

BGU8009

SiGe:C low-noise amplifier MMIC for GPS, GLONASS, Galileo and COMPASS and LTE B32

Rev. 7.3 — 16 May 2019 Product data sheet

1 General description

The BGU8009 is, also known as the GPS1201M, a Low-Noise Amplifier (LNA) for GNSS receiver and LTE Band 32 down link applications. This BGU8009 is available in a small plastic 6-pin extremely thin leadless package. The BGU8009 requires one external matching inductor and one external decoupling capacitor.

The BGU8009 adapts itself to the changing environment resulting from co-habitation of different radio systems in modern cellular handsets. It has been designed for low power consumption and optimal performance when jamming signals from co-existing cellular transmitters are present. At low jamming power levels, it delivers 18 dB gain at a noise figure of 0.65 dB. During high jamming power levels, resulting, for example from a cellular transmit burst, it temporarily increases its bias current to improve sensitivity.

2 Features and benefits

- Covers full GNSS L1 band, from 1559 MHz to 1610 MHz and LTE band 32 from 1452 MHz to 1496 MHz
- Optionally also the GNSS lower L-band can be covered (from 1164 MHz to 1299 MHz) by adding additional matching components as described in the application note AN11353.
- GNSS:
  - Noise figure = 0.65 dB
  - Gain 18 dB
  - High input 1 dB compression point of -7 dBm
  - High out of band $IP3_i$ of 6 dBm
- LTE B32:
  - Noise figure = 0.65 dB
  - Gain 20 dB
  - High input 1 dB compression point of -8.5 dBm
- Supply voltage 1.5 V to 3.1 V
- Optimized performance at low supply current of 4.2 mA
- Power-down mode current consumption < 1 µA
- Integrated temperature stabilized bias for easy design.
- Requires only one input matching inductor and one supply decoupling capacitor
- Input and output DC decoupled
- ESD protection on all pins (HBM > 2 kV)
- Integrated matching for the output
- Available in a 6-pins leadless package 1.1 mm x 0.9 mm x 0.47 mm; 0.4 mm pitch: SOT1230
- 180 GHz transit frequency - SiGe:C technology
- Moisture sensitivity level 1

3 Applications

- Smart phones
- Feature phones
- Tablets
- Digital still cameras
- Digital video cameras
- RF front-end modules
- Complete GNSS modules
- Personal health applications

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4 Quick reference data

Table 1. Quick reference data GNSS band L1

f = 1575 MHz; V_{CC} = 2.85 V; P_i < -40 dBm; T_{amb} = 25 °C; input matched to 50 Ω using a 5.6 nH inductor, see Figure 34, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		1.5	-	3.1	V
I_{CC}	supply current	$V_{I(ENABLE)}$ ≥ 0.8 V				
		• P_i < -40 dBm	2.6	4.4	6.5	mA
		• P_i = -20 dBm	-	9	-	mA
G_p	power gain	P_i < -40 dBm	16	17.8	20	dB
		P_i = -20 dBm	-	20.0	-	dB
NF	noise figure	P_i < -40 dBm [1]	-	0.65	1.2	dB
		P_i < -40 dBm [1]	-	0.70	1.25	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	V_{CC} = 1.8 V	-	-10	-	dBm
		V_{CC} = 2.85 V	-12.5	-7	-	dBm
$IP3_i$	input third-order intercept point	V_{CC} = 1.8 V [2]	-	3	-	dBm
		V_{CC} = 2.85 V [2]	-	6	-	dBm

[1] PCB losses are subtracted.
[2] f_1 = 1713 MHz; f_2 = 1851 MHz; P_i = -20 dBm per carrier

Table 2. Quick reference data LTE B32

f = 1474 MHz; V_{CC} = 2.8 V; P_i = -30 dBm; T_{amb} = 25 °C; input matched to 50 Ω using a 9.1 nH inductor, see Figure 34, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		1.5	-	3.1	V
I_{CC}	supply current	$V_{I(ENABLE)}$ ≥ 0.8 V	-	4.4	-	mA
G_p	power gain			20		dB
NF	noise figure	[1]	-	0.65	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	V_{CC} = 1.8 V	-	-11	-	dBm
		V_{CC} = 2.8 V	-	-8.5	-	dBm
$IP3_i$	input third-order intercept point	V_{CC} = 1.8 V [2]	-	-7	-	dBm
		V_{CC} = 2.8 V [2]	-	-6	-	dBm

[1] PCB losses are subtracted.
[2] Δf = 1 MHz; P_i = -30 dBm per carrier.

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5 Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BGU8009	XSON6	plastic very thin small outline package; no leads; 6 terminals; body 1.1 x 0.9 x 0.47 mm	SOT1230
OM7820	EVB	BGU8009 evaluation board, MMIC only	-
OM7824	EVB	BGU8009 evaluation board, front-end EVB	-
OM17066	EVB	BGU8009 evaluation board for LTE B32	

6 Marking

Table 4. Marking code

Type number	Marking code	Date code
BGU8009	A	YWW

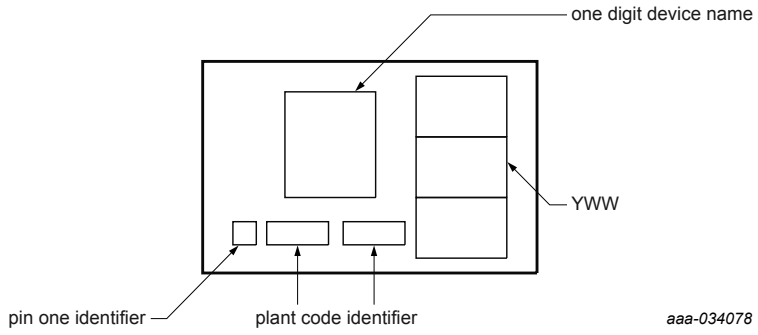


Figure 1. Marking diagram

7 Block diagram

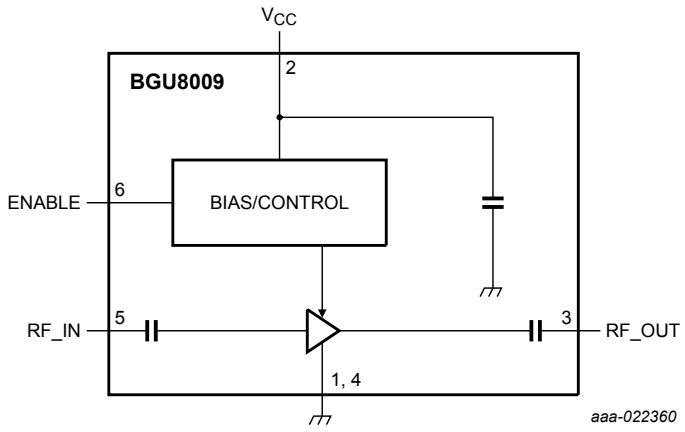


Figure 2. Block diagram

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8 Pinning information

8.1 Pinning

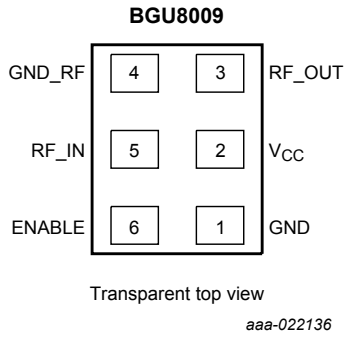


Figure 3. Pin configuration

8.2 Pin description

Table 5. Pin description

Symbol	Pin	Description
GND	1	ground
V_{CC}	2	supply voltage
RF_OUT	3	RF output
GND_RF	4	RF ground
RF_IN	5	RF input
ENABLE	6	enable

