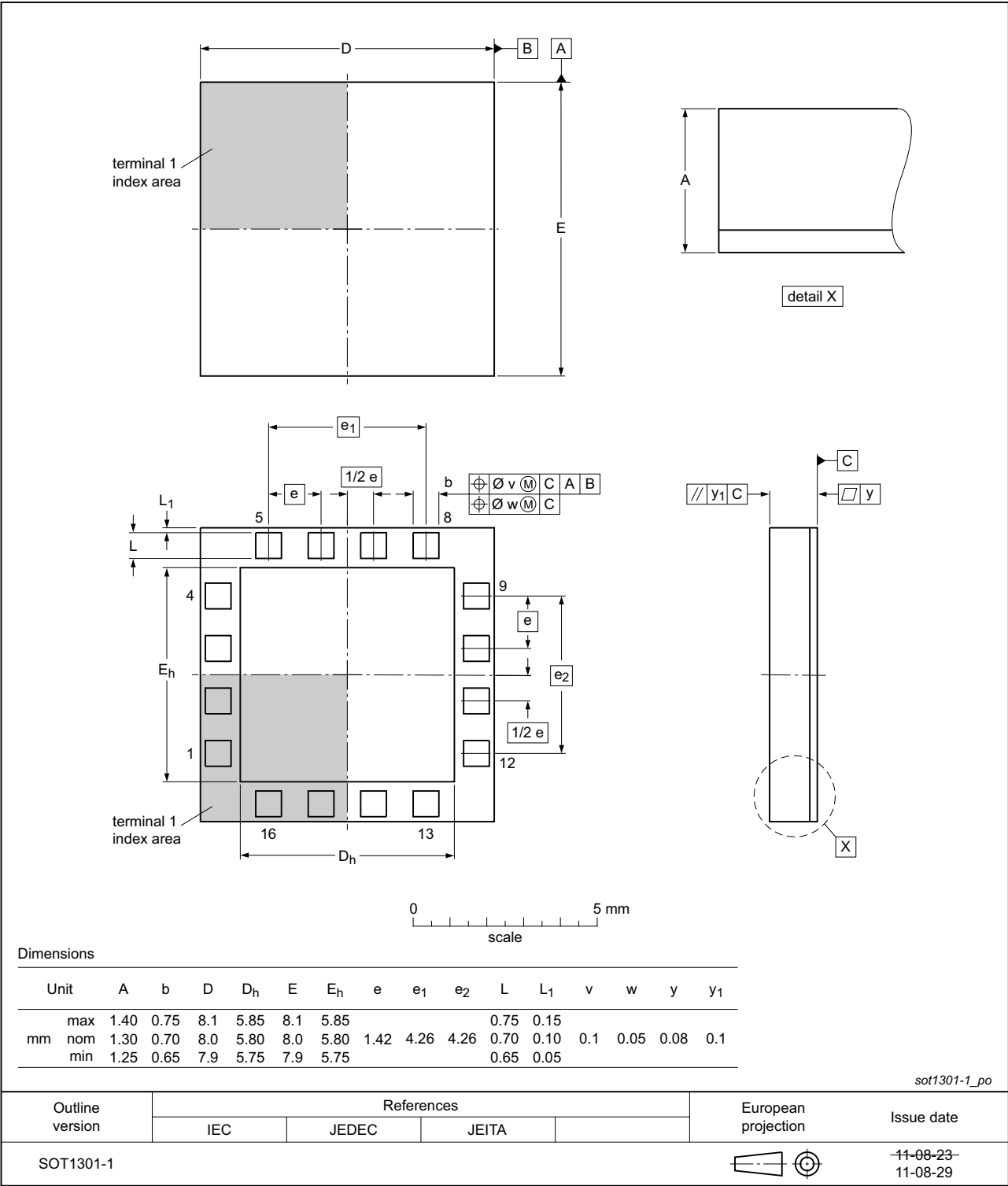


Fig 36. Package outline SOT1301-1 (HLQFN16R)

11. Abbreviations

Table 11. Abbreviations

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

12. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU7073 v.6	20170215	Product data sheet	-	BGU7073 v.5
Modifications:	Table 1 on page 2: updated the values for $I_{CC(tot)}$ Table 7 on page 5: updated the values for $I_{CC(tot)}$ Table 8 on page 7: updated the values for $I_{CC(tot)}$			
BGU7073 v.5	20170120	Product data sheet	-	BGU7073 v.4
Modifications:	Section 1 on page 1: added BTS5001M according to our new naming convention			
BGU7073 v.4	20161215	Product data sheet	-	BGU7073 v.3
Modifications:	Table 6 on page 5: The value for $R_{th(j-case)}$ has been updated.			
BGU7073 v.3	20151109	Product data sheet	-	BGU7073 v.2
Modifications:	Section 1.1 on page 1: The value of the noise figure has been updated. Section 1.2 on page 1: Several values have been updated. Table 1 on page 2: Several values have been updated. Table 6 on page 5: The value for $R_{th(j-case)}$ has been updated. Figure 2 on page 4: The functional diagram has been updated. Table 7 on page 5: Several values have been updated. Table 8 on page 7: Several values have been updated. Section 8.1 on page 8: The graphs have been updated. Section 9 on page 17: The application information has been updated.			
BGU7073 v.2	20150319	Product data sheet	-	BGU7073 v.1
BGU7073 v.1	20140128	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>.

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