9 Limiting values

Table 6. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Absolute Maximum Ratings are given as Limiting Values of stress conditions during operation, that must not be exceeded under the worst probable conditions.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CC}	supply voltage		[1]	-0.5	+5.0	V
$V_{I(ENABLE)}$	input voltage on pin ENABLE	$V_{I(ENABLE)} < V_{CC} + 0.6$ V	[1] [2]	-0.5	+5.0	V
$V_{I(RF_IN)}$	input voltage on pin RF_IN	DC, $V_{I(RF_IN)} < V_{CC} + 0.6$ V	[1] [2] [3]	-0.5	+5.0	V
$V_{I(RF_OUT)}$	input voltage on pin RF_OUT	DC, $V_{I(RF_OUT)} < V_{CC} + 0.6$ V	[1] [2] [3]	-0.5	+5.0	V
P_i	input power	1575 MHz	[1]	-	10	dBm
		1474 MHz	[1]	-	10	dBm
P_{tot}	total power dissipation	$T_{sp} \leq 130$ °C		-	55	mW

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Symbol	Parameter	Conditions	Min	Max	Unit
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		-	150	°C
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM) according to JEDEC standard JS-001-2010	-	±2	kV
		Charged Device Model (CDM) according to JEDEC standard JESD22-C101C	-	±1	kV

[1] Stressed with pulses of 200 ms in duration, with application circuit as in Figure 34.
[2] Warning: due to internal ESD diode protection, the applied DC voltage shall not exceed V_{CC} + 0.6 V and shall not exceed 5.0 V to avoid excess current.
[3] The RF input and RF output are AC coupled through internal DC blocking capacitors.

10 Recommended operating conditions

Table 7. Operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		1.5	-	3.1	V
T_{amb}	ambient temperature		-40	+25	+85	°C
$V_{I(ENABLE)}$	input voltage on pin ENABLE	OFF state	-	-	0.3	V
		ON state	0.8	-	-	V

11 Thermal characteristics

Table 8. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		225	K/W

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Table 9. Characteristics at V_{CC} = 1.8 V

f = 1575 MHz; V_{CC} = 1.8 V; $V_{I(ENABLE)}$ >= 0.8 V; P_i < -40 dBm; T_{amb} = 25 °C; input matched to 50 Ω using a 5.6 nH inductor, see Figure 34, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CC}	supply current	$V_{I(ENABLE)}$ ≥ 0.8 V	-	-	-	-
		P_i < -40 dBm	2.3	4.2	6.2	mA
		P_i = -20 dBm	-	9	-	mA
		$V_{I(ENABLE)}$ ≤ 0.3 V	-	-	1	µA
G_p	power gain	no jammer	16	17.6	20	dB
		P_{jam} = -20 dBm; f_{jam} = 850 MHz	-	19.8	-	dB
		P_{jam} = -20 dBm; f_{jam} = 1850 MHz	-	20.0	-	dB
RL_{in}	input return loss	P_i < -40 dBm	-	9	-	dB
		P_i = -20 dBm	-	11	-	dB
RL_{out}	output return loss	P_i < -40 dBm	-	15	-	dB
		P_i = -20 dBm	-	15	-	dB
ISL	isolation		-	37	-	dB
NF	noise figure	P_i = -40 dBm; no jammer [1]	-	0.65	1.2	dB
		P_i = -40 dBm; no jammer [2] [1]	-	0.70	1.25	dB
		P_{jam} = -20 dBm; f_{jam} = 850 MHz [2]	-	0.9	-	dB
		P_{jam} = -20 dBm; f_{jam} = 1850 MHz [2]	-	1.2	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	[1]	-	-10	-	dBm
$IP3_i$	input third-order intercept point	[1] [3]	-	3	-	dBm
		[1] [4]	-	3	-	dBm
t_{on}	turn-on time	time from $V_{I(ENABLE)}$ ON to 90 % of the gain	-	-	2	µs
t_{off}	turn-off time	time from $V_{I(ENABLE)}$ OFF to 10 % of the gain	-	-	1	µs

[1] Guaranteed by device design; not tested in production.
[2] Including PCB losses.
[3] f_1 = 1713 MHz; f_2 = 1851 MHz, P_i = -20 dBm per carrier.
[4] f_1 = 1713 MHz; f_2 = 1851 MHz, $P_{i(1)}$ = -20 dBm, $P_{i(2)}$ = -65 dBm.

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Table 10. Characteristics at Vcc = 2.85 V

f = 1575 MHz; V_{CC} = 2.85 V; $V_{I(ENABLE)}$ >= 0.8 V; P_i < -40 dBm; T_{amb} = 25 °C; input matched to 50 Ω using a 5.6 nH inductor,see Figure 34, unless otherwise specified.

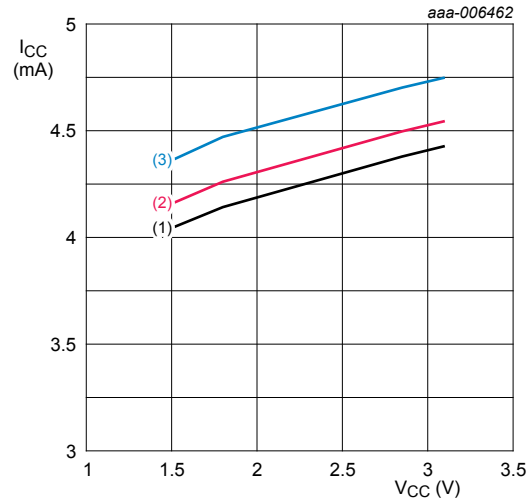
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CC}	supply current	$V_{I(ENABLE)}$ ≥ 0.8 V	-	-	-	-
		• P_i < -40 dBm	2.6	4.4	6.5	mA
		• P_i = -20 dBm	-	9	-	mA
		$V_{I(ENABLE)}$ ≤ 0.3 V	-	-	1	µA
G_p	power gain	no jammer	16	17.8	20	dB
		• P_{jam} = -20 dBm; f_{jam} = 850 MHz	-	20.0	-	dB
		• P_{jam} = -20 dBm; f_{jam} = 1850 MHz	-	20.2	-	dB
RL_{in}	input return loss	P_i < -40 dBm	-	9	-	dB
		P_i = -20 dBm	-	11	-	dB
RL_{out}	output return loss	P_i < -40 dBm	-	15	-	dB
		P_i = -20 dBm	-	15	-	dB
ISL	isolation		-	37	-	dB
NF	noise figure	P_i = -40 dBm; no jammer [1]	-	0.65	1.2	dB
		P_i = -40 dBm; no jammer [2] [1]	-	0.70	1.25	dB
		P_{jam} = -20 dBm; f_{jam} = 850 MHz [2]	-	0.9	-	dB
		P_{jam} = -20 dBm; f_{jam} = 1850 MHz [2]	-	1.2	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	[1]	-12.5	-7	-	dBm
$IP3_i$	input third-order intercept point	[1] [3]	0	6	-	dBm
		[1] [4]	0	6	-	dBm
t_{on}	turn-on time	time from $V_{I(ENABLE)}$ ON to 90 % of the gain	-	-	2	µs
t_{off}	turn-off time	time from $V_{I(ENABLE)}$ OFF to 10 % of the gain	-	-	1	µs

[1] Guaranteed by device design; not tested in production.
[2] Including PCB losses.
[3] f_1 = 1713 MHz; f_2 = 1851 MHz, P_i = -20 dBm per carrier.
[4] f_1 = 1713 MHz; f_2 = 1851 MHz, $P_{i(1)}$ = -20 dBm, $P_{i(2)}$ = -65 dBm.

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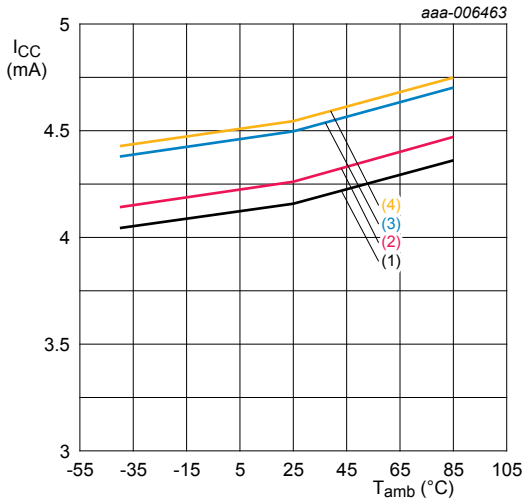
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13 Graphs GNSS band L1



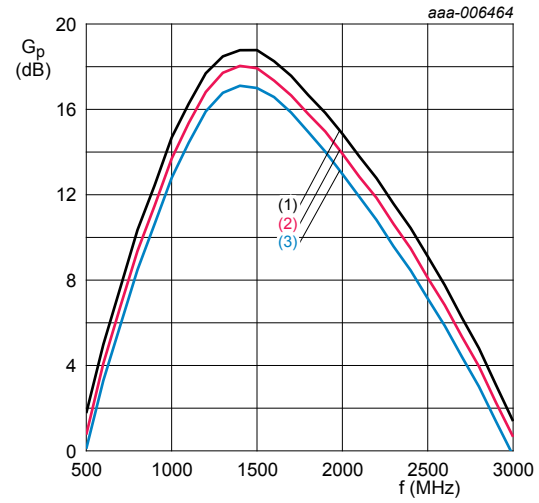
P_i = -45 dBm.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 4. Supply current as a function of supply voltage; typical values



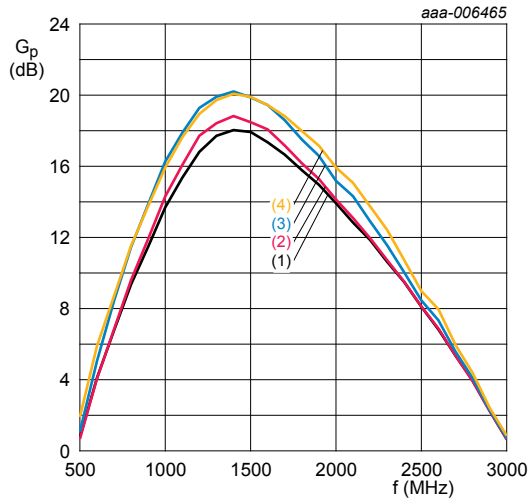
P_i = -45 dBm.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 5. Supply current as a function of ambient temperature; typical values



P_i = -45 dBm; V_{CC} = 1.8 V.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 6. Power gain as a function of frequency; typical values

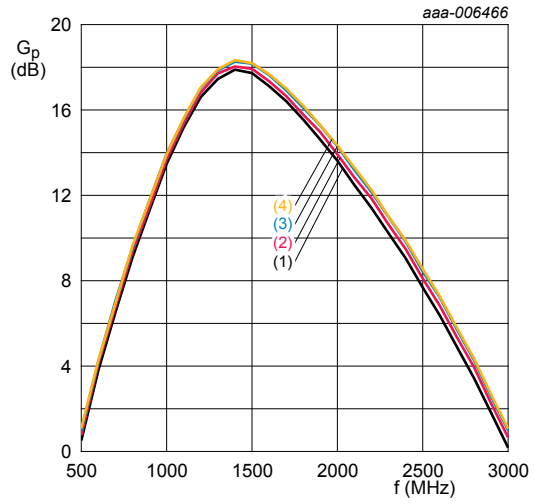


T_{amb} = 25 °C; V_{CC} = 1.8 V.
(1) P_i = -45 dBm
(2) P_i = -30 dBm
(3) P_i =- 20 dBm
(4) P_i = -15 dBm

Figure 7. Power gain as a function of frequency; typical values

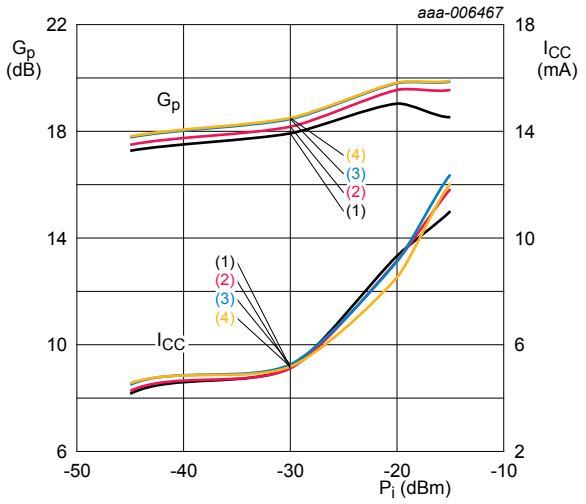
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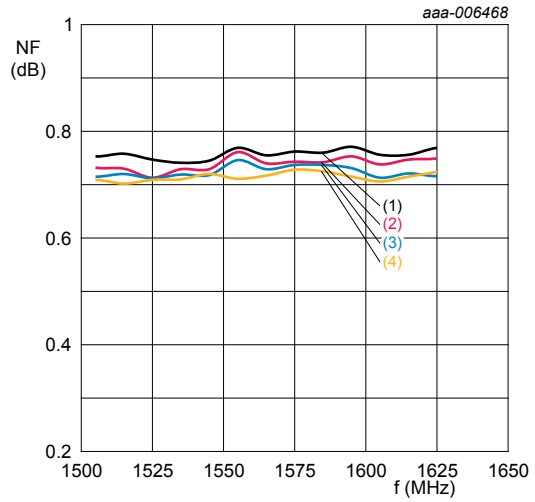
P_i = -45 dBm; T_{amb} = 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 8. Power gain as a function of frequency; typical values



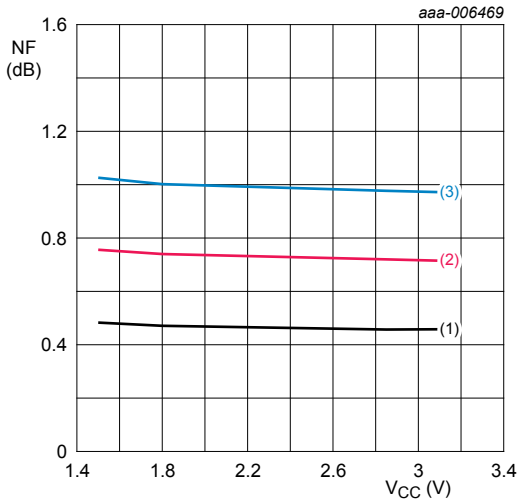
f = 1575 MHz; T_{amb}= 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 9. Power gain and supply current as function of input power; typical values



T_{amb} = 25 °C; no jammer, including PCB losses.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 10. Noise figure as a function of frequency; typical values

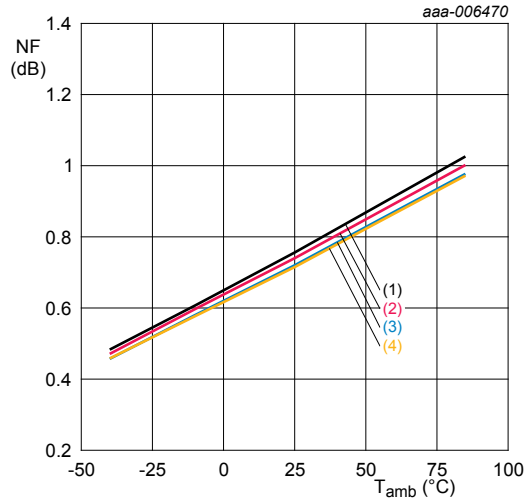


f = 1575 MHz; no jammer, including PCB losses.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 11. Noise figure as a function of supply voltage; typical values

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f = 1575 MHz; no jammer, including PCB losses.

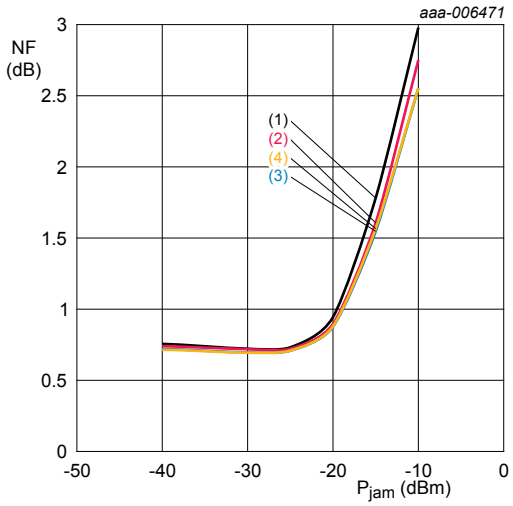
(1) V_{CC} = 1.5 V

(2) V_{CC} = 1.8 V

(3) V_{CC} = 2.85 V

(4) V_{CC} = 3.1 V

Figure 12. Noise figure as a function of ambient temperature; typical values



f_{jam} = 850 MHz; T_{amb}= 25 °C; f = 1575 MHz; including PCB losses.

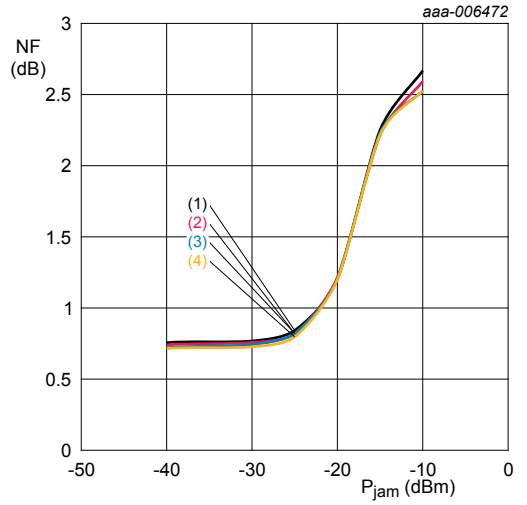
(1) V_{CC} = 1.5 V

(2) V_{CC} = 1.8 V

(3) V_{CC} = 2.85 V

(4) V_{CC} = 3.1 V

Figure 13. Noise figure as a function of jamming power; typical values



f_{jam} = 1850 MHz; T_{amb}= 25 °C; f = 1575 MHz; including PCB losses.

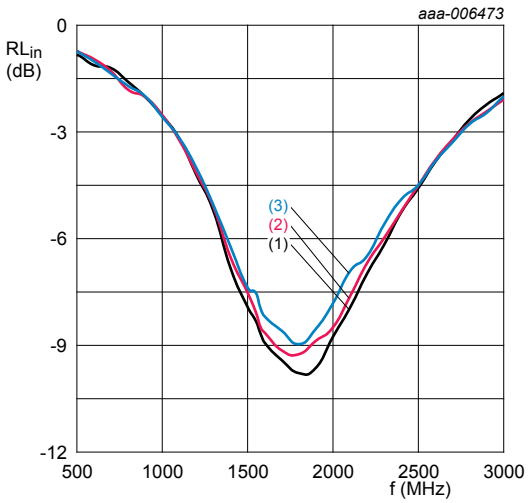
(1) V_{CC} = 1.5 V

(2) V_{CC} = 1.8 V

(3) V_{CC} = 2.85 V

(4) V_{CC} = 3.1 V

Figure 14. Noise figure as a function of jamming power; typical values



P_i = -45 dBm; V_{CC}= 1.8 V.

(1) T_{amb} = -40 °C

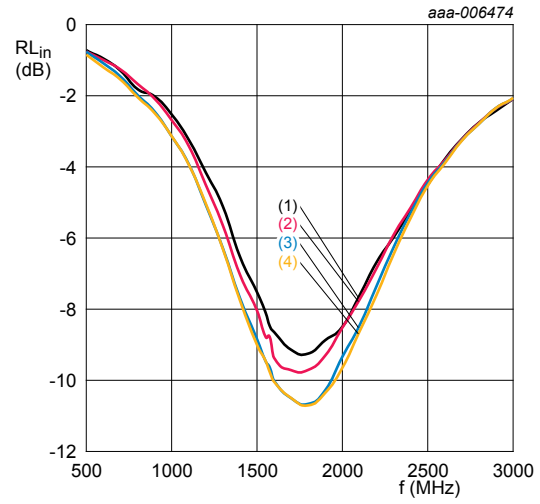
(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Figure 15. Input return loss as a function of frequency; typical values

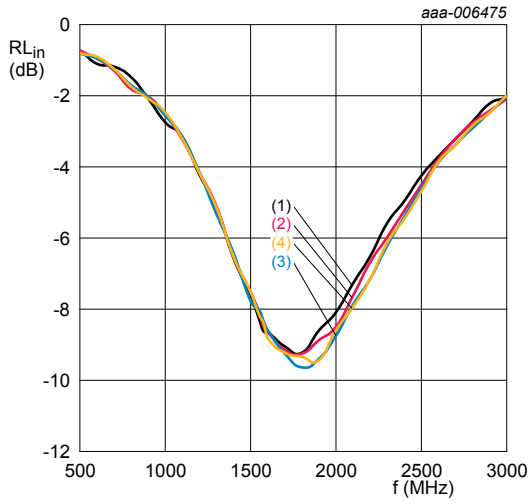
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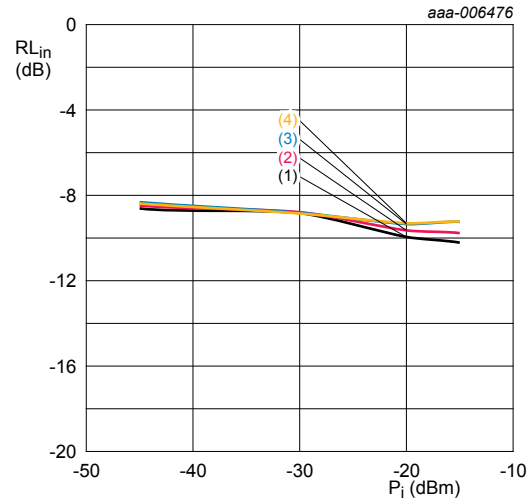
T_{amb} = 25 °C; V_{CC}= 1.8 V.
(1) P_i = -45 dBm
(2) P_i = -30 dBm
(3) P_i = -20 dBm
(4) P_i = -15 dBm

Figure 16. Input return loss as a function of frequency; typical values



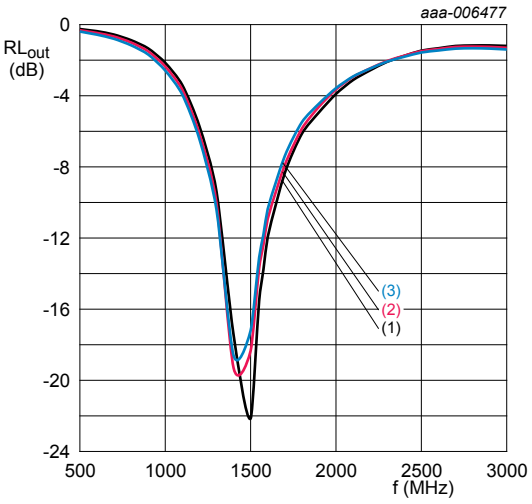
P_i = -45 dBm; T_{amb}= 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 17. Input return loss as a function of frequency; typical values



f = 1575 MHz; T_{amb} = 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 18. Input return loss as a function of input power; typical values

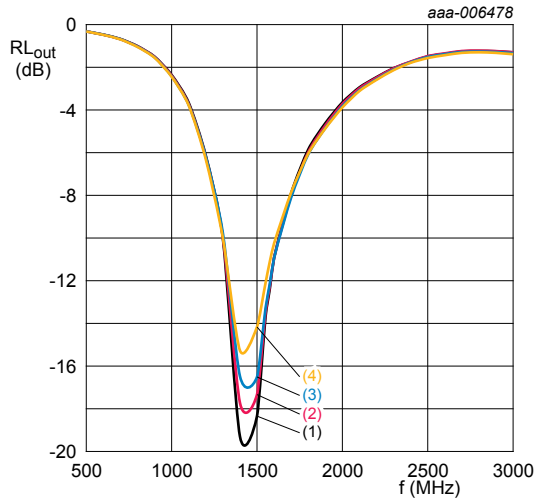


P_i = -45 dBm; V_{CC} = 1.8 V.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 19. Output return loss as a function of frequency; typical values

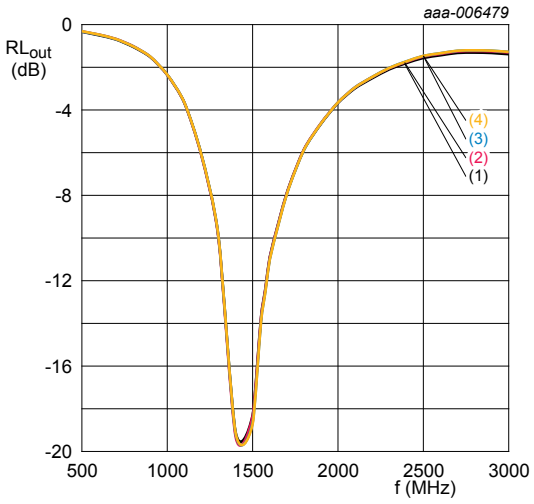
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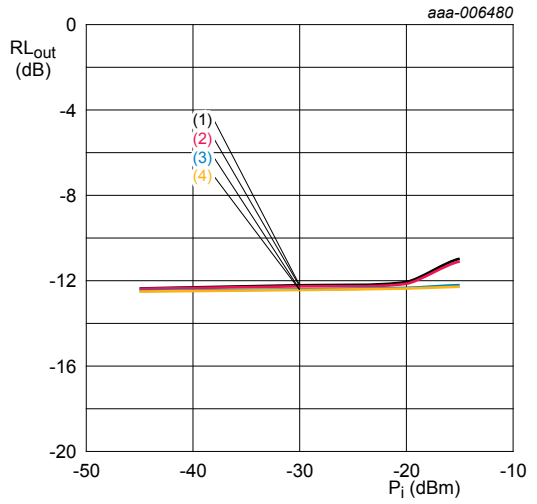
T_{amb} = 25 °C; V_{CC} = 1.8 V.
(1) P_i = -45 dBm
(2) P_i = -30 dBm
(3) P_i = -20 dBm
(4) P_i = -15 dBm

Figure 20. Output return loss as a function of frequency; typical values



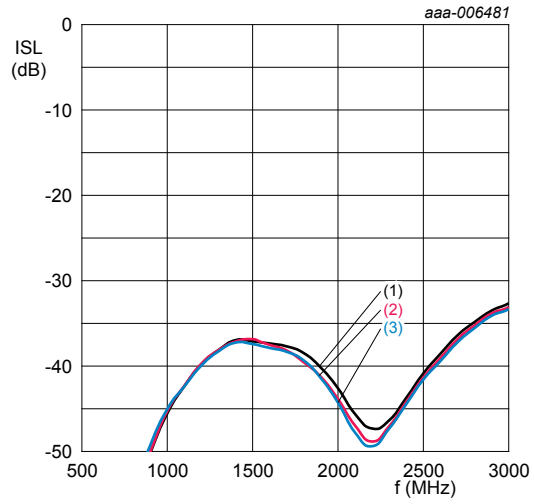
P_i= -45 dBm; T_{amb} = 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 21. Output return loss as a function of frequency; typical values



f = 1575 MHz; T_{amb} = 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 22. Output return loss as a function of input power; typical values

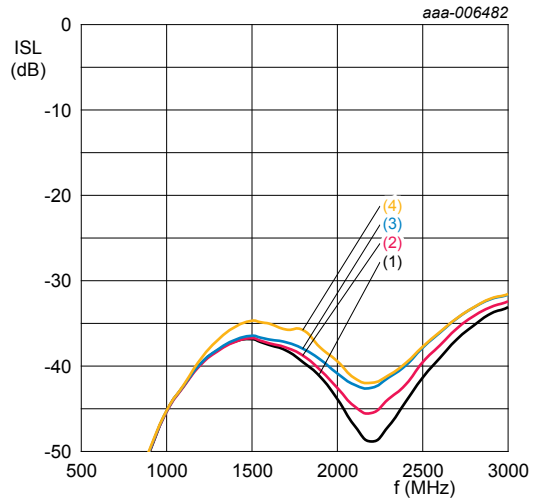


P_i = -45 dBm; V_{CC} = 1.8 V.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 23. Isolation as a function of frequency; typical values

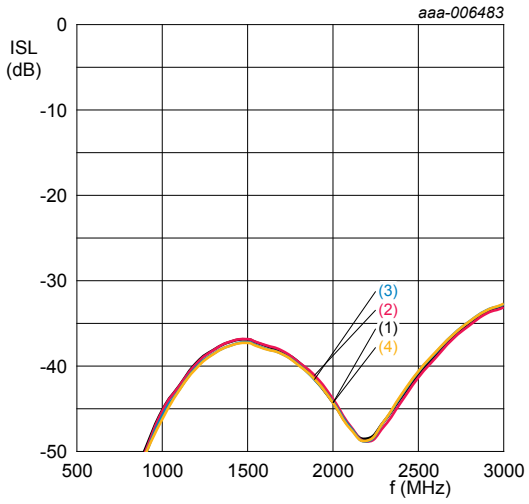
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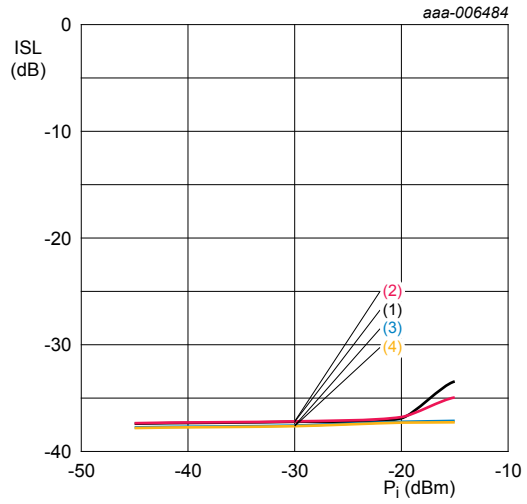
T_{amb} = 25 °C; V_{CC} = 1.8 V.
(1) P_i = -45 dBm
(2) P_i = -30 dBm
(3) P_i = -20 dBm
(4) P_i = -15 dBm

Figure 24. Isolation as a function of frequency; typical values



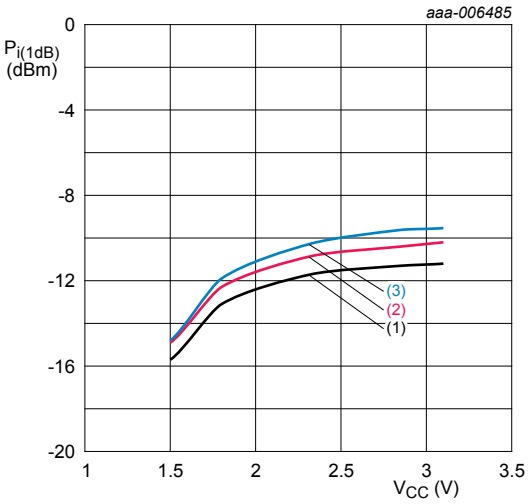
P_i = -45 dBm; T_{amb} = 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 25. Isolation as a function of frequency; typical values



f = 1575 MHz; T_{amb} = 25 °C.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3)V_{CC} = 2.85 V
(4)V_{CC} = 3.1 V

Figure 26. Isolation as a function of input power; typical values

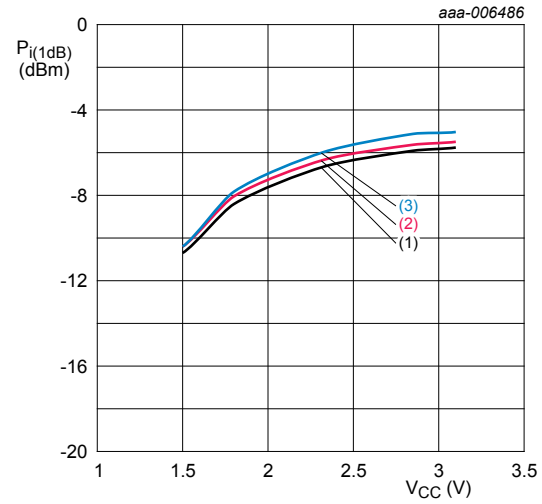


f = 850 MHz.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 27. Input power at 1 dB gain compression as a function of supply voltage; typical values

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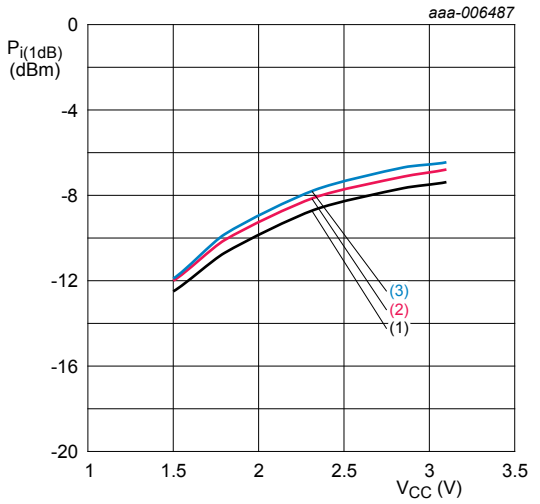
f = 1850 MHz.

(1) T_{amb} = -40 °C

(2) T_{amb} = +25 °C

(3) T_{amb}= +85 °C

Figure 28. Input power at 1 dB gain compression as a function of supply voltage; typical values



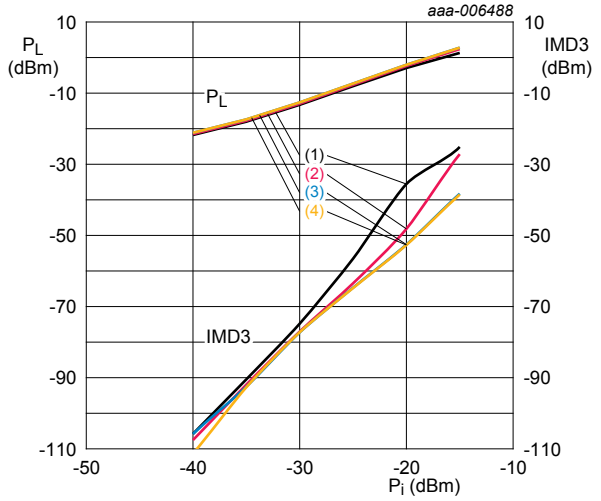
f = 1575 MHz.

(1) T_{amb} = -40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Figure 29. Input power at 1 dB gain compression as a function of supply voltage; typical values



T_{amb} = 25 °C; f = 1575 MHz; f_1 = 1713 MHz; f_2 = 1851 MHz; P_i per carrier.

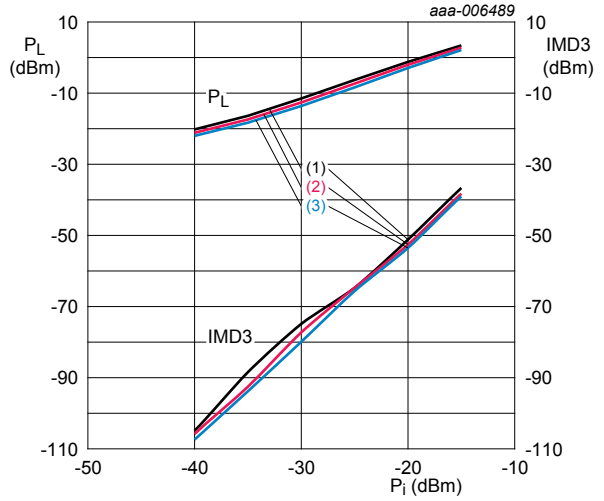
(1) V_{CC} = 1.5 V

(2) V_{CC} = 1.8 V

(3) V_{CC} = 2.85 V

(4) V_{CC} = 3.1 V

Figure 30. Output power and third order intermodulation distortion as function of input power; typical values



V_{CC} = 2.85 V; f = 1575 MHz; f_1 = 1713 MHz; f_2 = 1851 MHz; P_i per carrier.

(1) T_{amb} = - 40 °C

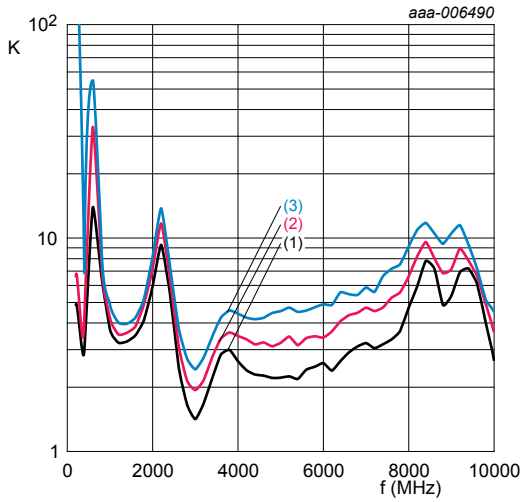
(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Figure 31. Output power and third order intermodulation distortion as function of input power; typical values

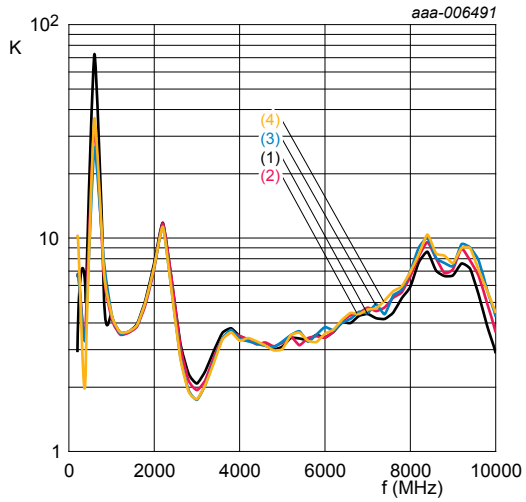
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V_{CC} = 1.8 V; P_i = -45 dBm.
(1) T_{amb} = -40 °C
(2) T_{amb} = +25 °C
(3) T_{amb} = +85 °C

Figure 32. Rollett stability factor as a function of frequency; typical values



T_{amb} = 25 °C; P_i = -45 dBm.
(1) V_{CC} = 1.5 V
(2) V_{CC} = 1.8 V
(3) V_{CC} = 2.85 V
(4) V_{CC} = 3.1 V

Figure 33. Rollett stability factor as a function of frequency; typical values

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14 Characteristics LTE B32

Table 11. Characteristics

1474 MHz; V_{CC} = 1.8 V; P_i = -30 dBm; T_{amb} = 25 °C; input matched 50 Ω using application diagram from Figure 34 and component values as in Table 14. Unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Gain Mode						
I_{CC}	supply current	$V_{I(ENABLE)}$ ≥ 0.8 V	-	4.4	-	mA
G_p	power gain		-	20	-	dB
RL_{in}	input return loss		-	17.5	-	dB
RL_{out}	output return loss		-	23.5	-	dB
ISL	isolation		-	36	-	dB
NF	noise figure	[1] [2]	-	0.65	-	dBm
$P_{i(1dB)}$	input power at 1 dB gain compression	[2]	-	-11	-	dBm
$IP3_i$	input third-order intercept point	Δf = 1 MHz, P_i = -30 dBm [2] [3]	-	-7	-	dBm
t_{on}	turn-on time	Time from $V_{I(CTRL)}$ ON to 90 % of the gain	-	-	2	µs
t_{off}	turn-off time	Time from $V_{I(CTRL)}$ OFF to 10 % of the gain	-	-	1	µs
K	Rollett stability factor		1	-	-	-

[1] PCB losses are subtracted.
[2] Guaranteed by device design; not tested in production.
[3] f_1= 1474 MHz, f_2 = 1475 MHz

Table 12. Characteristics

1474 MHz; V_{CC} =2.8 V; P_i = -30 dBm; T_{amb} = 25 °C; input matched 50 Ω using application diagram from Figure 34 and component values as in Table 14. Unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Gain Mode						
I_{CC}	supply current	$V_{I(ENABLE)}$ ≥ 0.8 V	-	4.6		mA
G_p	power gain		-	20	-	dB
RL_{in}	input return loss		-	17.5	-	dB
RL_{out}	output return loss		-	23.5	-	dB
ISL	isolation		-	36	-	dB
NF	noise figure	[1] [2]	-	0.65	-	dB
$P_{i(1dB)}$	input power at 1 dB gain compression	[2]	-	-8.5	-	dBm
$IP3_i$	input third-order intercept point	Δf = 1 MHz, P_i = - 30 dBm [2] [3]	-	-6		dBm
t_{on}	turn-on time	Time from $V_{I(CTRL)}$ ON to 90 % of the gain	-	-	2	µs
t_{off}	turn-off time	Time from $V_{I(CTRL)}$ OFF to 10 % of the gain	-	-	1	µs
K	Rollett stability factor		1	-	-	-

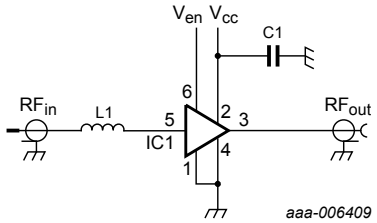
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[1] PCB losses are subtracted.
[2] Guaranteed by device design; not tested in production.
[3] f_1= 1474 MHz, f_2 = 1475 MHz

15 Application information

15.1 GNSS and LTE B32 LNA



For a list of components, see Table 13 (GNSS) and Table 14 (LTE B32).

Figure 34. Schematics GNSS LNA and LTE B32 evaluation board

Table 13. List of components for GNSS applications

See Figure 34 for schematics.

Component	Description	Value	Remarks
EVB	Evaluation Board	SOT1230 - EVB	EVB for GNSS application, NXP Semiconductors
C1	decoupling capacitor	1 nF	
IC1	BGU8009	-	NXP Semiconductors
L1	high-quality matching inductor	5.6 nH	GNSS band L1: 1559 < f < 1610 MHz Murata LQW15A

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Table 14. List of components for LTE B32 applications

See Figure 34 for schematics.

Component	Description	Value	Remarks
EVB	Evaluation Board	OM17025 (SOT1230, SOT1232)	EVB for LTE application, NXP Semiconductors
C1	decoupling capacitor	1 nF	
IC1	BGU8009	-	NXP Semiconductors
L1	high-quality matching inductor	9.1 nH	LTE band 32 L1: 1452 < f < 1496 MHz Murata LQW15A

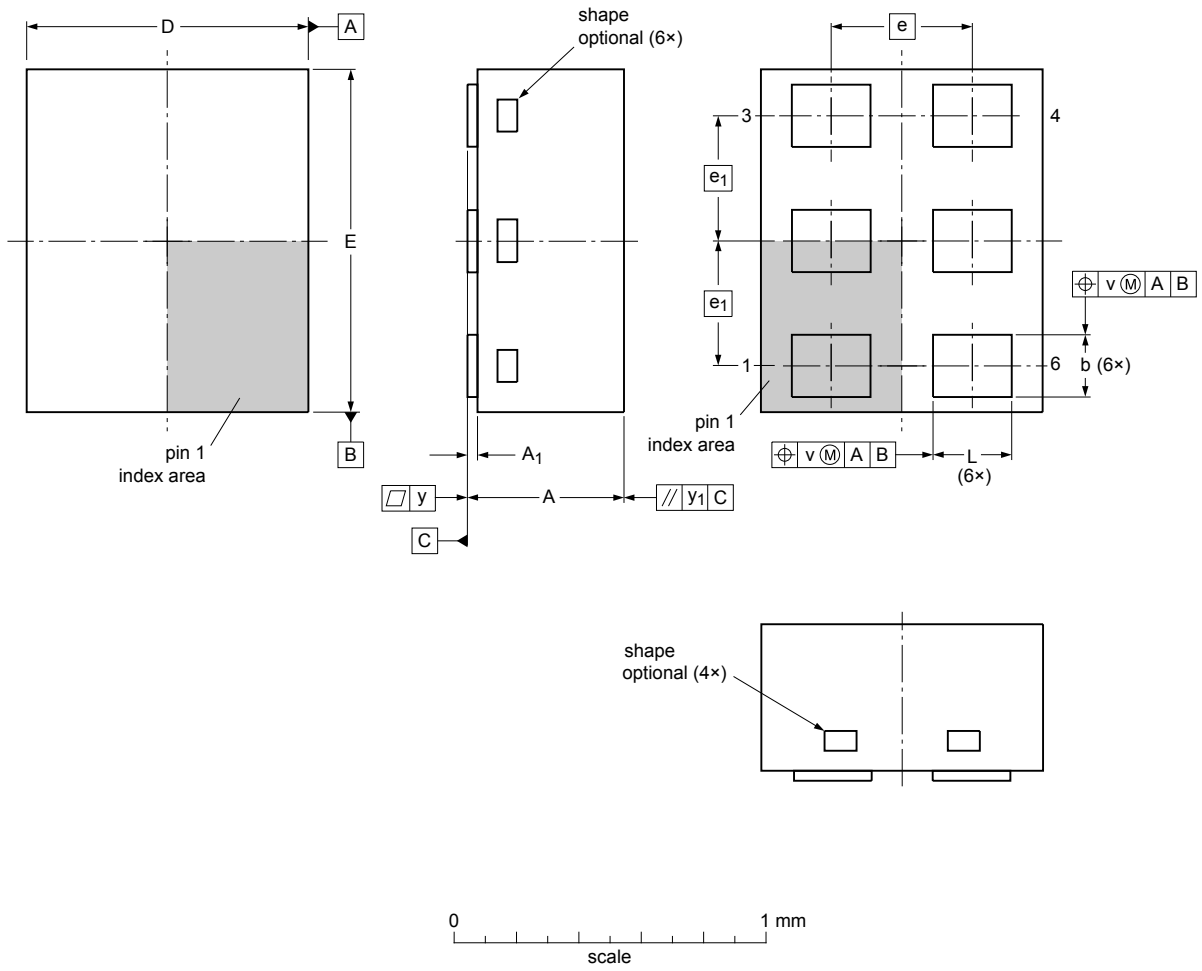
GNSS: See application note AN11288 for details. LTE B32: See application note AN11986.

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16 Package outline

XSON6: plastic very thin small outline package; no leads; 6 terminals; body 1.1 x 0.9 x 0.47 mm **SOT1230**



Dimensions (mm are the original dimensions)

Unit		A	A_1	D	E	e_1	e	b	L	V	Y	Y_1
	min	0.44		0.85	1.05			0.17	0.22			
mm	nom	0.47		0.90	1.10	0.4	0.45	0.20	0.25	0.1	0.05	0.1
	max	0.50	0.04	0.95	1.15			0.25	0.30			

Note
1. Dimension A is including plating thickness.

sot1230_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1230						~~13-01-02~~ 13-01-08

Figure 35. Package outline SOT1230 (XSON6)

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17 Handling information

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.
Such precautions are described in the *ANSI/ESD S20.20, IEC/ST 61340-5, JESD625-A* or equivalent standards.

18 Abbreviations

Table 15. Abbreviations

Acronym	Description
GLONASS	global navigation satellite system
GNSS	global navigation satellite system
GPS	global positioning system
HBM	human body model
MMIC	monolithic microwave-integrated circuit
PCB	printed-circuit board
SiGe:C	silicon germanium carbon

19 Revision history

Table 16. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU8009 v.7.3	20190516	Product data sheet	-	BGU8009 v.7.2
Modifications:	• added general Marking diagram			
BGU8009 v.7.2	20190510	Product data sheet	-	BGU8009 v.7.1
Modifications:	• removed incorrect marking code description • adapted date code notation to the Marking code table			
BGU8009 v.7.1	20180416	Product data sheet	-	BGU8009 v.7
Modifications:	• adapted the data sheet to the new look and feel			
BGU8009 v.7	20170720	Product data sheet	-	BGU8009 v.6
Modifications:	• Section 1 "General description" on page 1: added GPS1201M according to our new naming convention • Section 2 "Features and benefits" on page 1: added LTE B32 characteristics • Section 14 "Characteristics LTE B32" on page 17 added • Table 13 added EVB			
BGU8009 v.6	20170118	Product data sheet	-	BGU8009 v.5
Modifications:	• Section 1: added GPS1201M according to our new naming convention			
BGU8009 v.5	20160405	Product data sheet	-	BGU8009 v.4
Modifications:	• updated Figure 2			
BGU8009 v.4	20160316	Product data sheet	-	BGU8009 v.3

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Document ID	Release date	Data sheet status	Change notice	Supersedes
Modifications:	• updated Table 8 and Table 9 on page 6			
BGU8009 v.3	20141001	Product data sheet	-	BGU8009 v.2
Modifications:	• Section 6.1 on page 3: Section has been added.			
BGU8009 v.2	20130619	Product data sheet	-	BGU8009 v.1
BGU8009 v.1	20130201	Product data sheet	-	-

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20 Legal information

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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.

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